

A Water Management Plan for the Grand River Watershed



The Grand River lies at the heart of one of the richest, fastest growing regions in Ontario. The vitality of the Grand River watershed has been linked to the river and the natural environment.

Much has been done in the past 100 years to protect and improve the natural environment. Many of those improvements came about through the implementation of water management plans developed through partnerships involving the Grand River Conservation Authority, municipalities, the Province of Ontario and the Government of Canada.

The Grand River watershed faces new challenges brought on by high population growth, extensive agriculture and climate change.

This Water Management Plan addresses those issues. It is built on the foundation of earlier plans, especially the 1982 Grand River Basin Water Management Study.

This plan looks ahead 20 to 30 years and will guide future actions to maintain and improve the

The Issues

Population growth

The Grand River watershed has a population of about 985,000 which is expected to reach 1.53 million by 2051.

The cities of Kitchener, Waterloo, Cambridge, Guelph and Brantford are among the fastest growing in the province.

Municipal drinking water comes

The goals of the plan

The plan is an integrated water management plan with goals to:

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

environment of the Grand River watershed to ensure the environment remains healthy and sustainable as the population grows.

It is a joint plan by municipalities, First Nations, the GRCA, provincial ministries and federal departments to align their efforts and identify practical actions that will make the biggest difference.

It is a voluntary plan, not a legal requirement, so a spirit of cooperation and shared responsibility is critical to its success.

from more than 100 municipal wells and four river intakes. That same river also receives the treated effluent from 30 sewage treatment plants. More people means more demand on water resources for drinking water, stormwater management and sewage treatment.

Climate change

Warmer air and water temperatures, bigger rainstorms,

longer periods of drought — the possible consequences of climate change could pose new challenges in managing floods, improving water quality and securing water supplies for municipalities, farmers, industry and the natural environment.

Extensive agriculture

The Grand River watershed is one of the richest agricultural regions in Canada. About 70 per cent of the land is actively farmed and there are hundreds of thousands of hogs and cattle.

Fertilizers, farm chemicals and animal waste must be properly stored, handled and used to minimize impact on rivers, streams and groundwater. Erosion needs to be addressed to protect farmland and water quality.



The Partnership

The Plan is a voluntary, collaborative process that brings various agencies together as partners.

The focus of the Plan is to promote the adoption of best practices and the implementation of projects and programs that provide the greatest benefits relative to the investment.

By working together, these agencies have set out a strategy, based on agreed-upon local objectives and targets, to meet the needs of the ecosystem and watershed communities. The strategy will assist each partner to fulfill their role and to support each other throughout the process.

Many groups and organizations

have provided input to the plan through a variety of communication and engagement opportunities. That includes members of municipal councils, the agricultural community, aggregate producers, urban development organizations, environmental non-government organizations, other groups and the interested public.

Water Management Plan Partners

These agencies took part in the plan development and had members on the Project Team and/or Steering Committee.

Municipalities represented by:

- Regional Municipality of Waterloo
- County of Brant
- County of Haldimand

- City of Guelph
- City of Brantford
- City of Kitchener
- City of Waterloo
- City of Cambridge
- Township of Centre Wellington

Six Nations of the Grand River

Ontario Ministry of the Environment

Ontario Ministry of Natural Resources

Ontario Ministry of Agriculture and Food / Ministry of Rural Affairs

Environment Canada

Grand River Conservation Authority

The Integrated Action Plan

Introduction

The Water Management Plan consists of two sections:

- **The first part is an overview of issues and the latest scientific information on those issues**
- **The second part is the Integrated Action Plan.**

The Integrated Action Plan is a compilation of Recommendations and Action Items brought forward by the members of the Project Team on behalf of their organizations.

- **The Recommendations identify the steps to be taken to reach the goals of the Plan.**
- **The Action Items are the tasks the partner agencies are already taking or plan to take to implement the Recommendation.**

This document is a summary of the Recommendations in the Integrated Action Plan.

For the complete text of the Recommendations and the Action Items, please consult the Water Management Plan available at www.grandriver.ca

A Maintain a process of reporting, updating and continuous improvement

The success of the Water Management Plan will depend on:

- clear, regular communication,
- a commitment by each partner to implement the actions,
- a collective understanding of the gaps and barriers to implementation, and
- celebration of the collective successes of the actions.

Through this adaptive approach, the goals of the Water Management Plan will be achieved.

Recommendations

A1 Senior officials from the partner agencies will form an Implementation Committee to meet at least once a

year to review progress on the plan.

A second group, called the Water Managers Working Group, will be made up of representatives of the plan partners who are responsible for water management issues within their municipalities and organizations. The water managers will meet regularly to develop solutions to water issues, oversee work plans, implement actions, report on implementation and evaluate the effectiveness of actions.

A2 Regular communication and reporting are important for accountability, showing progress, celebrating success, identifying set-backs and achieving the results of the Plan.

Annual progress reports will be issued starting in 2015. A more detailed technical report on the progress toward achieving improvements in the watershed will be issued every five years.

A3. The Water Management Plan should be reviewed and updated regularly, particularly if changes are contemplated for some of the major assumptions in the Plan, such as:

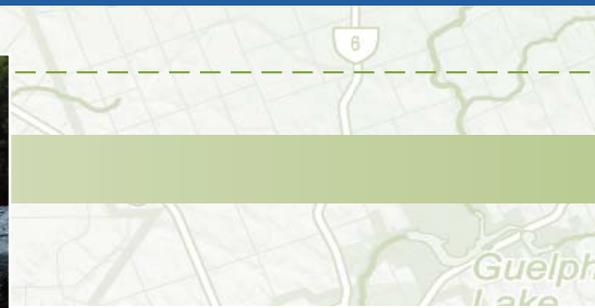
- if there is a plan by a municipality to expand its urban boundary,
- if there is renewed consideration of a Great Lakes pipeline as a water supply source, or
- if plans arise to develop a new municipal wastewater treatment plant

B Maintain a framework for water management

The best natural geographical unit for managing water resources is the watershed. It is also important to keep in mind the links between the land, water and related resources.

Recommendations

B1 To ensure sustainable water supplies, improve water quality and reduce flood damages, key hydrologic processes such as groundwater recharge, groundwater discharge and surface runoff must continue to be maintained or managed.



It is important to protect important features that provide these functions.

It is also important to recognize these features in municipal planning documents and subwatershed plans.

B2 A set of Broad Water Objectives for the Grand River Watershed was developed as part of the Water Management Plan.

These objectives express the uses, needs and values for water. The objectives were used to develop a series of indicators and targets used to measure changes in water conditions and evaluate the effectiveness of the Plan. Work should continue to expand and refine the suite of indicators and targets.

C Ensure sustainable water supplies for communities, economies and ecosystems

There is enough water in the Grand River watershed to reliably meet future water supply needs of communities, economies and ecosystems.

However, as water use increases, the resiliency of the watershed to deal with increasing population growth, shifts in agricultural production, climate variability (i.e. floods and droughts) and climate change is reduced.

Efficiency in water use is strongly encouraged across all sectors including municipal supply, crop irrigation and other commercial, industrial and domestic uses.

The following Recommendations are intended to ensure sustainable water supplies by improving security, reliability and resiliency to deal with variability and change.

Recommendations

C1 Municipalities, particularly those with growth centres, should maintain long-term Water Supply Master Plans to identify future needs and sources.

C2 Municipalities should consider steps they can take to manage the demand for water. They should establish objectives for reducing demand and promote water conservation.

C3 It is important that municipalities, provincial agencies and the GRCA continue to share information and maintain strong working relationships to reduce regulatory uncertainty and ensure the security of water sources. The Water Managers Working Group will provide a forum for this.

C4 Agricultural irrigation is important in the area around several creeks: Whitemans, Mount Pleasant and McKenzie.

To maintain the sustainability of water supplies, particularly in a time of climate change:

- Irrigation water should be sourced from storage ponds and/or groundwater to avoid direct withdrawal from streams during low flow periods
- Advice on water use efficiency should continue to be provided to farmers to minimize evaporation, overspray and other water loss. Soil moisture should be assessed prior to irrigating, and ponds should be big enough to satisfy summer irrigation needs.
- Information should be kept current on water use to observe trends across the watershed.

C5 The GRCA operates seven reservoirs that supply water to augment river flows during the summer and fall. Water is released to meet the requirements for wastewater treatment plants and municipal water supplies at key locations in the river system. The current target flows should be maintained

C6 Climate change studies indicate there will be a shift in the timing and type of precipitation in the future, particularly during the winter. Therefore, the GRCA should consider a more flexible operating policy for reservoirs during the spring.

C7 Water from the reservoirs also assists with the assimilation of effluent from wastewater treatment plants. Studies have identified specific river flows (called 7Q20) that can be used for designing upgrades or expansions of wastewater treatment plants in the Grand, Conestogo and Speed rivers downstream of reservoirs.

C8 New Permits to Take Water from the Grand, Conestogo and Speed rivers in areas downstream of the reservoirs should contain requirements that the permit holder

reduce the rate of taking when flows in the river drop below the operational low flow targets.

C9 Aquatic life need certain river flows to remain healthy. A set of low-flow thresholds have been identified in the Plan to protect aquatic life. These need to be field verified. They may be used to help manage reservoir operations and drought management planning.

C10 Groundwater is an important source of municipal water. Groundwater that discharges to streams helps support aquatic life. More work needs to be done, particularly in the central Grand area, to understand the links between recharge areas, water supply sources and important groundwater discharge areas.

C11 To ensure future groundwater supplies, municipalities with urban areas should protect important groundwater recharge areas and take these areas into account when developing growth strategies.

C12 Local water management plans can help resolve potential conflicts among water users. These plans are recommended for Whitemans, Mount Pleasant and McKenzie creek subwatersheds, in the Norfolk Sand Plan area of Oxford and Brant counties.

C13 Droughts may become more common as a result of climate change. Proactive drought contingency plans should be developed among water users to deal with low water conditions.

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

Surface and ground water quality issues vary across the watershed and are influenced by human activities and natural processes.

Water quality issues include nutrients, sediment, chloride and pathogens. Generally speaking, pollutants come from two types of sources:

- point sources are fixed locations, such as sewage treatment plants
- non-point sources include surface runoff from areas such as rural and urban land.

It is important that actions are implemented to manage both point and non-point sources.

Recommendations: Point Sources

D1 River water quality will improve greatly as wastewater treatment plants are upgraded over the next 10 years in Centre Wellington, Region of Waterloo, Guelph and Brant. These municipalities should continue with their plans.

D2 The managers and operators of wastewater treatment plants can improve the performance of their plants by adopting the Composite Correction Program. Municipalities that undertake the program are encouraged to adopt voluntary targets for effluent quality improvement.

D3 It is important that wastewater treatment plant operators have a good understanding of the materials coming into their plants. Municipalities should have and enforce sewer use bylaws.

D4 To reduce the frequency and severity of sewage spills and bypasses from municipal wastewater treatment plants, it is recommended that municipalities, the GRCA and the Ministry of the Environment continue to implement the actions identified in the report: "Best Practices: Municipal Wastewater Treatment Plant Bypass and Spill Preventions and Reporting in the Grand River Watershed."

D5 The Grand River Simulation Model (GRSM) is an effective tool to evaluate the cumulative impacts of the 10 wastewater treatment plants in the central Grand River and lower Speed River. The GRCA should continue to maintain this decisions support tool for future municipal wastewater planning.

D6. Best value solutions for wastewater treatment options for smaller municipalities may be identified through broader subwatershed studies. It is



recommended that studies be completed or updated for the upper Grand, upper Conestogo, and upper Nith rivers, as well as Fairchild and Canagagich creeks.

Recommendations: Rural Non-Point Sources

D7 The Rural Water Quality Program provides farmers with knowledge and financial incentives to reduce the amount of nutrients and sediment entering watercourses. The program should be enhanced to:

- a) expand the range of best management practices eligible for grants in some areas to provide a well-rounded watershed-wide program
- b) promote the adoption of conservation practices in addition to the current grants for capital projects;
- c) enhance assistance in priority areas or subwatersheds;
- d) extend the program to rural non-farm properties;
- e) include funding for well decommissioning across the watershed to protect aquifers; and
- f) include a monitoring program to measure the effectiveness of implementation.

D8 River nitrate levels tend to be high during winter and are expected to increase. Most nitrates come from non-point sources. To reduce nitrate concentrations, it is recommended that nitrogen application to land in areas of high groundwater recharge be optimized to maintain productivity while minimizing environmental losses in priority subwatersheds including the central Grand River, lower Nith River and Whitemans Creek.

D9 Municipal drains remove excess water from the land to facilitate farming. To facilitate management of sediment loads, soil erosion and flooding, municipalities should pursue best practices for municipal drain design and maintenance.

Recommendations: Urban Non-Point Sources

D10 Urban stormwater contributes significantly to phosphorous and sediment levels in the Central Grand River. It is recommended that municipalities implement practices that focus on sustainable funding of stormwater programs; development of stormwater management master plans; improvements to sediment and erosion control; enhanced communication and education; opportunities to retrofit existing uncontrolled areas, and maintenance and operation of facilities.

D11 Chloride levels are increasing, particularly in urban areas and areas of groundwater recharge. Municipalities should continue to manage chloride use by following Environment Canada's Code of Practice, participating in programs such as Smart About Salt, and promoting salt- and water-efficient water softeners.

D12 Pathogens (e.g. bacteria) are a concern to communities that get their drinking water from rivers. Studies should be carried out to understand the conditions when pathogens are of greatest concern so appropriate actions can be identified to mitigate these conditions.

Recommendations: In-River Improvements

D13 Water quality in the southern Grand River is poor, in part because of the cumulative impact from areas upstream, but also because of the lake-like conditions created by the Dunnville Dam. Studies should be done of possible ways to modify the dam or its operation to reduce its impact on water quality.

D14 Small dams and other in-river structures can alter the natural flow of the river, which causes sediment and phosphorous to accumulate behind them. Studies should be done to evaluate the likelihood that modifications or removal of these structures will improve water quality.

Recommendation: Data Collection & Monitoring

D15 It is important that water management decisions be based on adequate and reliable data. Gaps in existing data collection networks need to be addressed. More water quality data is needed to evaluate current conditions, monitor trends and report on progress



Water Management Plan

toward achieving water quality targets. The GRCA will continue to implement web-based tools for sharing data

E Reduce flood damage potential

The flood risk reduction program is relatively mature and the combination of structural and non- structural methods is effective.

It is estimated that structural measures implemented to this date have reduced average annual flood damages by 80 per cent.

Floodplain regulation has avoided creation of new flood damage potential and is helping to reduce future flood damage potential and risk to life.

Potential for large floods still exist. Climate change may increase the frequency and time of year that floods occur. The following recommendations are intended to enhance flood preparedness, adapt to a changing climate and continue to reduce the flood damage potential over time.

Recommendations

- E1** The seven multipurpose dams and reservoirs, and the extensive dike systems, are significant infrastructure assets that require ongoing investment, maintenance and operation. The GRCA will complete or update dam and dike safety studies.
- E2** An increase in the frequency and magnitude of severe storms will put stress on urban stormwater systems. Municipalities should assess their major stormwater systems to reduce their vulnerability. Consideration should be made for climate change.
- E3** Accurate floodplain maps help to prepare for emergencies, carry out flood damage assessment and manage development in flood-prone areas. The GRCA will complete digital floodplain mapping in flood damage centres, along the large rivers and on urban watercourses.
- E4** Maps showing potential flood depth levels and a database of vulnerable structures will help municipalities prepare for floods and carry out emergency plans. The GRCA will continue to create the



maps and work with municipalities to develop the database and develop flood warning lists.

- E5** The GRCA will maintain a watershed wide voice radio system so communication can be maintained even during severe weather when other communications systems may not be working.
- E6** The GRCA will continue to improve flood forecasting and its decision support tools (such as its computerized watershed models) as new data and technologies become available.
- E7** The GRCA will continue to refine the delivery of flood warning messages and work with other agencies to improve flood warning.
- E8** Additional ways to reduce flood damages in several flood-prone communities should be investigated: Drayton, Grand Valley, Paris, New Hamburg, Ayr, Caledonia, Cayuga and Dunnville.
- E9** Ice jams have the potential to cause significant flooding, especially in areas prone to jams such as Grand Valley, West Montrose, Paris, Brantford, Cayuga and Dunnville. The technical report, "Ice Jams in the Grand River Basin," will be updated and site-specific ice jam investigations will be carried out.

F Next steps

For innovative, best value solutions to manage water beyond 2030 Water Managers must keep local, regional and watershed-scale water planning a priority in their work plans. Steps need to be taken now to update and improve decision-support tools with adequate information and data. Furthermore, water managers should continue to consider for new ideas and push for innovative approaches to managing water and wastewater. Policies and best practices will need to be developed for these new approaches.

Grand River Watershed

A well managed river

The long history of water management has drawn national and international acclaim. In 1994 the Grand River and its tributaries became Canadian Heritage Rivers. In 2000 the Grand was recognized as one of the best managed rivers in the world when it won the Thies International Riverprize.



Grand River Conservation Authority, 400 Clyde Road, Cambridge, N1R 5W6
519-621-2761 | www.grandriver.ca

This project was undertaken with the financial support of the Government of Canada through the Federal Department of the Environment. This project has received funding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material.