

Grand River

Water Management Action Plan

2019 to 2025 Summary of Accomplishments



March 24, 2026



This report was prepared by the Grand River Conservation Authority on behalf of the Grand River Water Managers Working Group. The Summary of Accomplishments is the result of a collaborative water management planning process that aligns work plans, actions and activities across municipalities, provincial and federal government agencies, and First Nations to achieve a greater impact for the Grand River watershed. The collaboration and coordination of this initiative is supported by the Grand River Conservation Authority.

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Preface

There is a long history of watershed planning in the Grand River basin. Over the past century, many plans have been implemented to deal with critical problems such as flooding, poor water quality, and low flows. The studies were a response to the serious problems threatening the health and economic vitality of communities in the early part of the 20th century.

Today, the watershed consists of 38 municipalities and two First Nations reserves, and is home to just over a million residents, mostly residing in urban cities, towns, and villages. Most of the watershed is a rural landscape with intensive agricultural practices. The watershed is a complex, interconnected system that remains sensitive to pressures such as population growth, shifts in land cover and resource use, climate change, and other stressors that alter the landscape.

The future prosperity, growth, and sustainability of the communities in the watershed depend on a healthy watershed. The Grand River Conservation Authority (GRCA) supports and facilitates the [Grand River Water Management Plan](#) (2014, WMP) with municipalities, provincial and federal government agencies, and First Nations, to tackle water management challenges and to develop best-value solutions. The Water Management Plan (WMP) is like a municipal master plan or strategy in that it is a system-wide, or watershed-wide, approach to addressing needs and achieving common goals. It provides a framework for collective and collaborative action on water management that goes beyond municipal boundaries.

The goals of the Water Management Plan are to:

1. Ensure sustainable water supplies for communities, economies and ecosystems,
2. Improve water quality to improve river health and reduce the river's impact on Lake Erie,
3. Reduce flood damage potential, and
4. Increase resiliency to deal with climate change.

The purpose of this Summary of Accomplishments is to report on implementation of the WMP over the 2019 to 2025 period. This report follows a [2014 - 2018 Summary of Accomplishments](#) and should be read in conjunction with the earlier report.

A companion report, the [State of Water Resources](#), was released in 2020. This report on watershed conditions evaluated whether the actions that have been implemented have been making a difference in the watershed's water resources.

Collectively, these reports document the previous decade's progress in collaborative water management and are part of a broader process of continuous improvement (planning, doing, and checking) to ensure the integrity and long-term sustainability of water resources locally, regionally, and across the watershed. These reports on actions and conditions will inform an update of the 2014 WMP, initiated in 2026.

Water Managers Working Group

The Water Managers Working Group (WMWG) is responsible for the Water Management Plan. Members of the working group are senior water, wastewater, and stormwater staff from various agencies including provincial and federal government, municipalities, and First Nations.

Water managers meet quarterly, discuss local, municipal, regional, or watershed issues by sharing information, working together, coordinating efforts, and collaborating. By reporting regularly on the status of the actions in the Water Management Plan and the state of our rivers and groundwater, collectively water managers can ensure water is managed sustainably across the watershed.

The Grand River Conservation Authority (GRCA) coordinates and supports the implementation of the Water Management Plan on behalf of all watershed municipalities.

The following are active Plan partners, participants in the working group, or contributors to actions that improve water management in the watershed:

- County of Brant
- City of Brantford
- City of Cambridge
- City of Kitchener
- City of Waterloo
- City of Guelph
- Region of Waterloo
- Haldimand County
- Township of Centre Wellington
- Township of Southgate
- County of Oxford
- County of Dufferin
- County of Wellington
- Town of Grand Valley
- Township of Guelph/Eramosa
- City of Hamilton
- Township of Mapleton
- Six Nations of the Grand River
- Mississaugas of the Credit First Nation
- Ontario Ministry of Agriculture, Food, and Agribusiness (MAFA)
- Ontario Ministry of the Environment, Conservation, and Parks (MECP)
- Ontario Ministry of Natural Resources (MNR)
- Agriculture and AgriFood Canada (AAFC)
- Canada Water Agency (CWA)
- Environment and Climate Change Canada (ECCC)

Members are asked to share information made available at working group meetings with their staff so that future water managers are knowledgeable about the working group and the broader watershed context.

Contents

Preface	iii
Water Managers Working Group.....	iv
Introduction	1
A: Maintaining a process for reporting, updating and continuous improvement	1
B. Maintaining a framework for Integrated Watershed Management	2
B1. Protecting hydrologic processes.....	3
B2. Watershed indicators and targets.....	3
C. Ensuring water supply for communities, economies, and ecosystems	4
Actions for long-term water supply and demand management planning	4
C1. Long-term water supply planning.....	4
C2. Managing demand for water	4
C3. Confirming secure water supplies for long-term planning.....	5
Responding to low water conditions and managing permits to take water	5
C4, C8 & C13. Low water response and permits to take water.....	5
Actions for operating water management reservoirs	6
C5 & C6. Reservoir operating policy and operational flow targets	6
C7. Wastewater low-flow targets.....	6
Actions to understand surface and ground water interactions.....	7
C10 & C11. Improving our understanding of groundwater and maintaining recharge	7
D. Improving water quality to improve river health, and reduce the river’s impact on Lake Erie..	7
Actions for point sources of pollution	8
D1. Upgrading wastewater infrastructure	8
D2. & D3. Optimizing wastewater treatment for improved effluent quality and sewer use bylaws.....	9
D4. Wastewater bypasses and spills.....	10
D5. Regional approach to wastewater modelling.....	11
Actions for rural non-point sources of pollution	11
D7. Rural Water Quality Program.....	11
Actions for urban non-point sources of pollution	12
D.10 Urban stormwater management	12
D11. Reducing road salt use	13
Actions for in-river opportunities to improve water quality	13
Actions for data-based decision making	14
D15. Data collection, monitoring and coordination	14
D15. Geospatial data	15
E. Reducing flood damage potential.....	15

Actions to maintain flood damage reduction infrastructure.....	16
E1. Dam and dike studies	16
Overland and other urban flooding	17
E2. Stormwater management.....	17
Flood hazard mapping.....	18
E3 and E4. Floodplain and flood zone mapping	18
Ice jam flooding	18
E9. Actions to address ice jam flooding.....	18
F. Summary and next steps	19

Introduction

The Integrated Action Plan (IAP) of the Grand River Water Management Planⁱ (WMP) consists of 40 strategies and about 165 voluntary actions to achieve the WMP's goals. In addition to strategies and actions that support the goals, governance and reporting recommendations were made.

This Summary of Accomplishments is organized into six main sections, reflecting the pillars of the IAP:

- A. Maintaining a process for reporting, updating and continuous improvement
- B. Maintaining a framework for Integrated Water Management
- C. Ensuring sustainable water supplies for communities, economies, and ecosystems
- D. Improving water quality to improve river health, and reduce the river's impact on Lake Erie
- E. Reducing flood damage potential
- F. Summary and next steps.

The plan's fourth goal – building resilience to deal with climate change – was integrated into the other goals and will be addressed in each section.

The sections below highlight what actions were advanced over the 2019-2025 period. They should be read in conjunction with the [2014 - 2018 Summary of Accomplishments](#)ⁱⁱ for a more comprehensive picture of progress over the last decade. Where an individual strategy has not been listed below, related actions may have been reported in the previous Summary of Accomplishments. Actions reported in the previous report were not duplicated here, even if ongoing.

A: Maintaining a process for reporting, updating and continuous improvement

The success of the Water Management Plan relies on maintaining regular communication among partners. This includes sharing progress on implementation, evaluating whether actions are achieving their goals, identifying data gaps or barriers, developing solutions, coordinating efforts to overcome challenges, and reporting and celebrating collective achievements.

Development of the WMP was overseen by a multi-agency Steering Committee and supported by a Project Team and technical working groups. Following endorsement of the WMP in 2014, these bodies became the Implementation Committee and Water Managers Working Group (WMWG), respectively, and worked to advance implementation of the WMP. As implementation progressed, membership of the Implementation Committee, WMWG, and technical working groups changed, became fluid and overlapping, and some teams were discontinued, having served their purpose or were combined. Many members of the stormwater technical working group joined the WMWG.

Since about 2017, the WMWG has continued as the main governance body for the WMP. The working group met regularly in 2019, followed by a hiatus resulting from changeover in staff responsible for the WMP at the GRCA, and the Covid-19 Pandemic, which resulted in many WMP partners focusing efforts on emergency response. During that period, while the WMWG was inactive, staff across the plan's partners continued to work together to advance shared objectives.

The Terms of Reference for the WMWG was updated in 2023 and subsequently extended to 2028, to support a planned update of the WMP. The WMWG resumed meeting twice per year in 2023, with additional one-on-one and small group meetings held on specific issues (e.g., elevated nitrate levels in the Grand River) and to support scoping of the planned update. Quarterly meetings will resume in 2026.

While implementation of actions ultimately falls on each individual partner, the sharing of information is critical for the success of projects across the watershed. WMWG meetings are used mainly to share project details, progress, and successes among partners so best practices can be implemented wherever possible.

Following release of the 2014 to 2018 Summary of Accomplishments, efforts shifted to reporting on watershed conditions. A State of Water Resourcesⁱⁱⁱ report was released in 2020. This report on conditions evaluated whether the actions that have been implemented have been making a difference in the watershed's water resources. Following review of the State of Water Resources, the WMWG concluded that progress was being made towards achieving the plan's goals and implementation should continue.

Watershed conditions were reported on again through Conservation Ontario's Watershed Report Card program. The report card^{iv} provided a simple "checkup" on surface and groundwater quality and the conditions of forests and wetlands. Findings from the State of Water Resources report were integrated into the report card to illustrate water management challenges, such as drinking water source protection issues (elevated nitrate and chloride in some municipal supply wells).

Annual reports on action were paused during development of the State of Water Resources report and are captured in this Summary of Accomplishments.

Three underlying assumptions were fundamental to the WMP, including that within the 2041 timeline of the plan, population growth would be accommodated within the existing (2014) designated urban areas, a Great Lakes water supply pipeline would not be needed, and there would be no new municipal wastewater treatment plants discharging to the regulated reaches of the Grand, Conestogo, or Speed rivers. In recent years there have been developments affecting each of the assumptions. New urban areas have been designated, municipalities are updating water supply strategies to explore new sources needed to support growth, and a new wastewater treatment plant is being planned for Caledonia.

Over the past decade, foundational water management planning assumptions have changed, including those about population growth, water supply, wastewater treatment, stormwater management, security of water supply and quality, climate change impacts, and provincial land and water-related legislation and policies. Further, many of the actions from the 2014 WMP have been implemented.

As a result, in December 2025, the WMWG endorsed a project charter to update the Water Management Plan by the end of 2028.

B. Maintaining a framework for Integrated Watershed Management

Integrated water management requires the coordinated management of water, land and related natural resources. Identification and protection of watershed features (e.g., moraines, forests, wetlands) that provide hydrologic functions (e.g., groundwater recharge/discharge, surface runoff) supports integrated watershed management.

B1. Protecting hydrologic processes

In 2020, the GRCA completed a series of eleven subwatershed-scale Natural Heritage Characterization Reports, identifying features and functions and highlighting linkages between natural heritage, surface water, and groundwater features. More detailed assessments of the interconnections between groundwater recharge and discharge areas, and wetlands and other natural features, have been advanced locally through municipal subwatershed studies (e.g., Waterloo Region's Upper Cedar Creek Scoped Subwatershed Study and Guelph's Clair-Maltby Master Environmental Servicing Plan and Clythe Creek Subwatershed Study).

The Waterloo Moraine is the primary source of groundwater recharge for Waterloo Region's water supply. In 2025, the Region of Waterloo's land use planning responsibilities were transferred to area municipalities, who became responsible for implementing Regional Official Plan policies, including the Regional Recharge Area designation, which restricts development on the moraine. Continued protection of the Regional Recharge Area is needed to protect the long-term sustainability of the Region's water supplies.

The GRCA's land acquisition policies and priorities, along with significant ecological restoration activities, have resulted in landholdings with a high concentration of natural areas and natural hazard lands. Out of the approximately 19,900 hectares of land owned by the GRCA, around 11,300 hectares (or 57%) are designated as natural hazard features, including 7,137 hectares (36%) of wetlands. Throughout the decades, strategic land acquisition and significant ecological restoration projects have resulted in a land holding that is close to 90% covered by natural areas: 59% forest (including swamps), 17% open water, 7% marsh, and 6% grassland. GRCA landholdings cover 3% of the watershed, however, the properties contain 11% of the total watershed wetland area and 7% of the total watershed forest cover.

In 2024, the GRCA approved a Conservation Areas Strategy^v that serves as a high-level framework to guide and inform future decision-making on all GRCA-owned and controlled lands and updated its Land Acquisition Policy. Objectives for acquisition include provincially significant wetlands and valley lands, source water areas, and landholdings for potential future reservoir sites at West Montrose and Everton. Development of a Natural Heritage Restoration Strategy for the GRCA's lands by 2027 has been identified as a strategic priority.

B2. Watershed indicators and targets

The WMP established measurable indicators, targets, and milestones for water quality and quantity so that progress towards achieving the plan's goals could be assessed over time. Water quality milestones were for dissolved oxygen, total phosphorus, and unionized ammonia. Operational flow targets were listed for maintaining river flows, wastewater assimilation, and environmental flows. There remains a need to develop targets for suspended sediments, turbidity, and nutrient load reductions that are supportive of river and Lake Erie health.

The GRCA has collaborated with Environment and Climate Change Canada (ECCC) and academic partners to improve understanding of nutrient loading to the Grand River and Lake Erie. The GRCA and ECCC explored the potential for continuous turbidity monitoring to improve knowledge of phosphorus concentrations in the Grand River and contribute to more accurate estimates of nutrient loading^{vi}. The GRCA partnered with the University of Waterloo to install continuous phosphorus sensors at two permanent water quality stations in 2023 (Grand River downstream of Belwood and Grand River at Blair). In early 2026, ECCC will be installing a continuous phosphorus sensor in the furthest downstream station, Grand River at York. Once operational, this will provide the partners with access to continuous phosphorus data at three locations in the watershed, strategically located in the upper, middle and lower reaches of the watershed. These data will support improved understanding of phosphorus transport dynamics and improved accuracy of phosphorus load estimates to Lake Erie.

In 2018, the governments of Canada and Ontario released the Lake Erie Action Plan^{vii} (LEAP), a joint plan to reduce phosphorus loads to Lake Erie from Canadian sources. While it did not establish a phosphorus reduction target for the eastern basin of the Lake, to which the Grand River discharges, it did propose precautionary actions to reduce nutrient loading and the potential for nuisance algal blooms in the nearshore. Implementation of the Grand River Water Management Plan, the Watershed-Wide Wastewater Optimization Program, grant programs for agricultural best practices, and ongoing monitoring are identified as LEAP actions. More information on LEAP and supportive actions in the Grand River watershed is provided in section D.

From 2022 to 2025, ECCC updated the Grand River Soil and Water Assessment Tool (SWAT) model to include recent years' climate, flow, water quality, and land management data for nutrient loading simulations. Based on the calibrated SWAT model, the impact of implementation of best management practices and climate change will be evaluated to support the LEAP.

C. Ensuring water supply for communities, economies, and ecosystems

Securing sustainable water supplies across all sectors (municipal, private domestic, agricultural, industrial and commercial) is a long-standing concern, and one that will be ever more challenging as the watershed's population grows, infrastructure ages, demand for water-intensive industry increases, and the hydrologic cycle adapts to a changing climate.

Actions for long-term water supply and demand management planning

C1. Long-term water supply planning

Municipalities who had committed to starting or completing their water supply master plans have done so, and in some cases a further cycle of planning has begun. Milestones since the previous Summary of Accomplishments include:

- The County of Brant updated the Paris Master Servicing Plan in 2020.
- The City of Brantford updated its Master Servicing Plan in 2021.
- The Township of Centre Wellington completed its Water Supply Master Plan in 2019, and Water and Wastewater Servicing Master Plan in 2025.
- The City of Guelph updated its Water Supply Master Plan in 2022.
- The Region of Waterloo began an update to its 2015 Water Supply Master Plan in 2022.

C2. Managing demand for water

Reducing water demand will help ensure sustainable water supplies in the future for communities, economies and the ecosystem.

Both Waterloo Region and the City of Guelph have begun updates to the water efficiency plans they completed in the previous Water Management Plan implementation reporting period (2014 to 2018):

- The updated Water Supply Strategy begun by Waterloo Region in 2022 will consider how to further encourage water conservation and reduce water use.
- In 2024, the City of Guelph began work on The Blueprint: Guelph's One Water Plan. Recognizing the interconnectedness of drinking water, stormwater, and wastewater, The Blueprint will consider all forms of water as part of a single, integrated system. The plan

will provide updated strategic direction on water demand reduction targets and implementation actions.

The Township of Centre Wellington fosters water conservation through implementation of its Outdoor Water Use By-law, a residential toilet rebate program, and by providing online information about water efficiency building guidelines. The City of Brantford also has a Water Conservation By-law and provides online information about water conservation.

As water conservation and efficiency initiatives have matured in the larger urban communities, new approaches will be needed to achieve further water conservation savings.

C3. Confirming secure water supplies for long-term planning

Water supplies are permitted by the Ministry of Environment, Conservation and Parks (MECP) through the Permit to Take Water Program (PTTW) while the proponent (e.g. municipality, farmer, industry) is responsible for the development of the water supplies.

Long-term water supply planning for municipalities requires a high level of certainty in understanding the physical availability of water from aquifers and surface water sources but municipalities also need to know that their permitted water supply will be available to them over the long term.

Ensuring physical and regulatory water security requires collaboration among neighbouring municipalities, the MECP as the regulator, and the GRCA. Solid technical studies and monitoring underpin the knowledge of water availability; strong working relationships and trust among the partners underpins regulatory water security for the long-term.

Since 2017, Tier 3 water budget studies have been completed for municipal drinking water sources vulnerable to consumptive water takings and reductions in groundwater recharge. A Tier 3 water budget is a detailed technical study that assesses the water quantity risk to current and future municipal drinking water sources. A variety of scenarios are evaluated, such as future increased municipal water needs and drought.

Policies to manage water quantity threats to municipal drinking water sources for the Township of Centre Wellington, the Region of Waterloo, and Brant County have been incorporated into the Grand River Source Protection Plan^{viii}. Policies to address threats to water sources for the City of Guelph and the Township of Guelph/Eramosa are under development. More collaboration is needed to reassure municipalities that their future water supply needs will be considered in water allocation decisions within identified vulnerable areas. Cooperation across municipal boundaries also will be needed to ensure growth can be serviced sustainably from shared aquifers.

The Water Managers Working Group and the Lake Erie Region Source Protection Committee and related teams continue to be forums for discussing water management issues that cross boundaries or mandates. The Township of Centre Wellington has formed a Water Resources Technical Working Group to share information and support collaborative water management in the wellhead protection area for quantity. Participants include Wellington County, Mapleton Township, Waterloo Region, the MECP and the GRCA.

Responding to low water conditions and managing permits to take water

C4, C8 & C13. Low water response and permits to take water

Low rainfall and hot weather can result in low flows and low groundwater levels. This can affect the amount of water available for drinking water, agriculture and industry, as well as the health of the ecosystem. The GRCA coordinates a Low Water Response Team with participants

representing major water users: municipalities, First Nations, farmers, golf courses, gravel pits, water bottlers and others.

Between 2019 and 2025, Level 1 low water conditions were declared for part of each year except 2019. Level 2 conditions were declared for parts of the year in 2020 (Whitemans Creek, Mt. Pleasant Creek and McKenzie Creek subwatersheds), 2022 and 2023 (entire Grand River watershed), and 2025 (Whitemans Creek, Lower Nith River and McKenzie Creek subwatersheds). Water users are asked to voluntarily reduce consumption by 10% under Level 1 conditions and 20% under Level 2 conditions.

In the future, Permits to Take Water on regulated river reaches may have a direct influence on the reliability of the major water management reservoirs to meet downstream flow requirements. Changes to the *Conservation Authorities Act* and regulations have resulted in scoping of the GRCA's role in review of Permit to Take Water applications to concern for impacts on natural hazards (e.g., flooding). However, the GRCA remains a source of technical support for MECP-led assessment of potential PTTW impacts on low flows. The GRCA continues to screen PTTW applications for large takings within identified wellhead protection areas for quantity, to support municipal review and identification of significant threats to vulnerable source waters.

As part of the Permit to Take Water review process, the Ministry of the Environment, Conservation and Parks may apply conditions to surface-water PTTWs to manage consumptive water takings during low-flow periods. These conditions are imposed when they support a specific water-management objective and when technical information indicates potential site-specific impacts during low-water conditions.

Using an adaptive management approach, MECP may update existing PTTWs if new watershed information, hydrologic data, or low-flow risks emerge. This allows the Director to add low-flow conditions as needed and ensures the program remains responsive to changing conditions.

Actions for operating water management reservoirs

C5 & C6. Reservoir operating policy and operational flow targets

The GRCA manages seven medium-to-large multipurpose reservoirs, balancing flood management and flow attenuation throughout the year with water storage and augmentation of downstream river flows during low flow periods, which helps support water supply and wastewater assimilation needs.

In 2024, the GRCA updated its Reservoir Operations Policy^{ix}. As part of the review, precipitation and inflows to the reservoirs were assessed, to determine how resilient reservoir filling may be to a changing climate. The review concluded that historically, even when inflows have been insufficient to fill the reservoirs to their April 1st target, the total volume of inflows in the second quarter of the year has generally been sufficient to fill the reservoirs to their June 1st target – helping to ensure there will be sufficient water stored for low flow augmentation.

To address the recent trend of warmer winter months and the early loss of snowpack before the spring freshet, the rule curves for Shand, Conestogo, Woolwich and Guelph dams have been adjusted between February 22nd and April 1st. The upper rule curve has been revised to be shown as a dashed line during this period of the year. This revision allows for greater flexibility in capturing runoff from potential early snowmelt events.

C7. Wastewater low-flow targets

In addition to flood control, another primary function of the water management reservoirs is to augment river flows during low-flow periods to assist with the assimilation of wastewater effluent in the regulated reaches. River flows termed '7Q20 equivalent flows' were established for the

design of wastewater treatment plant upgrades or expansions in the regulated reaches of the Grand, Conestogo and Speed Rivers. A review of flow data by the GRCA in 2020 concluded that a comprehensive update of 7Q20 equivalent flows was not needed. The 7Q20 flow for St. Jacobs was updated in 2025. There is an ongoing need for municipalities, the MECP and the GRCA to continue to work together on updating 7Q20 flows as needed.

Actions to understand surface and ground water interactions

C10 & C11. Improving our understanding of groundwater and maintaining recharge

Groundwater in the central Grand River region is valued as a municipal supply, for sustaining baseflows in small streams and larger rivers, and for maintaining important cold-water aquatic habitat. A strong shared understanding of the linkages between significant regional recharge areas, water supply sources and important groundwater discharge areas is needed by Water Managers.

Since 2017, Tier 3 water budget studies have been completed for municipal drinking water sources for the Township of Centre Wellington, the City of Guelph and Guelph/Eramosa Township, Waterloo Region, and Oxford and Brant counties (Whiteman's Creek). These studies and the numerical groundwater flow models that inform them are critical tools for understanding groundwater recharge and discharge. Wellhead protection areas have been mapped and policies developed to manage risks from water takings and reductions in groundwater recharge.

More discussion among municipalities, the MECP, and the GRCA, will be needed to identify triggers to update Tier 2 (watershed) and Tier 3 water budget studies as municipalities continue to develop new water supplies to support growth.

The joint committee on cumulative effects assessment on below-water aggregate operations is inactive. While the need for a cumulative effects approach to decision-making about below-water aggregate extraction in priority subwatersheds remains strong, because of changes to the *Conservation Authorities Act* in the early 2020s, the GRCA's hydrogeological review of applications under the *Aggregate Resources Act* is scoped to the risk of natural hazards, including impacts on wetland hydrology and the associated control of flooding.

Alignment of decisions on water takings and aggregate extraction with drinking water source protection objectives will be needed to protect municipal water supplies and natural heritage features that rely on groundwater discharges.

Other activities related to these actions are described under action C3 and in section B of this report (e.g., subwatershed planning, land use planning policies).

D. Improving water quality to improve river health, and reduce the river's impact on Lake Erie

Water quality concerns across the watershed vary by location and are shaped by geology, land cover, and land management. Key issues include nutrients, sediment, and chloride. Surface water quality issues are often seasonal, influenced by events such as spring runoff or summer low flows. Groundwater quality reflects local geology but is also strongly affected by land management practices—such as fertilizer use—and historic industrial activities.

Between 2008 and 2022, the largest contributor of phosphorus loads to the eastern basin of Lake Erie, from Canadian sources, was the Grand River^x. The largest contributing types of sources each year continue to be from non-point sources.

Following the first 5 years of implementing the LEAP, Canada and Ontario released the Canada-Ontario Lake Erie Action Plan Evaluation and Update Report. The report concluded

that while significant action had been taken to implement the plan, sustained action is needed to achieve measurable reductions in phosphorus loads to the Lake. Implementation priorities continue to be focused on watersheds to the west of the Grand River, but provincial and federal agencies continue to support work in the Grand River watershed.

As population grows, agricultural production intensifies, and climate conditions become more variable, both surface and groundwater quality will remain priority concerns. To meet the goal of improving river health and reducing the Grand River's impact on Lake Erie, the WMP included both point-source and non-point-source management strategies to ensure effective, long-term water quality improvements.

Actions for point sources of pollution

D1. Upgrading wastewater infrastructure

There are 30 wastewater treatment plants (WWTPs) across the Grand River watershed. Five major facilities—Kitchener, Waterloo, Guelph, Galt, and Brantford—produce most of the treated effluent, in order from largest to smallest discharge. These plants, which release their treated effluent into the Grand or Speed Rivers, handle roughly 82% of all wastewater generated in the watershed. Even so, the effluent from the smaller treatment plants remains critically important for supporting the health and flow of local streams and rivers.

Watershed municipalities continue to upgrade WWTPs. Recent improvements include:

- The Kitchener WWTP has undergone phased upgrades over the past decade to renew aging infrastructure, improve operational reliability, and significantly enhance the quality of treated effluent discharged to the Grand River. New tertiary filtration facilities were commissioned in 2017, resulting in improved phosphorus removal and overall effluent quality. In 2019, commissioning of new process tankage and upgraded aeration systems across the various treatment trains was completed, enhancing biological treatment performance, improving nitrification, and substantially reducing ammonia concentrations in effluent discharged to the Grand River.
- The Waterloo WWTP has undergone phased upgrades over the past decade to renew aging infrastructure and improve operational reliability and energy efficiency. Upgrades to the aeration systems across the treatment trains were commissioned in 2018, enhancing biological treatment performance, improving nitrification, and substantially reducing ammonia concentrations in effluent discharged to the Grand River. The Waterloo plant currently provides secondary treatment. Future plans include the addition of tertiary filtration as part of a plant expansion. The timing and scope of this expansion will be evaluated through an ongoing update of the Wastewater Treatment Master Plan, (last updated in 2018).
- The Hespeler WWTP has undergone significant upgrades to enhance nitrification performance, primarily through the implementation of Membrane Aerated Biofilm Reactor (MABR) technology. Commissioning and performance testing of the new MABR treatment system were completed in 2025. The MABR system enables simultaneous nitrification and denitrification, resulting in intensified nitrogen removal and improved overall treatment performance, while also enhancing operational resiliency.
- Brant County completed an environmental assessment to support expansion of the St George WWTP and upgrades are planned to begin in 2026. An environmental assessment for upgrade and expansion of the Paris Water Pollution Control Plant is underway.

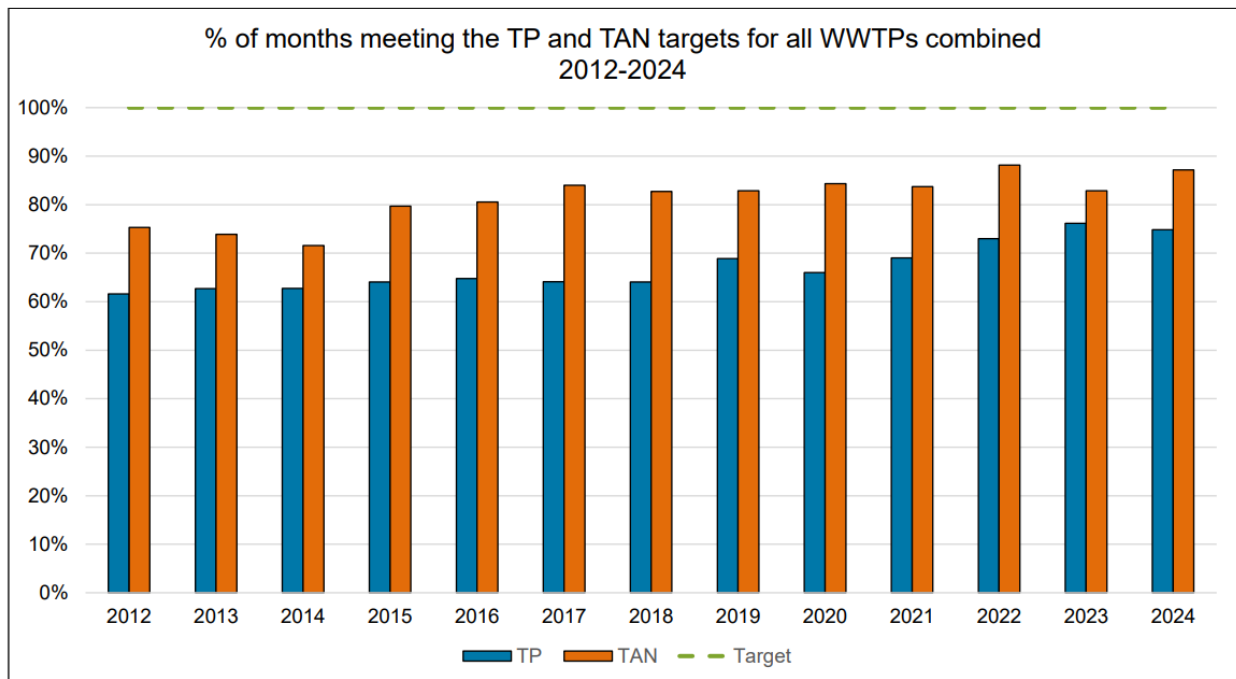
- Oxford County completed an environmental assessment for the Drumbo WWTP in 2019. Substantial completion of planned upgrades, including increased capacity and a membrane bioreactor, were completed in 2024.
- In recent years, municipalities have updated master plans for wastewater, including Centre Wellington (2025), Brant County (Paris in 2020, Cainsville in 2024), and Guelph (2022).

D2. & D3. Optimizing wastewater treatment for improved effluent quality and sewer use bylaws

The GRCA works with municipal partners and the Ministry of the Environment, Conservation and Parks (MECP) to improve the operation of wastewater treatment plants through a program called the Watershed-wide Wastewater Optimization Program (WWOP). Optimization is a continuous improvement process that uses the full potential of people and infrastructure. This means using the existing equipment at the wastewater treatment plant to its maximum capacity before building expensive new tanks and treatment processes.

Owners and operators of municipal WWTPs contribute data and the GRCA assesses achievement of voluntary targets for total phosphorus (TP) and total ammonia nitrogen (TAN) annually^{xi}. Since 2012, there has been a gradual increase in achievement of the voluntary effluent targets (Figure 1). The TP targets were achieved 62% of the time in 2012 and 75% in 2024. Overall, the achievement of TAN targets has improved 16% since the start of the program from 75% in 2012 to 87% in 2024.

Figure 1: Percentage of months meeting the voluntary targets for all plants combined.



A watershed-wide community of practice of WWTP owners and operators is facilitated by the GRCA through training and workshops, on-site studies, technical support, an annual workshop, and a recognition program that celebrates WWTPs that achieve the voluntary targets. Recent milestones of note include:

- In 2019, the GRCA wrapped up development of an action plan to mitigate inflow and infiltration, funded by the Federation of Canadian Municipalities Climate Adaptation program. Municipal partners included Waterloo Region, Brant County, Haldimand County, City of Brantford and Centre Wellington.
- The GRCA undertook a technical study in 2023 to 2024 to collect and share insights from 6 WWTPs that consistently meet the voluntary TP targets: Kitchener, Guelph, Caledonia, Brantford, Preston, and Cayuga. The study captured key phosphorus removal performance metrics, including the chemical costs, and documented technical and other insights to help plants across the watershed improve effluent quality.
- In 2025, a record number of wastewater treatment plants received recognition for exceptional performance and achievement of the voluntary targets (for the 2024 operating year).

The following are specific actions completed by partners:

- Waterloo Region, Guelph, Brantford, Haldimand, Brant County, Centre Wellington and other municipalities continue to actively participate in the WWOP program.
- Brant completed an environmental study in 2025 that concluded that flows at the Paris WWTP do not yet warrant expansion.
- Centre Wellington has adopted the Composite Correction Program approach to optimize discharges, with primary mass control to be implemented in 2026.
- The GRCA supported Southgate Township in lagoon operations and emergency planning.

Understanding the quality of influent entering a wastewater treatment plant helps managers optimize treatment performance and consistently meet effluent limits. A strong and well-enforced sewer use bylaw further protects plant capacity by limiting substances that cannot be fully treated in conventional systems. Effective upstream control allows plants to operate efficiently, achieve regulatory targets, and delay costly upgrades or expansions. Guelph and Waterloo Region updated their bylaws in 2024 and 2021, respectively.

D4. Wastewater bypasses and spills

A 2009 report^{xii} summarized best practices that municipalities, MECP, and the GRCA can take to reduce the frequency and severity of bypasses from municipal wastewater treatment plants.

For applicable bypass and overflows events originating from wastewater plants in the Grand River watershed, the MECP assists municipal wastewater owners and operators by providing immediate downstream notifications to drinking water systems with intakes drawing from the Grand River. Information reported for bypass and overflow events is collected and captured in the ministry's database. Annual reports^{xi} of the GRCA's Watershed-wide Wastewater Optimization program document bypasses and overflows of untreated or partially treated sewage that reached natural water bodies.

Recent actions taken by partners include:

- The MECP has implemented Consolidated Linear Infrastructure Environmental Compliance Approvals (CLI ECAs) for municipal sewage collection works. The Environmental Compliance Approvals (ECAs) consolidate previously issued approvals into a single modern ECA for a municipality's sanitary sewage collection system. Under the new ECAs system owners are required to assess the impacts of wet weather flows

on their wastewater systems and where applicable provide action plans to reduce bypass and overflows.

- The cities of Waterloo and Kitchener updated master plans for wastewater servicing in 2025 and 2024, respectively. As an outcome of Kitchener's updated plan, the City is installing permanent flow monitoring and weather stations to assess sanitary network response to wet and dry weather scenarios, which will help to identify target areas for inflow and infiltration (I/I) remediation.
- The City of Kitchener's Spills Management Plan (2024) safeguards health, safety, and the environment by outlining procedures for spill containment, cleanup, disposal, notification, and documentation. It defines spill categories, legislative requirements, stakeholder roles, divisional responsibilities, and cost recovery methods. The plan applies to all spills within City jurisdiction, requiring coordinated action across divisions and external partners.
- A number of municipalities are addressing I/I through sewer level and flow monitoring (Brant County), CCTV surveys (Centre Wellington), spot repairs and relining linear infrastructure, and developing backup power systems (Guelph) and Spill Response and Contingency Plans (Brantford) for pumping stations and plants.

D5. Regional approach to wastewater modelling

A regional approach is needed to evaluate the cumulative effects of the ten wastewater treatment plants discharging to the central portion of the Grand River and the lower Speed River. The WMP recommended continued use of the Grand River Simulation Model (GRSM) to support watershed wastewater planning and assimilative capacity studies. With support from the MECP, the GRCA initiated a review of the GRSM in 2025, which will help inform future water quality modelling.

The GRCA continues to maintain a network of 9 continuous monitoring stations for dissolved oxygen, temperature, pH, conductivity and turbidity to validate and calibrate the GRSM. The GRCA installed two continuous nitrate sensors in the Grand River at Brant (2022) and Bridgeport (2024), to inform understanding of the impacts of point and nonpoint sources of nitrate on river water quality. Near real-time monitoring data is shared online^{xiii}.

Actions for rural non-point sources of pollution

D7. Rural Water Quality Program

Through the Rural Water Quality Program (RWQP), grants are available to farmers to help them undertake projects that protect water quality and soil health. Projects may be structural, like manure storage facilities and fencing, or non-structural, like cover crops and nutrient management plans.

In 2024, in response to changes to the *Conservation Authorities Act*, the GRCA entered into new funding agreements with member municipalities to continue to support the staffing and administration costs of the RWQP as a nonmandatory program. Funds for cost-share grants are provided by Waterloo Region and the counties of Brant, Dufferin, Haldimand, Wellington, and Oxford. In Hamilton, the GRCA helps deliver a well decommissioning program. The GRCA also delivers a watershed-wide private land tree planting program.

The GRCA has secured funding from provincial and federal programs to expand cost-share grant opportunities, including from Forests Canada, Tree Canada, Fisheries and Oceans Canada's Habitat Stewardship Program for Aquatic Species at Risk, Conservation Ontario's Nature Smart Climate Solutions Fund, and Environment and Climate Change Canada's Great Lakes Protection Program.

Some of these programs focus investment in priority nutrient reduction areas, such as the Grand River Priority Watersheds Phosphorus Reduction Program, funded by the Canada Water Agency. This is a targeted program that provides grants to farmers in the Nith River and Fairchild Creek subwatersheds to manage phosphorus losses from their fields. This program also supports action D8 – supporting implementation of cover crops in the lower Nith River, identified as a priority for minimizing losses of nitrate the environment.

Between 2019 and 2024, a total of 1,886 projects were completed through the RWQP. Over this 6-year period, \$16.4M was spent on projects to improve rural water quality, of which \$5.2M were grants to supplement farmers' investments. An estimated 680,000kg of phosphorus has been retained on the land by RWQP projects implemented since 1998, counting just the year the projects were implemented.

Cost-share grants for best management practices (BMPs) are also delivered by other agencies. For instance, the Ontario Soil and Crop Improvement Association supported 250 projects to improve water quality in the Grand watershed between 2019 and 2025.

Partners continue to work on tools and approaches for identifying BMP opportunities and benefits:

- With the Ontario Ministry of Agriculture, Food and Agribusiness (MAFA), the GRCA delivered a demonstration project exploring profit mapping as a decision support tool for identifying BMP opportunities and economic benefits.
- MAFA is supporting use of the Agriculture Conservation Planning Framework (ACPF), a set of geographic information system (GIS) tools originally developed in the United States for identifying site-specific BMP opportunities. MAFA has prepared core input data and sponsored training workshops.
- The GRCA piloted the ACPF in priority watersheds with funding from the Canada Water Agency.
- As part of efforts to better understand nutrient loading, from 2022 to 2025 ECCC updated the Grand River soil and water assessment tool (SWAT) model with recent climate, flow, water quality, and land management data. This model allows for better impact assessment of climate change and the implementation of best management practices (BMPs).

As part of the Priority Watersheds Phosphorus Reduction project, supported by the Canada Water Agency, a series of videos^{xiv} were produced to highlight the GRCA's stewardship programs and promote agricultural best practices that keep nutrients and sediment on the land and out of local waterways and Lake Erie. Additional funding for the project was provided by the Ministry of the Environment, Conservation and Parks.

Actions for urban non-point sources of pollution

D.10 Urban stormwater management

Urban stormwater contributes significantly to the phosphorus and sediment levels in the central Grand River. A Stormwater Management Working Group was formed to support development of the 2014 WMP and continued to meet until 2019, when stormwater managers joined the broader Water Managers Working Group.

In 2021, the MECP began moving to a Consolidated Linear Infrastructure Environmental Compliance Approval (CLI ECA) system to speed up stormwater projects. Instead of submitting individual applications for each pipe, pond, or low impact development facility, municipalities receive a single system-wide approval and pre-authorization for changes to the system, if

projects follow design standards and ECA conditions. This streamlined approach aims to make approvals more efficient. As municipalities transition to a CLI ECA, they are required to develop and implement stream-based monitoring programs to track the effectiveness of the stormwater systems. Municipalities across the watershed are in various stages of designing (Guelph, Cambridge, Woolwich) and implementing (Brantford, Oxford County) the monitoring programs, with some municipalities building on existing urban stream monitoring programs (Kitchener, Waterloo).

Municipalities continue to implement stormwater management best practices identified in the Water Management Plan^{xv}. Recent actions by plan partners include:

- Brantford expanded its Design and Construction Manual for stormwater infrastructure to include Low Impact Development and best management practices.
- Guelph updated its Stormwater Management Master Plan in 2023, which identified opportunities for construction of stormwater quality and quantity controls and established a Low Impact Development policy for the City.
- Waterloo completed a Stormwater Management Master Plan in 2020 and updated standard operating procedures for erosion and sediment control facilities. Since 2022, the city has been implementing a program focused on roads with rural cross-sections to retrofit existing uncontrolled areas using Low Impact Development measures.
- Cambridge began charging stormwater fees and created a credit program in 2025, becoming the fourth municipality in the watershed to do so. Stormwater fees provide a dedicated source of funding to maintain municipal stormwater infrastructure.

D11. Reducing road salt use

Chloride levels are rising in both groundwater and surface water across the watershed, with the greatest concern in central urban areas and zones of high groundwater recharge. Source protection work has also flagged chloride and sodium as a concern for many municipal groundwater wells. Chloride issues have been identified in 6 drinking water systems in the Township of Centre Wellington, Guelph/Eramosa Township, and Region of Waterloo, with an increasing trend reported for most wellfields in 2024. Sodium issues have been identified in 4 drinking water systems in Guelph/Eramosa Township, and the Region of Waterloo, with an increasing trend reported for most wellfields in 2024.

In 2021, the MECP updated the Director's Technical Rules under the *Clean Water Act*, allowing for lower thresholds for identification of significant drinking water threats related to road salt application and storage in wellhead protection areas. Over the coming years, municipalities will identify more properties where risk management measures will be needed.

In 2025, Waterloo Region, Guelph, Cambridge, and other municipalities across Ontario passed council resolutions to encourage the Province to remove barriers to road salt use reduction, including developing limited liability legislation for winter maintenance operators and establishing standard BMPs for snow and ice management.

Actions for in-river opportunities to improve water quality

In the 2000s and during development of the Water Management Plan, significant effort focused on improving water quality and river conditions in the southern Grand River. MNR and ECCC supported a strategic decision-making process to identify comprehensive remediation options, involving data collection, modelling, and literature review. A final workshop, held in 2019, took the form of a structured exercise with participants from the GRCA, Haldimand County, ECCC, MNR, Trout Unlimited, and McMaster University. A technical report^{xvi} synthesized previous studies and was the key tool used to inform the structured ranking of alternatives. Of a series of

alternatives that included a range of dam modifications, reservoir management, and fish passage improvements, the highest ranked alternative was to remove all the weirs at Dunnville (main channel weir and side channel weirs)^{xvii}. This initiative lost momentum following the workshop and additional engagement of affected interest holders and a financial strategy would be needed to advance a feasibility study.

Due in part to changes to the *Conservation Authorities Act* and shifting priorities of partner agencies, the Grand River Fisheries Management Plan Implementation Committee has been inactive. The GRCA continues to consider alterations to infrastructure that do not serve a natural hazard (flood and erosion) management purpose as capacity and resources allow. For instance, the GRCA commissioned a 2020 study on the Dunville fishway to assess its condition and determine opportunities to improve its performance. The review concluded that weir location and design are key limiting factors that would impede improvement in function.

Actions for data-based decision making

The WMP noted that more data is needed to support well-informed water management decisions. Monitoring programs do not adequately capture seasonal or hydrologic conditions, limiting confidence in decision-making. A coordinated effort to fill these information gaps will ensure that future data is collected strategically and can effectively support both current and emerging water issues.

D15. Data collection, monitoring and coordination

The GRCA continues to implement a data management system for hydrometric data (KISTERS WISKI). Initial implementation focused on continuous hydrologic, water quality, and climate data. More recent additions have included periodic (i.e., grab) water quality data and historic and current groundwater level data (ongoing). These platforms are fully integrated into web-services and can be used to share data among internal and external users.

The GRCA continues to partner with the MECP on the Provincial Groundwater Monitoring Network (PGMN) and Provincial Water Quality Monitoring Network (surface water). To supplement these programs, in 2025 the GRCA, in partnership with the MECP, conducted enhanced monitoring at 10 rural stream sites and 24 groundwater monitoring wells, to better understand non-point sources of nutrients (phosphorus and nitrogen) in the watershed.

The GRCA continues to maintain a network of 9 continuous monitoring stations for dissolved oxygen, temperature, pH, conductivity and turbidity to validate and calibrate the GRSM. The GRCA installed two continuous nitrate sensors in the Grand River at Bridgeport and Brant (2023), to inform understanding of the impacts of point and nonpoint sources of nitrate on river water quality. Near real-time monitoring data is shared online^{xviii}. Grab samples were collected at both these sites and analyzed for nitrates at an accredited laboratory following installation of the sensors, for the purpose of validating the continuous sensor data.

The City of Brantford installed a continuous nitrate sensor in the Holmedale Canal to support assessment of source water quality for its drinking water system.

Partners continue to collaborate and share water quality monitoring data to monitor trends and report on conditions. For instance, the GRCA, Brantford, and Waterloo Region share monitoring data to assess and characterize elevated nitrate levels in the Grand River. The GRCA gathered and analyzed municipal wastewater treatment plant effluent data through the Watershed-wide Wastewater Optimization Program to help inform point and nonpoint source loading of nitrates to the Grand River during rainfall events.

The GRCA partnered with the University of Waterloo to install continuous phosphorus sensors at water quality stations in 2023 (Grand River downstream of Belwood and Grand River at

Blair). An additional installation in partnership with ECCC is anticipated in 2026 at the York station. Once operational, continuous phosphorus data will be collected at three locations in the watershed, strategically located in the upper, middle and lower reaches. These data will help improve understanding of phosphorus transport dynamics and the accuracy of phosphorus load estimates to Lake Erie.

The MECP completed an intensive 5-year study (the multi-watershed nutrient study, 2015 to 2020) to assess the interaction between agricultural land use and land management and nutrient loadings in streams in the Great Lakes basin. Small tributaries were selected, including two in the Grand River watershed (Larches and Smith Creeks), representing a range of agricultural conditions in Southern Ontario.

Through a partnership with the Ontario Geological Survey, the GRCA acquired a new groundwater monitoring well in Mapleton Township, an area identified as an information gap in a water budget study. The GRCA also added 4 wells in the Cedar Creek subwatershed to its long-term monitoring network. These additions bring the number of wells at which the GRCA monitors water levels to 60. Water quality data is collected annually from the 38 wells that are part of the PGMN. Since 2019, with the support of the MECP, 6 PGMN wells have been equipped with satellite telemetry and near real-time data are accessible on the GRCA's website.

The GRCA developed a framework for analysing groundwater levels to support watershed conditions reporting and assessment of low water conditions. Percentiles are used to illustrate current water level conditions in the context of individual wells' periods of record. For example, during a period of low water in November 2022, 7 monitoring wells were identified as having the lowest water levels on record.

The GRCA has also updated publicly available watershed-wide groundwater mapping including the water table, potentiometric surface, and vertical hydraulic gradients using data from the Provincial Water Well Information System and LiDAR.

With the support of Fisheries and Oceans Canada (2023-2025), the GRCA gathered flow and fish community data from 23 municipal drains in Brant County, Waterloo Region, and the townships of Perth East, Wellington North, Wellesley, and Grand Valley. This work will support municipal drain classification and the development of municipal stormwater monitoring programs and contributes to IAP D.9 (municipal drain maintenance).

D15. Geospatial data

The GRCA acquired Census 2021 agricultural and population data to support watershed characterization reporting for the planned update of the WMP to be initiated in 2026.

Agricultural Land use (crop inventory) information is now gathered annually via remote sensing by Agriculture and AgriFood Canada^{xix}.

MAFA soil specialists have a multiyear project to renew the province's soil mapping, using digital soil mapping techniques^{xx}. Techniques developed in completing updates in other parts of the province will inform planned updates for the Grand watershed.

Actions advancing production of high-resolution digital elevation models are noted below.

E. Reducing flood damage potential

The primary causes of riverine flooding in the Grand River watershed include winter rainfall combined with snowmelt, ice jams, and both widespread heavy and localized intense rainfall. Areas along the southern Grand River and the Lake Erie shoreline may also flood when strong winds generate storm surges on Lake Erie.

The GRCA is responsible for managing both riverine and coastal flooding.

- Riverine flooding occurs when flows in a watercourse exceed the channel's capacity, causing water to spill beyond the normal banks. In the Grand River watershed, this usually results from rainfall, snowmelt, or rain-on-snow events occurring over a large area. Riverine flooding may also be worsened by obstructions that restrict natural flow, such as ice jams, debris, culverts, bridges, or encroaching development. The defining feature is that a watercourse with defined bed and banks cannot contain the volume of water moving through it.
- Coastal flooding within the watershed occurs along the Lake Erie shoreline and is typically caused by high lake levels, storm surges, waves, or a combination of these factors.

Municipalities and property owners are responsible for addressing localized flooding.

- Overland flooding refers to water accumulating or flowing across the landscape without being associated with a defined watercourse. In rural areas, this may include water ponding in fields or roadside ditches overflowing onto adjacent land or roads. In urban areas, it typically involves water flowing along streets or across surfaces when storm sewer systems are blocked or overwhelmed. The key distinction from riverine flooding is that the water is not coming from a watercourse, but rather is unable to reach the drainage system.
- Basement seepage flooding occurs when high groundwater levels surround a building's foundation and water enters through cracks, joints, or openings. This can happen anywhere—due to nearby high water levels in a watercourse or simply because of locally elevated groundwater conditions.
- Sewer backup flooding happens when storm or sanitary sewer systems exceed their capacity, causing stormwater or sewage to back up through connections into basements, or to surcharge onto roadways where it becomes overland flow.

Actions to maintain flood damage reduction infrastructure

E1. Dam and dike studies

In 2024, the GRCA completed a Water Control Structures Asset Management Plan for eight flood control and/or flow augmentation dams, and six dike and floodwall systems. This included completing condition assessments and providing recommendations for major maintenance and replacement of components for the dams. The plan provides clear documentation and support for the decision-making process for prioritizing maintenance and managing the water control infrastructure assets. The plan will assist the GRCA in deciding when and how much will be required to invest in existing water control infrastructure assets to maintain the required level of service to provide flood control and low flow supply functions.

Federal and provincial funding is essential for maintaining important flood and erosion control infrastructure. From 2019 to 2024, the GRCA received \$4.6M from the Ministry of Natural Resources' Water Erosion Control Infrastructure (WECI) program. Key WECI funded projects have included concrete repairs and bridge deck rehabilitation for the Conestogo Dam and improvements to the isolation stoplogs and gains for Shand Dam. In 2022, the GRCA and City of Kitchener began the Bridgeport Dike Rehabilitation and Capacity Improvement Project, funded in part by the federal Disaster Mitigation and Adaptation Fund. The study will explore options to rehabilitate and improve the capacity of the existing Bridgeport Dike.

In 2022, the GRCA evaluated its dam safety program and compared the level of development (maturity) of the program with industry standards. The benchmarking exercise confirmed that the program is reflective of good industry practice.

To sustain the reduction in flood damages achieved by the dams and dikes, the GRCA has increasingly focused its efforts on the assessment and management of aging flood control infrastructure. This work has included comprehensive dike and dam safety reviews, as well as the prioritization and implementation of recommendations arising from these studies to address identified deficiencies and ensure continued structural integrity and public safety. Key initiatives undertaken as part of this program include:

- Hazard Potential Classification and Inundation Analysis for Woolwich Dam, Laurel Creek Dam and Shade's Mills Dam. These studies assess the potential consequences of a dam failure, including the extent and severity of downstream flooding, to support risk classification, emergency planning, and informed decision-making for dam safety management.
- Updated Operation, Maintenance and Surveillance manuals have been completed for Woolwich, Shand, Guelph, Conestogo, Laurel Creek and Shade's Mills Dams. These manuals establish consistent operational procedures, inspection protocols, and maintenance requirements that support safe and reliable long-term operation.
- Other notable improvements include gate repairs, refurbishment and/or inspections at Guelph and Conestogo dams, and control panel upgrades at Woolwich dam.
- The GRCA routinely undertakes a range of studies to assess and manage its dike systems, including hydraulic analyses, dike safety reviews, field investigations, flood damage assessments and vegetation assessments. These studies provide important information on dike capacity and structural stability, and they help identify required maintenance and longer-term capital works. Recent studies have been completed for Bridgeport, Brantford and Cambridge dikes.

Collectively, these investments enhance the condition and performance of GRCA's flood control infrastructure, supporting continued reduction in downstream flood damage potential.

Overland and other urban flooding

E2. Stormwater management

Municipal stormwater systems, both major and minor, work together to collect and redirect excess runoff. Minor systems—such as storm sewers and stormwater ponds—are built to manage routine or smaller rainfall events. Major systems, including roadways and roadside ditches, are intended to convey larger volumes of runoff during significant storms. Ongoing, long-term maintenance of both systems is essential to minimizing the risk of urban flooding.

Urban municipalities continue to implement and update stormwater master plans and major/minor system assessments:

- Implementation of the City of Kitchener's Integrated Stormwater Master Plan has been ongoing since its approval in 2016, with 43 out of 52 projects and programs to be completed by 2030. Scoping and pre-engagement for an updated master plan began in 2025. To support the updated plan, the City is expanding its storm network model and plans to use 2-dimensional modelling to identify areas of highest overland flooding risk and hazard.
- Building on the Stormwater Master Plan completed in 2011, the City of Cambridge has developed maintenance and inspection programs for stormwater management facilities

and anticipates beginning a stormwater funding study to develop a plan for sustainable funding of the stormwater program.

- The City of Waterloo completed its Stormwater Master Plan in 2019 and in 2023 modeled flood risk to identify stormwater system deficiencies.
- Brant County undertook an initial stormwater system assessment for Paris as part of an updated master servicing plan. More detailed studies are needed.
- The City of Guelph updated its Stormwater Management Master Plan in 2023. The Master Plan included an urban flood management assessment and concluded that climate change and intensification pose a risk to the level of service provided by the stormwater system.
- The City of Brantford updated its master servicing plan for water, wastewater and stormwater services in 2021 and is developing a stormwater model.

Flood hazard mapping

E3 and E4. Floodplain and flood zone mapping

Alongside structural measures such as dams and dikes, the GRCA applies a range of non-structural approaches to reduce flood damage. Flood hazard mapping is the foundation for floodplain management, emergency preparedness planning and flood damage assessment. Since the previous Summary of Accomplishments, the GRCA has completed flood zone mapping for West Montrose, New Hamburg, Ayr, Drayton, Brant County and Brantford, with more updates planned.

The GRCA received funding from the National Disaster Mitigation Program (NDMP) to support the New Hamburg Flood Mitigation Study (2020), updated flood damage assessments for Grand Valley, Waldemar and Drayton (ongoing), Lake Erie shoreline hazard mapping and risk assessment for Haldimand County (2020), and floodplain mapping updates for the Speed and Conestogo Rivers (ongoing). Updated floodplain mapping also was completed for a Two Zone Floodplain Policy Area for parts of Dunnville (2023) and Randall and Breslau Drains in the Region of Waterloo (2024).

Advances in computing and geospatial data collection have enabled the development of more accurate mapping products that support emergency planning and preparedness, as well as more sophisticated modelling for flood forecasting. The creation of a Province-wide LiDAR-based digital terrain model^{xxi} greatly enhanced the base information available for flood hazard mapping. LiDAR can provide highly detailed topographic information on landscape features and is helpful in identifying vulnerable areas along rivers and water bodies. The GRCA uses topobathymetric LiDAR to support some floodplain mapping projects, including updates to the Upper Grand and Speed River floodplain mapping funded by the NDMP. This technology has the ability to penetrate water if it isn't too turbid, mapping riverbed and bank features.

Joint emergency preparedness exercises between municipalities, the GRCA, and other partners have proven an effective means of confirming roles and responsibilities for dam operations and maintenance.

Ice jam flooding

E9. Actions to address ice jam flooding

Ice jams in the river have the potential to cause significant flooding. In 2024, the GRCA completed an Ice Management Plan^{xxii}, documenting factors influencing river ice and ice jam formation, identifying communities vulnerable to ice jam flooding, and describing recent major

ice jam events. The GRCA's main roles are to raise awareness of the potential for ice jams, monitor conditions, and communicate flood warnings.

Following significant ice jam flooding in Brantford in 2018, the GRCA completed an ice jam characterization study and, with the City of Brantford, began a feasibility study of ice jam flooding mitigation options in 2021. In 2024, the GRCA, in partnership with the City of Brantford began the Brantford Ice Jam Mitigation Class Environmental Assessment (EA). Several reports were completed in 2024 to 2025 for the Class EA, with public consultation and an evaluation of alternatives to be completed in 2026.

F. Summary and next steps

The Water Management Plan documents about 165 actions that Plan partners, and others, have contributed to achieving the goals of the Plan - to ensure water supplies, improve water quality, reduce flood damage potential and build resilience to deal with climate change.

Most of the actions listed by Plan partners have either been completed or are well underway to being completed. There are, however, a few actions that were not completed due to shifting needs and priorities, particularly during the COVID-19 Pandemic, and changes to the *Conservation Authorities Act*, which refocused the GRCA's efforts on mandatory program areas and programs delivered on behalf of municipalities.

Key assumptions of the 2014 WMP – that growth would stay within existing urban areas, no Great Lakes water pipeline would be needed, and no new wastewater plants would discharge to the Grand, Conestogo, or Speed rivers—have since changed. New urban lands have been added, municipalities are exploring new water supply sources, and a new wastewater treatment plant is planned for Caledonia.

Broader shifts over the past decade, including changes in growth, water supply, wastewater and stormwater management, water security, climate impacts, and provincial policies, have prompted the need for an update. In December 2025, the Water Managers Working Group endorsed a project charter to update the WMP by 2028.

The update will:

- Draw on new information to describe watershed stressors, including population growth, agriculture, and climate change.
- Provide a forum for inter-agency and cross-border discussion of water management issues and strategies with upstream-downstream or regional implications.
- Address priority water security issues, such as groundwater resources vulnerable to overuse, elevated nitrate concentrations in surface water and groundwater, the Grand River's contribution to phosphorus loading to Lake Erie, and flood and drought management.
- Reflect current municipal strategic planning context and priorities for water, wastewater, and stormwater services, and climate adaptation.
- Align strategies to adapt water resources management to a changing climate.
- Present an opportunity to strengthen working relationships with First Nations to help ensure their cultural practices and values are recognized in the stewardship of water resources.

Strategies and actions of the 2014 WMP that are outstanding will be reviewed and carried forward if they remain important actions to advancing the plan's goals.

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