



The Regional Municipality of York

 ***Water and Wastewater***



Master Plan



November 2016


York Region



york.ca/wwmp



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A Message from York Region Chairman and CEO and Members of Regional Council

When people across York Region turn on their kitchen faucet, take a shower or flush their toilet they expect a safe, reliable and efficient delivery of water and wastewater services. As more people choose to make York Region their home, we must carefully plan water and wastewater infrastructure, our pipes, sewers and water treatment plants, to ensure we have enough capacity to serve our new and growing communities.

To successfully meet the needs of our growing municipalities, we have updated our Water and Wastewater Master Plan. It considers our long-term needs and puts forward a plan to expand our infrastructure in a way that responds to water conservation trends and seeks opportunities for innovation. The new plan integrates water and wastewater initiatives with the Region's Official Plan, Transportation Master Plan and other strategies to ensure the needs of our rapidly growing Region are met cost-effectively. I encourage you to take a few minutes and read through this updated document.

As Chairman and CEO, I am proud of our dedicated and professional staff. They deliver critical services across the Region with the utmost professionalism. In York Region, we have an excellent quality of life that is attracting people from around the world. Over the course of this term of office, members of Regional Council will continue planning for complete communities that are vibrant, healthy and affordable.

Sincerely,

Wayne Emmerson
Chairman and CEO
Regional Municipality of York



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Overview

This document reports on the update of the Water and Wastewater Master Plan for The Regional Municipality of York. The updated Master Plan will guide investments in water and wastewater systems to support the Region’s projected growth to 2041.

This document also explains how the Region will meet the goal of sustainable growth through adopting a new “One Water” approach, which aims to realize the value of water whether in a lake, river, aquifer or municipal system. One Water strives to view all water as a resource and to reduce the need to build new infrastructure by making the best use of existing infrastructure, conserving water to lessen pressure on natural and financial resources and utilizing water reuse to create markets for treated wastewater. **Figure ES.1** summarizes the One Water approach to water and wastewater servicing.

The updated Master Plan will also integrate water and wastewater initiatives with the Region’s Official Plan, Transportation Master Plan and other strategies to ensure the needs to service growth are met cost-effectively.

This Master Plan Update has been completed in accordance with the Municipal Class Environmental Assessment process, and completes phases 1 and 2 of that process.

Background

The Regional Municipality of York, also described as York Region or the Region in this report, has grown rapidly since its creation in 1971 and is expected to continue to grow through provincially mandated growth in terms of residents and jobs.

The Region, under the governance of Regional Council which represents the nine local municipalities within it, provides a range of services to more than one million residents. These services are often delivered in coordination with local municipalities.

The main role of York Region in the area of water and wastewater is to act like a wholesale service provider to local municipalities. These Regional responsibilities reside within the Environmental Services Department. **Figure ES.2** shows the different functions of the water and wastewater systems.



Figure ES.1 - One Water Approach

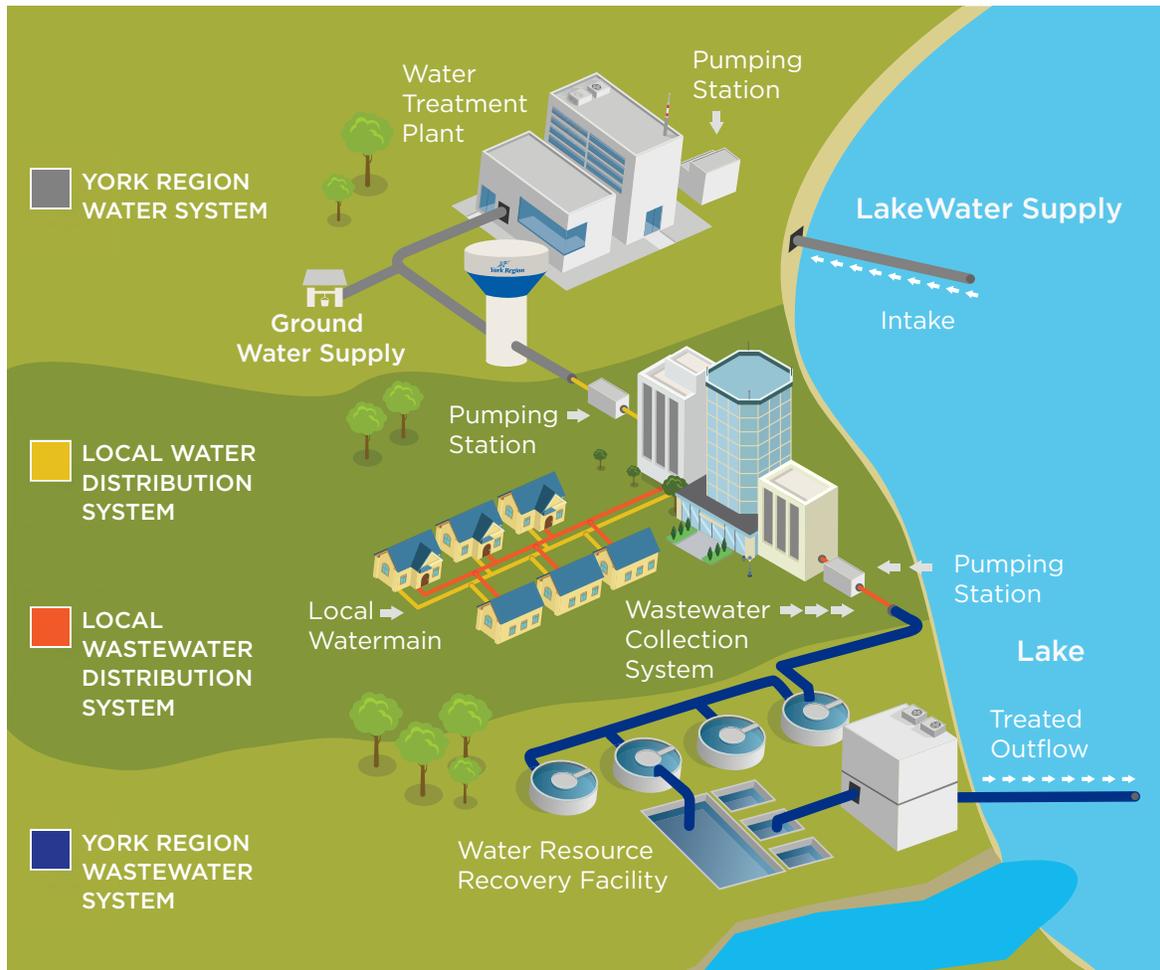


Figure ES.2 – Regional and Local Servicing System in York Region

Communities in York Region are serviced by Lake Ontario based water, Lake Simcoe based water and/or groundwater. In the Greater Toronto Area, York Region is unique in that it is the only regional municipality which lacks direct access to Lake Ontario. As a result, the Region has entered into long-term agreements with the Region of Peel, Durham Region and the City of Toronto for various aspects of its water and wastewater service needs.

To help its water and wastewater services keep pace with provincially mandated growth while working to create sustainable communities, the Region has prepared a series of Water and Wastewater Master Plans at regular intervals, with the last released in 2009. This update reflects major developments since then, including revised population and employment direction from the Province identified in **Amendment 2 to the Growth Plan for the Greater Golden Horseshoe, 2013**.



The provincial direction, which York Region must take into account in planning its infrastructure, is for population to increase by just over 50 per cent in 2041, reaching 1.79 million people. Employment in the Region is predicted to grow at roughly the same rate over the period, reaching 900,000 (**Figure ES.3**).

York Region's population is expected to grow from

1.16 million in 2015 **to** **1.79** million in 2041

York Region's employment is expected to grow from

578 thousand in 2015 **to** **900** thousand in 2041

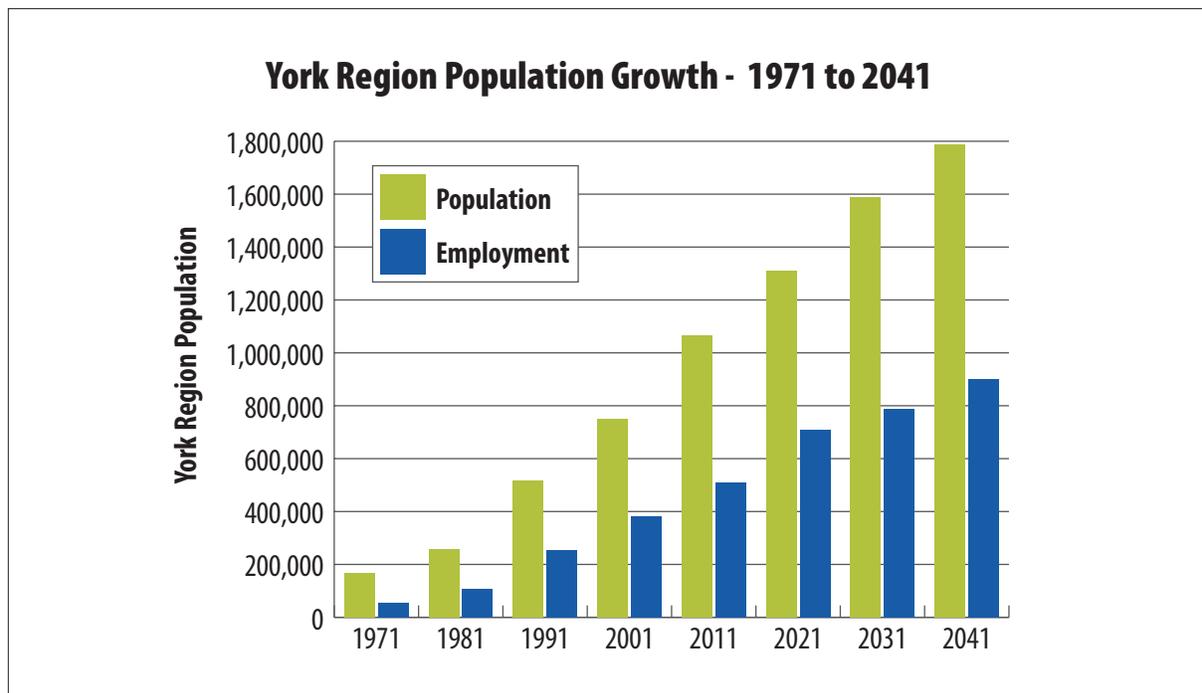


Figure ES.3 – Population and Employment Growth in York Region

The City of Markham, Town of Richmond Hill and City of Vaughan are expected to absorb a majority of the population increase – approximately two-thirds.



A More Stringent Regulatory Environment

Across Ontario, water services continue to face greater regulatory complexity and scrutiny. This is especially true for the Region, which is subject to both province-wide regulatory regimes and additional requirements that reflect its unique geography.

- The *Ontario Water Resources Act, 1990* as amended by the *Safeguarding and Sustaining Ontario's Water Act, 2007*, bans transfers of water from one Great Lakes watershed to another except under strictly regulated conditions. This is a challenge for the Region, because it straddles the Lake Huron (Simcoe) and Lake Ontario watersheds. The Region has received permission to transfer no more than 105 million litres a day of water, and must meet ongoing conditions for this transfer.
- A protection plan released under the province's *Lake Simcoe Protection Act, 2008*, aims to reduce contaminants in Lake Simcoe and its watershed. The plan puts more stringent limits on discharges from existing water resource recovery facilities (formerly called wastewater treatment plants), including several operated by the Region, in the Lake Simcoe watershed.
- The province's *Oak Ridges Moraine Conservation Act, 2001* and *Greenbelt Act, 2005* are intended to reduce pressure on natural and agricultural lands in the Greater Golden Horseshoe Area. As a large portion of the Region's lands are located within the Oak Ridges Moraine and Greenbelt, these Acts have significant implications on development and water and wastewater infrastructure planning. Specifically, the Oak Ridges Moraine Conservation Plan prohibits "partial servicing" of water or wastewater (except in very limited circumstances) and the Greenbelt Plan restricts the extension of lake-based water and wastewater servicing.
- The province's *Clean Water Act, 2006* introduced the new regulatory tool of source water protection, to safeguard Ontario's drinking water resources. The Region is recognized for its leadership in establishing the first Risk Management Official in the Province and for preparing and implementing Source Water Protection efforts for the two watersheds that lie within its boundaries.

These requirements are very important considerations for the Region in planning its future water and wastewater services.

How the Master Plan Update Is Being Carried Out

All municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EAA). The Municipal Engineers Association Municipal Class Environmental Assessment (the "Class EA") is an approved planning process that municipal proponents can use in order to meet the requirements of the EAA. The Class EA process allows for the evaluation of the environmental effects of alternatives to a project and alternative methods of carrying out a project. It includes mandatory requirements for public consultation and/or notification and expedites the environmental assessment process for municipal projects that are similar in nature, carried out routinely, have a predictable range of environmental effects, and are



responsive to mitigating measures. Municipal water and wastewater projects are covered by the Class EA process.

The Municipal Class EA, Appendix 4, section 4.1 states that “Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or groups of related projects in order to outline a framework for planning for subsequent projects and/or developments.” Section 4.3 notes “whereas a Master Plan does not require approval under the EAA (unless conducted as an individual EA), specific projects identified within the Master Plan must fulfill all appropriate Class EA requirements.

York Region is following the first approach for Master Plans (per Appendix 4 of the Municipal Engineers Association Municipal Class Environmental Assessment document, 2000, as amended “Municipal Class EA”.) This Approach involves the Master Plan being completed at a broad level of assessment and a proponent undertaking more detailed investigations at the project-specific level as required in order to fulfil the Municipal Class EA consultation and documentation requirements for the specific projects identified within it.

After completion of the Master Plan, Schedule A projects may proceed directly to Phase 5 – Implementation. Schedule A+ projects may proceed to Phase 5 – Implementation, following public notification required by the Municipal Class EA process. Schedule B and C projects will require subsequent assessment through a project-specific Municipal Class EA process. The Master Plan will become the basis for, and be used in support of, future investigations for the specific Schedule B and C projects within it. All Schedule B projects will require the filing of the Project File Report for public review, and all Schedule C projects will have to fulfil Phases 3 and 4 prior to filing an Environmental Study Report for public review. Projects that do not fall within the scope of the Municipal Class EA but are subject to the Environmental Assessment Act will be subject to an environmental assessment completed under Part II of the Act (referred to as a “full” or “individual” environmental assessment).

Schedule B and C projects will also be open to requests for an order to comply with Part II of the Environmental Assessment Act (i.e. a “Part II Order request”). A Part II Order request cannot be made for the Master Plan itself. The opportunity to request a Part II Order for the individual projects is available at the time of filing the applicable Project File Report or Environmental Study Report for public review.

This Master Plan Update followed the requirements under phases 1 and 2 of the Municipal Engineers Association master planning process including identification of the problem and the preferred servicing strategy alternative **(Figure ES.4)**.

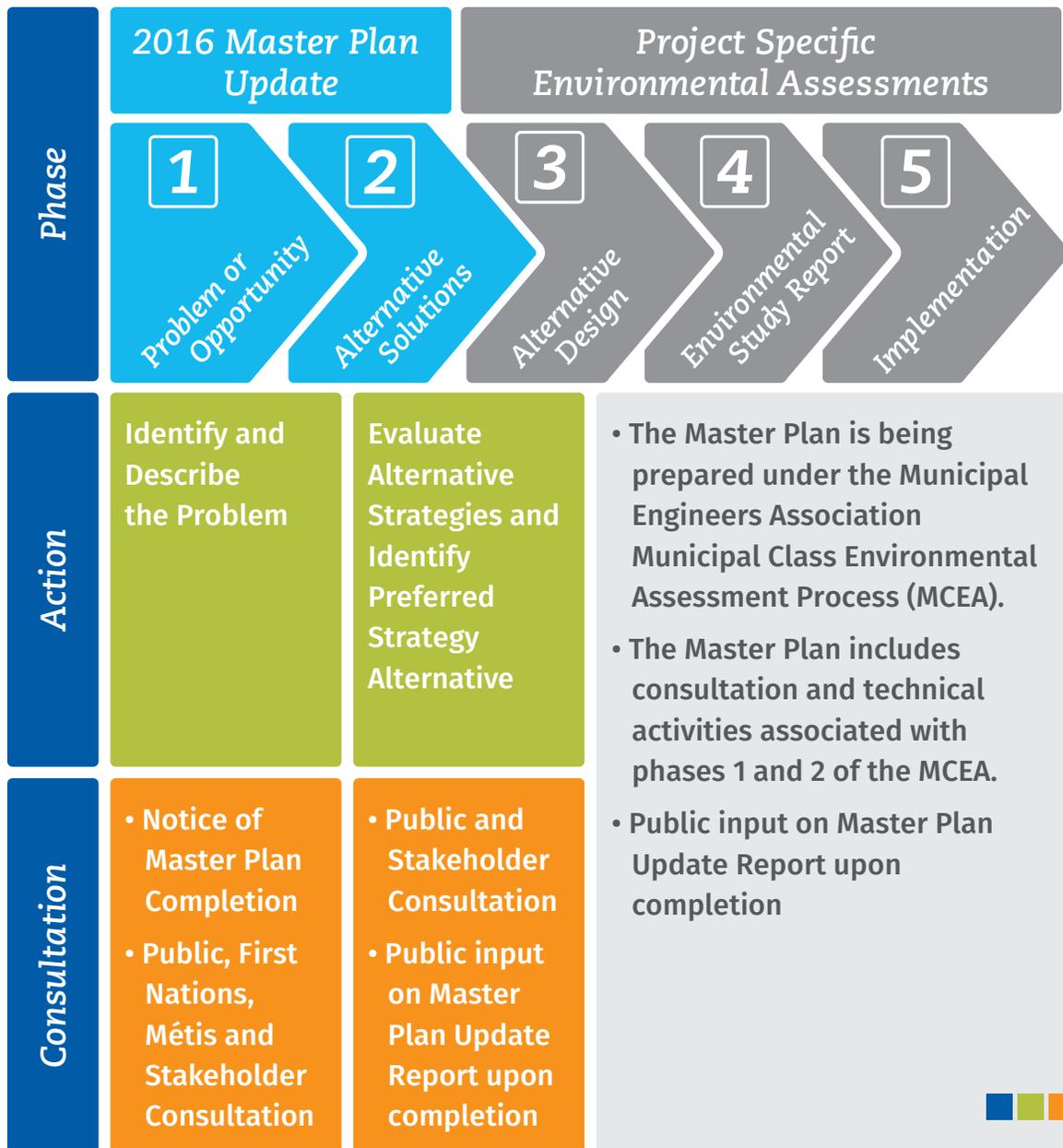


Figure ES.4 – Municipal Class Environmental Assessment Process for a Master Plan

Purpose of the Water and Wastewater Master Plan Update

The main purpose of the Master Plan Update is to determine the water and wastewater infrastructure requirements needed to support the revised growth forecasts identified in *Amendment 2 to the Growth Plan for the Greater Golden Horseshoe*, and to develop a long term strategy to ensure that York Region continues to serve its residents in an environmentally and economically sustainable manner.



Working with its nine local municipalities, community and government partners, York Region is updating the Master Plan through a Made-in-York **One Water** approach to achieve two key objectives:

Objective 1

Develop a cost-effective, resilient water and wastewater infrastructure plan to service future growth to 2041 and beyond

Objective 2

Develop an integrated, long-term strategy to provide sustainable water and wastewater services

Problem Statement

As part of the Municipal Class Environmental Assessment process, a Problem Statement has been identified for this Master Plan Update. The Problem Statement is defined as follows:

“In 2041, York Region’s population and employment are expected to reach 1.79 million and 900,000, respectively. This growth will strain existing water and wastewater systems and require new infrastructure and servicing strategies in order to continue to provide safe, reliable and sustainable water and wastewater services.” ■■■



Preferred Servicing Strategy Alternative and Infrastructure Plan

The Master Plan Update explored options to achieve **Objective 1 - Develop a cost effective, resilient water and wastewater infrastructure plan to service future growth to 2041 and beyond**. Opportunities and challenges of various options and concepts were studied. Options and concepts deemed unfeasible were eliminated.

Figure ES.5 outlines the approach taken to develop and evaluate servicing strategies beginning with the problem statement and individual servicing concepts.

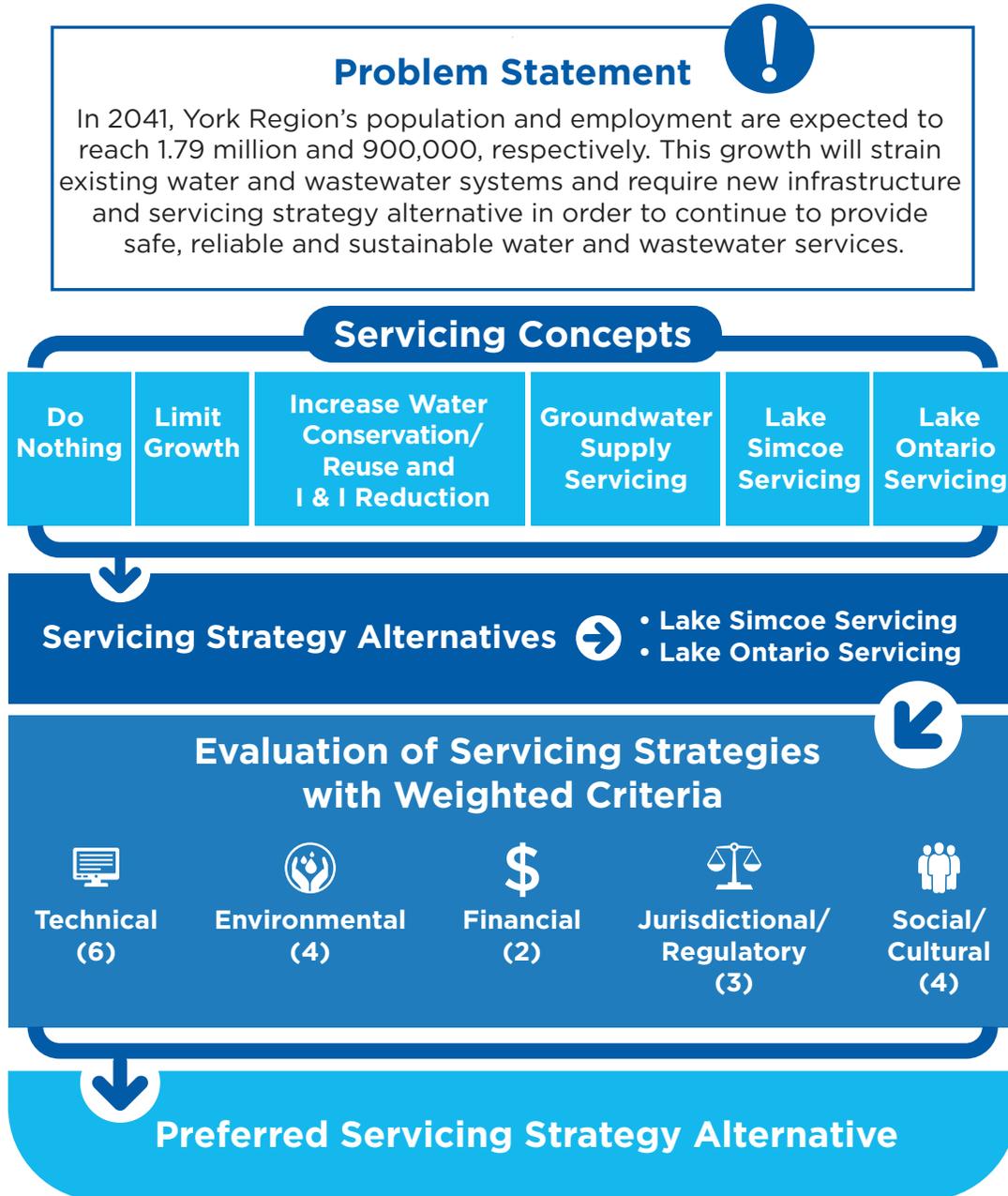


Figure ES.5 – Development and Evaluation of Servicing Strategy Alternatives



Two key servicing strategy alternatives were ultimately identified for further evaluation:

- **Lake Simcoe Servicing Strategy Alternative** would permit the flexibility of supplying a small portion of the incremental water demand forecasted in parts of East Gwillimbury (Holland Landing, Sharon and Queensville) and Newmarket with Lake Simcoe water, while the majority of supply for East Gwillimbury and Newmarket would continue to be from Lake Ontario. This would require construction of a new pumping station and a 6.5km watermain from Georgina to East Gwillimbury. It would also require an increase in the capacity of the Aurora East Water Pumping Station.
- A key feature of the Lake Simcoe strategy is that it completes the link to connect the Lake Simcoe and Lake Ontario water supplies, allowing for bi-directional flow which would provide a level of security in the event of a disruption to either supply.
- Supply of Lake Simcoe water to East Gwillimbury would be incremental and is projected to begin in 2041.
- **Lake Ontario Servicing Strategy Alternative** - would supply incremental water demand in Newmarket and parts of East Gwillimbury with Lake Ontario water only.

Detailed evaluation showed that the Lake Simcoe Servicing Strategy Alternative was preferable to the only other feasible option, which would be to use Lake Ontario-based water. Using Lake Simcoe water would enhance the Region's security of supply. It would also reduce energy needs for pumping and result in lower water age for the service area. Both options were very similar in cost.

Implementation of Lake Simcoe water supply to East Gwillimbury and Newmarket is projected to occur in 2041. Prior to implementation, this servicing strategy will be reviewed in subsequent master plans scheduled for 2021, 2026, 2031 and 2036. A Schedule C Class Environmental Assessment will also be undertaken to confirm the preferred water servicing strategy.

The wastewater servicing strategy is the same for both Lake Simcoe and Lake Ontario Servicing Strategies. The York Durham Sewage System (including the Peel diversion system) will continue to service Aurora, Markham, Richmond Hill, Vaughan, King City, Stouffville and the majority of Newmarket. East Gwillimbury and part of Newmarket will be serviced by the proposed Water Reclamation Centre as recommended under the Upper York Sewage Solutions Individual Environmental Assessment.

Communities currently serviced by stand-alone water and/or wastewater systems will continue to be serviced by stand-alone systems. These include Keswick and Sutton (Town of Georgina), Mount Albert (Town of East Gwillimbury), Ballantrae (Town of Whitchurch-Stouffville), Ansnorveldt, Nobleton and Schomberg (Township of King). Kleinburg Water Resource Recovery Facility will continue to service new developments up to its permitted capacity, after which all new developments will be serviced by the York Durham Sewage System.

The total cost of growth-related water and wastewater projects required to support 2041 population is \$3.1 billion. About 26 per cent is for water servicing and 74 per cent for wastewater servicing.



Recommended One Water Approach to Sustainability

Sustainability requires York Region to be environmentally and financially responsible while meeting the needs of growth and providing outstanding water and wastewater service. With the Master Plan Update, sustainability was a major focus for the Region. The Master Plan Update is committed to achieve:

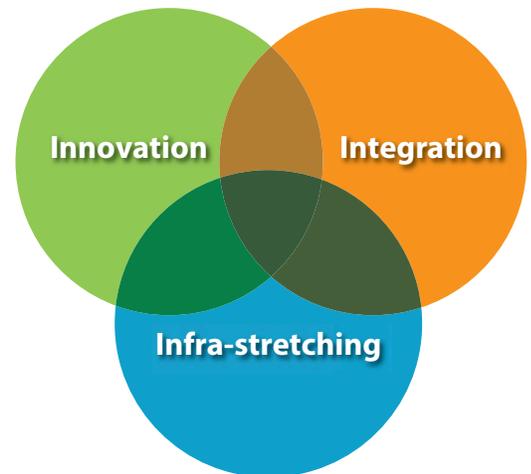
Objective 2

Develop an integrated, long-term strategy to provide sustainable water and wastewater services

Sustainability of any resource – natural, built or financial – is founded on stewardship. A central goal of the Region’s strategic plan is good stewardship of assets. Building on that stewardship concept, sustainability can be defined as *providing safe and reliable water and wastewater services* that:

- Minimizes the environmental impacts of *all* water and wastewater activities; and
- Is accountable to the people of York Region through the cost-effective design and delivery of services.

Together, these two requirements form the basis of an action plan to be developed under the Made-in-York One Water approach. The Made-in-York One Water approach is inspired by an emerging concept in the water industry with an aim to unlock the value of more innovative thinking and integrated decision making on water management and the water cycle. Through this approach, the Region is on route to capitalize on cross-functional *integration* benefits, practice *innovation* to realize the value of treated wastewater as a resource, and maximize the sustainable use of existing resources (referred as *infra-stretching* in this document).



The Made-In-York One Water Action Plan is a five year plan and will be updated in step with the Master Plan Update timeline. The goal is to proactively identify and implement actions today to set the stage for the Region to achieve Objective 2.

Six major action areas as listed below are considered to be instrumental to achieve Objective 2. Activities identified under each action area are to be implemented within the next five years. Progress and achievements will be monitored and tracked to inform action plan enhancements for the next Master Plan Update.

1. Implement the Long Term Water Conservation Strategy and Water Reuse
2. Implement Inflow and Infiltration Reduction
3. Enhance Integration of Asset Renewal with Growth Projects
4. Develop Climate Change Adaptation and Mitigation Strategies
5. Continue Energy Optimization and Renewable Energy Initiatives; and
6. Ensure Financial Sustainability.



Impact of Intensification Scenarios on Master Plan Update

In May 2016, the Province released the draft amendments to Places to Grow: Growth Plan for the Greater Golden Horseshoe, proposing the minimum intensification rate to be increased from 40 per cent to 60 per cent. Accordingly, a high level assessment of the implications of intensification on the Master Plan recommendations was undertaken. Results of the assessment show:

- The overall water and wastewater servicing strategy remains unchanged regardless of the intensification scenario under consideration.
- The overall servicing strategy detailed in the Master Plan is built upon long-term sustainability principles, which are applicable to all intensification scenarios.
- Non-infrastructure solutions including water conservation, inflow and infiltration reduction, and environment protection measures such as minimizing intra-basin transfer and promoting energy conservation are integral parts of the Master Plan Update servicing strategy and are equally applicable to all intensification scenarios.
- While there may be some longer term project timing changes for higher intensification scenarios, it is not expected that there will be any material impact to proposed projects planned for implementation within the next ten years.

Upon finalization of the preferred growth scenario, additional analysis will be completed. Any refinements to timing of specific infrastructure projects slated for implementation in the medium to long term will be made through the capital budget process, as well as reviewed and updated through the next Master Plan Update.

Conclusion and Next Steps

This report is a key milestone in updating York Region's Water and Wastewater Master Plan. It sets out a long-term strategy to ensure residents benefit from water and wastewater services that are safe, reliable and both environmentally and economically sustainable. Its foundation is the new One Water approach, which will reduce the need to build new infrastructure by making the best use of existing infrastructure, conserving water and creating markets to reuse treated water.

Moving ahead, the Region will develop a detailed One Water Action Plan which will lay out the steps it will take to address the six action areas and work with local municipalities, businesses, First Nations and Métis, Regional residents and other stakeholders to ensure the long-term sustainability of its water and wastewater services. Progress will be monitored until the next Master Plan Update in 2021.





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Appendix 1 Baseline Water and Wastewater System Update

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Chapter

1

Introduction

The Update



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 - 1.4.1 One Water Concept
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1.1 Why the Water and Wastewater Master Plan Is Being Updated

York Region has a successful history of effectively planning its water and wastewater services to meet long-term needs. A key element of good planning is to regularly update the Water and Wastewater Master Plan, which guides future capital projects. The most recent update was completed in 2009.

The current update discussed in this report addresses several changes since then, including revised long-term growth projections for the Region. In June 2013, a provincial amendment to the Growth Plan for the Greater Golden Horseshoe, an area that includes York Region, came into effect. It forecasts a residential population of 1.79 million and an employment population target of 900,000 for the Region by 2041. These targets represent an increase of just over 50 per cent from current population and job figures (Figure 1.1).

York Region's population is expected to grow from

1.16 million in 2015 **to** **1.79 million** in 2041

York Region's employment is expected to grow from

578 thousand in 2015 **to** **900 thousand** in 2041

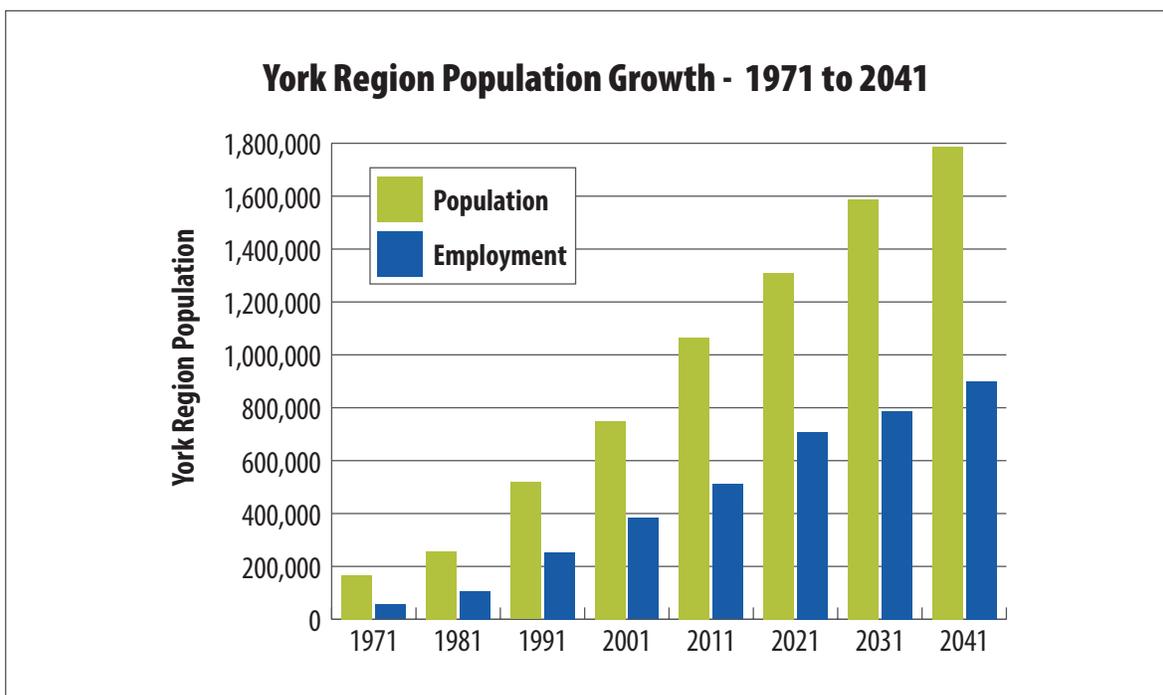


Figure 1.1 – Population and Employment Growth in York Region



As well as considering the impact of the new projection on water and wastewater needs, this update also responds to the Region’s continued commitment to environmentally sustainable growth, and to a number of key strategic directions set by York Region’s Vision 2051, which was approved by Regional Council in May 2012.

1.2 Purpose

The main purpose of the Master Plan Update is to determine the water and wastewater infrastructure requirements needed to support the revised growth forecasts identified in *Amendment 2 to the Growth Plan for the Greater Golden Horseshoe*, and to develop a long term strategy to ensure that York Region continues to serve its residents in an environmentally and economically sustainable manner.

Working with its nine local municipalities, community and government partners, York Region is updating the Master Plan through a Made-in-York **One Water** approach to achieve two key objectives:

Objective 1

Develop a cost-effective, resilient water and wastewater infrastructure plan to service future growth to 2041 and beyond

Objective 2

Develop an integrated, long-term strategy to provide sustainable water and wastewater services

1.3 Problem Statement

In view of the needs and directions described above, the Problem Statement for this Master Plan Update is defined as follows:

“In 2041, York Region’s population and employment are expected to reach 1.79 million and 900,000, respectively. This growth will strain existing water and wastewater systems and require new infrastructure and servicing strategies in order to continue to provide safe, reliable and sustainable water and wastewater services.” ■■■

1.4 Strategic Context

1.4.1 One Water Concept

The municipal water system has traditionally been thought of as several isolated fields. However as emerging issues that may affect our water supply continue to mount such as climate change and resource scarcity, it is becoming increasingly clear that we must acknowledge the interconnectedness of water in all of its forms and rethink our approach about managing it.

The One Water concept is a new way of thinking about our relationship with water. One Water is an approach that looks at the water system holistically and fosters a sustainable, integrated and innovative strategy for water resource management.



Figure 1.2 – One Water Approach

One Water provides the framework to develop an integrated, innovative strategy to ensure the long-term environmental and financial sustainability of the Region’s water and wastewater service delivery system.

The impact of One Water can be seen in the coordinated approach to water resource management including initiatives such as water reuse, resource recovery and inflow & infiltration reduction among others. These initiatives form part of the One Water approach and are explained in greater detail in Chapter 4.

The One Water approach builds on York Region’s Vision 2051 and 2015-2019 Strategic Plan.

The One Water approach is presented in **Figure 1.2**. The steps associated with developing the One Water Action Plan are presented in the outer ring, starting with preparation of a growth plan and culminating with the development of the One Water Action Plan, which brings together the

preferred water and wastewater servicing strategy with programs and other initiatives.

The inner rings highlight the Region’s programs, initiatives and action areas that form the core of the Region’s One Water Approach. Details on the One Water Action Plan can be found in Section 4.

1.4.2 Vision 2051

Approved by Regional Council in May 2012, Vision 2051 sets out a path for York Region to follow over the next decades to achieve its goal of creating strong, caring and safe communities.

Vision 2051 describes a York Region that:

- Is a place where everyone can thrive;
- Is made up of liveable cities and complete communities;
- Has a resilient natural environment and agricultural system;
- Has appropriate housing for all ages and stages;
- Has an innovation economy;
- Has interconnected systems for mobility;
- Promotes living sustainably; and
- Has open and responsive governance.



These eight goal areas set priorities that help guide York Region's decision-makers.

Of particular interest for the Water and Wastewater Master Plan Update, Vision 2051 highlights what sustainability means to York Region:



“By 2051, sustainability can be practiced in everyday life through climate resiliency, innovative water conservation and reuse, water resource protection, waste reduction, energy conservation and greenhouse gas reduction.”

One Water aligns with and advances these core elements of Vision 2051 by striving to provide cost-effective and sustainable water and wastewater services through innovation and integration. Climate resiliency, water conservation and reuse and energy conservation are concepts embedded in the One Water approach to ensure sustainability.

1.4.3 Corporate Strategic Plan

To achieve the long-term goals of Vision 2051, the Strategic Plan is developed as a roadmap emphasizing the Region's priorities over each four-year term of Regional Council. In 2014, Council adopted the 2015-2019 Strategic Plan.

Key Strategic Plan objectives include:

- Protecting public health by ensuring that we continue to provide water that meets all relevant standards;
- Optimizing critical infrastructure by making smart investments in water and wastewater systems; and
- Being good stewards of the Region's assets by improving approaches to managing water and wastewater infrastructure.



The made-in-York One Water approach to optimize use of built infrastructure and integrate planning for growth and asset renewal projects supports the objectives of this Strategic Plan.



1.5 An Integrated Approach to Updates

Managing growth calls for effective strategies to guide Regional activities now and in the future. In recognition of this need, the Region undertook an integrated process to update three long-term plans, each of which is integral to ensuring growth in population and employment is effectively managed:

- **York Region Official Plan:** Outlines policies to guide growth, economic, environmental and community planning decisions;
- **Transportation Master Plan:** Is the blueprint for addressing the Region's transportation and mobility needs to address current demands and accommodate future growth; and
- **Water and Wastewater Master Plan:** Is the blueprint for addressing the Region's water and wastewater system needs to address current demands and accommodate future growth. All water and wastewater projects are subject to the relevant objectives and policies of the York Region Official Plan.



As these three plans are closely related, staff from the Planning and Economic Development branch, Transportation Services and Environmental Services worked closely together and consulted extensively with local municipalities and other stakeholders. The goal was to ensure a coordinated approach to accommodating growth, especially by ensuring that necessary infrastructure is well-planned and delivered efficiently and effectively, at the right place and the right time.

Figure 1.3 shows the relationship of the plans to one another and to the Vision 2051 principles and how these plans influence local municipal planning and ultimately the services provided to residents and businesses in York Region.



Figure 1.3 – York Region’s Planning Roadmap

How the Water and Wastewater Master Plan serves York Region’s communities:

- A** **Vision 2051** - Vision 2051 is the blueprint for York Region’s future and helps guide us, ensuring we set a course today for the future we desire by the year 2051.
- B** **York Region Official Plan (ROP)** - The ROP enables Vision 2051. It is the policy framework that describes how York Region plans to accommodate future growth and development while meeting the needs of existing residents and businesses. It sets out directions and policies that guide economic, environmental and community planning decisions over the next 25 years and beyond.
- C** **Water and Wastewater Master Plan (WWMP)** - The WWMP puts the policies and growth forecasts of the ROP into an action plan for delivery of a water and wastewater servicing strategy to support new and existing communities over the next 25 years and beyond. It integrates social, environmental and financial sustainability principles.



- D Transportation Master Plan (TMP)** - The TMP puts policies and growth forecasts of the ROP into an action plan addressing transportation and mobility needs of those living and working in York Region over the next 25 years and beyond. It guides planning and investing in York Region’s transportation network, including Regional roads, York Region Transit (YRT/Viva) and cycling and walking facilities.
- E Local official plans and secondary plans** - These local municipal plans apply York Region’s vision, policies and plans to the local context. They provide detailed land use planning direction in accordance with the ROP and direct cost-effective design, investigation and evaluation of transportation and water and wastewater infrastructure projects.
- F Plans of subdivisions, condominium and site plans** - These plans implement Regional and local plans and policies to build and provide infrastructure for our communities.
- G In Your Home** - The ROP, WWMP and TMP help provide essential services to our residents and businesses, including community centres, parks, schools, local transit, cycling, taps and toilets

1.6 Municipal Class Environmental Assessment Process

All municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EAA). The Municipal Engineers Association Municipal Class Environmental Assessment (the “Class EA”) is an approved planning process that municipal proponents can use in order to meet the requirements of the EAA. The Class EA process allows for the evaluation of the environmental effects of alternatives to a project and alternative methods of carrying out a project. It includes mandatory requirements for public consultation and/or notification and expedites the environmental assessment process for municipal projects that are similar in nature, carried out routinely, have a predictable range of environmental effects, and are responsive to mitigating measures. Municipal water and wastewater projects are covered by the Class EA process.

The Municipal Class EA, Appendix 4, section 4.1 states that “Master Plans are long range plans which integrate infrastructure requirements for existing and future land use with environmental assessment planning principles. These plans examine an infrastructure system(s) or groups of related projects in order to outline a framework for planning for subsequent projects and/or developments.” Section 4.3 notes “whereas a Master Plan does not require approval under the EAA (unless conducted as an individual EA), specific projects identified within the Master Plan must fulfill all appropriate Class EA requirements.”

The requirements under phases 1 and 2 are completed for master planning purposes under this Update. These phases will be revisited during subsequent assessments through the completion of the five phases of the project-specific Municipal Class EA process as necessary. **Figure 1.4** outlines phases of the Municipal Class Environmental Assessment process and their basic requirements.

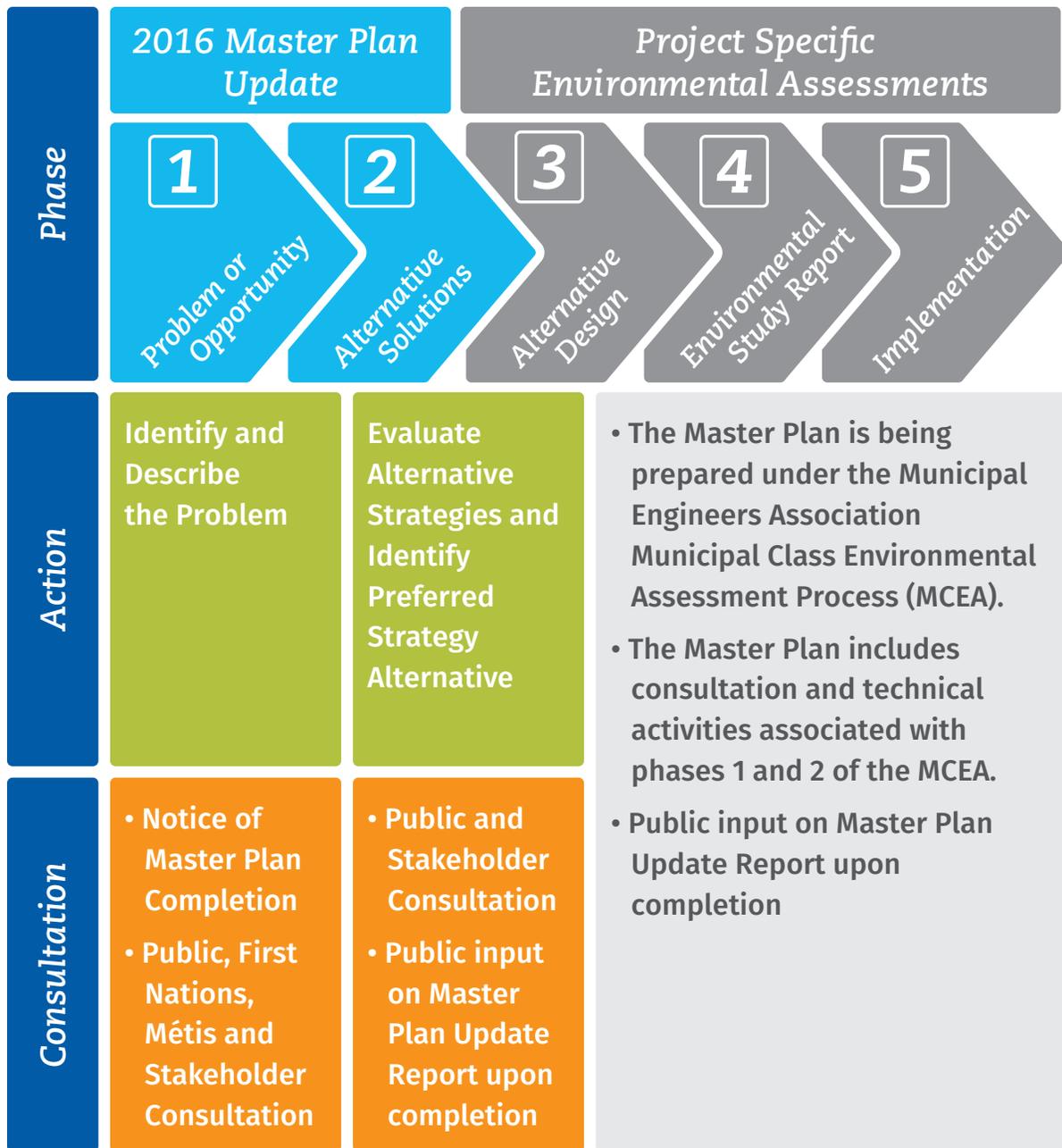


Figure 1.4 - Municipal Class Environmental Assessment Process for a Master Plan

This report sets out details of the Water and Wastewater Master Plan Update for the public record and is a required step in the process. It demonstrates how the update has addressed phase 1 (identifying the problem) and phase 2 (evaluating the options and recommending strategies).

York Region is following the first approach for Master Plans as per Appendix 4 of the Municipal Engineers Association Municipal Class Environmental Assessment document, 2000, as amended (Municipal Class EA). This Approach involves the Master Plan being completed at a broad level of assessment and a proponent undertaking more detailed investigations at the project-specific level as required in order to fulfil the Municipal Class EA consultation and



documentation requirements for the specific projects identified within it. The Master Plan will become the basis for, and be used in support of, future investigations for the specific projects within it.

After completion of the Master Plan, Schedule A projects may proceed directly to phase 5 – Implementation. Schedule A+ projects may also proceed directly to phase 5 following public notification as per the Municipal Class EA process.

All Schedule B projects will revisit Phases 1 and 2 of the Municipal Class EA and require the filing of the Project File Report for public review. All Schedule C projects will also revisit Phases 1 and 2 of the Municipal Class EA as well as completing Phases 3 and 4 prior to filing an Environmental Study Report for public review. Projects that do not fall within the scope of the Municipal Class EA but are subject to the Environmental Assessment Act will be subject to an environmental assessment completed under Part II of the Act (referred to as a “full” or “individual” environmental assessment).

Schedule B and C projects will also be open to requests for an order to comply with Part II of the Environmental Assessment Act (i.e. a “Part II Order request”). A Part II Order request cannot be made for the Master Plan itself. The opportunity to request a Part II Order for the individual projects is available at the time of filing the applicable Project File Report or Environmental Study Report for public review.

Follow-up environmental assessments, design and construction projects will avoid natural heritage features where possible. Where they cannot be avoided, effects will be minimized and every effort made to mitigate and/or compensate for adverse impacts.



1.7 Public and Stakeholder Consultation

The environmental assessment process requires consultation with the public, government agencies, First Nations and Métis communities and other stakeholders.

The Region developed and implemented an extensive consultation program to engage stakeholders and ensure feedback was taken into consideration. Throughout the update, collaboration was achieved among the Region, its local municipalities, residents and businesses, First Nations and Métis, neighbouring jurisdictions and regulatory and other agencies. Volume 4 of this report provides further details. **Figure 1.5** provides statistical detail on public and stakeholder outreach.



Figure 1.5 - Consultation Statistics

The purpose of consultation was to provide an overview of the Master Plan Update and how it would be carried out, communicate the challenges and possible solutions, highlight the evaluation process and recommended Servicing Strategy Alternative and collect feedback. The sections below provide more detail on specific elements of consultation.

1.7.1 Public Consultation

The communications component of the consultation program began with publication of the Notice of Study Commencement in July 2014 in local newspapers and on the Region's website and social media. It was also shared at that time with municipal representatives, agencies and other stakeholders.

Throughout the process, the Region also used social media (Twitter) and a dedicated web page on the York Region website (www.york.ca/wwmp) to provide up-to-date information. The web page was used to share master plan information including presentations, display



panels used at Public Consultation Centres, frequently asked questions, and links to other relevant information. It also included a video called “York Region is Planning for the Future” that the Region prepared for the joint updates of the Water and Wastewater Master Plan, Transportation Master Plan and Regional Official Plan.

York Region hosted three rounds of Public Consultation Centres over the course of the update, the first two of which were held in conjunction with the joint plan updates. The first round took place in November 2014 in Vaughan, Newmarket and Markham with a total of 172 attendees. A video of the Vaughan event was posted to the web page. The second round was held in June 2015 in Markham, Richmond Hill, Aurora and Georgina with a total of 139 attendees. The third round took place in January 2016 in Richmond Hill and Newmarket with a total of 54 attendees.

The public was provided opportunities to provide comments on comment sheets at each of the Public Consultation Centres and through a dedicated email address (watermasterplan@york.ca). The web page also offered an online survey.

The general response collected from participants of these sessions was positive:

- The Open House content was presented in a format that was easy to understand, providing participants with a good understanding of the objectives and servicing strategies.
- Participants support the One Water objectives and the recommended Lake Simcoe Servicing Strategy Alternative

In addition to general feedback, members of the public expressed interest in ensuring the Region takes several factors into consideration in updating the Water and Wastewater Master Plan. Some of these considerations include:

- Using innovative approaches to water and wastewater treatment
- Ensuring the quality and quantity of our water sources are protected
- Ensuring future population growth does not compromise services
- Ensuring environmental sustainability is considered in evaluating potential servicing strategies
- Ensuring Regional and local municipal staff are accountable both from a technical and from a financial standpoint



1.7.2 Government and Other Stakeholder Consultation

The Region held workshops and one-on-one meetings with local municipalities and government agencies to share findings, provide updates and receive feedback on proposed directions in the Master Plan Update.

The first workshop was held in October 2014 at the Region's Administrative Centre in Newmarket to introduce the master plan to municipal partners and government agencies. The second and final workshop was held with representatives from local municipalities in October 2015 at the Aurora Cultural Centre. At this workshop the Region provided an update on the project and sought input on the One Water approach to sustainability. Details of these workshops are available in Volume 4, Appendix 4 B.

The Region also held two rounds of one-on-one meetings with local municipalities to discuss the update and get their input. The first round was held in the spring of 2015. It covered the servicing concepts, preliminary servicing strategies and possible evaluation criteria for the environmental assessment process. The second round, in the fall of 2015, provided an update on the servicing strategy alternatives and the proposed infrastructure.

The Region met with the Ontario Ministry of the Environment and Climate Change, Toronto Region Conservation Authority and Lake Simcoe Region Conservation Authority in the spring and fall of 2015. These meetings were held to provide updates on the master plan approach and consultations as well as receive feedback. The Region also held two rounds of meetings with Building Industry and Land Development Association, in the summer of 2015 and in early 2016.

Table 1.1 provides additional details on consultation events held since the beginning of the update.



Table 1.1 - Consultation Event Summary

	Consultation Event	Date
Public	Public Open House #1 (Vaughan, Newmarket and Markham)	November 2014
	Public Open House #2 (Markham, Richmond Hill, Aurora and Georgina)	June 2015
	Public Open House #3 (Richmond Hill and Newmarket)	January 2016
	National Public Works Family Fun Day	May 23, 2015
	Canada Water Week	March 18, 2015 March 22, 2016
	World Town Planning Day	November 7, 2014 November 6, 2015
First Nations and Métis	York Region's Master Plans and Official Plan Updates - First Nations and Métis Consultation	June 19, 2015
	Water and Wastewater Master Plan Update Meeting with First Nations and Métis	February 18, 2016
Stakeholders	Water Conservation Advisory Committee Meetings	December 3, 2014 December 2, 2015
	Building Industry and Land Development Association (BILD)	June 23, 2015 February 12, 2016
Local Municipalities, Local Partners, and Agencies	Staff Meetings - Aurora	April 29, 2015 October 20, 2015
	Staff Meetings - East Gwillimbury	June 4, 2015 November 19, 2015
	Staff Meetings - Richmond Hill	May 25, 2015 October 26, 2015
	Staff Meetings - Newmarket	May 13, 2015 October 27, 2016
	Staff Meetings - Georgina	May 26, 2015 November 6, 2015
	Staff Meetings - Markham	May 12, 2015 November 3, 2015
	Staff Meetings - Whitchurch-Stouffville	June 5, 2015 November 16, 2015
	Staff Meetings - Vaughan	May 19, 2015 October 14, 2015
	Staff Meetings - King	June 3, 2015 November 12, 2015
	Presentation to City of Toronto Partnership Quarterly Meeting	August 20, 2015
	Presentation to York/Durham Region Capital Subcommittee	August 21, 2015
	Municipal Partners, Agencies and Conservation Authorities Workshop	October 29, 2014
	Municipal Partners Master Plan Visioning Workshop	October 9, 2015
	Staff Meetings with Ministry of the Environment and Climate Change	November 24, 2015 April 30, 2015
	Staff Meetings with Toronto and Region Conservation Authority	November 30, 2015 June 2, 2015
	Staff Meetings with Lake Simcoe Region Conservation Authority	December 7, 2015 June 2, 2015



1.7.3 First Nations and Métis Consultation

York Region respects and acknowledges its First Nation and Metis heritage. The Region seeks to exceed the Environmental Assessment Act's consultation requirements. First Nations and Métis have presence, interest and historical connections in the Region. These First Nations and Métis were all notified of the Master Plan Update and invited to all consultation sessions.

The project team began consultations with First Nations and Métis by notifying them of the commencement of the project. Follow-up correspondence was carried out in collaboration with the Transportation Master Plan and Regional Official Plan project teams.

The following First Nations and Metis communities were notified:

- Alderville First Nation
- Beausoleil First Nation (Christian Island)
- Chiefs of Ontario
- Chippewas of Georgina Island First Nation
- Chippewas of Mnjikaing First Nation (Rama)
- Curve Lake First Nation
- Henvey Inlet First Nation
- Hiawatha First Nation
- Huron-Wendat Nation
- Iroquois Confederacy/Haudenosaunee
- Kawartha Nishnawbe First Nation of Burleigh Falls
- Magnetawan First Nation
- Métis Nation of Ontario
- Métis National Council
- Mississaugas of Scugog Island First Nation
- Mississaugas of New Credit First Nation
- Mohawks of the Bay of Quinte
- Moose Deer Point First Nation
- Munsee-Delaware Nation
- Nipissing First Nation
- Oneida Nation of the Thames



- Six Nations of the Grand River Territory
- Union of Ontario Indians
- Williams Treaty First Nations
- Wahta Mohawks (Mohawks of Gibson)
- Wausauksing First Nation
- Ministry of Aboriginal Affairs
- Aboriginal Affairs and Northern Development Canada (now Indigenous and Northern Affairs Canada)

In June 2015, in conjunction with the second Public Consultation Centre, York Region partnered with the City of Markham to jointly host a workshop. The goal was to obtain First Nations and Métis input on the Regional Official Plan, Transportation Master Plan and Water and Wastewater Master Plan Update, and Markham's Future Urban Area. Discussion focused on the amount and pace of growth, water quality and environmental protection. The workshop also provided information on project status and provided First Nation and Métis leaders an opportunity to discuss and provide input on their concerns and issues related to water and wastewater services in York Region.

First Nations and Métis were again invited to a second meeting held in February 2016 as, in conjunction with the third Public Consultation Centre. The meeting provided another opportunity to update First Nations and Métis on the status of the project and receive their input.

1.7.4 Issues Identified and Addressed

The Region sought and received input from the public and stakeholders throughout the study and this input was used to guide the master planning process, including evaluating options.

Public input was also used directly in weighting the criteria for evaluating long-term water and wastewater servicing strategy alternatives. Please see subsection 3.7.3 in the report for more information on how public input was used in weighting the evaluation criteria.

A summary of the most common issues identified by members of the public, First Nations and Métis, local municipal partners, agencies and other stakeholders is provided in **Table 1.2**. A comprehensive summary of all comments and feedback received, and how the comments have been taken into consideration is presented in Volume 4.

Table 1.2 - Summary of Comments From Consultations on Master Plan Update

	Summary of Comment Heard	Consideration of Comment
Public	Future population and employment growth should not compromise services currently provided to existing residents or significantly increase the price of water	In October 2015, Regional Council approved the Water and Wastewater Financial Sustainability Plan (also referred to in this report as the Water Rate Study). The new water rates in the plan position the Region to achieve full cost recovery in 2021. See section 4.3.6 of the Master Plan for additional information.
	Find efficiencies to keep costs down	The Master Plan principles of integration, infra-stretching and innovation all provide opportunities to promote cost efficiency and environmental sustainability.
	Ensure the quality and quantity of our water sources are protected	The Region has prepared and implemented Source Water Protection efforts for the two watersheds that lie within its boundaries. See section 2.4 of the Master Plan Report for additional information.
	Ensure Regional and local municipal are accountable for their decisions both from a technical and from a financial standpoint.	Comment noted.
First Nations and Métis	Impacts from growth have a significant impact on the aquatic and terrestrial environment. The Master Plan must ensure protection and conservation of these natural environments including water quality and quantity and endangered species.	The Master Plan Servicing Strategy Evaluation Criteria includes criteria for natural and aquatic environment. Municipal Class Environmental Assessments which will be carried out for individual projects will also consider potential impacts in more detail. See section 3.7.2 of the Master Plan for additional information.
Local Municipalities, Local Partners and Agencies	Integrate long term infrastructure planning with asset management.	As part of this Master Plan and ten-year capital plan processes, the Region has adopted an integrated approach to programming and scheduling growth projects and asset renewal projects. See section 4.3.3 of the Master Plan for additional information.
	Incorporate best practices in Inflow & Infiltration reduction in design criteria (e.g. redesign of manholes – holes in manhole cover lids).	Comment noted.
	New infrastructure needs to accommodate for extreme weather conditions associated with climate change.	As part of the Master Plan Update the Region completed the Climate Change White Paper. The Master Plan is recommending incorporating climate change considerations into the risk management framework for water and wastewater infrastructure. See section 4.3.4 of the Master Plan.
	Will there be blending of Lake Simcoe and Lake Ontario water, when Lake Simcoe supply is implemented?	Yes, there would be blending of Lake Simcoe and Lake Ontario water. Further study on Lake Simcoe supply will be undertaken prior to its implementation including a Municipal Class Environmental Assessment and future master plan updates. A water quality assessment will form part of the Environmental Assessment study.
	Consider establishing an on-going collaborative working group (with representatives from CA's, LAMs, YR, MOECC) to assist in carrying forward policy and programming recommendations in between master plans.	Comment noted.
	Consider establishing a working group for all municipalities/counties/regions etc. that surround Lake Simcoe; to discuss what current and future activities mean to the lake as a whole and as a water resource.	Comment noted.





Chapter

2

Background and Context



In this chapter:

- 2.1 York Region Profile
- 2.2 A Unique Geography
- 2.3 Overview of Existing Water and Wastewater Systems
- 2.4 Regulatory Framework



2.1 York Region Profile

York Region is located in the Greater Toronto Area directly north of the City of Toronto. Covering 1,776 square kilometres, the Region is bordered by Lake Simcoe and Simcoe County to the north, Peel Region to the west and Durham Region to the east. It consists of nine local municipalities:

- Town of Aurora
- Town of East Gwillimbury
- Town of Georgina
- Township of King
- City of Markham
- Town of Newmarket
- Town of Richmond Hill
- City of Vaughan
- Town of Whitchurch-Stouffville

The Region is governed by a Regional Council and Chair drawn from these local municipalities. **Figure 2.1** shows the municipalities included in the Master Plan Update and key natural and man-made features.

The Region's central location in the Greater Toronto Area makes it part of Canada's most important economic area, one that includes more than six million people. Since its creation in 1971, the Region has seen strong growth. Its population in 2015 was an estimated 1.16 million, making it one of Canada's largest municipalities.

It is also home to one of the country's most highly educated and wealthy populations. After the City of Toronto, it is Ontario's second largest business hub, with more than half a million local jobs.

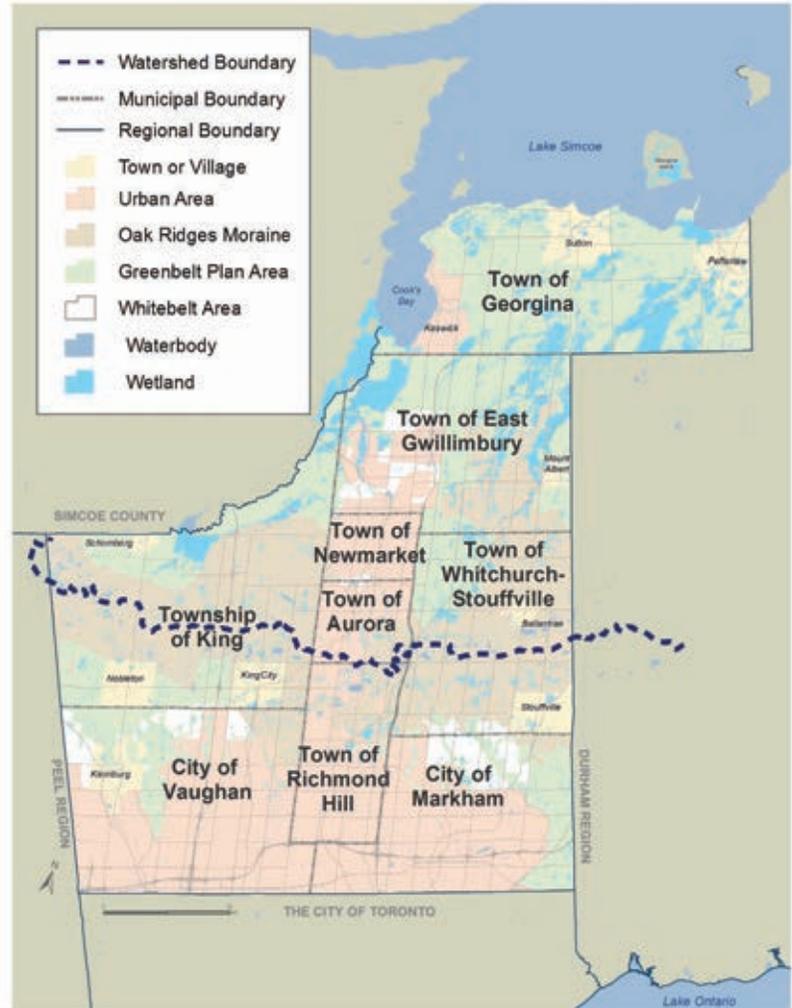


Figure 2.1 – Local Municipalities of York Region



2.2 A Unique Geography

The area that York Region covers has a rich cultural heritage, beginning with aboriginal hunting bands that first arrived in the area roughly 11,000 years ago and continuing with the travels of French explorers, settlement by Loyalists, and the arrival of successive waves of immigration. Today the Region's population is highly diverse, with residents reporting more than 200 distinct ethnic origins.

Underlying its built history is a unique physical geography that creates special challenges for York Region in providing water and wastewater services.

The Region's key major landform is the Oak Ridges Moraine, a height of land running east and west that separates two major watersheds. Streams and rivers in the northern portion of the Region flow to Lake Simcoe, which lies in the Lake Huron watershed, while those in the south drain to Lake Ontario. The moraine's underlying geology makes it an important source of groundwater recharge. Straddling two watersheds, it is the headwater source of 65 river systems. In the southern watershed these include the Don, Rouge and Humber rivers; and in the northern watershed, the Holland, Black and Maskinonge rivers.





The moraine is one of many significant natural land and water features within the Region. Where these provide habitat for species at risk, protection is required. The Region also includes extensive greenlands. The Regional Greenlands System is comprised of a number of core areas connected by corridors and linkages. Regional Official Plan policies aim to protect and enhance the key natural heritage and hydrologic features and functions within these areas. As noted in Section 2.2.1 of York Region Official Plan, key natural heritage features and key hydrologic features within York Region include:

- significant habitat of endangered and threatened species
- fish habitat
- wetlands
- Life Science Areas and Earth Science Areas of Natural and Scientific Interest
- Environmentally Significant Areas
- significant valleylands
- significant woodlands
- significant wildlife habitat
- sand barrens, savannahs and tallgrass prairies
- lakes and their littoral zones
- permanent and intermittent streams
- kettle lakes
- seepage areas and springs deemed vulnerable or sensitive surface water features
- Lake Simcoe Shoreline

Finally, York Region – unlike any other regional municipality in the Greater Toronto Area – does not border Lake Ontario, a major source of drinking water for southern Ontario.

These geographic features, as well as growth patterns, have determined to a large extent the shape of York Region's existing water and wastewater systems. Geography is also responsible for specific elements of the regulatory framework governing development in the Region including water and wastewater systems.

2.3 Overview of Existing Water and Wastewater Systems

As noted above, York Region is unique in that it is the only regional municipality in the Greater Toronto Area that does not have direct access to Lake Ontario. As a result, York has entered into long-term arrangements with neighbouring municipalities for most of its water and wastewater services.

As a Regional Municipality, the Region is the wholesale supplier of water to its nine local municipalities, responsible for bulk supply, treatment and storage. The Region has long-term agreements with Region of Peel and the City of Toronto for the supply of treated drinking water from Lake Ontario that together supply approximately 88 per cent of York Region's total demand. The balance comes from Lake Simcoe and regional groundwater wells. York Region's drinking water supply is therefore currently divided into several distinct systems: the Lake Ontario-based York Water System, the Lake Simcoe-based Georgina Water System and the various stand-alone groundwater well systems.



Figure 2.2 shows York Region’s current sources of supply. The existing infrastructure and related challenges associated with each are discussed in detail in the next chapter.

In its role as a wholesale provider of wastewater services, York Region collects wastewater from local municipalities and conveys it to treatment plants. It operates a complex system of trunk sewers, pumping stations and wastewater equalization tanks. It co-owns, with Durham Region, the Duffin Creek Water Pollution Control Plant in Pickering, which treats about 85 per cent of the Region’s wastewater, as well as part of the conveyance system to Duffin Creek. York Region also has an agreement with the Region of Peel for the treatment of roughly a further 10 per cent of the Region’s wastewater, from the City of Vaughan. Finally, York Region operates and maintains seven wholly-owned water resource recovery facilities (formerly called water pollution control plants), mainly in the northern part of the Region, that treat the balance.

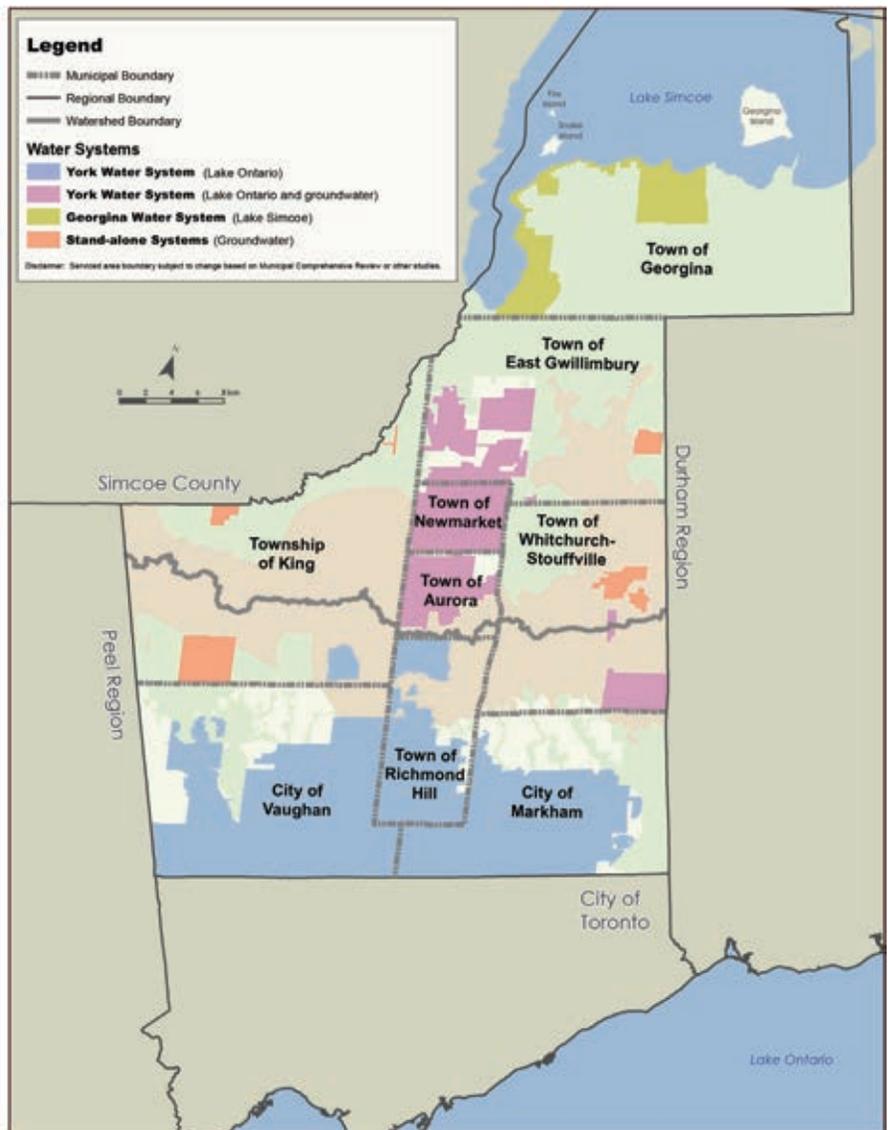


Figure 2.2 – York Region Sources of Supply in 2016

Parallel to the drinking water system, the Regional wastewater system also includes several components: the York Durham Sewage System, Georgina Wastewater System and the stand-alone facilities. **Figure 2.3** shows York Region’s current wastewater system. The existing infrastructure supporting each, and related challenges, are discussed in detail in the next chapter. A more detailed explanation of York Region’s existing Water System and Wastewater System can be found in the Baseline Water and Wastewater System Update report contained in Volume 1, Appendix 1.



Over the past ten years, York Region has invested more than \$3.7 billion in water and wastewater infrastructure, including:

- Sixteenth Avenue Trunk Sewer
- Extension of Lake-Based Water Supply to Aurora and Newmarket
- Lower Leslie Trunk Sanitary Sewer
- Duffin Creek Water Pollution Control Plant Stage 3 Expansion
- New Southeast Collector Trunk Sewer
- Leslie Street Sewage Pumping Station Upgrade
- Expansion of Keswick, Kleinburg, Mount Albert, Sutton stand-alone water resource recovery facilities and construction of a new facility in Nobleton

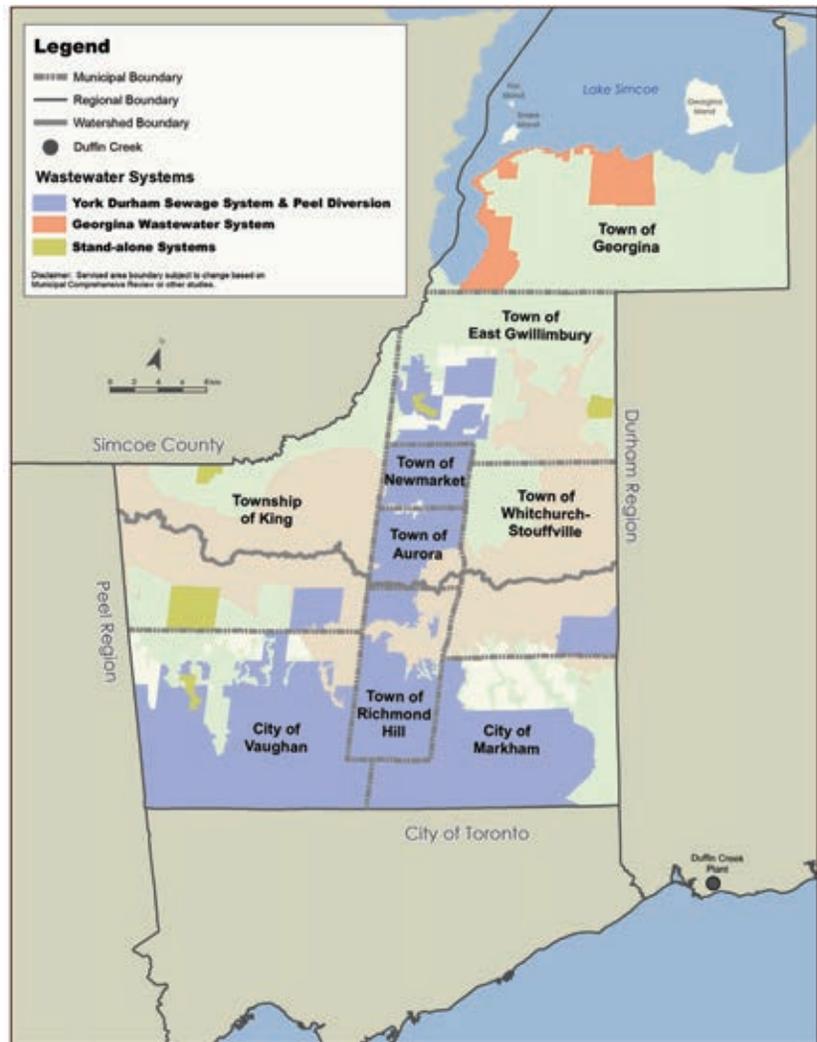


Figure 2.3 – York Region Wastewater Systems in 2016

These projects have been driven largely by the need to service growth, but asset rehabilitation and replacement are becoming increasingly important as the base of existing assets grows. As a result of these and earlier investments, the Region currently manages water and wastewater assets with an estimated replacement cost of \$5.3 billion.

A large majority of residents in York Region are connected to a municipal water and wastewater system. Large areas of land, however, are not served by a municipal system. Because these areas are mainly rural, the share of residents on private wells and/or septic systems is relatively small.



2.4 Regulatory Framework

One of the drivers of the Master Plan Update is York Region's need to meet current and emerging regulatory requirements. A variety of federal and provincial acts, regulations, guidelines and policies govern the delivery of water and wastewater services in the Region, either directly or indirectly by affecting development patterns. In addition, specific York Region projects such as the Southeast Collector Trunk Sewer are subject to specific requirements determined through the environmental assessment process. Some of the key regulatory requirements impacting the current Master Plan Update are provided herein.

Safe Drinking Water Act, 2002

The *Safe Drinking Water Act, 2002* provides the legislative framework for municipal drinking water systems. It establishes a set of province-wide standards, rules and regulations to ensure the population has access to safe reliable drinking water.

The Act specifies requirements for drinking water systems, testing services and the certification of system operators and water quality analysts including regulatory water quality standards and mechanisms for compliance.





Ontario Water Resources Act, 1990

The *Ontario Water Resources Act, 1990* as amended by the *Safeguarding and Sustaining Ontario's Water Act, 2007*, bans new or increased water transfers from one Great Lakes watershed to another (these are termed as intra-basin transfers). Exceptions are subject to strictly regulated conditions. This poses unique challenges to York Region because, as noted above, the Region straddles two Great Lakes watersheds and has an integrated water system.

In 2010, York Region successfully completed the Prior Notice and Consultation process and received provincial permission for the transfer of up to 105 million litres of water a day with return flow from the Lake Ontario watershed to Lake Simcoe (in the Lake Huron watershed). This places a limit on how much drinking water from Lake Ontario can be made available to meet needs in the northern part of the Region.



Lake Simcoe Protection Act, 2008

The **Lake Simcoe Protection Plan, 2009**, established under the *Lake Simcoe Protection Act, 2008* sets out provincial targets and policies for reducing phosphorus, pathogens and other contaminants in Lake Simcoe and its watershed. The **Lake Simcoe Phosphorus Reduction Strategy, 2010**, was subsequently developed to help meet the objectives of the Lake Simcoe Protection Plan and places specific limits on phosphorus discharge from existing water resource recovery facilities. These include the Region's facilities serving Schomberg, Holland Landing, Keswick, Mount Albert and Sutton.

York Region fully supports the plan while recognizing the challenges it creates, taking the lead in implementing state-of-the-art treatment technologies at several water resource recovery facilities. Examples include the membrane process at the Keswick facility, as well as the proposed water reclamation centre that would be part of the Upper York Servicing Solutions. The reclamation centre proposes to use highly advanced reverse osmosis treatment technology to serve growth in East Gwillimbury and parts of Newmarket, also freeing capacity for growth in Aurora in an expanded York Durham Sewage System.



Great Lakes Water Quality Agreement, 2012 and Great Lakes Protection Act, 2015

The Nutrients Annex (Annex 4) of the *Great Lakes Water Quality Agreement* has committed Canada and the United States to coordinating binational actions to manage phosphorus concentrations and loadings, and other nutrients if warranted, in the Great Lakes. The Agreement, among other measures, commits both countries to develop binational substance objectives for phosphorus concentrations, including loading targets and loading allocations for Lake Erie.





The **Great Lakes Protection Act, 2015** has been implemented to protect and restore the ecological health of the Great Lakes-St. Lawrence River Basin and create opportunities for individuals and communities to become involved in its protection and restoration.

All the York Region wastewater facilities discharge into the Great Lakes directly, through Lake Ontario and its tributary streams or through the Lake Simcoe (Lake Huron) watershed. As a result, the Act has the potential to increase wastewater requirements in York Region involving additional treatment technology. At present, neither the Act nor the Nutrients Annex have imposed additional requirements on York Region wastewater facilities. This may however change in the future and will be a consideration in ongoing water and wastewater master planning.

Oak Ridges Moraine Conservation Act, 2001, Greenbelt Act, 2005, and Places to Grow Act, 2005

The **Oak Ridges Moraine Conservation Act, 2001, Greenbelt Act, 2005** and **Places to Grow Act, 2005** each affect growth in York Region. The **Places to Grow Act, 2005** allows for the development of strategic growth plans to manage growth and development, while the **Oakridges Moraine Act, 2001** and **Greenbelt Act, 2005** both protect the moraine and other lands designated as part of the “greenbelt” within the Greater Golden Horseshoe Area. Their combined effect is to focus growth in existing urban areas.

The **Growth Plan for the Greater Golden Horseshoe, 2006**, developed pursuant to the **Places to Grow Act, 2005** is a framework for implementing the Province’s vision for building stronger, prosperous communities by better managing growth in the region and includes policies to guide infrastructure planning and strategic investment decisions to support forecasted population and economic growth. Among other elements, the growth plan requires that at least 40 per cent of all dwelling units built each year be located within the built-up urban area.



The **Oak Ridges Moraine Conservation Plan**, established under the **Oak Ridges Moraine Conservation Act, 2001** to provide land use and resource management for the Moraine and requires municipalities to prepare watershed plans, water budgets and water conservation plans to incorporate into their official plans. Development in wellhead protection areas and areas highly vulnerable to groundwater contamination is restricted. Limitations are also set on impervious surfaces in areas outside settlement areas.



The Oak Ridges Moraine Conservation Plan also prohibits expansion of partial services. Partial services are those in which a building is connected to:

- a. a communal or municipal wastewater/water service; and
- b. an individual, on-site wastewater/water system.



The **Greenbelt Plan**, established under the *Greenbelt Act, 2005* is intended to protect against the loss of agricultural land and provide permanent protection to natural heritage and water resource systems. Among other elements, the plan prohibits the extension of lake based water or wastewater systems into greenbelt areas not currently serviced by such a system. This prevents the expansion of the Lake Ontario-based System and the Lake Simcoe-based System into such greenbelt areas.

The policy on partial services and the restrictions on lake-based system expansion into greenbelt areas have a particularly significant influence on strategies for serving the Region's smaller communities in the greenbelt.

Provincial Policy Statement, 2014

The 2014 Provincial Policy Statement (PPS), issued under the Planning Act by the Ontario Ministry of Municipal Affairs and Housing, came into effect on April 30, 2014. It provides policy direction on matters relating to land use planning and development and applies to any land use planning decisions made under the Planning Act by municipal councils, local boards, planning boards, provincial ministers, provincial government and agency officials, including the Ontario Municipal Board. Municipal planning decisions are to be consistent with the policies of the Provincial Policy Statement.

The PPS includes policies relevant to water and wastewater infrastructure planning including the requirement that infrastructure be provided in a co-ordinated, efficient and cost-effective manner. Among other direction, the PPS also notes that the impacts of climate change shall be considered and the use of green infrastructure should be promoted in planning future growth.

Clean Water Act, 2006

The *Clean Water Act, 2006*, introduced source water protection for drinking water resources. Source water is untreated water in rivers, lakes and underground aquifers that is used to supply drinking water systems. Source water protection involves a "multi-barrier" approach to ensuring drinking water safety, and was recommended by a commission of enquiry after contaminated drinking water was responsible for the deaths of seven residents of Walkerton, Ontario, in 2000. The basic premise is simple: protecting drinking water at the source, before it enters the treatment system, is key to ensuring its safety.

There are 19 watershed-based Source Protection Regions (SPR) across Ontario. Within each, a local Source Protection Committee had the task of developing a plan to protect existing and future drinking water sources in their SPRs. The two watersheds in York Region, Lake Huron and Lake Ontario, fall respectively into the South Georgian Bay-Lake Simcoe SPR and the Credit Valley, Toronto and Region and Central Lake Ontario SPR, see **Figure 2.4**. York Region was represented on both Source Protection Committees.

The Source Protection Committees lead the development of Assessment Reports and Source Protection Plans for their respective SPRs. Source Protection Plans outline policies



to mitigate current drinking water threats and prevent new ones. York Region was to develop risk management plans specifying mitigation measures for properties where activities pose a “significant drinking water threat”, as defined by the Clean Water Act, 2006. For Lake Ontario supplies, the Ontario Ministry of the Environment and Climate Change was required to work with industries identified as posing significant threat to ensure adequate spill prevention measure and spill response were in place.

Land use planning policies to prevent new, significant threats within vulnerable areas are being implemented by local municipalities.

Source protection work identified a moderate risk across York Region regarding the quantity of groundwater available. Policies were drafted to ensure recharge is maintained and water taking is sustainable. Municipalities also must ensure development does not reduce recharge, mainly through low-impact development techniques for stormwater management. Off-site compensation is permitted where recharge on site cannot be maintained.

York Region’s Official Plan, planning decisions and Municipal Class EA projects such as water and wastewater infrastructure projects must conform to the policies in the Source Protection Plans that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

York Region created the Source Water Protection Incentive Program to manage and reduce identified risks to municipal drinking water sources. Properties with risks to drinking water sources are eligible for projects funded at 85 per cent of the project’s total cost to a maximum of \$10,000, including applicable taxes. Properties are limited to a maximum total of \$25,000 for all eligible projects over the life of the program. After eligibility is confirmed, a funding agreement is drafted based on competitive cost estimates.



Information on the Source Protection Regions, including the applicable Source Protection Plans and Assessment Reports can be found online:

- South Georgian Bay-Lake Simcoe Source Protection Region at www.ourwatershed.ca
- Credit Valley, Toronto and Region, and Central Lake Ontario Source Protection Region at www.ctcswp.ca

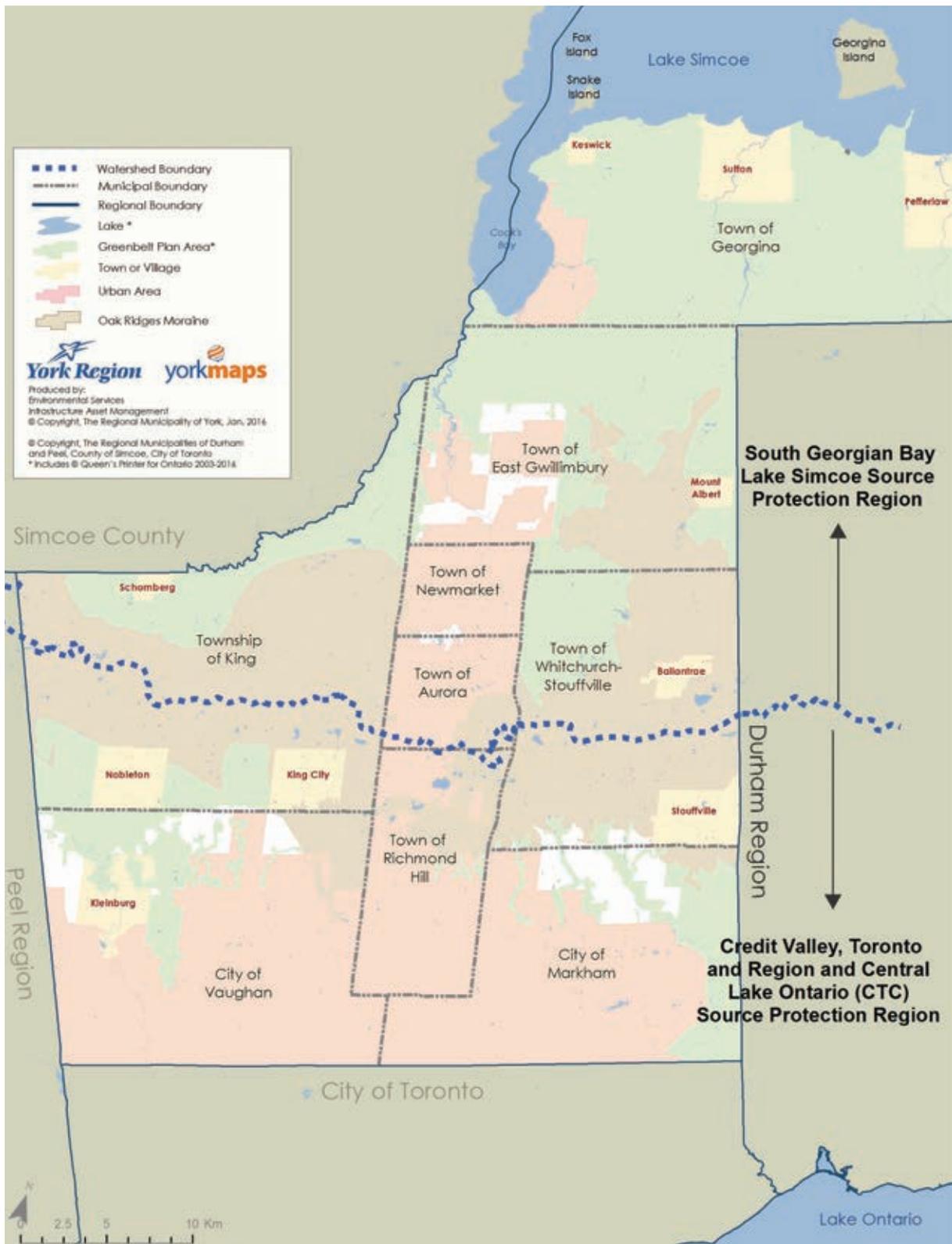


Figure 2.4 –Source Protection Regions in York Region



Chapter **3** | **Servicing Growth** Opportunities and Challenges

In this chapter:

- 3.1 Turning Challenge of Growth into Opportunity
- 3.2 A One Water Approach to Service Growth
- 3.3 Population and Employment Growth Forecasts
- 3.4 Improving Water Demand Forecasts
- 3.5 Improving Storm Forecasts
- 3.6 Baseline Water and Wastewater System
 - 3.6.1 Drinking Water
 - 3.6.2 Wastewater
- 3.7 Development & Evaluation of Servicing Strategy Alternatives
 - 3.7.1 Servicing Concepts Screening
 - 3.7.2 Servicing Strategy Alternatives
 - 3.7.3 Servicing Strategy Evaluation
- 3.8 Preferred Servicing Strategy Alternative



3.1 Turning Challenge of Growth into Opportunity

The most important consideration for the Master Plan Update is the new provincial growth forecast for the Region. The Province’s forecast was converted into the Region’s growth plan.

The growth plan would see residential population increase by just over 50 per cent from the current 1.16 million to 1.79 million.

Master Plan Objective #1:

Develop a cost effective, resilient water and wastewater infrastructure plan to service future growth to 2041 and beyond.

Specific growth forecasts for each local municipality are shown in **Figure 3.1**.

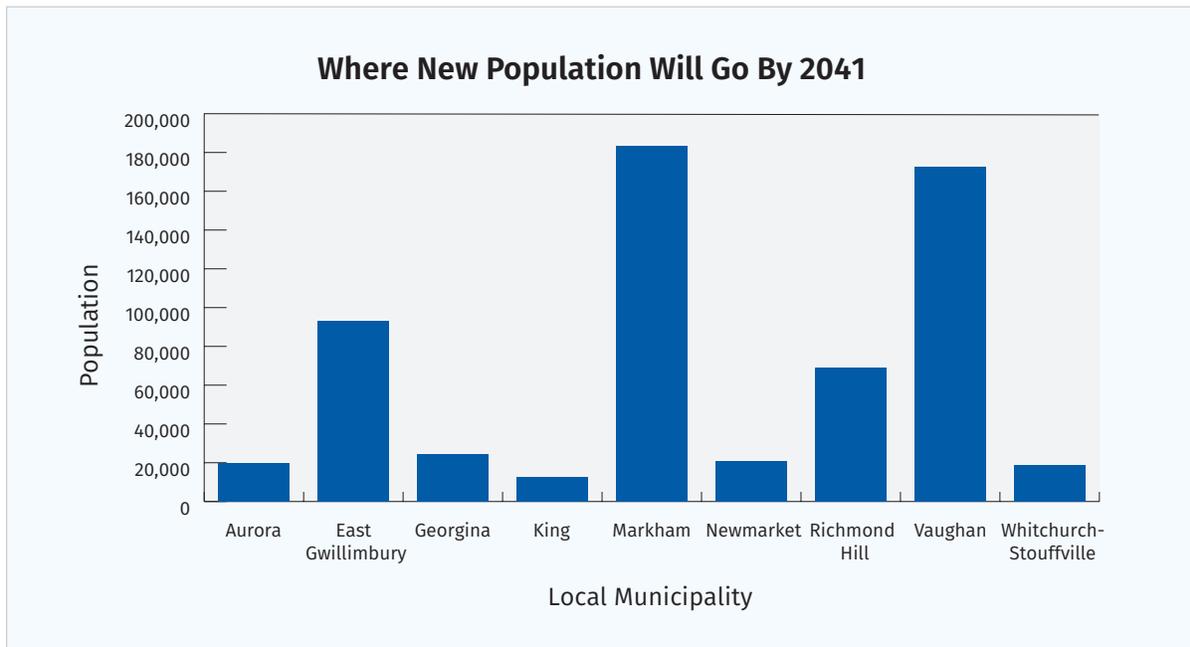


Figure 3.1 - Population Forecast

The update therefore focused on how best to deliver services to accommodate growth across the Region given environmental, technical, financial and other considerations.



3.2 A One Water Approach to Service Growth

The challenges of growth present York Region with an important opportunity. Traditionally, solutions for servicing growth have focused solely on infrastructure expansion. Through a made-in-York One Water approach introduced in this Master Plan, York Region is meeting that objective.

One Water is also inspiring the Region to plan for a future that is more sustainable and less dependent on simply adding new infrastructure in step with population growth. Over the past few years, the Region has embarked on new, innovative and sustainable approaches to meet its future growth need, including initiatives such as the Long Term Water Conservation Strategy and Inflow and Infiltration Reduction Strategy. Additional information can be found in Section 4.

These initiatives have had a tangible impact on the Region’s infrastructure planning process. Per capita water demand for example has been decreasing steadily over the last decade, resulting in significant water savings that translate into more efficient use of infrastructure, lower energy consumption and fewer greenhouse gas emissions. This can be seen when comparing the York water system total average day demand projection from 2009 with the current projection. The difference between these two projections, and the associated water savings realized as a result, are shown in **Figure 3.2**.

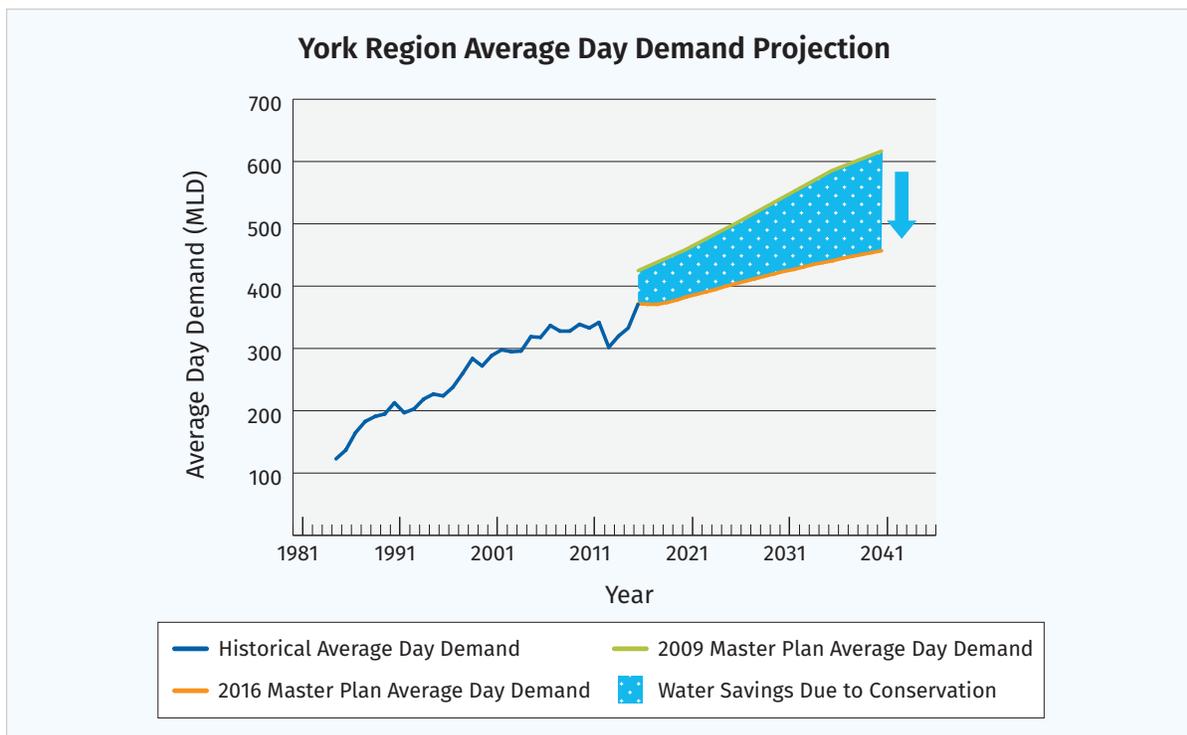


Figure 3.2 - Average Day Demand Projections

This reduction in long-term demand reduces the need for additional capacity-related infrastructure. One Water leverages these experiences to provide guidance for the master planning process. Chapter 4 provides more detail on this innovative approach to managing growth in more sustainable ways and sets out the One Water Action Plan that will make it a reality.



3.3 Population and Employment Growth Forecasts

Tables 3.1 and 3.2 show respectively the assumed 2041 population and employment growth forecasts to 2041 used in this Master Plan Update.

Table 3.1 - Residential Population Forecast for 2041

Local Municipality	Current Population	Forecast Population (2041)	Per cent Change (%)	Portion of Regional Growth (%)
Aurora	56,600	79,000	39.6%	3.5%
East Gwillimbury	24,400	118,700	386.5%	14.9%
Georgina	47,300	71,300	50.7%	3.8%
King	24,400	37,900	55.3%	2.1%
Markham	346,900	535,100	54.3%	29.7%
Newmarket	85,900	108,200	26.0%	3.5%
Richmond Hill	205,100	277,900	35.5%	11.5%
Vaughan	320,800	497,400	55.0%	27.9%
Whitchurch-Stouffville	44,900	64,500	43.7%	3.1%
York Region	1,156,200	1,790,000	54.8%	100%

Note: Current population as of mid-year 2015

Table 3.2 - Employment Population Forecast for 2041

Local Municipality	Current Employment	Forecast Employment (2041)	Per cent Change (%)	Portion of Regional Growth (%)
Aurora	26,100	38,500	47.5%	3.8%
East Gwillimbury	9,700	45,100	364.9%	11.0%
Georgina	9,000	24,500	172.2%	4.8%
King	9,100	16,000	75.8%	2.1%
Markham	176,500	269,200	52.5%	28.8%
Newmarket	43,100	52,400	21.6%	2.9%
Richmond Hill	75,300	109,800	45.8%	10.7%
Vaughan	214,000	321,500	50.2%	33.3%
Whitchurch-Stouffville	14,800	23,000	55.4%	2.5%
York Region	577,600	900,000	55.8%	100%

Note: Current employment as of mid-year 2015



3.4 Improving Water Demand Forecasts

Preparing a reliable demand forecast is critical in converting the growth plan into actual servicing requirements (previously shown in **Figure 3.2**). The demand forecast coupled with the knowledge of existing baseline infrastructure capacities, as shown in Volume 1, Appendix 1 provides the basis of assessing new infrastructure requirements.

This Master Plan Update builds on the water demand forecast model that York Region developed as part of its Water Rate Study in 2015.

The forecast model is based on a regression analysis that takes into consideration historical demand data and the elasticity of water demand to various demand factors:

- Population growth;
- Climate;
- Response to water prices;
- Changes in fixtures and appliances (i.e. low flow);
- Urban density and housing types;
- Demand by business; and
- Conservation patterns and attitudes.

Forecasted water demand for York Region to 2041 is shown in **Figure 3.3**. The mean trend line predicts that demand will likely increase by about 20 per cent from 2016 to 2041. As total population is projected to increase by more than 50 per cent over this same period, this highlights the expected continuation of the trend in declining water demand per capita (i.e., average daily water use).

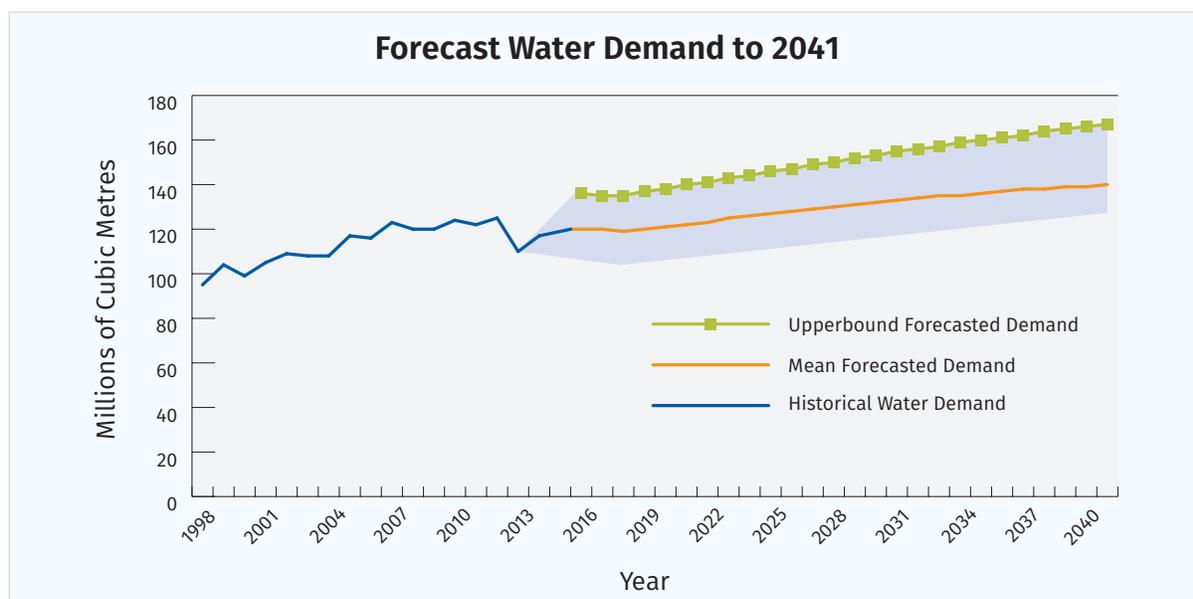


Figure 3.3- Forecast Water Demand to 2041



The light blue shaded band shows the 95 per cent confidence interval above and below the mean. Statistically, it can be expected that the outcome (in this case, actual demand) will fall within this band 95 per cent of the time. This wider range of possibilities is a reminder that all forecasts are subject to uncertainty. For the purposes of this Master Plan Update, the upper bound – that is, the highest predicted demand within the 95 per cent confidence interval – was used to assess and size new infrastructure requirements. This was done to ensure greater certainty that water supply would meet demand and that infrastructure is adequately sized. The upper bound of the forecast forms the basis of future demand expectations.

The forecast model will be reviewed and updated annually based on actual results, and the updates will inform projections used for infrastructure planning on an ongoing basis.

The forecasted water demand and associated populations were employed to calculate per capita design rates for the water and wastewater systems.

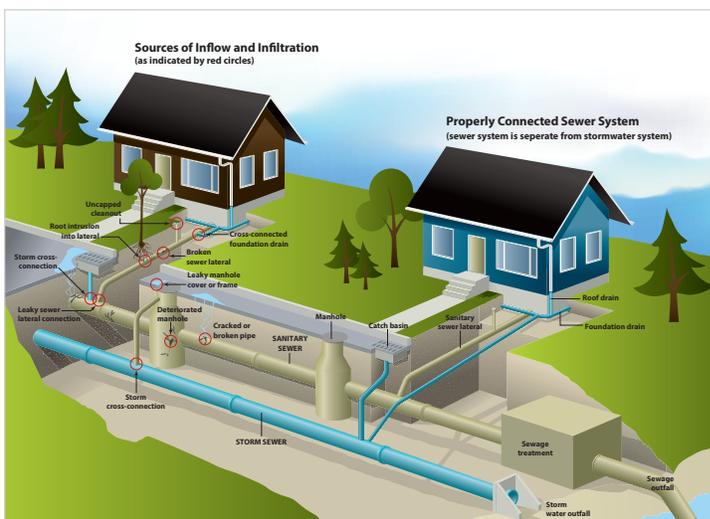
Table 3.3 highlights water demand rates to be used for infrastructure design for systems serving more than 25,000 residents or employees. Below that user population, average demand and the highest maximum day factor over the preceding five years are to be used. As discussed above, the design rates are based on the upper bound of the 95 per cent confidence interval.

Table 3.3 - Water Design Rates

Design Rate	Year					
	2016	2021	2026	2031	2036	2041
Residential	233	218	211	201	195	189
Employment	182	164	160	155	149	144

Notes: (1) Values are all litres per capita per day, or what an average person would use in a day
 (2) Maximum day demand is obtained by multiplying a factor that varies from 1.8 for the York Water System to a maximum of 2.7 for Stand-alone water systems to the above numbers

3.5 Improving Storm Forecasts



York Region’s sanitary sewer system are still influenced by wet weather flow. During periods of rainfall and snowmelt these flows find their way into the sewers via household connections such as roof leaders and footing drains as well as through deteriorated portions of the sewer system. The excess flows entering the sewers are collectively known as inflow and infiltration. Inflow and infiltration can rapidly overwhelm the sanitary system capacity resulting in basement flooding, and overflows.



The Region’s wastewater system is sized and designed to convey wet weather flow from a 25-year storm event. A 25-year storm event refers to a storm of such intensity that it would typically only happen once every 25 years.

For this Master Plan, the Region has adopted a new 25-year design storm that better represents its historical rainfall record and drainage basin size. The previous design storm was based on a model of rainfall distribution (Chicago method). The new design storm was derived based on an actual rainfall event and is considered more representative of the type of rainfall observed in the service area of the YDSS. This provides a more accurate picture of rainfall impacts on wastewater flow rates. The 25-year design storm rainfall distribution is presented in **Figure 3.4** below. Inflow and Infiltration flow rates for existing service areas are based on measured flow data and normalized to a 25-year design storm.

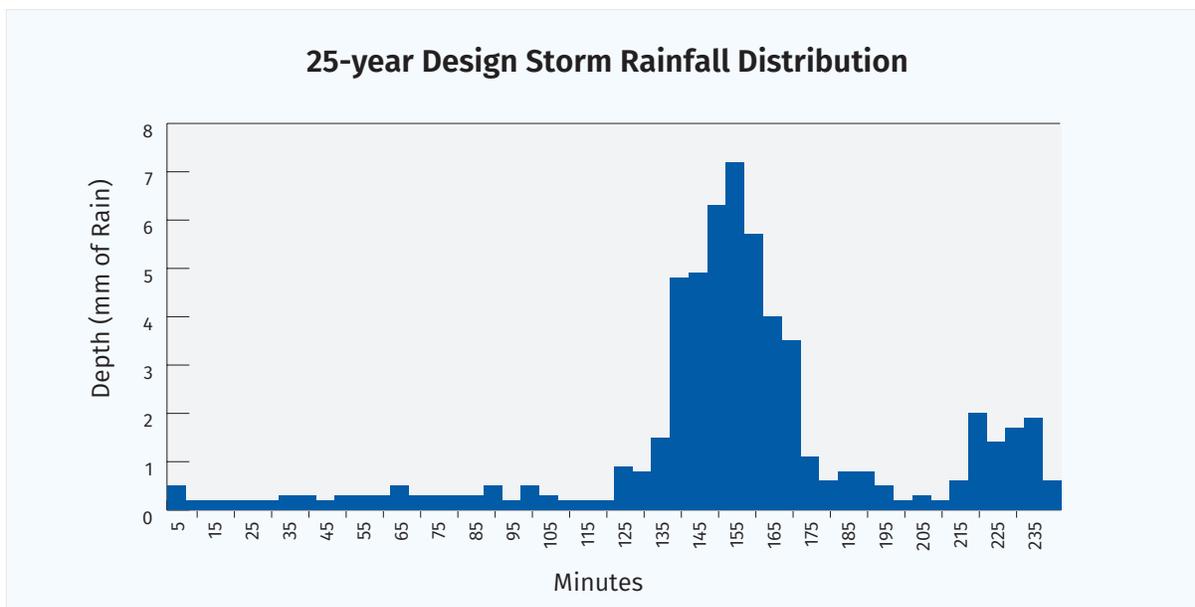


Figure 3.4 - 25-year Design Storm Rainfall Distribution

The design flow for the wastewater system is calculated as follows:

- Dry Weather Flows (Existing): Use dry weather flows as per calibrated model.
- Dry Weather Flows (Future): Wastewater generation rates for dry weather conditions are based on adding a groundwater base infiltration allowance of 90 litres per capita per day to the water design rates shown in **Table 3.3**.
- Wet Weather Flows (Existing): Generate flows through modelling by using a calibrated hydraulic model. Inflow and Infiltration flow rates for existing service areas are based on measured flow data and normalized to a 25-year design storm.
- Wet Weather Flows (Future): The wet weather flow rates for future service areas are derived by adding the domestic flow based on water design rates in **Table 3.3** to the Region’s inflow and infiltration flow hydrograph with a peak flow of 0.26 litres per second per hectare.



3.6 Baseline Water and Wastewater System

As a starting point for this Master Plan Update, the Region completed the Water and Wastewater System Update Report in May 2016. Appearing in Volume 1, Appendix 1, it provides an overview of existing water and wastewater systems and how they have changed since the 2009 Master Plan Update.

Volume 3, Appendix 3 A lists completed or ongoing Class Environmental Assessment studies since the 2009 Master Plan Update was completed. For the purposes of this Master Plan, “baseline systems” refers to all existing infrastructure and infrastructure under construction before June 2016.

The next ten years will see the Region implementing new projects, as planned in the Region’s ten-year capital plan and as identified through this Master Plan Update. This will include new works on the Upper York Sewage Solutions project in the north, as well as water and wastewater system expansion into new service areas and expansion of existing systems.

The following sections outline the baseline water and wastewater infrastructure servicing York Region and highlight future capacity increase requirements needed to accommodate growth.

3.6.1 Drinking Water

The baseline Regional water systems are shown in **Figure 3.5**. Service areas and pressure district maps can be seen in Volume 2, Appendix 2 C.

York Water System – Supply

The York Water System serves Aurora, parts of East Gwillimbury (Holland Landing, Queensville, and Sharon), King City, Markham, Newmarket, Richmond Hill, Stouffville, and Vaughan. Water is sourced from Lake Ontario through the City of Toronto and Region of Peel water systems, where it is blended with groundwater supplies from the Yonge Street Aquifer and Whitchurch-Stouffville wells. The York Water System service population is forecast to grow by 50 per cent from 2016 to 2041.

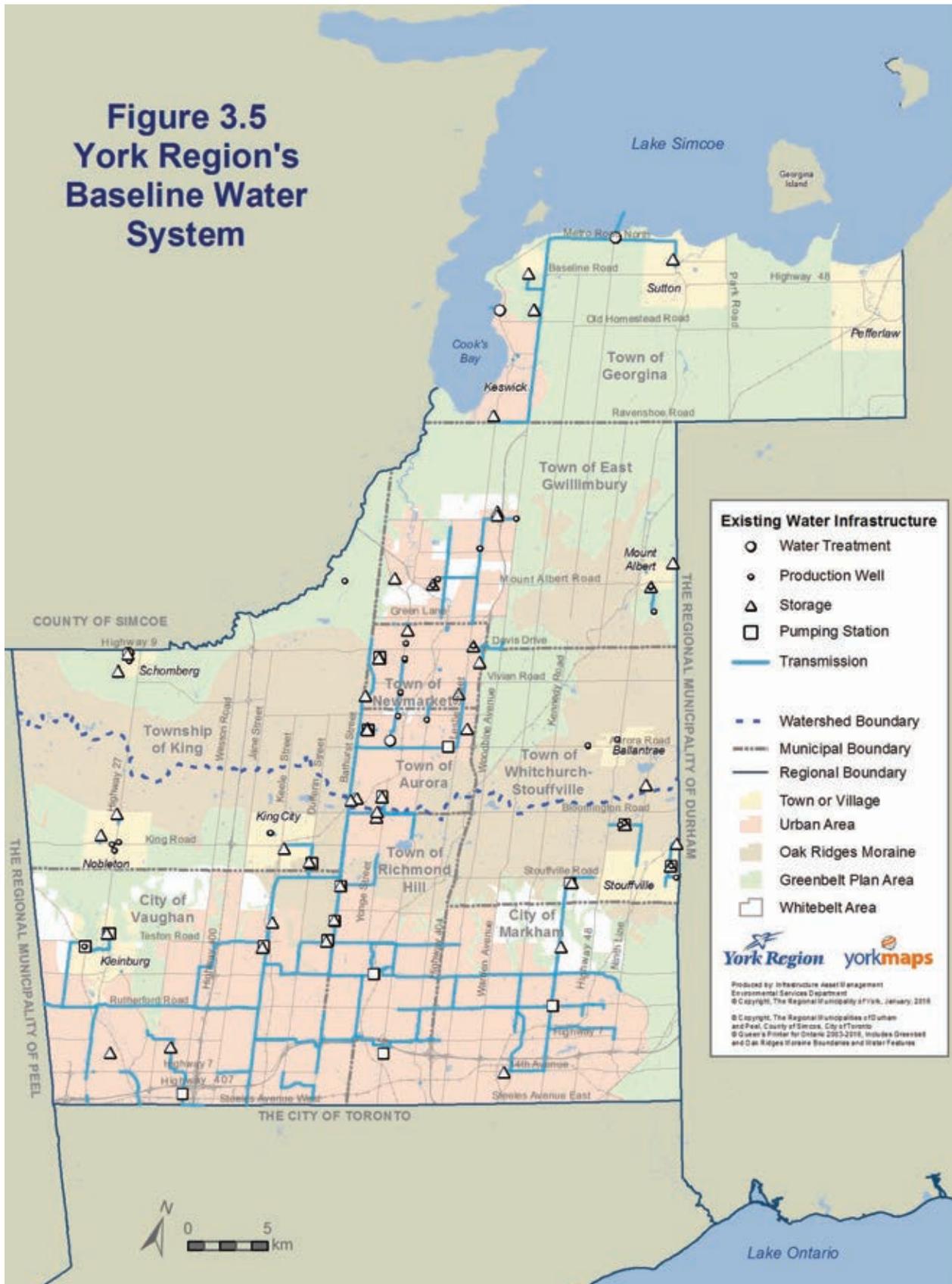


York Region has secured a maximum supply of 509 million litres a day from Toronto and 331 million litres a day from Region of Peel. Capacity of the Yonge Street Aquifer groundwater system is 62 million litres a day, with an annual average daily taking limit of 42 million litres a day. Capacity of the Stouffville groundwater system is 12 million litres a day.

Based on current groundwater supply capacity and the lake-based capacity secured through servicing agreements with Toronto and Peel, there is sufficient capacity to meet forecasted water demand in 2041. Please see Volume 2, Appendix 2 A for the York Water System Average Day Supply and Demand to 2041.



Figure 3.5
York Region's
Baseline Water
System





York Water System – Transmission

Aurora, Newmarket, parts of East Gwillimbury (Holland Landing, Queensville, Sharon).

Population in these communities will increase by 77 per cent from 2016 to 2041. Staged expansion of the existing transmission system will be needed to deliver the water supply these municipalities will require.

Markham. Expansion of the urban service area in northern Markham requires the extension of the Pressure District 7 system.

Intensification in areas between Yonge Street and Bayview Avenue near Highway 7 will require an upgrade to the Pressure District 6 system. The Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Schedule B Class Environmental Assessment completed in 2015 identifies works required to support growth in Richmond Hill Centre and Langstaff Gateway Urban Growth Centre. (See Volume 3, Appendix 3 A).

Richmond Hill. As mentioned above, intensification in areas between Yonge Street and Bayview Avenue near Highway 7 requires an upgrade to the Pressure District 6 system, as per The Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Schedule B Class Environmental Assessment completed in 2015.

Vaughan. Developments and/or expansion of urban service areas north of Teston Road, between Keele Street and Pine Valley Drive, require expansion of Pressure District 8 and 9 systems. The Northeast Vaughan Water and Wastewater Servicing Class Environmental Assessment is currently underway to determine the preferred solution. (See Volume 3, Appendix 3 A) Expansion of urban service areas in west Vaughan will require an upgrade of Pressure Districts 4 and 5 as well as the Kleinburg-Nashville water systems.

Whitchurch-Stouffville. Additional lake-based supply capacity will be needed to service growth in the Stouffville system to 2041. An optimization study is currently underway to identify the preferred solutions to provide the required additional supply and storage capacities in stages.

Georgina Water System

The Georgina Water System services the communities of Keswick, Sutton and Willow Beach. Water supply is provided through the Georgina and Keswick water treatment plants, which draw water from Lake Simcoe. Their current capacities are 30 million litres a day and 12 million litres a day respectively. The combined Permits to Take Water limit for these plants, issued by the provincial government, is a combined capacity of 68 million litres a day.

The serviced population in Georgina is forecast to grow by 50 per cent from 2016 to 2041. Future capacity needs could be met through expansion of the Georgina Water Treatment Plant within its existing Permit to Take Water limit. Please see Volume 2, Appendix 2 A for the Georgina Water System Max Day Supply and Demand.

Additional storage capacity will be required in the Sutton system.





Stand-Alone Systems

The Region also provides drinking water through five stand-alone groundwater-based systems. **Table 3.4** shows the stand-alone drinking water systems and their respective capacities.

Table 3.4 - Stand-alone Drinking Water Systems

Community	Capacity (million litres a day)
Ansnorveldt	0.3
Ballantrae-Musselman Lake	4.6
Mount Albert	5.0
Nobleton	4.5
Schomberg	5.4

These systems were designed to support approved community plans. Ansnorveldt, Mount Albert and Schomberg drinking water systems have sufficient capacity to meet the approved community plans.

The Water for Ballantrae - Long-term Water Supply Schedule B Class Environmental Assessment currently underway will provide additional capacity in the Ballantrae water system through the revision of its Permit to Take Water.

The Nobleton water system requires additional capacity to service the planned community expansion to about 9,500 people.



3.6.2 Wastewater

The Regional baseline wastewater systems are shown in **Figure 3.6**. Service area maps can be seen in Volume 2, Appendix 2 C.

York Durham Sewage System – Primary System

The York Durham Sewage System – Primary System refers to the Duffin Creek Water Pollution Control Plant and the associated conveyance system co-owned by York and Durham Regions. It serves the Region’s local municipalities of Aurora, parts of King and East Gwillimbury, Markham, Newmarket, Richmond Hill, Whitchurch-Stouffville and Vaughan.

About 80 per cent of the current flow to the Duffin Creek plant comes from York Region. The plant was recently expanded to treat 630 million litres a day, but its capacity rating under the existing Environmental Compliance Approval is temporarily limited to 520 million litres a day subject to the Schedule C Class Environmental Assessment to Address Outfall Capacity Limitations at the Duffin Creek Water Pollution Control Plant being completed.

The population served by the YDSS Primary System is forecasted to grow by 57 per cent from 2016 to 2041. The plant’s hydraulic capacity can meet this need subject to addressing the outfall constraint. Review is also recommended to identify potential treatment process limitations as result of higher loadings before population growth reaches the design limit.

Additional detail on wastewater treatment capacity can be found in Volume 2, Appendix 2 A.



The Schedule C Class Environmental Assessment to Address Outfall Capacity Limitations at the Duffin Creek Water Pollution Control Plant has been completed to address the outfall constraint and is currently under review by the Ontario Ministry of the Environment and Climate Change. (See Volume 3, Appendix 3 A).

On the conveyance side, the primary trunk sewer that connects the main collector sewer (Southeast Collector) to the Duffin Creek plant will require a second conduit around 2031.

York Durham Sewage System – York Collection System



The York Collection System refers to the parts of the York Durham Sewage System wholly owned and operated by York Region.

A key facility in the York Durham Sewage System is the Leslie Street Sewage Pumping Station. The Station is expected to be completed before the end of 2017. Two new pumps were installed as part of the upgrade works with the remaining four pumps to be replaced by larger ones at a later date. The existing two forcemains are inadequate to convey the 2041 flow.

Markham. Expanding the urban service area in northern Markham requires extending the trunk sewer system from Sixteenth Avenue north to service the urban expansion area.

Intensification in areas between Yonge Street and Bayview Avenue, near Highway 7 requires expanding the trunk sewer system, as the existing Pomona Creek Sewer cannot accommodate flows from full build-out of its service area. Required works to support full build-out growth in the Richmond Hill Centre and Langstaff Gateway Urban Growth Centre have been identified in The Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Schedule B Class Environmental Assessment completed in 2015. (See Volume 3, Appendix 3 A)

Richmond Hill. As mentioned above, intensification in areas between Yonge Street and Bayview Avenue near Highway 7 requires expanding the trunk sewer system, as per the The Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Schedule B Class Environmental Assessment completed in 2015 (See Volume 3, Appendix 3 A).

Vaughan. Developing and expanding urban service areas north of Teston Road between Keele Street and Pine Valley Drive in northeast Vaughan will require extending and upgrading the Jane-Rutherford sewer system. A Class Environmental Assessment is underway to determine the preferred solution. (See Volume 3, Appendix A). In west Vaughan, an expansion of the trunk sewer system will be needed. The West Vaughan Sewage Servicing Environmental Assessment study completed in 2013 identified the need to build a new pumping station at the existing Humber Sewage Pumping Station site (replacing the existing pumping station) and construct



a new sewer along Highway 27 from the pumping station to the Kleinburg Water Resource Recovery Facility. (See Volume 3, Appendix 3 A).

Peel Diversion System

The York-Peel Servicing Agreement provides York Region with 53 million litres a day of wastewater treatment capacity in Peel Region, sufficient for projected 2041 needs. The Humber Sewage Pumping Station, however, which conveys wastewater to Peel, will require an expansion to increase capacity before 2041. The West Vaughan Sewage Servicing Environmental Assessment study recommended building a new pumping station at the existing pumping station site to address the capacity limits. The work is scheduled for completion in 2024. (See Volume 3, Appendix 3 A).

Georgina System

Georgina is served by the Keswick and Sutton Water Resource Recovery Facilities. Georgina is forecast to grow by 50 per cent from 2016 to 2041. Class Environmental Assessments completed in 2006 and 2010 identified ultimate capacity needs of 24.0 million litres a day for Keswick and 6.2 million litres a day for Sutton. (See Volume 3, Appendix 3 A). In addition, the High Street Sewage Pumping Station in Sutton would need to be expanded in complement with the increased capacity of the Sutton Water Resource Recovery Facility.

Aurora, Newmarket, East Gwillimbury

The communities of Aurora, Newmarket, and parts of East Gwillimbury (Queensville, Holland Landing and Sharon) are forecast to grow by 80 per cent from 2016 to 2041. The Upper York Sewage Solutions Environmental Assessment was completed in 2014 and is awaiting approval for the area that would be served by Upper York Sewage Solutions, which includes Queensville, Holland Landing, Sharon, Aurora and Newmarket (See Volume 3, Appendix 3 A). The preferred solution is to:

- Build a new water reclamation centre with a capacity of 40 million litres a day, to be implemented in two stages;
- Twin the existing Newmarket Sewage Pumping Station forcemain and Bogart Creek Sewage Pumping Station forcemain to continue to be serviced by the YDSS.

An additional expansion of the water reclamation centre beyond its initial 40 million litres a day capacity will be required to accommodate anticipated growth prior to 2041.

The Aurora Sewage Pumping Station forcemain ends at the Yonge Street Sewer near Bloomington Road. The Yonge Street Sewer is expected to be at capacity before 2041 due to increased flow from Aurora and Newmarket, and intensification along that section of Yonge Street. Conveyance capacity will need to be increased in that area.



Stand-alone Systems

Table 3.5 shows the Region’s five stand-alone wastewater facilities, their respective treatment system and capacity.

Table 3.5 - Stand Alone Wastewater Treatment Systems

Community	Treatment System	Capacity (MLD)
Holland Landing	Lagoon	1.36
Kleinburg	Water Resource Recovery Facility	2.87
Mount Albert	Water Resource Recovery Facility	2.04
Nobleton	Water Resource Recovery Facility	2.90
Schomberg	Water Resource Recovery Facility	2.05

The Holland Landing lagoon will be decommissioned upon completion of the new water reclamation centre in East Gwillimbury, currently scheduled for 2024. The Nobleton Water Resource Recovery Facility will require expansion to accommodate planned community expansion to about 9,500 people. Growth in Kleinburg beyond the existing capacity of its facility could be served by a connection to the trunk sewer system proposed by the West Vaughan Sewage Servicing Class Environmental Assessment - Environmental Study Report. Mount Albert and Schomberg Water Resource Recovery Facilities have sufficient capacity to meet the approved community plans.

3.7 Development & Evaluation of Servicing Strategy Alternatives

The Master Plan Update developed refined and evaluated potential servicing strategies to address the problem statement through a two stage process. Figure 3.7 provides an overview of the approach.

The first stage saw development of **Servicing Concepts**. Servicing Concepts are the various distinct techniques or tools available to the Region which could be used independently or in combination to address servicing needs at a conceptual level.

The second stage saw development of **Servicing Strategy Alternatives**. Servicing Strategies are an evolution of the concepts – a comprehensive, refined and feasible *approach* to fully address water and wastewater servicing needs. The Servicing Strategy Alternatives use and build upon each of the concepts and set out in detail the specific infrastructure needed to implement a given strategy. Each strategy describes the required type and sizing of infrastructure. Timing and sizing are based on capacity assessments of existing infrastructure and integrated with Transportation Master Plan projects and asset management initiatives where possible.

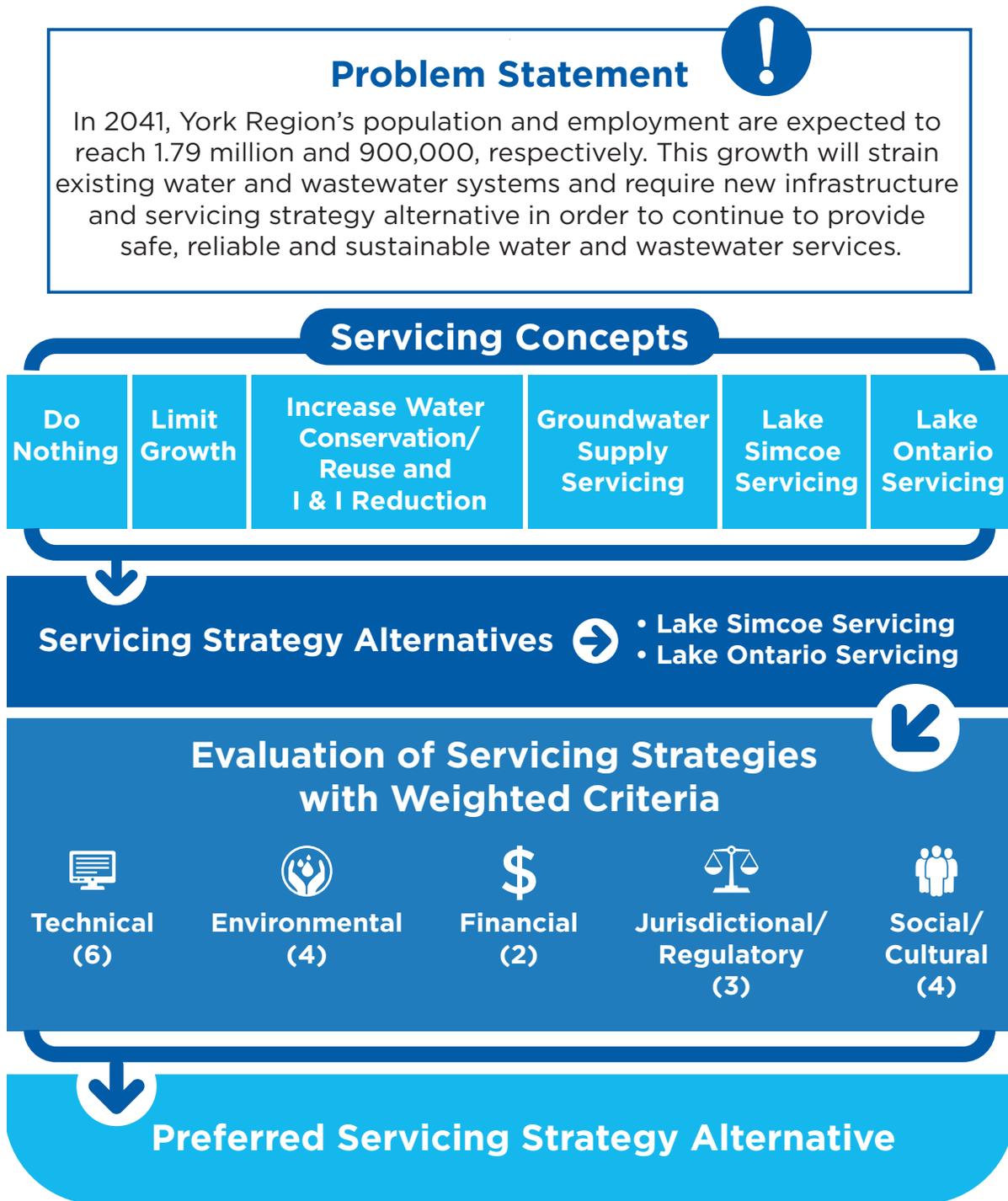


Figure 3.7 - Development and Evaluation of Servicing Strategy Alternatives



3.7.1 Servicing Concepts Screening

Six Servicing Concepts were identified through this Master Plan Update:

1. Do Nothing
2. Limit Growth
3. Increase Water Conservation/Reuse and Inflow/Infiltration Reduction
4. Increase Groundwater Servicing
5. Increase Lake Simcoe-Based Water and Wastewater Servicing
6. Increase Lake Ontario-Based Water and Wastewater Servicing

Concepts 1 and 2 (Do Nothing and Limit Growth)

The “Do Nothing” and “Limit Growth” concepts are typically included in the Class Environmental Assessment process.

“Do Nothing” is a hypothetical concept which acknowledges growth will occur but provides no plan or action to ensure additional water or wastewater servicing demands are met. This is not feasible as the Region would be unable to meet future water and wastewater servicing needs and would also risk being unable to meet requirements of the *Safe Drinking Water Act, 2002* and the *Ontario Water Resources Act*.

“Limiting Growth” is a benchmark concept that would limit growth to what existing water and wastewater systems can serve. Limiting growth would put the Region in conflict with the *Places to Grow Act, 2005* and the *Growth Plan for the Greater Golden Horseshoe, 2006*.

These concepts would not address increasing demand for water and wastewater services and would put the Region at risk of being able to meet requirements under provincial legislation. Consequently these two concepts were not considered further.

Concept 3 (Increase Water Conservation/Reuse and Inflow/Infiltration Reduction)

Conserving more water and reducing inflow and infiltration would not, by itself, meet expected growth. These concepts can, however, form a cost-efficient part of an overall strategy. In particular, conservation through water reuse is an emerging initiative in Ontario that will likely play an important role in reducing water demand in the future. Additional details on these concepts are provided in Chapter 4.



Concepts 4, 5, 6 (Increase Groundwater, Lake Simcoe-Based and Lake Ontario-Based Servicing)

The Region currently uses groundwater, Lake Simcoe and Lake Ontario as sources for its drinking water. With growth, the Region looks to existing sources as potential options to meet the higher demand for drinking water. Similarly, on the wastewater side, it looks to Lake Simcoe and Lake Ontario, which are both currently used as receiving waters for treated water from water resource recovery facilities, to help accommodate growth. It should be noted that none of these three water sources - groundwater, Lake Simcoe or Lake Ontario – can provide a full solution on their own. These concepts are water supply options to meet incremental demand only. Existing demands will continue to be met by existing supply sources in order to fully leverage the use of existing and committed capital infrastructure.

The six servicing concepts were presented to the public in June 2015, during the second round of Public Consultation Centres. They were then screened using the five criteria presented in **Figure 3.8** and evaluated for further consideration. These criteria are based on the Municipal Engineers Association Class Environmental Assessment process requirements.

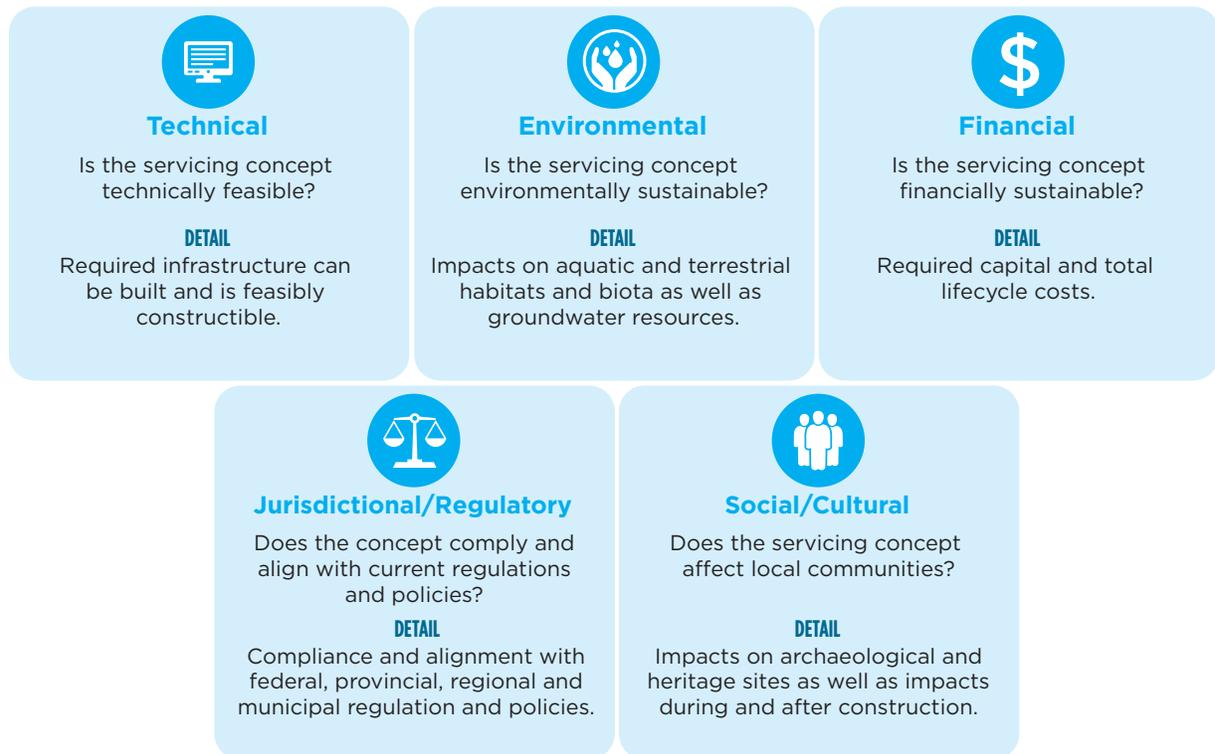


Figure 3.8 – Servicing Concept Screening Criteria



Table 3.6 - Screening of Servicing Concepts

Concept	Screening Criteria				
	Technical	Environmental	Financial	Jurisdictional/Regulatory	Social/Cultural
1. Do Nothing	Inadequate water & wastewater capacity would prevent adequate servicing for growth	Inadequate wastewater capacity may lead to spills and associated negative environmental impact	Not applicable	Does not meet provincial regulation	Inadequate servicing would disrupt community fabric and potentially put public health at risk
2. Limit Growth	Current capacity limitations would severely restrict future growth capacity.	No impact	Limiting growth would negatively impact York Region communities due to reduced employment and economic activity	Does not meet Provincial regulation	Limiting growth would result in demographic imbalance between York Region communities and surrounding municipalities
3. Conservation/ Reuse and I&I Reduction	Not able to meet future demand on its own	Net reduction in energy/chemical consumption and greenhouse gas emission	Low to moderate impact	Compliant with existing regulation. Water reuse may require new regulations.	Limited to no impact that may include shifts in water consumption behaviour.
4. Groundwater Servicing	York Region aquifers not able to meet future demand on its own	Limited to no environmental impact, similar to current water taking	Moderate impact	Meets provincial regulation	Limited to no impact that may include inconvenience associated with minor construction activities
5. Lake Simcoe Servicing	Lake Simcoe not able to meet future demand on its own	Limited environmental impact that may be associated with minor to moderate construction activities	Moderate to high impact	Meets provincial regulation	Limited impact that may include inconvenience associated with minor to moderate construction activities
6. Lake Ontario Servicing	Lake Ontario not able to meet future demand on its own	Limited environmental impact that may be associated with minor to moderate construction activities	Moderate to high impact	Meets provincial regulation	Limited impact that may include inconvenience associated with minor to moderate construction activities



Based on the screening, no single servicing concept was shown to provide a complete solution by itself. It suggested, however, that two or more concepts could be integrated to create a comprehensive and fully workable servicing strategy. Specifically, greater efforts to conserve water and reduce inflow and infiltration (Concept 3) could be combined with both ground-based and lake-based water supply (Concepts 4, 5 and 6) resulting in a less costly and more robust water and wastewater servicing strategy.

As a result, two distinct Servicing Strategy Alternatives were developed:

1. **Lake Simcoe Servicing Strategy Alternative; and**
2. **Lake Ontario Servicing Strategy Alternative.**

3.7.2 Servicing Strategy Alternatives

The two Servicing Strategy Alternatives are a combination of the servicing concepts. Recognizing the benefits of **water conservation, reuse** and **inflow and infiltration reduction**, these all form an integral part of both Servicing Strategy Alternatives.

Reasons for this integration are numerous. Efforts to reduce water consumption and implement water reuse reduces the overall demand on water and wastewater infrastructure, reducing energy consumption, operating costs and deferring the need for additional capacity-related infrastructure. Additional information on these programs appears in Chapter 4.

Similarly, inflow and infiltration reduction efforts reduces flow on the wastewater collection and treatment system, further reducing energy consumption, operating costs and deferring the need for additional capacity-related infrastructure.

As demand for drinking water continues to increase across York Region, water supply from both Lake Ontario and Lake Simcoe will also increase. The majority of local municipalities will continue to rely mainly on Lake Ontario supplies while Georgina being close to Lake Simcoe will rely mainly on Lake Simcoe supplies.

Groundwater supply will remain a key source of water to several municipalities in the Region.

The key difference between the two Servicing Strategy Alternatives is how they differ in supplying incremental drinking water to Newmarket and parts of East Gwillimbury (Holland Landing, Queensville, and Sharon):

- **Lake Simcoe Servicing Strategy Alternative** would permit the flexibility of supplying a small portion of the incremental water demand forecasted in Newmarket and parts of East Gwillimbury (Holland Landing, Sharon and Queensville) with Lake Simcoe water, while the majority of supply for East Gwillimbury and Newmarket continues to be from Lake Ontario. This would require construction of a new pumping station and watermain linking Georgina and East Gwillimbury water systems. It would also require an increase in the capacity of the Aurora East Water Pumping Station.



- A key feature of the Lake Simcoe strategy is that it completes the link to connect the Lake Simcoe and Lake Ontario water supplies, allowing for bi-directional flow which would provide a level of security in the event of a disruption to either supply. Incremental supply of Lake Simcoe water to East Gwillimbury would represent about 5% of the total water supply to East Gwillimbury and Newmarket.
- **Lake Ontario Servicing Strategy Alternative** would supply all additional demand forecasted in Newmarket and parts of East Gwillimbury with only Lake Ontario water. This would require a larger increase in the capacity of the Aurora East Water Pumping Station.

Projected water supply sources in 2041 for Aurora, Newmarket, East Gwillimbury and Georgina under both strategies are shown in **Figures 3.9A and 3.9B**.

The same approach to wastewater servicing is used in each of these Servicing Strategy Alternatives. The key pieces that form the basis of the wastewater servicing strategy include:

- Acting on the long-standing York Durham Sewage System strategy to expand the Duffin Creek Water Pollution Control Plant and improve north-to-south and west-to-east pumping and sewer connectivity;
- Putting in place the Upper York Sewage Solutions Water Reclamation Centre and expanding it in phases;
- Expanding stand-alone water resource recovery facilities at Nobleton, Keswick and Sutton.

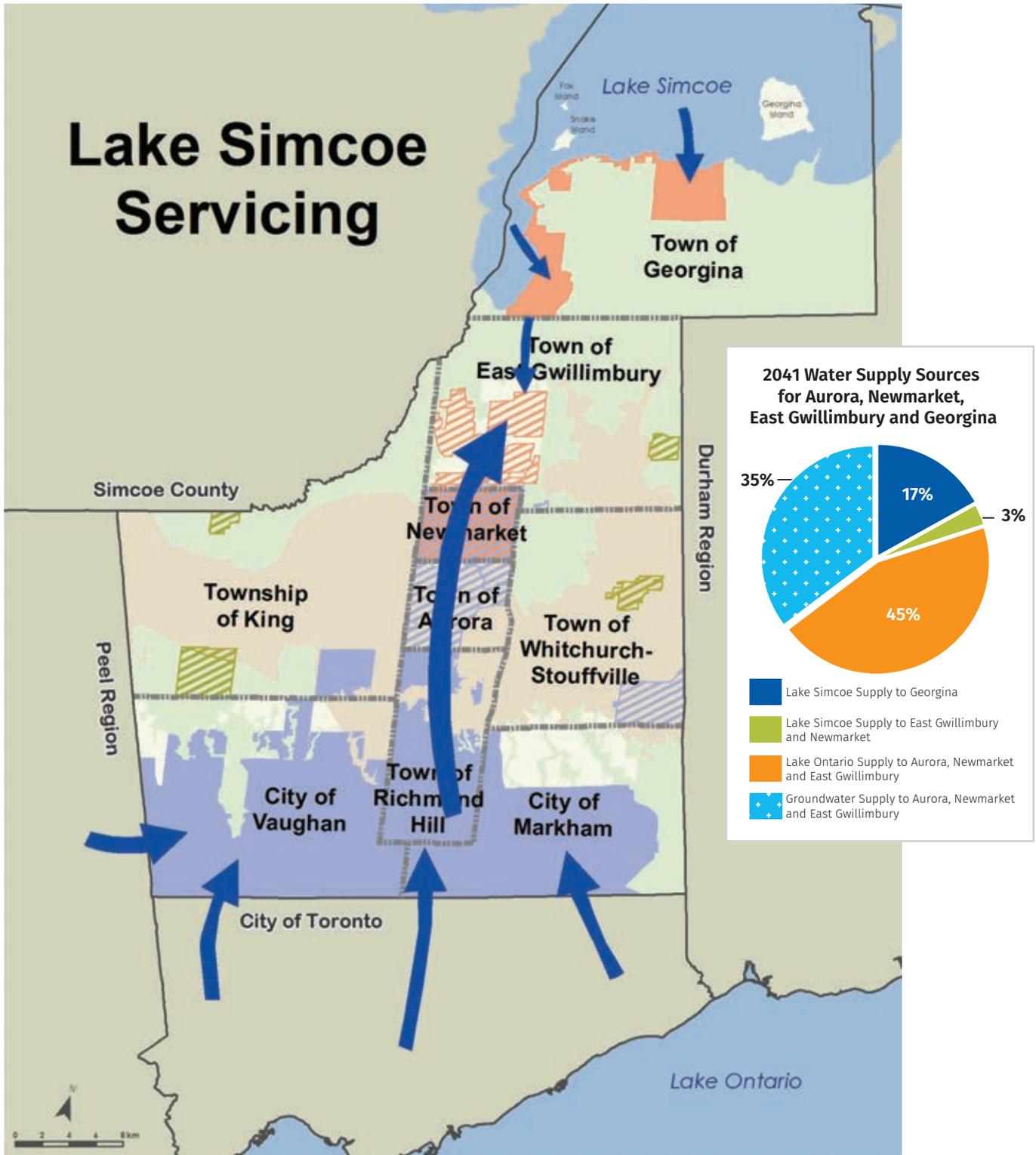


Figure 3.9A - Lake Simcoe Water Servicing Strategy Alternative - 2041

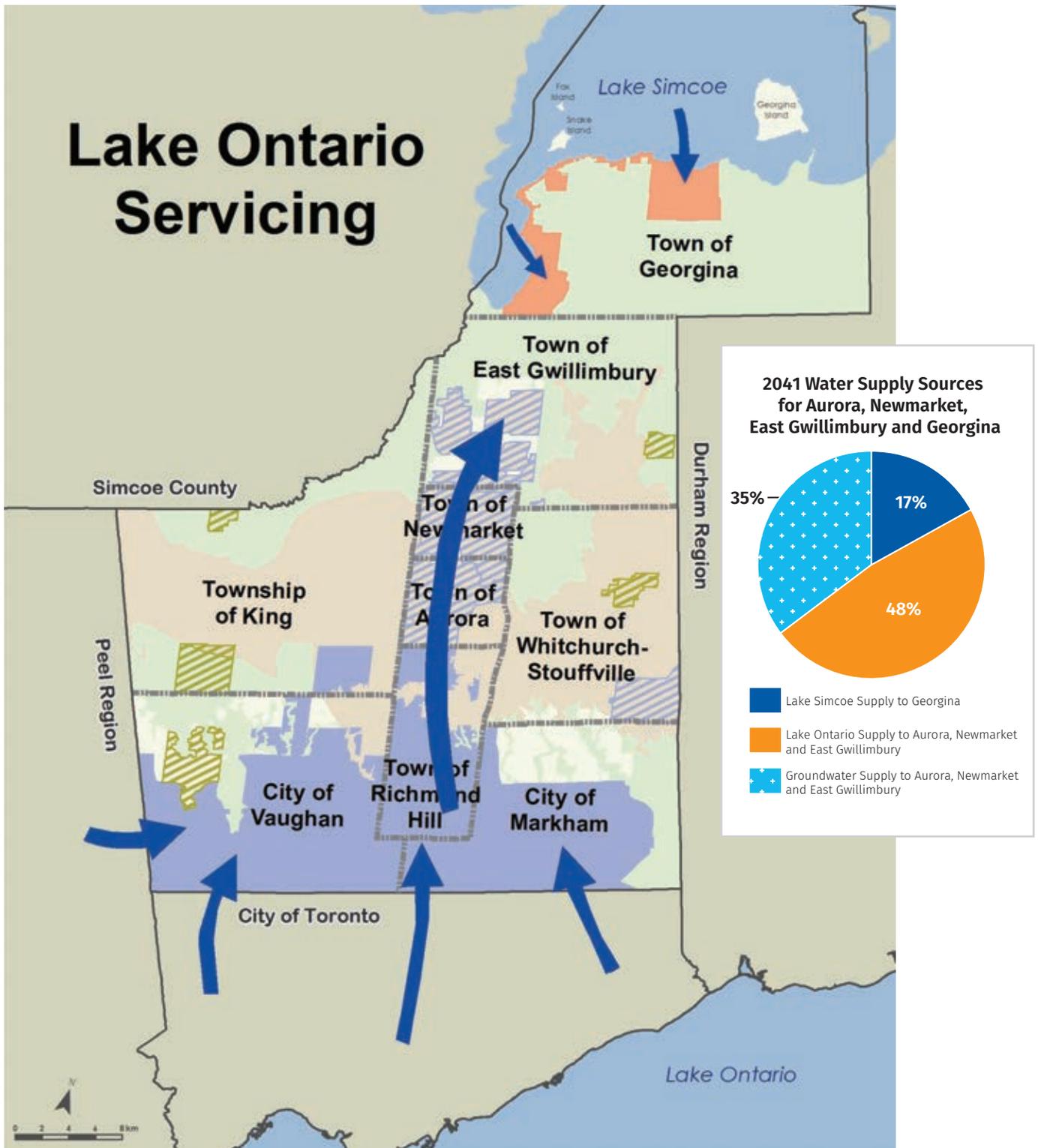


Figure 3.9B - Lake Ontario Water Servicing Strategy Alternative - 2041



3.7.3 Servicing Strategy Evaluation

The same five criteria categories used to screen servicing concepts were applied to evaluate the two Servicing Strategy Alternatives. In this case, however, each category was weighted and expanded into more detailed criteria. The detailed criteria were derived from “Description of the Environment” Section C.3.1 of the 2015 Version of the Municipal Class Environmental Assessment document (MEA, 2015) and are consistent with previous master plans. Descriptions of each criterion and details on scoring metrics can be seen in **Table 3.8 on page 57**.

Category weightings were determined through several public events and Consultation Centres and in conjunction with internal consultations.

Visitors to the Water and Wastewater Master Plan display during the second round of public consultations (June 2015) and the Region’s Public Works Day event (May 2015) were asked to share what was important to them in evaluating Servicing Strategies by participating in a voting activity called ‘Have your Say’. Based on general criteria set out in Municipal Class Environmental Assessment document, the voting activity focused on four key perspectives: Social, Environmental, Economic and Technical.

Two revolving information ‘towers’ were provided which identified eight action areas within the four categories. Visitors were allotted eight ‘chips’, which they were able to use to vote on what they valued as most important to them based on the four categories presented. The number of votes from both events totaled 1063. The results were combined with regional staff voting for each category and an overall weighting was determined.





Figure 3.10 shows the averaged results. Environmental and technical considerations were ranked the highest, followed by financial and then regulatory issues, with the social/cultural category ranked lowest.

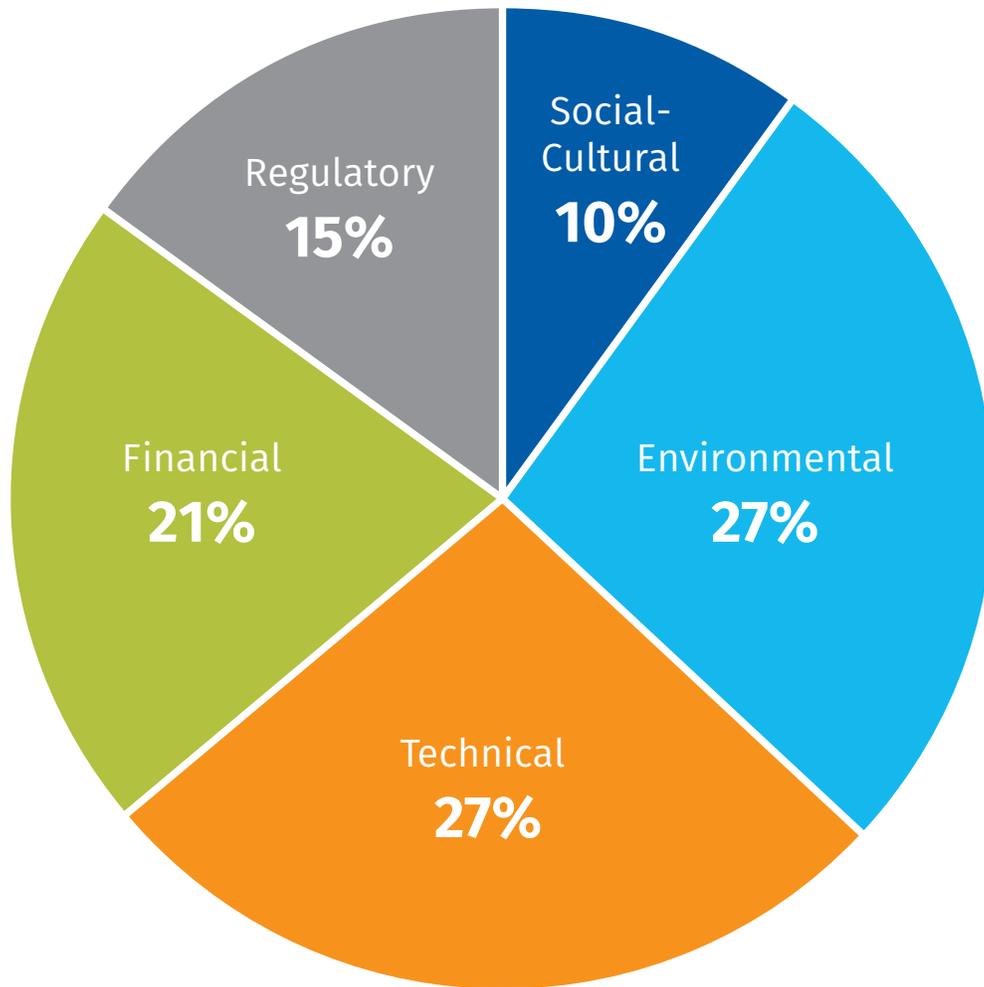


Figure 3.10 - Average Criteria Weights

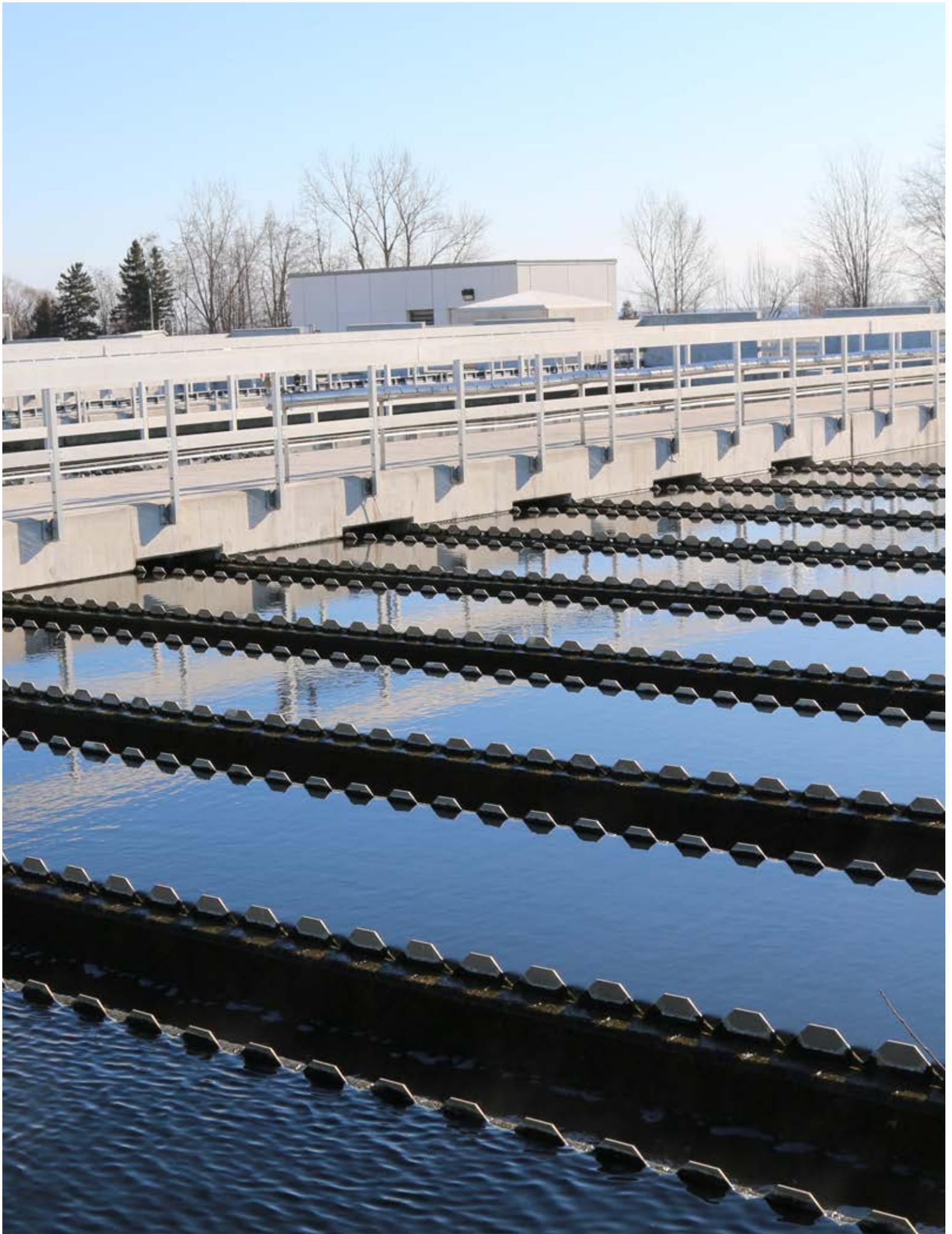


Table 3.8 - Servicing Strategy Scoring Criteria

Category	Criteria	Description	Less Favourable Strategy (Score 0)	More Favourable Strategy (Score 1)
Technical	Constructability	Construction challenges considering the need to maintain service, infrastructure crossings, depth of excavation, geotechnical conditions, contaminated soils and other factors. Volume and complexity of construction associated with strategy.	Higher construction risk strategy e.g. high number of crossings, poor geotechnical conditions or “live” connection. Higher volume and complexity of construction.	Lower construction risk strategy e.g. few utility conflicts or defined areas of contaminated soils. Lower volume and complexity of construction.
	Redundancy of Supply/ Service	Improvement in redundancy of supply or service.	No or limited improvement in redundancy of supply or service.	Substantial improvement in redundancy of supply or service.
	Resilience to Climate Change	Ability of the strategy to reliably provide desired level of service under a changing climate. Is the strategy robust? Impact categories include surface water supply quantity and quality changes, receiving water assimilative capacity changes, groundwater supply changes, water demand changes and increased physical risks to Regional facilities (e.g. flooding).	Strategy with limited resilience to changing climatic conditions impacting one or more of the impact categories indicated.	Strategy with resilience to the impact of changing climatic conditions for most or all of the impact categories indicated.
	Water Age	Impact on water age in the distribution system.	Higher water age in distribution system.	Lower water age in distribution system.
	Operations and Maintenance	Requirement for additional and new Operations and Maintenance resources. The complexity and maintainability of new assets.	High new resource requirements, substantial complexity and challenging maintainability.	Low to moderate new resource requirements, less complexity and challenges to maintainability.
	Energy Efficiency	Energy intensity associated with the strategy.	High energy intensity associated with the strategy.	Low energy intensity associated with the strategy.
Environmental	Aquatic Vegetation and Wildlife	Includes impacts during construction and from ongoing operations. Considerations include impacts on local aquatic species and habitats, aquatic species at risk and locally significant aquatic species.	High potential impacts of construction due to for example multiple stream crossings. High potential impacts on aquatic species and habitats resulting from ongoing facility operations.	Low potential impacts of construction due to for example few stream crossings. Low or no potential impacts on aquatic species and habitats resulting from ongoing facility operations.
	Terrestrial Vegetation and Wildlife	Includes impacts during construction and from ongoing operations. Considerations include impacts on local terrestrial species and habitats, designated areas, species at risk and locally significant species.	High potential impacts due to construction near wetlands or other designated areas (e.g. environmentally sensitive areas). High potential impacts on species and habitats resulting from ongoing facility operations.	Low potential impacts due to construction near wetlands or other designated areas (e.g. environmentally sensitive areas). Low potential impacts on species and habitats resulting from ongoing facility operations.
	Regional Water Balance	Water balance pertaining to intra-basin water transfer between Lake Ontario and Lake Huron, based on average annual daily transfer in MLD.	Less water balance due to higher water transfer between basins.	Better water balance due to lower water transfer between basins.
	Construction Impacts on Groundwater Resources	Potential impact on groundwater quantity or quality during construction.	Significant potential impact during construction due to dewatering or other requirements.	Low or no potential impact during construction due to dewatering or other requirements.
Financial	Capital Cost	Net Present Value of capital and commissioning costs.	Highest cost strategy.	Least cost strategy.
	Lifecycle Cost	Net Present Value lifecycle cost.	Highest cost strategy.	Least cost strategy.
Jurisdictional/ Regulatory	Land Requirements	Area of non-Regional land or length of easements required.	Strategy with highest area of non-Regional land or length of easements required.	Strategy with lowest area of non-Regional land or length of easements required.
	Direct Access to Water Supply	Direct access to drinking water supply sources.	Strategy does not improve direct access to the drinking water supply.	Strategy improves direct access to the drinking water supply.
	Alignment with regulatory direction	Ability of strategy to adapt to anticipated changes in drinking water quality and wastewater effluent requirements.	Strategy less likely in alignment with regulatory direction	Strategy more likely in alignment with regulatory direction
Social/Cultural	Archaeological Sites	Potential impact on registered/known archaeological features during construction or ongoing operations.	Potential impact due to construction or ongoing operations on registered/known archaeological site.	Low or no impact due to construction or ongoing operations on registered/known archaeological site.
	Cultural/Heritage Features	Potential impact on known cultural landscapes and built heritage features during construction or ongoing operations.	Potential impact due to construction or ongoing operations on cultural or heritage site.	Low or no impact due to construction or ongoing operations on cultural or heritage site.
	Impacts During Construction	Potential construction impacts due to noise, dust, odour or traffic.	Potential impact due to construction noise, dust, odour or traffic on local community.	Low impact due to construction noise, dust, odour or traffic on local community.
	Long-Term Community Impact	Long-term impact on local community and businesses including land-use compatibility.	Potential impact due to ongoing operations on local community. Incompatible land use.	Low or no impact due to ongoing operations on local community. Compatible land use.



Servicing Strategy Alternatives were evaluated in a pairwise manner against each criterion and assigned a score as follows:

- Favoured strategy of the pair – Score = 1
- Not favoured strategy of the pair – Score = 0
- Equally favoured, each strategy – Score = 1

In evaluating the two Servicing Strategy Alternatives, scores for each of the categories were summed and weightings applied. Weighted scores were then added to produce an overall score for each Servicing Strategy Alternative. For each category, the scores were normalized for the number of criteria in that category.

Volume 3, Appendix 3 B provides the detailed evaluation and the rationale for scoring of the two alternative servicing strategies.

Preliminary costs used in the evaluation process are summarized in **Table 3.9**. Costs are presented as the net present value over the next 100 years. Details of the costing methodology and assumptions are presented in Volume 2, Appendix 2 C.

Table 3.9 - Servicing Strategy Alternatives Cost Comparison

Cost Component	Cost Details	Lake Ontario Net Present Value (\$Million)	Lake Simcoe Net Present Value (\$Million)
Net Present Value Capital	Net Present Value initial capital costs including allowances for land, engineering, construction management and a contingency allowance among other factors.	\$1,820	\$1,830
Net Present Value Lifecycle	Net Present Value lifecycle costs roll up the capital costs and add in the costs of asset renewal over the lifetime of the new assets.	\$2,400	\$2,410

Note: 1. Net Present Value was calculated over a 100-year period, rounded to nearest \$10M

Table 3.10 provides the breakdown of the Servicing Strategy Alternative scoring, showing the pairwise comparison results and weighted normalized total scores.



Table 3.10 - Lake Ontario vs. Lake Simcoe Servicing Strategy Scoring

Evaluation Criteria	Lake Ontario Score	Lake Simcoe Score
Technical		
Constructability	1	0
Redundancy of Supply/Service	0	1
Resilience to Climate Change	0	1
Water Age	0	1
Operations and Maintenance	1	1
Energy Efficiency	0	1
Total Technical Score	2/6	5/6
Technical Weighted Score	9	23
Environmental		
Aquatic Vegetation and Wildlife	1	0
Terrestrial Vegetation and Wildlife	1	1
Regional Water Balance	0	1
Construction Impacts on Groundwater Resources	1	1
Total Environmental Score	3/4	3/4
Environmental Weighted Score	20	20
Financial		
Capital Cost	1	1
Lifecycle Cost	1	1
Total Financial Score	2/2	2/2
Financial Weighted Score	21	21
Jurisdictional/ Regulatory		
Land Requirements	1	1
Direct Access to Water Supply	0	1
Adaptability to Changing Regulation	0	1
Total Jurisdictional/ Regulatory Score	1/3	3/3
Jurisdictional / Regulatory Weighted Score	5	15
Social/Cultural		
Archaeological Sites	1	1
Cultural/Heritage Features	1	1
Impacts During Construction	1	1
Long-Term Community Impact	1	1
Total Social/Cultural Score	4/4	4/4
Social/Cultural Weighted Score	10	10
Total Score	65	89



3.8 Preferred Servicing Strategy Alternative

The overall weighted score favoured the **Lake Simcoe Servicing Strategy Alternative**. The Lake Simcoe Servicing Strategy Alternative was presented during the final consultations held in late 2015 and early 2016.

The Lake Simcoe Servicing Strategy Alternative scored very well in the technical category for its benefits of enhancing system security through multiple supplies and making use of the nearby resource of Lake Simcoe rather than the more remote supply from Lake Ontario. It also scored well on drinking water quality by lowering system water age and on energy efficiency because of lower pumping requirements. It offered these additional benefits for virtually the same lifecycle costs as the Lake Ontario Servicing Strategy Alternative.

Key factors in selecting the Lake Simcoe Servicing Strategy Alternative include:

- Meeting needs of growth to 2041 and beyond;
- Leveraging existing water and wastewater infrastructure to avoiding overbuilding;
- Minimizing intra-basin water transfer
- Reducing energy consumption and greenhouse gas emissions
- Shorter water travel time and water age;
- Providing a state-of-the-art water reclamation centre to support water reuse and return water taken from Lake Simcoe to its watershed;
- Increasing operational flexibility and better response to supply disruption or planned maintenance; and
- Reducing dependence on Toronto and Peel water supplies and on wells, enhancing security of supply.





Based on the evaluation of Servicing Strategy Alternatives and the results of the public and stakeholder consultations the recommended Lake Simcoe Servicing Strategy Alternative became the Preferred Servicing Strategy Alternative. Key benefits of the Lake Simcoe Servicing Strategy Alternative are shown in **Figure 3.11**.

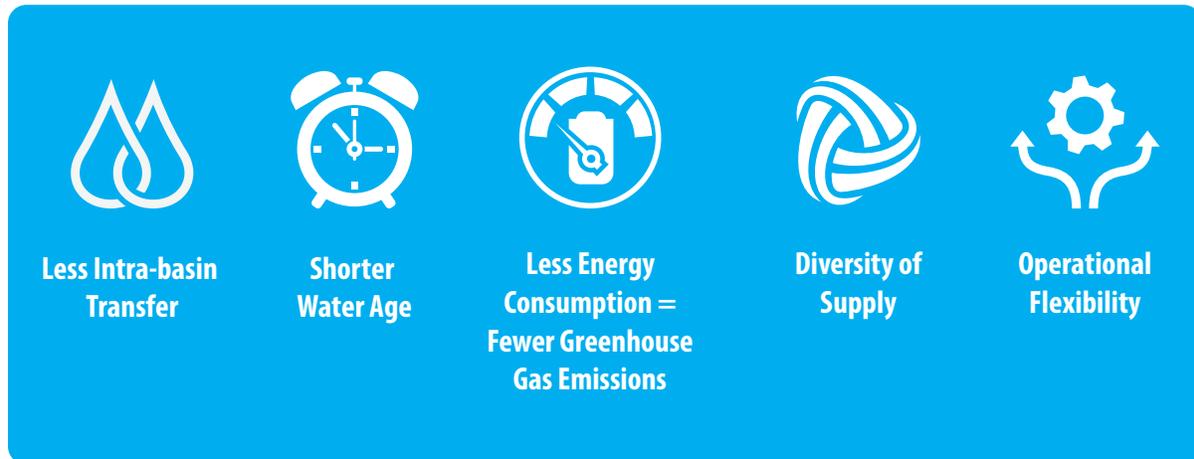


Figure 3.11 – Benefits of Lake Simcoe Servicing Strategy Alternative

In 2010, York Region successfully completed the Prior Notice and Consultation process and received permission to increase the intra-basin transfer of drinking water originating from Lake Ontario, with return flow to Lake Ontario, up to a maximum daily transfer of 105 MLD.

The proposed Water Reclamation Centre (WRC) and Lake Simcoe surface water connection to East Gwillimbury will improve the water balance between the Lake Ontario and Lake Huron watersheds, and at the same time maintain the intra-basin transfer from Lake Ontario to Lake Huron watershed below the permitted maximum daily transfer of 105 MLD with return flow.

Prior to implementing the Lake Simcoe water supply to East Gwillimbury and Newmarket this servicing strategy will be reviewed in subsequent master plans scheduled for 2021, 2026, 2031 and 2036. A Schedule C Class Environmental Assessment will also be undertaken to confirm the preferred water servicing strategy for East Gwillimbury and Newmarket.

Details on the specific water and wastewater infrastructure that forms the Lake Simcoe Servicing Strategy Alternative, including descriptions and approximate locations, costs and timing, can be seen in Chapter 5.

York Region recognizes the potential of environmental impacts during construction and operation of the proposed infrastructure components of the preferred alternative and is committed to mitigating any impacts. Individual projects are still subject to the requirements of the Class EA process, during which the magnitude and scope of any environmental impacts will be fully evaluated.



Chapter

4

A Sustainable Future

One Water Action Plan



In this chapter:

- 4.1 Made-In-York Sustainability
- 4.2 How One Water Supports Better Decisions
- 4.3 Delivering on Sustainability: One Water Action Plan
 - 4.3.1 Implement Long Term Water Conservation and Water Reuse
 - 4.3.2 Implement Inflow and Infiltration Reduction
 - 4.3.3 Enhance Integration between Asset Renewal and Growth Projects
 - 4.3.4 Develop Climate Change Adaptation and Mitigation Strategies
 - 4.3.5 Continue Energy Optimization and Renewable Energy
 - 4.3.6 Ensure Financial Sustainability



4.1 Made-In-York Sustainability

Sustainability of the economy, environment and community - known as the “triple bottom line” - is central to the master planning process. These elements are important in both the development and evaluation of servicing strategy alternatives as seen in Section 3.7 and in the development of the One Water Action Plan.

Master Plan Objective #2:

Develop an integrated, long-term strategy to provide sustainable water and wastewater service

Sustainability of any resource – natural, built or financial – is founded on stewardship. A central goal of the Region’s strategic plan is good stewardship of its water and wastewater assets. Building on this, for the purpose of this Master Plan Update sustainability is defined as providing safe and reliable water and wastewater services that:

- Minimizes the environmental impacts of water and wastewater activities; and
- Is accountable to the people of York Region through cost-effective design and delivery.



In order to realize its Vision 2051, the Region will need to minimize its environmental footprint through energy conservation, greenhouse gas reduction and water conservation and reuse, while at the same time providing financially sustainable water and wastewater services.

The goal of the **One Water Action Plan** is to ensure long-term sustainability of the Region by taking actions today to minimize the impact of its operations while striving for continuous improvement in the delivery of best-in-class water and wastewater services.





4.2 How One Water Supports Better Decisions

One Water emphasizes the value of more integrated thinking about water management and the water cycle to improve decision making. It is inspiring the Region to practice **innovation** by realizing the value of treated wastewater as a resource, capitalize on cross-functional **integration** benefits, and maximize the use of existing infrastructure (or **infra-stretching**). These three guiding principles are shown in **Figure 4.1**.

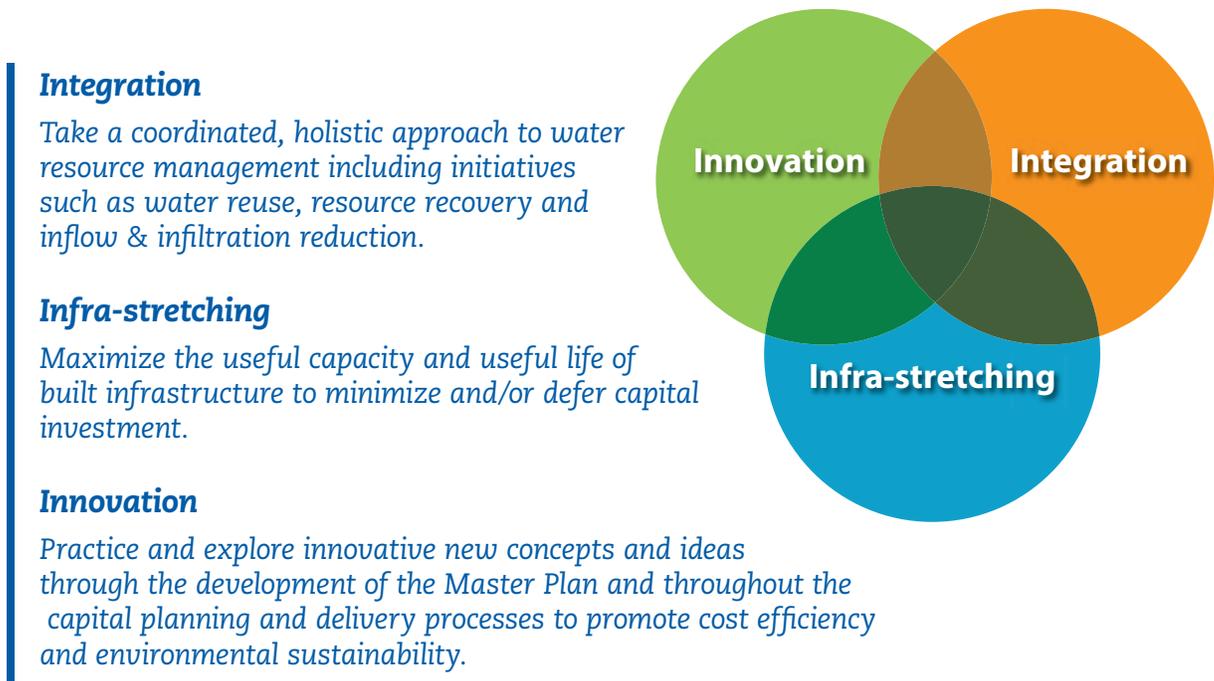


Figure 4.1 - Three Guiding Principles

4.3 Delivering on Sustainability: One Water Action Plan

A key aspect of turning One Water into tangible results is the One Water Action Plan. The action plan will cover five years and will be updated in step with the Master Plan Update. It will build on existing efforts and look at how they can be linked and integrated to achieve even greater impacts.

A workshop was held in October 2015 with local municipality staff to identify opportunities for collaboration on One Water. Public input captured at Public Consultation Centers and stakeholder input from the recent Long Term Water Conservation Strategy and Inflow and Infiltration Reduction Strategy updates also helped to support the development of ideas under One Water.

The Made-In-York One Water Action Plan consists of six major action areas which target long-term sustainability by aiming to minimize environmental impacts and targetting the efficient, cost-effective delivery of water and wastewater services.



The plan will identify initiatives to support these action areas, many of which will be or are already being advanced through existing programs (for example, water conservation programs as identified under the 2016 Long Term Water Conservation Strategy Update).

The purpose of the One Water action plan is not to duplicate efforts, but rather to identify opportunities to work across functional areas for greater efficiency. For example, it is beneficial to expand public outreach to include information on the value of reducing inflow and infiltration on private property, which is a new recommendation of the 2016 Inflow and Infiltration Reduction Strategy Update.

The discussion of each of the six action areas below includes recommendations for achieving greater financial and environmental sustainability, many of these aimed at better cross-functional integration.

4.3.1 Implement Long Term Water Conservation and Water Reuse

Water conservation is an integral part of this Master Plan’s Preferred Servicing Alternative, aiming to reduce demand. In the long-term, water conservation will be key to continual success in providing environmentally and financially sustainable water services.

In March 2016, the Region updated the Long Term Water Conservation Strategy. Incorporating a One Water approach, the 2016 Long Term Water Conservation Strategy Update sets the direction on future focus areas:



WATER SMART
IRRIGATION PROFESSIONAL

- Expand and enhance market-based water conservation programs**, including the existing Water Smart Irrigation Professionals program that trains and certifies irrigation contractors. The objective is to transform the irrigation industry by raising awareness and knowledge to promote and practice water conservation. Building on this marketplace-based programming concept, the Region is piloting a Fusion Gardening pilot program in 2016 to train and certify landscape designers and installers to promote water-efficient landscapes. This pilot is focused on a residential community with high outdoor water use.



- **Develop water reuse projects** as a new and sustainable alternative for water supply sources. The 2016 Long Term Water Conservation Strategy Update recognized the importance of water reuse in achieving the Region’s 2051 water consumption target of 150 litres per resident per day. The strategy update recommended that the Region start undertaking pilot projects within the next five years to position the Region to implement water reuse in future.



- **Develop and enhance water conservation programs to target high water users**, including the existing capacity buyback program for Industrial/Commercial/Institutional customers, piloting an incentive program to replace once-through water-cooled equipment with equipment that recirculates water, and exploring new programs to address high-water-use communities.
- **Continue to implement education and outreach programs**, including the “Water Is” campaign, Children’s Water Festival and educational activities for students to increase awareness of water conservation techniques.

The ultimate goal of the Long Term Water Conservation Strategy is to reduce residential water consumption from the current 200 litre per capita per day to 150 litres per day by 2051, with interim targets as shown in **Table 4.1** below. It should be noted that these numbers do not include non-revenue water.

Table 4.1 – Per Capita Residential Consumption Rate Targets to 2051

Year	2015 (Actual)	2021	2031	2041	2051
Consumption rate (litres per capita per day)	200	190	180	165	150

Recommendations

1. Coordinate water reuse programs to integrate with timing of capital projects. The proposed water reclamation centre in East Gwillimbury, for example, will provide an ideal opportunity to implement water reuse.
2. Pilot water reuse projects in advance to inform policy discussions with the Province and permit timely full-scale implementation.
3. Continue to update the water consumption forecast model. As the Region moves into large scale water reuse programs that result in quantifiable reductions, the forecast model should reflect this and any other factors that may impact consumption.



4.3.2 Implement Inflow and Infiltration Reduction

Inflow and infiltration reduction is an integral part of this Master Plan’s Preferred Servicing Alternative, aiming to minimize loading on the wastewater conveyance system. Longer-term, inflow and infiltration reduction is key to the continued success in providing environmentally and financially sustainable wastewater services.

In March 2016, the Region updated the Inflow and Infiltration Reduction Strategy. Incorporating a One Water Approach, the 2016 Inflow and Infiltration Reduction Strategy Update sets the direction for future focus areas:

- Increase efforts to reduce inflow and infiltration on private property.** The current industry view is that private property sources of inflow and infiltration contribute 40 to 60 per cent of the system total. Achieving the 2031 reduction target of 40 million litres a day therefore calls for reducing inflow and infiltration from private property. This would require joint efforts by local municipalities and the Region to develop programs, measures and, potentially, bylaws or incentives to address private property sources.
- Increase efforts to minimize inflow and infiltration in new developments.** Preventing deficiencies in new sewers before the municipality assumes them can save significant costs later. The 2016 Inflow and Infiltration Reduction Strategy Update recommended raising construction and inspection standards, as well as engaging the Province to support implementation of new development design standards and construction practices.
- Continue collaboration between local municipalities and the Region on reducing Inflow and Infiltration.** The Region will take the lead in identifying sources of inflow and infiltration through system-wide flow monitoring, data analysis and sanitary sewer evaluation surveys, and local municipalities will lead remedial works in local sanitary sewer systems.

The goal of the Inflow and Infiltration Reduction Strategy is to achieve a reduction of 71 million litres a day (MLD) in peak flow in the Southeast Collector Trunk Sewer by 2031, with 40 MLD achieved through inflow and infiltration reduction, and 31 MLD achieved through water conservation. Interim targets for the 40 MLD inflow and infiltration reduction is shown in **Table 4.2** below. Monitoring of dry weather flow at the Southeast Collector Trunk Sewer will verify the achievement of 31 MLD flow reduction through water conservation.

Table 4.2 - Inflow and Infiltration Reduction Targets to 2031

Year	2017	2020	2031
Target reduction (millions of litres per day)	10	20	40



Recommendations

1. Integrate the use and management of water consumption and inflow and infiltration data collected under the two programs and enhance data management tools to provide aggregated water consumption data by “mini-basin” (a small wastewater collection area used to study inflow and infiltration.) The 2016 Inflow and Infiltration Strategy Update recommended mini-basin flow monitoring to locate and quantify sources of inflow and infiltration in small, well defined areas. Having water consumption data to correlate with wastewater flow data would greatly enhance analysis of the mini-basin data and help quantify base infiltration.
2. Integrate condition assessment programs with inflow and infiltration monitoring. The Region is developing a risk-based condition assessment program to determine the optimized frequency of closed circuit television camera inspections. Risks associated with inflow and infiltration will be included in the decision-making process.
3. Expand the public messaging to include information for homeowners on the value of reducing inflow and infiltration on private property.

4.3.3 Enhance Integration between Asset Renewal and Growth Projects

As part of this Master Plan and ten-year capital plan processes, the Region has adopted an integrated approach to programming and scheduling growth projects and asset renewal projects. Going forward, other aspects of integration should be considered and/or enhanced, including:

- **Incorporate asset management needs into the planning and design of new infrastructure.** Maintenance and rehabilitation constitute a major component of the life-cycle cost of an asset. It is important that asset management needs be considered in the planning and design stages. Asset management needs include accessibility for condition assessment, system redundancy to minimize disruption when facilities are taken out of service for rehabilitation, adequate property to permit future expansion, and siting infrastructure to avoid conflict with future utilities.
- **Extend the use of the risk management framework in the decision-making process for growth projects.** The Region is updating its risk-based asset criticality/vulnerability model and developing risk management strategies to help with asset replacement decisions. Results of this work will be used to inform the decision-making process for planning and prioritizing new infrastructure.

Recommendations

1. Include asset management needs in Region’s design standards.
2. Consider the adoption of a risk-based asset management framework.



4.3.4 Develop Climate Change Adaptation and Mitigation Strategies

The implications of climate change on York Region's water and wastewater systems were assessed in a Climate Change White Paper prepared by York Region and released in February 2015.

In this report, the full discussion of potential impacts can be found in Volume 3, Appendix 3 D. Major forecast climate change impacts include:

- Water demand may increase over time due to increasing temperatures, even though groundwater and surface water supply quantities are not likely to be significantly affected;
- Higher surface water temperatures, increased evaporation, decreased water levels and degraded surface water quality of receiving waters may decrease their assimilative capacity (that is, their ability to receive run-off, snow melt or other wastewater without harmful effects);
- Increased Lake Simcoe water temperatures may enhance algae blooms, aquatic plant growth and decomposition, with corresponding negative impacts on water quality and raw water for drinking water supply treatability; and
- Increased peak inflow and infiltration from more extreme rainfall events may exceed the capacity of collection and pumping systems. This may give rise to system backups and/or discharge of untreated sewage into receiving waters with environmental, reputational and regulatory impacts.

In addition to the above, more extreme precipitation events might increase flood zone hazards, threaten facilities located close to watercourses or in low-lying areas, exacerbate bank erosion and put at risk the stability of built assets such as pipes and retaining walls. Major storms might also damage assets and cause service interruptions.

The Region has adopted a two-track response to climate change through adaptation and mitigation programs. Potential actions for adaptation of water services are discussed in this section, while the next section discusses mitigation through better energy use and reduced greenhouse gas emissions.

The Region is involved with the International Council for Local Environmental Initiatives Canada, which is an association of local governments committed to improving environmental sustainability. The Council developed the Building Adaptive and Resilient Communities Tool. This tool provides an innovative means of climate change adaptation planning consistent with the One Water approach. It is modelled on a five-milestone framework that leads local government practitioners through the climate change adaptation planning process. York Region is committed to using this framework to address climate change adaptation.

The Region's Climate Change White Paper meets Milestone 2 of the Building Adaptive and Resilient Communities framework by providing a high-level summary of climate trends. York must now decide how to proceed with the remaining milestones and implement its climate adaptation program.



In the meantime, York Region is already engaged in making its water services more adaptive and resilient through the Long-Term Water Conservation Program and Inflow and Infiltration Reduction Strategy. These two programs provide solutions that are not dependent on building new infrastructure.



As the climate continues to change, changes in design standards and operational procedures will be needed. For example, the Region's design storm is based on a 25- year event which, as discussed in Chapter 3, was recently updated. In the future, as severe storms become more frequent, further adjustments will likely have to be made. Typically, adjustments happen when new Intensity-Duration-Frequency curves – which graph the probability of a given average rainfall intensity – become available. In the future, however, more sensitivity and risk analysis will be used to ensure design flexibility that allows for better climate change resilience.

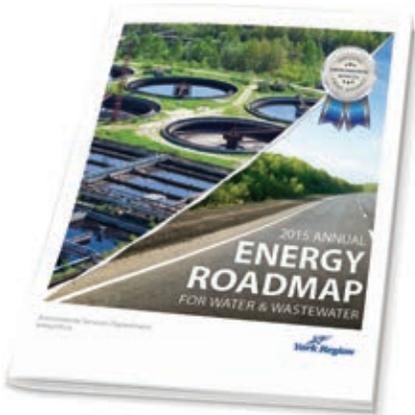
The Region also currently partners with the Lake Simcoe Region Conservation Authority and Toronto Region Conservation Authority on stream bank protection and in-stream erosion mitigation. A particular focus is mitigating any potential impacts on Regional infrastructure of erosion resulting from increasingly severe storms.

Recommendations

1. Because climate change issues are wide-ranging and complex, leverage existing partnerships to better address them:
 - The work of an existing partnership with the Region of Peel, the City of London and the Institute for Catastrophic Loss Reduction on inflow and infiltration could be expanded to assess and address impacts of climate change on the sanitary sewer system.
 - The current partnerships with the conservation authorities could be used to study and address issues of a watershed scale – for example, the vulnerability of Regional water and sanitary assets in flood plains and erosion-susceptible areas, Quagga mussels in Lake Simcoe and developing new Intensity-Duration-Frequency (rainfall intensity) curves to better respond to climate change impacts.
2. Incorporate climate change considerations into the risk management framework for water and wastewater infrastructure. For example, sewers located in erosion-vulnerable areas should be assigned a comparatively higher risk factor in the asset criticality model.
3. Prepare a plan for climate change adaptation based on the Building Adaptive and Resilient Communities framework.



4.3.5 Continue Energy Optimization and Renewable Energy



Energy is essential to the operation of the Region's water services. Lowering energy usage not only reduces operating costs, it also helps the environment by reducing greenhouse gas emissions. The Region's **2015 Annual Energy Roadmap for Water and Wastewater** estimated energy usage, costs and greenhouse gas equivalents for the period 2012 to 2014. The analysis showed that energy costs, for electricity and natural gas, increased 15 per cent and 2 per cent a year in 2013 and 2014 respectively, while energy consumption increased by only 4 per cent and 1 per cent a year.

Water and wastewater pumping, including pumping from water wells, accounts for 74 per cent of total energy consumed for water and wastewater services. Treatment uses about 24 per cent and other needs account for the remaining 2 per cent. As proposed advanced energy-intensive technologies such as microfiltration and reverse osmosis come online at the water reclamation centre, the proportion of energy costs associated with treatment will increase.

The 2015 Water and Wastewater Energy Roadmap focused on the energy efficiency of water and wastewater assets. The Roadmap identifies potential cost-effective energy efficiency projects, establishes a progress measurement process and increases the energy efficiency of the Region's water and wastewater facilities.

The Roadmap has identified energy efficiency innovations as well as energy-saving pilot projects that may have high returns on investment. Some of the specific innovations being evaluated include:

- Micro-hydro turbines incorporated into the water system;
- Thermal energy recovery from wastewater streams; and
- Solar photovoltaic installations at water and wastewater facilities.

A number of Roadmap initiatives are aimed at improving energy efficiency. They include:

- Ongoing facility energy audits and development of key performance indicators and benchmarks;
- Wastewater aeration process reviews and potential upgrades at six water resource recovery facilities;
- A sub-metering program aimed at measuring energy consumption for all pumps with motors higher than 100 horsepower; and
- Optimized pumping operations.

Other initiatives are planned and will be implemented as the Roadmap evolves.

One of the corollary benefits of the 2015 Water & Wastewater Energy Roadmap will be the additional reduction in greenhouse gas emissions resulting from more efficient energy use.



Recommendations

1. The Region should take a holistic approach in assessing energy conservation programs provided through the Roadmap :
 - Energy consumed (or saved) under one isolated project may have an overall opposite effect. A pumping strategy that works for one facility may increase energy use in the system as a whole.
 - Energy used by third parties that is not normally accounted for must be considered. For example, in deciding whether to upgrade a stand-alone water resource recovery facility that uses aerobic digestion, the benefits of reducing energy used to haul sludge to disposal sites must be considered.
 - Energy-saving projects must be planned in conjunction with asset renewal and growth project programs. Capital investment in energy-saving initiatives in a facility that is soon to be decommissioned does not provide real benefits.
2. For greater cost-efficiency, the Region should use new capital projects as opportunities to launch energy conservation pilots. For example, piloting energy recovery in a newly-built sanitary sewer system is far more cost-efficient than retrofitting an existing system.

4.3.6 Ensure Financial Sustainability

One vital aspect of ensuring long-term sustainability is putting in place the financial resources needed to operate water services and maintain them in a state of good repair. This requires recovering the full cost of services as well as delivering services efficiently.

The Region currently manages water and wastewater assets with a replacement cost of \$5.3 billion. Future growth to 2041 will add approximately \$3 billion in assets.

Challenges associated with ensuring financially sustainable services include:

- Water demand has declined both on a per-capita basis and a total overall volume basis as a result of successful conservation programs, building code changes and more water-efficient fixtures in the market which have offset increases in water rates to a large extent and kept revenues fairly flat;
- Compliance with complex and evolving legislation and regulations has been costlier than expected, as a result of increasingly stringent requirements under the *Occupational Health and Safety Act*, *Safe Drinking Water Act, 2002*, *Clean Water Act, 2006*, Source Protection Plans, Lake Simcoe Protection Plan, the Drinking Water Quality Management Standard; and
- A growing, complex asset base is becoming more expensive to operate and maintain as the Region urbanizes and access to infrastructure becomes more limited.



In October 2015, Regional Council approved a Water and Wastewater Financial Sustainability Plan (also referred to in this report as the Water Rate Study). The new water rates in the plan position the Region to achieve full cost recovery in 2021. The objectives and principles that formed the plan’s foundation are shown in **Figure 4.2**. The Water and Wastewater Financial Sustainability Plan can be found on york.ca.

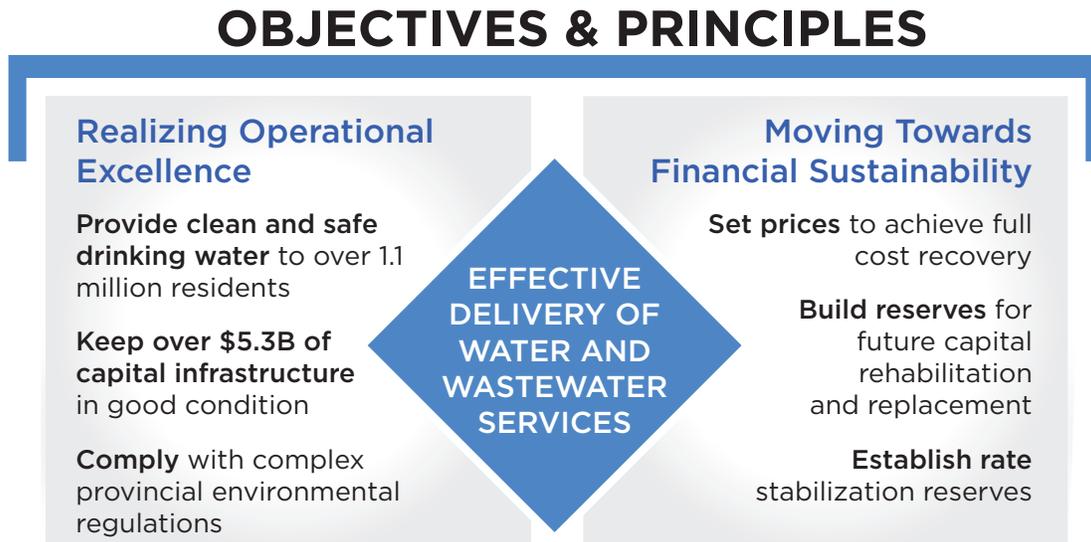


Figure 4.2 - Objective and Goals of Financial Sustainability Plan

To ensure full cost pricing is achieved and maintained, the Region will continuously monitor results and use updated water consumption and cost information to improve the water rate model.

While increasing revenue to achieve full-cost recovery is the key component of financial sustainability, York Region is also committed to manage the cost of water services through existing programs and future innovations. Ensuring these are cost-effective is also important for sustainability.

As well, the Region’s risk management processes should consider the potential impacts of delivering water and wastewater services on long-term financial sustainability. This should include looking at the possible impacts on new projects and asset management needs if long-term trends in population, revenues and/or costs differ from those used in modelling. While the water rate structure approved by Regional Council includes mechanisms to manage some of these risks, a more comprehensive framework may be beneficial.

Recommendations

1. Develop business cases for programs proposed in the One Water Action Plan and analyze the cost-effectiveness of existing programs to ensure water programs and initiatives are integrated with long-term financial sustainability.
2. Continue to monitor water consumption and asset rehabilitation/replacement cost, and update water rate model to ensure full-cost pricing is maintained.



Chapter 5 | *Master Plan* Implementation and Phasing



In this chapter:

- 5.1 Implementation – Projects, Costs and Phasing
 - 5.1.1 Water Projects
 - 5.1.2 Wastewater Projects
- 5.2 Summary of Master Plan Costs
 - 5.2.1 Capital Costs
 - 5.2.2 Operation and Asset Renewal Costs
 - 5.2.3 Operation and Maintenance Costs
 - 5.2.4 Asset Renewal Costs
 - 5.2.5 Water and Wastewater Transfer Costs
 - 5.2.6 Total Operation and Maintenance, Asset Renewal and Transfer Costs



Following is a summary of growth-related infrastructure works that are required to be constructed from 2016 to 2041 to implement the preferred servicing strategy alternative:

Water

- *Approximately 65 kilometres of new trunk watermains*
- *Four new water pumping stations*
- *Four water pumping station expansions*
- *Five new water storage facilities*
- *Two water storage facility replacements*
- *Two water pumping station decommissioning*
- *One water treatment plant expansion*
- *One groundwater system expansion*

Wastewater

- *Approximately 45 kilometres of new trunk sewers and forcemains*
- *One new sewage pumping station*
- *Six sewage pumping station expansions*
- *One new water reclamation centre and one water reclamation centre expansion*
- *Three water resource recovery facility expansions*

5.1 Implementation – Projects, Costs and Phasing

The Master Plan Update builds on the Region’s previous and current activities. Projects that are either completed or currently under construction are referred to as “baseline projects.” A list of water and wastewater baseline projects appears in Volume 1, Appednix 1. The list includes projects carried forward from previous master plans, some of which are under construction or have been revised in scope as a result of subsequent environmental assessments.

For water and wastewater projects, estimated capital costs in 2016 dollars and planned time frames for completion are shown. Project costs include only the costs from 2016 onward; any costs incurred before 2016 are excluded. Costs are based on the best available information at this time and are subject to change as project details are defined through subsequent environmental assessments and/or master plan updates.

Project cost information comes from a number of sources, including the current 10-year York Region capital plan and the asset valuation models. The cost methodology is documented in Volume 3, Appendix 3 D. Estimates are based on a conceptual level of design. Actual construction costs will depend on site conditions, design and construction approaches, and construction environment at the time of tendering and other factors.



Infrastructure phasing was developed for the next 10, 20 and 25 years to 2041. Phasing means building necessary water and wastewater infrastructure in a logical progression that keeps pace with forecast growth and ensures uninterrupted service delivery. Phasing also allows the Region to prioritize expenditures within its capital budget.

The following subsections provide additional detail on individual water and wastewater project timing, capital project phasing and capital investment cash flow.

5.1.1 Water Projects

Growth related water projects (in addition to baseline projects) required to support growth to 2041 are presented below. Each is identified with a project number to allow for easy reference to maps and tables. Projects are presented in phases according to their intended completion date.

The Region's preferred water servicing projects to 2041 are shown in **Figure 5.1**.

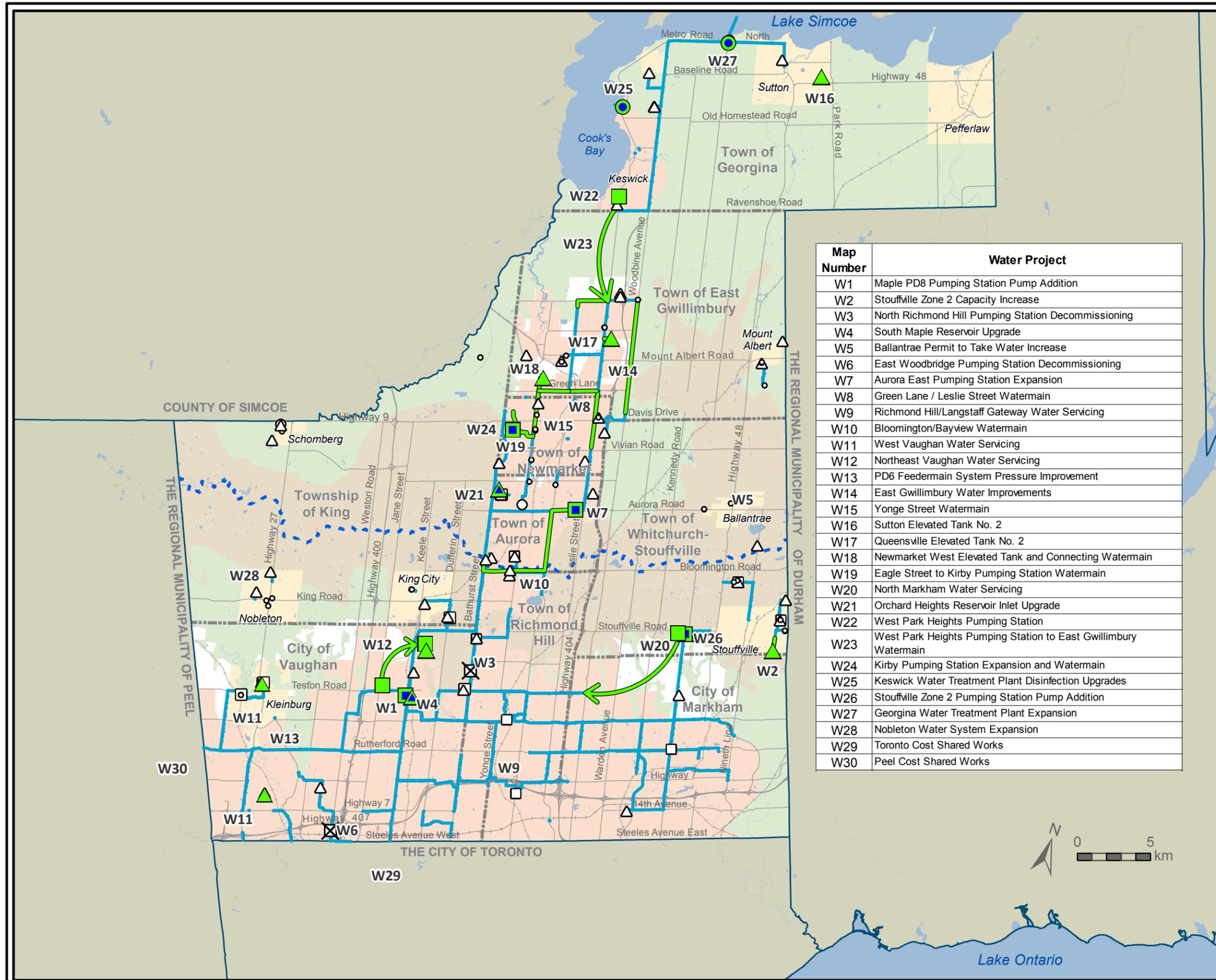
Table 5.1 presents the growth-related water projects, along with information about the expected time frame to complete each project and the proposed Class Environmental Assessment schedule. Detailed phasing maps (10, 20 and 25 years) for water projects appear in Volume 2, Appendix 2 B. As most projects are subject to the environmental assessment process, the scope, timing and cost of a project is subject to change.

Table 5.2 shows how these detailed water projects meet the needs of growth identified earlier in Chapter 3.





Figure 5.1 Preferred Water Servicing Strategy



Map Number	Water Project
W1	Maple PD8 Pumping Station Pump Addition
W2	Stouffville Zone 2 Capacity Increase
W3	North Richmond Hill Pumping Station Decommissioning
W4	South Maple Reservoir Upgrade
W5	Ballantrae Permit to Take Water Increase
W6	East Woodbridge Pumping Station Decommissioning
W7	Aurora East Pumping Station Expansion
W8	Green Lane / Leslie Street Watermain
W9	Richmond Hill/Langstaff Gateway Water Servicing
W10	Bloomington/Bayview Watermain
W11	West Vaughan Water Servicing
W12	Northeast Vaughan Water Servicing
W13	PD6 Feedermain System Pressure Improvement
W14	East Gwillimbury Water Improvements
W15	Yonge Street Watermain
W16	Sutton Elevated Tank No. 2
W17	Queensville Elevated Tank No. 2
W18	Newmarket West Elevated Tank and Connecting Watermain
W19	Eagle Street to Kirby Pumping Station Watermain
W20	North Markham Water Servicing
W21	Orchard Heights Reservoir Inlet Upgrade
W22	West Park Heights Pumping Station
W23	West Park Heights Pumping Station to East Gwillimbury Watermain
W24	Kirby Pumping Station Expansion and Watermain
W25	Keswick Water Treatment Plant Disinfection Upgrades
W26	Stouffville Zone 2 Pumping Station Pump Addition
W27	Georgina Water Treatment Plant Expansion
W28	Nobleton Water System Expansion
W29	Toronto Cost Shared Works
W30	Peel Cost Shared Works

- Water Projects**
- New - Pumping Station
 - Expansion/Upgrade - Pumping Station
 - ⊗ Decommission - Pumping Station
 - Expansion/Upgrade - Water Treatment Plant
 - ▲ New - Storage
 - ▲ Expansion/Upgrade - Storage
 - Water Servicing Project - Alignment Subject to Further Study

- Existing Water Infrastructure**
- Water Treatment Plant
 - Production Well
 - △ Storage
 - Pumping Station
 - Transmission
 - - - Watershed Boundary
 - - - - Municipal Boundary
 - Regional Boundary
 - Town or Village
 - Urban Area
 - Oak Ridges Moraine
 - Greenbelt Plan Area
 - Whitebelt Area



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Environmental Services Department
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Table 5.1 - Growth-Related Water Projects

Project	Class Environmental Assessment Schedule and Status
Projects for Completion Within 0-5 Years (2016–2020)	
<p>W1 – Maple Pressure District 8 Pumping Station Pump Addition</p> <p><i>Install fourth pump at Maple PD8 pumping station to service development in northeast Vaughan prior to implementing the proposed PD8 Vaughan Pumping Station (see W12). This project will increase the station capacity from 868 L/s to 1302 L/s.</i></p>	Schedule A+
<p>W2 – Stouffville Zone 2 Capacity Increase – Phase 1</p> <p><i>Interconnect Zone 1 and Zone 2 pressure districts through construction of pressure reducing valves to increase zone 2 capacity.</i></p>	Schedule A+
<p>W3 – North Richmond Hill Pumping Station Decommissioning</p> <p><i>Decommission PD8 North Richmond Hill Pumping Station following commissioning of the new East Vaughan Pumping Station in 2016 (Baseline project).</i></p>	Schedule A+
<p>W4 – South Maple Reservoir Upgrade</p> <p><i>Adjust South Maple (PD6) reservoir inlet pipe elevation to minimize unusable storage below the invert of the pipe.</i></p>	Schedule A+
<p>W5 – Ballantrae Permit to Take Water Increase</p> <p><i>Increase the permitted water taking for Ballantrae well system in support of additional development. Water Supply in the Communities of Ballantrae-Musselman Lake and Bloomington Class Environmental Assessment Study and Water Resource Exploration Project, HMM, June 2010 is currently in progress to determine the amount of water that can be sustainably withdrawn over the long term.</i></p>	Schedule B In Progress
<p>W11 – West Vaughan Water Servicing – Phase 1</p> <p><i>Improve pressure district interconnection in the Woodbridge service area.</i></p>	Schedule A
<p>W31 – Provision of iron removal treatment in groundwater wells . Feasibility study in progress</p>	Schedule B
Projects for Completion Within 5-10 Years (2021–2025)	
<p>W9 – Richmond Hill/Langstaff Gateway Urban Growth Centre Water Servicing</p> <p><i>Install water system connections to service the proposed urban growth centre in pressure district 6 as recommended by the Yonge Street / Highway 7 Regional Centre Water and Wastewater Servicing Class Environmental Assessment completed in 2015.</i></p>	Environmental Assessment Complete
Projects for Completion Within 10-15 Years (2026–2030)	
<p>W7 – Aurora East Pumping Station Expansion</p> <p><i>Construct a new 405 L/s pumping station to deliver Lake-Ontario based supply to Aurora, Newmarket and East Gwillimbury prior to introduction of Lake Simcoe supply. The station is assumed to be located near the existing Aurora East Pumping Station.</i></p>	Schedule B



Project	Class Environmental Assessment Schedule and Status
<p>W8 – Green Lane/Leslie Street Watermain - Phase 1</p> <p><i>Extend 4 kilometres of transmission main on Green Lane from Leslie Street to Yonge Street to service growth along Green Lane Corridor.</i></p>	Schedule A+
<p>W12 – Northeast Vaughan Water Servicing</p> <p><i>Expand water system to support significant urban expansion in northeast Vaughan. Subject to the outcome of the ongoing Northeast Vaughan Water a Servicing Class Environmental Assessment, GHD, infrastructure could include:</i></p> <p><i>New PD8 pumping station with capacity of 350 L/s</i></p> <p><i>New PD8 storage facility with a capacity of 14 ML</i></p> <p><i>7.1 kilometres of PD8 watermain</i></p> <p><i>New PD9 pumping station with a capacity of 90 L/s</i></p> <p><i>3.4 kilometres of PD9/King City watermain</i></p>	Schedule B, In Progress
<p>W13 – Pumping District 6 Feedermain System Pressure Improvements</p> <p><i>Install pressure reducing valves along connection points to the York-Peel Feedermain to maintain acceptable pressures as Peel supply increases over time.</i></p>	Schedule A
<p>W14 – East Gwillimbury Water Servicing</p> <p><i>Construct 2 kilometres of watermain on Queensville Sideroad from Leslie Street to Second Concession, and 8 kilometres of watermain on Woodbine Avenue from Davis Drive to Queensville Sideroad. Both watermains are required to service new development in East Gwillimbury.</i></p>	Schedule A+
<p>W21 – Orchard Heights Reservoir Inlet Upgrade</p> <p><i>Replace or twin the existing inlet to Orchard Heights Reservoir as demands on the system increase to support growth in Aurora, Newmarket and East Gwillimbury.</i></p>	Schedule B
Projects for Completion Within 15-20 Years (2031–2035)	
<p>W2 – Stouffville Zone 2 Capacity Increase – Phase 2</p> <p><i>Construct a new elevated tank with a capacity of 4 ML and 1.5 kilometres of watermain to provide additional storage capacity to service growth in Stouffville.</i></p>	Schedule B
<p>W8 – Green Lane/Leslie Street Watermain - Phase 2</p> <p><i>Extend 4 kilometres of transmission main on Leslie Street from Mulock Drive to Green Lane to service growth in East Gwillimbury and parts of Newmarket.</i></p>	Schedule A+
Projects for Completion Within 15-20 Years (2031–2035)	
<p>W10 – Bloomington/Bayview Watermain</p> <p><i>Construct 9 kilometres of watermain along Bloomington Road from Aurora South Reservoir to Bayview Avenue, and along Bayview Avenue to the proposed Aurora East Pumping Station (see W7). This watermain is required to bring additional Lake Ontario based supply to Aurora, Newmarket and East Gwillimbury.</i></p>	Schedule B



Project	Class Environmental Assessment Schedule and Status
<p>W11 – West Vaughan Water Servicing - Phase 2</p> <p><i>Replace West Woodbridge elevated tank (5 ML) and Kleinburg elevated tank (3.5 ML). This project is needed to augment storage capacity in Woodbridge and Kleinburg-Nashville areas.</i></p>	Schedule B
<p>W15 – Yonge Street Watermain</p> <p><i>Construct 2.6 kilometres of watermain on Yonge Street from Gladman Road to Green Lane to service proposed intensification along the Yonge Street corridor and connect Newmarket Central and Holland Landing pressure districts.</i></p>	Schedule A+
<p>W16 – Sutton Elevated Tank No 2</p> <p><i>Construct a new 2 ML elevated tank to support growth in Sutton as recommended by the Sutton Water Servicing Class Environmental Assessment completed in 2012.</i></p>	Environmental Assessment Complete
<p>W17 – Queensville Elevated Tank No. 2</p> <p><i>Construct a new 6.5 ML elevated tank assumed to be located at Leslie Street just south of Doane Road and 0.2 kilometres of watermain to connect the elevated tank to the existing system. This project is required to accommodate growth in East Gwillimbury.</i></p>	Schedule B
<p>W18 – Newmarket West Elevated Tank and Connecting Watermain</p> <p><i>Construct a new 5 ML elevated tank assumed to be located on Yonge Street north of Green Lane and 1.1 kilometres of watermain from the elevated tank to Green Lane. This project is needed to support growth in Newmarket West pressure district.</i></p>	Schedule B
<p>W19 – Eagle Street to Kirby Pumping Station Watermain</p> <p><i>Construct 2 kilometres of watermain from Eagle Street to Glenway Reservoir / Kirby Pumping Station site. This project is required to augment transmission system capacity and improve filling the recently expanded Glenway reservoir which services Newmarket Central and is also the main source of supply to Kirby pumping station feeding Newmarket West and Green Lane West areas.</i></p>	Schedule B
<p>W20 – North Markham Water Servicing</p> <p><i>Construct a new 350 L/s pumping station assumed to be located adjacent to the existing North Markham Reservoir and 10 kilometres of watermain from the new pumping station to the existing PD7 watermain at the intersection of Woodbine Avenue and Elgin Mills Road. This project is required to support urban expansion north of Elgin Mills Road in Markham.</i></p>	Schedule B
<p>W24 – Kirby Pumping Station Expansion and Watermain</p> <p><i>Expand Kirby pumping station from current capacity of 90 L/s to 174 L/s and construct 2 kilometres of watermain from the pumping station to Woodspring Avenue. This project is to improve system robustness in Newmarket West pressure district.</i></p>	Schedule A
<p>Projects for Completion Within 20-25 Years (2036–2041)</p>	
<p>W6 – East Woodbridge Pumping Station Decommissioning</p> <p><i>Decommission East Woodbridge Pumping Station as it is no longer required to service the Woodbridge area.</i></p>	Schedule A+



Project	Class Environmental Assessment Schedule and Status
<p>W22 – West Park Heights Pumping Station</p> <p><i>Construct a new 174 L/s pumping station assumed to be located adjacent to the existing West Park Heights reservoir in Keswick. This project is needed to introduce Lake Simcoe supply to East Gwillimbury.</i></p>	Schedule C
<p>W23 – West Park Heights Pumping Station to East Gwillimbury Watermain</p> <p><i>Construct 7 kilometres of watermain on Leslie Street from the new West Park pumping station (W22) to Queensville Sideroad. The watermain will normally be used to convey Lake Simcoe water south to East Gwillimbury, but will be designed to allow water to flow to support Georgina system during system disruption.</i></p>	Schedule C
<p>W25 – Keswick Water Treatment Plant Disinfection Upgrades</p> <p><i>Convert Georgina water system to chloramination system by upgrading Keswick Water Treatment Plant disinfection system. This project is required to allow introduction of Lake Simcoe Supply to East Gwillimbury.</i></p>	Schedule A
<p>W26 – Stouffville Zone 2 Booster Pumping Station Pump Addition</p> <p><i>Install a new pump and replace three existing pumps at Stouffville Zone 2 booster pumping station to reach ultimate station capacity of 290 L/s. The project is required to support growth in Stouffville.</i></p>	Schedule A
<p>W27 – Georgina Water Treatment Plant Expansion</p> <p><i>Increase Georgina water treatment plant capacity from the existing 30 MLD to its ultimate permitted capacity of 50 MLD as recommended in the Region of York/Consumer Utilities, Consolidation of Master Plan and Town of Georgina Class Environmental Assessment, Lake Simcoe Water Treatment Facility Completion of Class Environmental Assessment - Phases 3 & 4, Greater Toronto Consulting Group, June 1998. The expansion is needed to support local growth within Georgina and the supply of water from Georgina to East Gwillimbury and Newmarket.</i></p>	Environmental Assessment Complete
<p>W28 – Nobleton Water System Expansion</p> <p><i>Increase supply capacity to support proposed Nobleton community expansion through addition of new wells and/or revision of existing Permit to Take Water limit.</i></p>	Schedule C
<h2>Cost-Shared Projects</h2>	
<p>W29 – Toronto Cost-Shared Works</p> <p><i>Implement various cost-shared capital projects within the City of Toronto to permit increase in water transfers to the Region under the existing agreement with City of Toronto.</i></p>	Various
<p>W30 – Peel Cost-Shared Works</p> <p><i>Implement various cost-shared capital projects within the Region of Peel to permit increase in water transfers to the Region under the existing agreement with the Region of Peel.</i></p>	Various



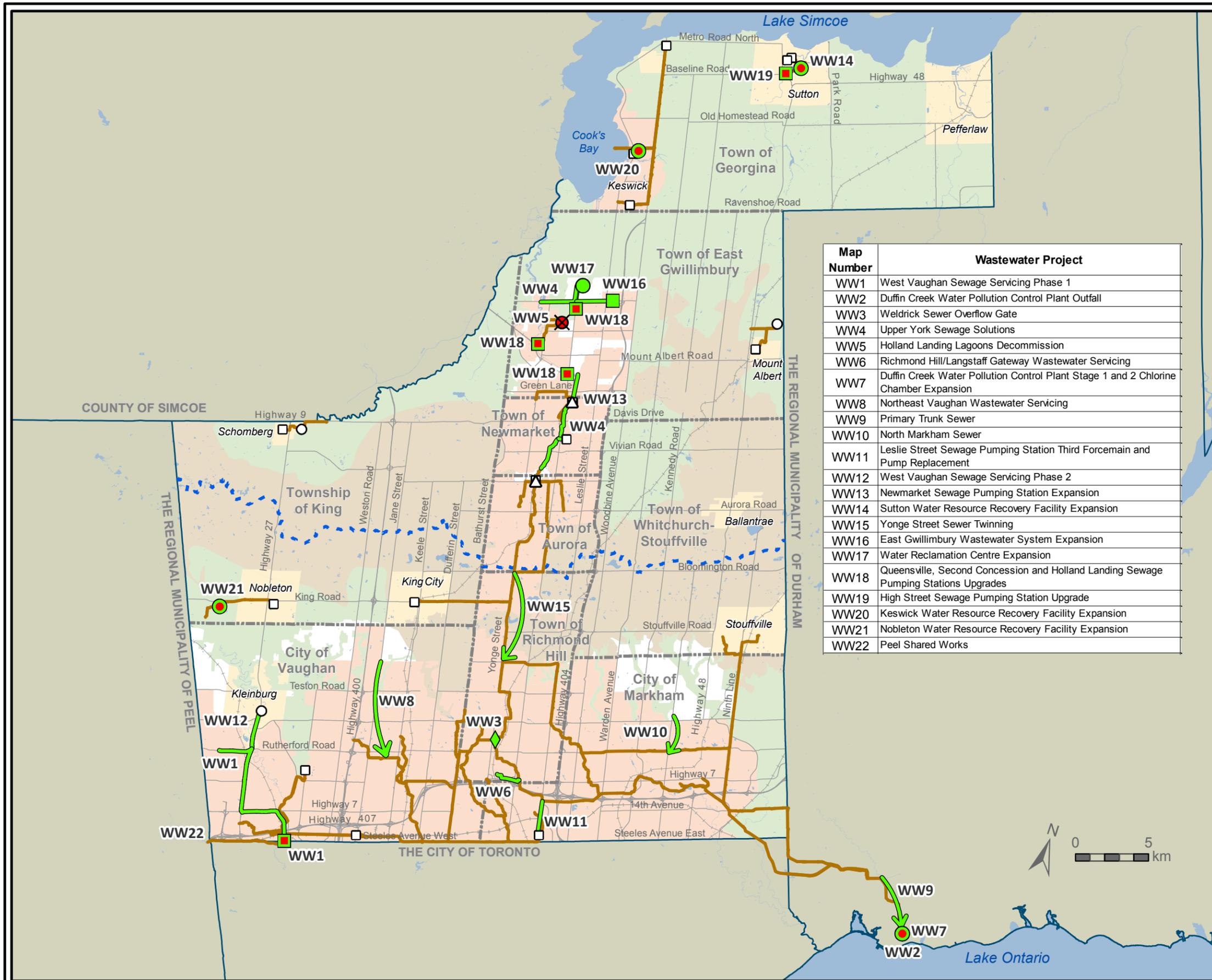
Table 5.2 - Water Opportunities and Challenges – Supporting Projects

Water System		
Opportunities and Challenges	Projects	
Aurora, East Gwillimbury, Newmarket		
<p>Population growth in Aurora, Newmarket and East Gwillimbury will increase by 77 per cent between 2016 and 2041.</p> <p>The existing transmission system will need to be expanded in stages to deliver the necessary water supply to these three municipalities.</p>	W7	Aurora East Pumping Station Expansion
	W8	Green Lane/Leslie Street Watermain
	W10	Bloomington/Bayview Watermain
	W14	East Gwillimbury Water Improvements
	W15	Yonge Street Watermain
	W17	Queensville Elevated Tank No. 2
	W18	Newmarket West Elevated Tank and Connecting Watermain
	W19	Eagle Street to Kirby Pumping Station Watermain
	W21	Orchard Heights Reservoir Inlet Upgrade
	W22	West Park Heights Pumping Station
	W23	West Park Heights Pumping Station to East Gwillimbury Watermain
	W24	Kirby Pumping Station Expansion and Watermain
	W25	Keswick Water Treatment Plant Disinfection Upgrades
	W27	Georgina Water Treatment Plant Expansion
	W29	Toronto Cost Shared Works
W30	Peel Cost Shared Works	
Markham		
<p>Pressure District 7 system will have to be extended to service the expanded urban service area.</p> <p>The Pressure District 6 system will have to be upgraded because of intensification in areas between Yonge Street and Bayview Avenue, near Highway 7.</p>	W20	North Markham Water Servicing
	W9	Richmond Hill/Langstaff Gateway Urban Growth Centre Water Servicing
	W29	Toronto Cost Shared Works
Richmond Hill		
<p>The Pressure District 6 system will have to be upgraded because of intensification in areas between Yonge Street and Bayview Avenue, near Highway 7.</p> <p>North Richmond Hill Pumping Station is no longer required after commissioning of the East Vaughan Pumping Station</p>	W9	Richmond Hill/Langstaff Gateway Urban Growth Centre Water Servicing
	W3	North Richmond Hill Pumping Station Decommissioning



Water System		
Opportunities and Challenges	Projects	
Vaughan		
<p>Pressure District 8 and 9 systems need to be expanded because of development and expansion of urban service areas in northeast Vaughan.</p> <p>Pressure District 6 and Kleinburg-Nashville systems will need to be upgraded because of expansion of urban service areas in the West Vaughan area.</p>	W1	Maple Pressure District 8 Pumping Station Pump Addition
	W12	Northeast Vaughan Water Servicing
	W4	South Maple Reservoir Upgrade
	W6	East Woodbridge Pumping Station Decommissioning
	W13	Pressure District 6 Feedermain System Pressure Improvements
	W11	West Vaughan Water Servicing
	W29	Toronto Cost Shared Works
	W30	Peel Cost Shared Works
Stouffville		
<p>More lake-based supply and storage capacity will be needed in Stouffville system to service growth to 2041.</p>	W2	Stouffville Zone 2 Elevated Tank and Connecting Watermain
	W26	Stouffville Zone 2 Booster Pumping Station Pump Addition
	W29	Toronto Costs Shared Works
Georgina		
<p>The Georgina Water System services the Keswick, Sutton and Willow Beach communities and draws water from Lake Simcoe.</p> <p>Serviced population in Georgina is forecast to grow by 50 per cent between 2016 and 2041. The Georgina water treatment plant capacity is recommended to be increased to support the proposed Georgina growth and in 2041 provide a small supplement to the water supply to East Gwillimbury and part of Newmarket.</p>	W27	Georgina Water Treatment Plant Expansion
	W16	Sutton Elevated Tank No. 2
<p>The Sutton system also needs more storage capacity.</p>		
Stand-Alone Systems		
<p>Current permit to take water will need to be revised to service a population of approximately 6,300 in Ballantrae.</p>	W5	Ballantrae Permit to Take Water Increase
<p>Expansion of the Nobleton water system and/or revision of the current permit to take water is required to service a population of approximately of 9,500 persons</p>	W28	Nobleton Water System Expansion

Figure 5.2 Preferred Wastewater Servicing Strategy



Map Number	Wastewater Project
WW1	West Vaughan Sewage Servicing Phase 1
WW2	Duffin Creek Water Pollution Control Plant Outfall
WW3	Weldrick Sewer Overflow Gate
WW4	Upper York Sewage Solutions
WW5	Holland Landing Lagoons Decommission
WW6	Richmond Hill/Langstaff Gateway Wastewater Servicing
WW7	Duffin Creek Water Pollution Control Plant Stage 1 and 2 Chlorine Chamber Expansion
WW8	Northeast Vaughan Wastewater Servicing
WW9	Primary Trunk Sewer
WW10	North Markham Sewer
WW11	Leslie Street Sewage Pumping Station Third Forcemain and Pump Replacement
WW12	West Vaughan Sewage Servicing Phase 2
WW13	Newmarket Sewage Pumping Station Expansion
WW14	Sutton Water Resource Recovery Facility Expansion
WW15	Yonge Street Sewer Twinning
WW16	East Gwillimbury Wastewater System Expansion
WW17	Water Reclamation Centre Expansion
WW18	Queensville, Second Concession and Holland Landing Sewage Pumping Stations Upgrades
WW19	High Street Sewage Pumping Station Upgrade
WW20	Keswick Water Resource Recovery Facility Expansion
WW21	Nobleton Water Resource Recovery Facility Expansion
WW22	Peel Shared Works

- Wastewater Projects**
- New - Sewage Pumping Station
 - Expansion/Upgrade - Sewage Pumping Station
 - New - Water Resource Recovery Facility
 - Expansion/Upgrade - Water Resource Recovery Facility
 - ⊗ Decommission - Water Resource Recovery Facility
 - ◆ New - Sewer Overflow Gate
 - Wastewater Linear Projects
 - ↪ Wastewater Servicing Project - Alignment Subject to Further Study
- Existing Wastewater Infrastructure**
- Sewage Pumping Station
 - Water Resource Recovery Facility
 - Equalization Tank
 - Conveyance
 - Watershed Boundary
 - Municipal Boundary
 - Regional Boundary
 - Town or Village
 - Urban Area
 - Oak Ridges Moraine
 - Greenbelt Plan Area
 - Whitebelt Area



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5.1.2 Wastewater Projects

Growth related wastewater projects (in addition to baseline projects) required to support growth to 2041 are presented in **Table 5.3**. Each is identified with a project number to allow for easy reference to maps and tables. Projects are presented in phases according to their intended completion date.

The Region’s preferred wastewater servicing projects to 2041 are shown in **Figure 5.2**.

Table 5.3 presents the growth-related wastewater projects, along with information about the expected timeframe to complete each project and the proposed class environmental assessment schedule. Detailed phasing maps (10, 20 and 25 years) for water projects appear in Volume 2 Appendix 2 B. As most projects are subject to an environmental assessment process, the scope of a project and the location of the works may be subject to change.

Table 5.4 shows how these detailed projects meet the needs of growth identified earlier in Chapter 3.

Table 5.3 - Growth-Related Wastewater Projects

Project	Class Environmental Assessment Schedule and Status
Projects for Completion Within 0-5 Years (2016–2020)	
WW2 – Duffin Creek Water Pollution Control Plant Outfall – Phase 1 Implement solutions to address operational and regulatory capacity constraints at the Duffin Creek plant. Solutions include optimizing or expanding liquid and solid treatment processes, and twinning or replacing the existing outfall.	Schedule C, Under Review
WW3 – Weldrick Sewer Overflow Gate Install a gate structure at maintenance hole 27 on Yonge Street to control overflow into the existing 400 mm diameter Weldrick Sewer	Schedule A
Projects for Completion Within 5-10 Years (2021–2025)	
WW4 – Upper York Sewage Solutions Construct a new 40 MLD water reclamation centre in East Gwillimbury with associated sanitary sewers. Construct 5.8 kilometres of forcemain from Newmarket and Bogart Creek sewage pumping stations. The project is required to support growth in East Gwillimbury, Newmarket and Aurora.	Individual Environmental Assessment, Under Review
WW5 – Holland Landing Lagoons Decommissioning Decommission Holland Landing Lagoons which will no longer be required once the new water reclamation centre (WW4) is in service.	Schedule A+
WW6 – Richmond Hill/Langstaff Gateway Wastewater Servicing Construct 2 kilometres of sewer on Cedar Avenue and Highway 7 that will convey flows from part of Richmond Hill - Langstaff Gateway Regional Urban Growth Centre to the Richmond Hill Collector as recommended by the Class Environmental Assessment completed in 2015	Environmental Assessment Complete
Projects for Completion Within 10-15 Years (2026–2030)	



Project	Class Environmental Assessment Schedule and Status
<p>WW1 – West Vaughan Sewage Servicing Phase 1</p> <p><i>Increase capacity of Humber sewage pumping station from 1,700 L/s to 2,400 L/s and construct 11 kilometres of sewer along Rutherford Road, Highway 27 and Highway 7 as recommended by the West Vaughan Sewage Servicing Class Environmental Assessment - Environmental Study Report, HMM, June 2013. This project is required to service future growth in northwest Vaughan and Kleinburg.</i></p>	Environmental Assessment Complete
<p>WW7 – Duffin Creek Water Pollution Control Plant Stage 1 and 2 Chlorine Chamber Expansion</p> <p><i>Expand chlorine chambers at the Duffin Creek water pollution control plant</i></p>	Schedule A
<p>WW8 – Northeast Vaughan Wastewater Servicing</p> <p><i>Construct 8.5 kilometres of sewer to convey flows generated in the northeast Vaughan area to the existing Jane Rutherford Sewer, subject to the outcome of the Northeast Vaughan Wastewater Servicing Class Environmental Assessment, GHD, currently in progress.</i></p>	Schedule B, In Progress
<p>WW9 – Primary Trunk Sewer</p> <p><i>Construct over 5 kilometres of sewer from the terminus of the Southeast Collector Trunk Sewer at Valley Farm Road to the Duffin Creek water pollution control plant. The project is required to service growth in the overall York Durham Sewage System service area</i></p>	Schedule C
<p>WW16 – East Gwillimbury Wastewater System Expansion</p> <p><i>Construct a 140 L/s pumping station to service growth in East Gwillimbury. The 140 L/s pumping station is assumed to be located on Queensville Sideroad immediately to the west of Highway 404 and include 4.1 kilometres of forcemain along Queensville Sideroad and connecting to the Water Reclamation Centre.</i></p>	Schedule B
Projects for Completion Within 15-20 Years (2031–2035)	
<p>WW10 – North Markham Sewer</p> <p><i>Construct 2.1 kilometres of sewer on McCowan Road from 16th Avenue to Major Mackenzie Drive East. This sewer is required to service future growth in North Markham.</i></p>	Schedule B
<p>WW11 – Leslie Street Sewage Pumping Station Third Forcemain and Pump Upgrade</p> <p><i>Construct 2.5 kilometres of forcemain and replace four existing pumps to increase the Leslie Street sewage pumping station capacity from 5400 L/s to 7,500 L/s. The project is needed as flows to the station increase due to growth.</i></p>	Schedule B
<p>WW2 – Duffin Creek Water Pollution Control Plant Outfall – Phase 2</p> <p><i>Implement solutions to address operational and regulatory capacity constraints at the Duffin Creek plant. Solutions include optimizing or expanding liquid and solid treatment processes, and twinning or replacing the existing outfall.</i></p>	Schedule C, Under Review
<p>WW13 – Newmarket Sewer Diversion</p> <p><i>Construct 2.1 Kilometres of sewer from the Newmarket Pumping Station to connect to Sharon trunk sewer to divert flow during wet weather event.</i></p>	Schedule B
<p>WW14 – Sutton Water Resource Recovery Facility Expansion</p> <p><i>Expand Sutton water resource recovery facility from 39 L/s to 71 L/s to service growth in Sutton as recommended by the Sutton Water Pollution Control Plant Phase IV & V Expansion Class Environmental Assessment Environmental Study Report, HMM, June 2010.</i></p>	Environmental Assessment Complete



Project	Class Environmental Assessment Schedule and Status
Projects for Completion Within 15-20 Years (2031–2035)	
<p>WW15 – Yonge Street Sewer Twinning</p> <p><i>Construct 3.1 kilometres of sewer to twin sections of Yonge Street North Trunk Sewer as flows from Aurora, Newmarket and Richmond Hill increase. The first section is from Bloomington Road to Maple Grove and the second section from south of Jefferson Sideroad to south of Tower Hill Road.</i></p>	Schedule B
<p>WW18 – Queensville, Second Concession and Holland Landing Sewage Pumping Stations Upgrades</p> <p><i>Increase capacity of Queensville sewage pumping station from 99 L/s to 405 L/s; Second Concession sewage pumping station from 354 L/s to 1200 L/s; and Holland Landing sewage pumping station from 158 L/s to 258 L/s. Proposed upgrades can be accommodated within the original building.</i></p>	Schedule A+
<p>WW19 – High Street Sewage Pumping Station Upgrade</p> <p><i>Increase capacity of High Street sewage pumping station from 150 L/s to 173 L/s to accommodate growth in Sutton.</i></p>	Schedule A+
Projects for Completion Within 20-25 Years (2036–2041)	
<p>WW12 – West Vaughan Sewage Servicing Phase 2</p> <p><i>Construct 3.3 kilometres of sewer from the Kleinburg water resource recovery facility south to the top end of West Vaughan Sewage Servicing - Phase 1 (WW1) at Rutherford Road and Highway 27. The sewer allows decommissioning of the Kleinburg water resource recovery facility.</i></p>	Environmental Assessment Complete
<p>WW17 – Water Reclamation Facility Expansion</p> <p><i>Expand the water reclamation centre (WW4) from 40 MLD to 60 MLD to service growth in Aurora, East Gwillimbury and Newmarket.</i></p>	Schedule C
<p>WW20 – Keswick Water Resource Recovery Facility Expansion</p> <p><i>Increase capacity of Keswick water resource recovery facility from 18 MLD to 24 MLD to accommodate growth in the Keswick service area.</i></p>	Environmental Assessment Complete
<p>WW21 – Nobleton Water Resource Recovery Facility Expansion</p> <p><i>Increase capacity of Nobleton water resource recovery facility from 2.9 MLD to 4.2 MLD, including the adding a third treatment train, upgrades to the filtration system and modification to existing headwork and pump station. The expansion is required to accommodate growth in Nobleton.</i></p>	Schedule C
Cost Shared Projects	
<p>WW22 – Peel Cost-Shared Works</p> <p><i>Implement various cost shared projects in the Region of Peel to allow diversion of wastewater from York for treatment in Peel under the existing agreement with the Region of Peel.</i></p>	Various



Table 5.4 - Wastewater Opportunities and Challenges – Supporting Projects

Water System	
Opportunities and Challenges	Projects
York-Durham Sewage System – Primary System	
The serviced population in the Duffin Creek sewershed is forecast to grow 57 per cent between 2016 and 2041. To accommodate the 2041 flow, operating capacity of Duffin Creek Water Pollution Control Plant must increase to 630 million litres a day by addressing the outfall constraint. Any additional treatment process improvements to be identified through study before flow reaches 630MLD.	WW2 Duffin Creek Water Pollution Control Plant Outfall
	WW7 Duffin Creek Water Pollution Control Plant Stage 1 and 2 Chlorine Chamber Expansion
The Primary Trunk Sewer will require a second conduit before 2031.	WW9 Primary Trunk Sewer
York-Durham Sewage System – York Collection System	
Beyond the current upgrade to the Leslie Street Sewage Pumping Station, four pumps will have to be replaced, and a third forcemain from the Leslie Street Sewage Pumping Station will be needed to accommodate the 2041 flow.	WW11 Leslie Street Sewage Pumping Station Third Forcemain and Pump Upgrade
Other system improvements are needed to meet capacity needs in the York Durham Sewage System.	WW3 Weldrick Sewer Overflow Gate
	WW15 Yonge Street Sewer Twinning
Markham	
Expansion of the urban service area in northern Markham means the trunk sewer system must be extended from 16th Avenue north to Major Mackenzie Drive East.	WW10 North Markham Sewer
Intensification in areas between Yonge Street and Bayview Avenue area Highway 7 requires that the trunk sewer system be upgraded.	WW6 Richmond Hill/Langstaff Gateway Wastewater Servicing
Richmond Hill	
Intensification in areas between Yonge Street and Bayview Avenue area near Highway 7 requires that the trunk sewer system be upgraded.	
The Aurora Sewage Pumping Station forcemain terminates at the Yonge Street Sewer near Bloomington Road. The Yonge Street Sewer is expected to be at capacity before 2041 as a result of increased flow from Aurora and Newmarket and intensification along that section of Yonge Street in Richmond Hill.	WW6 Richmond Hill/Langstaff Gateway Wastewater Servicing
	WW15 Yonge Street Sewer Twinning
Vaughan	
The Jane Rutherford Sewer System must be extended into Northeast Vaughan and upgraded because of development and expansion of urban service areas north of Teston Road between Keele Street and Pine Valley Drive.	WW8 Northeast Vaughan Wastewater Servicing
The trunk sewer system must be expanded because of development and expansion of urban service areas in West Vaughan.	WW1 West Vaughan Sewage Servicing Phase 1
	WW12 West Vaughan Sewage Servicing Phase 2
Peel Diversion System	
The Humber Sewage Pumping Station, which diverts sewage flow from the Humber sewershed to Peel, will be over capacity as early as 2024.	WW1 West Vaughan Sewage Servicing Phase 1



Water System	
Opportunities and Challenges	Projects
Georgina System	
<p>Georgina is serviced by the Keswick and Sutton Water Resource Recovery Facilities. Georgina is forecast to grow by 52% from 2016 to 2041. Both Water Resource Recovery Facilities must be expanded to accommodate growth through 2041.</p> <p>In addition, the High Street Sewage Pumping Station in Sutton must be expanded to match the increased capacity of the Sutton Water Resource Recovery Facility.</p>	WW14 Sutton Water Resource Recovery Facility Expansion
	WW20 Keswick Water Resource Recovery Facility Expansion
	WW19 High Street Sewage Pumping Station Upgrade
Aurora, East Gwillimbury, Newmarket	
<p>The communities of Aurora, Newmarket, Queensville, Holland Landing and Sharon are forecast to grow substantially between 2016 and 2041.</p> <p>According to an Individual Environmental Assessment, the preferred solution is to build a new water reclamation centre in East Gwillimbury, with an initial capacity of 40 million litres a day. Associated with this water reclamation centre is the need for improvements in the conveyance system to support growth and pump wastewater to the new treatment facility.</p> <p>The 40 million litre a day water reclamation facility will be at capacity before 2041.</p> <p>Capacity of the Aurora and Newmarket Sewage Pumping Station Systems do not have capacity to support 2041 growth. A portion of flow to Newmarket needs to be diverted to the water reclamation facility during wet weather events.</p> <p>The Aurora Sewage Pumping Station forcemain terminates at the Yonge Street Sewer near Bloomington Road. The Yonge Street Sewer is expected to be at capacity before 2041 as a result of increased flow from Aurora and Newmarket and intensification along that section of Yonge Street in Richmond Hill.</p>	WW4 Upper York Sewage Solutions
	WW5 Holland Landing Lagoons Decommissioning
	WW16 East Gwillimbury Wastewater System Expansion
	WW18 Queensville, Second Concession and Holland Landing Sewage Pumping Stations Upgrades
	WW17 Water Reclamation Centre Expansion
	WW13 Newmarket Diversion Sewer
	WW15 Yonge Street Sewer Twinning
Stand-alone Systems	
<p>The Holland Landing lagoon will be decommissioned when the new water reclamation facility in East Gwillimbury is complete.</p> <p>Expansion of the Nobleton Water Resource Recovery Facility is required to service a population of approximately of 9,500 persons.</p> <p>The West Vaughan Sewer extension north of Rutherford Road is required to permit decommissioning of the Kleinburg Water Resource Recovery Facility and to serve the area when capacity of the Kleinburg Water Resource Recovery Facility reaches its permitted capacity.</p>	WW5 Holland Landing Lagoons Decommission
	WW21 Nobleton Water Resource Recovery Facility Expansion
	WW12 West Vaughan Sewage Servicing Phase 2



5.2 Summary of Master Plan Costs

Estimated total costs associated with carrying out the master plan capital program include the proposed infrastructure, supporting programs, operation and maintenance, water transfer costs and asset management. The following section describes each cost component, and then presents a more detailed capital investment cash flow.

The costs presented represent the incremental costs associated with meeting 2041 water and wastewater servicing needs.

5.2.1 Capital Costs

The estimated capital cost to implement the preferred strategy alternative (Lake Simcoe Servicing Strategy Alternative) is \$3,149 million, \$840 million of which is associated with water projects and \$2,309 million with wastewater projects. These costs cover capital expenditures required up to 2041, and include environmental assessment, design, land acquisition and construction costs, plus contingencies.

Table 5.5 shows a summary of the total expenditures of growth projects recommended by this Master Plan Update in 10-year intervals through to 2041.

Table 5.5 - Summary of Master Plan Projected Expenditures for Growth Capital Projects

System	Expenditures of Capital Growth Projects (\$Millions)			
	2016–2025	2026–2035	2036–2041	Total
Water	\$287	\$477	\$76	\$840
Wastewater	\$1,008	\$1,030	\$271	\$2,309
Total	\$1,295	\$1,507	\$347	\$3,149

Tables 5.6 and 5.7 shows the master plan project cash flow in 10-year intervals through to 2041 for water and wastewater respectively.

Table 5.6 - Water 10-Year Intervals Cash Flows

Project Name		Cost Estimates (000's)			
		(2016-2025)	(2026-2035)	(2036-2041)	Total Expenditures
W1	Maple PD8 PS Pump Addition	\$740	\$0	\$0	\$740
W2	Stouffville Zone 2 Elevated Tank and Connecting Watermain	\$1,960	\$8,460	\$0	\$10,420
W3	North Richmond Hill Pumping Station Decommissioning	\$1,140	\$0	\$0	\$1,140
W4	South Maple Reservoir Upgrade	\$6,420	\$0	\$0	\$6,420
W5	Ballantrae Permit to Take Water Increase	\$940	\$0	\$0	\$940
W6	East Woodbridge PS Decommissioning	\$1,060	\$0	\$0	\$1,060
W7	Aurora East Pumping Station Expansion	\$110	\$20,180	\$0	\$20,290
W8	Green Lane / Leslie Street Watermain	\$8,880	\$26,680	\$0	\$35,560
W9	Richmond Hill / Langstaff Gateway Water Servicing	\$1,470	\$20	\$0	\$1,490
W10	Bloomington / Bayview Watermain	\$0	\$46,900	\$0	\$46,900
W11	West Vaughan Water Servicing	\$1,000	\$14,350	\$0	\$15,350
W12	Northeast Vaughan Water Servicing	\$16,930	\$50,720	\$0	\$67,650
W13	PD6 Feedermain System Pressure Improvements	\$0	\$5,010	\$0	\$5,010
W14	East Gwillimbury Water Servicing	\$0	\$34,430	\$0	\$34,430
W15	Yonge Street Watermain	\$0	\$43,190	\$0	\$43,190
W16	Sutton Elevated Tank No. 2	\$0	\$3,400	\$0	\$3,400
W17	Queensville Elevated Tank No. 2	\$0	\$11,990	\$0	\$11,990
W18	Newmarket West Elevated Tank and Connecting Watermain	\$0	\$12,340	\$0	\$12,340
W19	Eagle Street to Kirby PS Watermain	\$0	\$10,650	\$0	\$10,650
W20	North Markham Water Servicing	\$0	\$52,590	\$0	\$52,590
W21	Orchard Heights Reservoir Inlet Upgrade	\$440	\$890	\$0	\$1,330
W22	West Park Heights Pumping Station	\$0	\$0	\$6,700	\$6,700
W23	West Park Heights Pumping Station to East Gwillimbury Watermain	\$0	\$0	\$15,460	\$15,460
W24	Kirby Pumping Station Expansion and Watermain	\$0	\$9,790	\$0	\$9,790
W25	Keswick Water Treatment Plant Disinfection Upgrades	\$0	\$0	\$220	\$220
W26	Stouffville Zone 2 Booster Pumping Station Pump Addition	\$0	\$0	\$2,030	\$2,030
W27	Georgina Water Treatment Plant Expansion	\$0	\$0	\$10,990	\$10,990
W28	Nobleton Water System Expansion	\$0	\$0	\$5,030	\$5,030
W29	Toronto Cost Shared Works (2016 – 2025)	\$100,120	\$105,860	\$28,390	\$234,370
W30	Peel Cost Shared Works (2016 – 2025)	\$66,570	\$7,630	\$0	\$74,200
Water System Enhancement		\$30,000	\$0	\$0	\$30,000
Baseline Water Projects		\$34,780	\$0	\$0	\$34,780
Supporting Water Programs		\$14,670	\$11,900	\$7,530	\$34,100
Total Cost Estimates - Water System		\$287,230	\$476,980	\$76,350	\$840,560



Table 5.7 - Wastewater 10-Year Intervals Cash Flows

Project Name	Cost Estimates (000's)			
	(2016-2025)	(2026-2035)	(2036-2041)	Total Expenditures
WW1 West Vaughan Sewage Servicing Phase 1	\$84,420	\$177,040	\$0	\$261,460
WW2 Duffin Creek Water Pollution Control Plant Outfall	\$26,840	\$237,800	\$0	\$264,640
WW3 Weldrick Sewer Overflow Gate	\$800	\$0	\$0	\$800
WW4 Upper York Sewage Solutions	\$591,210	\$54,000	\$0	\$645,210
WW5 Holland Landing Lagoons Decommission	\$1,100	\$0	\$0	\$1,100
WW6 Richmond Hill/Langstaff Gateway Wastewater Servicing	\$26,150	\$20	\$0	\$26,170
WW7 Duffin Creek Water Pollution Control Plant Stage 1 and 2 Chlorine Chamber Expansion	\$0	\$3,500	\$0	\$3,500
WW8 Northeast Vaughan Wastewater Servicing	\$35,700	\$71,720	\$0	\$107,420
WW9 Primary Trunk Sewer	\$30,600	\$222,970	\$0	\$253,570
WW10 North Markham Sewer	\$0	\$34,830	\$0	\$34,830
WW11 Leslie Street Sewage Pumping Station Third Forcemain and Pump Upgrade	\$0	\$49,060	\$0	\$49,060
WW12 West Vaughan Sewage Servicing Phase 2	\$0	\$17,600	\$15,930	\$33,530
WW13 Newmarket Diversion Sewer	\$0	\$20,480	\$0	\$20,480
WW14 Sutton Water Resource Recovery Facility Expansion	\$2,000	\$38,680	\$0	\$40,680
WW15 Yonge Street Sewer Twinning	\$0	\$52,190	\$0	\$52,190
WW16 East Gwillimbury Wastewater System Expansion	\$2,020	\$19,890	\$0	\$21,910
WW17 Water Reclamation Centre Expansion	\$0	\$0	\$190,670	\$190,670
WW18 Queensville, Second Concession and Holland Landing Sewage Pumping Stations Upgrades	\$0	\$5,190	\$0	\$5,190
WW19 High Street Sewage Pumping Station Upgrade	\$0	\$2,280	\$0	\$2,280
WW20 Keswick Water Resource Recovery Facility Expansion	\$0	\$0	\$32,030	\$32,030
WW21 Nobleton Water Resource Recovery Facility Expansion	\$0	\$0	\$19,040	\$19,040
WW22 Peel Cost Shared Works	\$33,730	\$0	\$0	\$33,730
Baseline Wastewater Projects	\$149,770	\$0	\$0	\$149,770
Wastewater Supporting Programs	\$23,420	\$22,670	\$13,500	\$59,590
Total Cost Estimates - Wastewater System	\$1,007,760	\$1,029,920	\$271,170	\$2,308,850



5.2.2 Operation and Asset Renewal Costs

In addition to capital costs for building new infrastructure, there would be additional costs due to the operation, maintenance, rehabilitation and renewal of the new infrastructure as well as costs of water and wastewater service for additional serviced population.

5.2.3 Operation and Maintenance Costs

Incremental operation and maintenance costs associated with the new infrastructure proposed under this master plan update have been estimated based on the incremental increase in asset value of new, upgraded or expanded infrastructure. This approach is consistent with the analysis presented in the *Water and Wastewater Financial Sustainability Plan*, October 2015.

Figure 5.3 summarizes the estimated cumulative, incremental annual operation and maintenance costs to 2041.

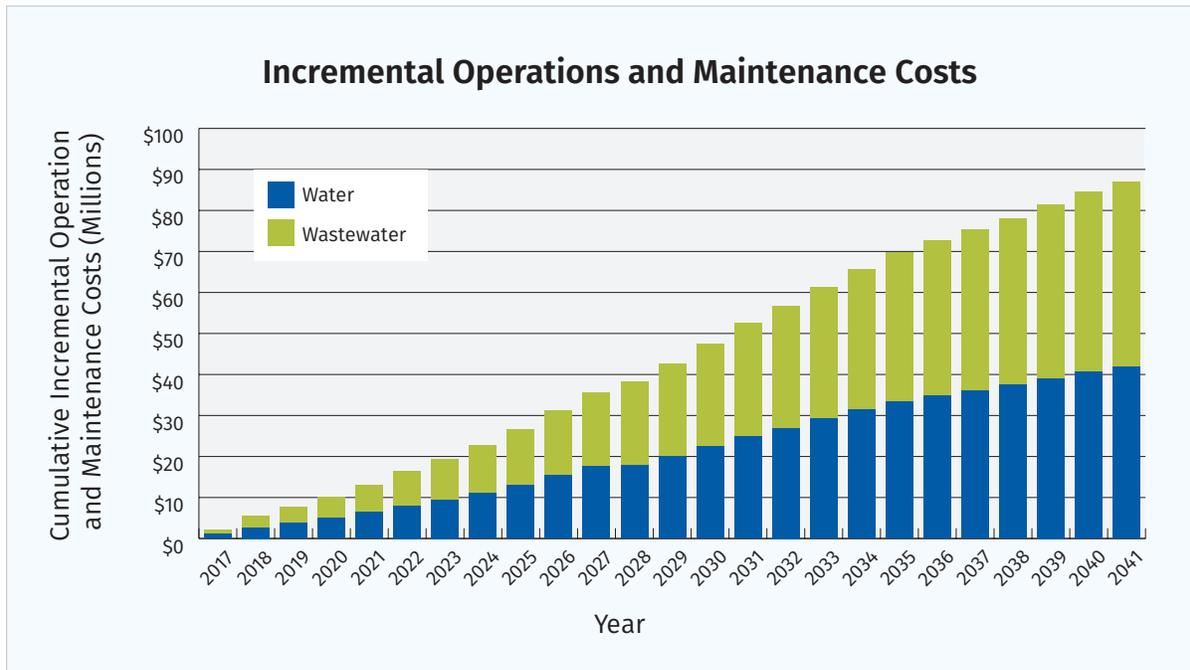


Figure 5.3 - Incremental Operation and Maintenance Costs



5.2.4 Asset Renewal Costs

Incremental asset renewal costs associated with implementing the new infrastructure have been estimated by assuming that each component of a facility will need to be replaced at the end of its estimated service life.

The total asset renewal cost over the 100-year period to 2115 has been calculated.

Figure 5.4 presents the distribution of costs, in ten-year increments, over the period.

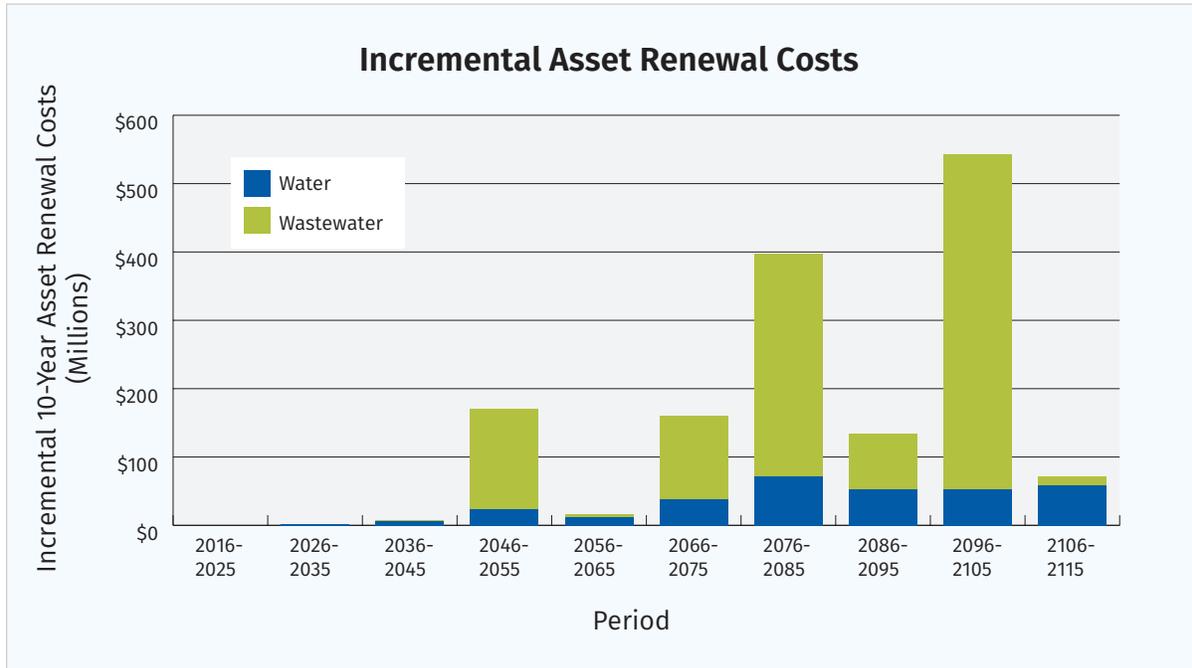


Figure 5.4 - Incremental Asset Renewal Costs



5.2.5 Water and Wastewater Transfer Costs

The Region incurs water and wastewater transfer costs for water purchased from the City of Toronto and Region of Peel, and for wastewater sent to Region of Peel for treatment. These costs cover operations, maintenance and asset renewal. The cost of wastewater treatment at Duffin Creek Water Pollution Control Plant is addressed through the co-ownership agreement with the Region of Durham.

Figure 5.5 presents the estimated cumulative increase in annual water and wastewater transfer costs through 2041 that will result from projected increases in overall water demand. The increase in water and wastewater transfer costs is based on the recent *Water and Wastewater Financial Sustainability Plan*, October 2015.

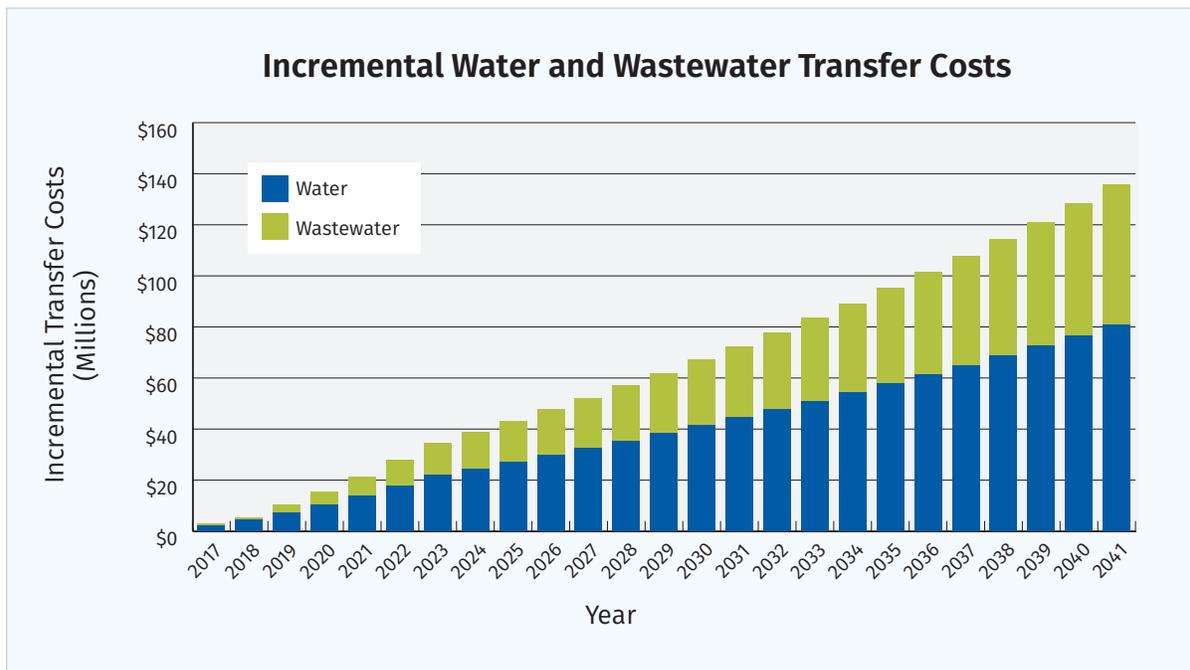


Figure 5.5- Incremental Water and Wastewater Transfer Costs



5.2.6 Total Operation and Maintenance, Asset Renewal and Transfer Costs

The cash flow for the combined, cumulative incremental operation and maintenance costs, assets renewal costs and transfer costs is presented in **Figure 5.6**. As input to the cash flow calculations, the 100-year asset renewal costs shown in **Figure 5.4** have been annuitized to provide an equivalent annual cost.

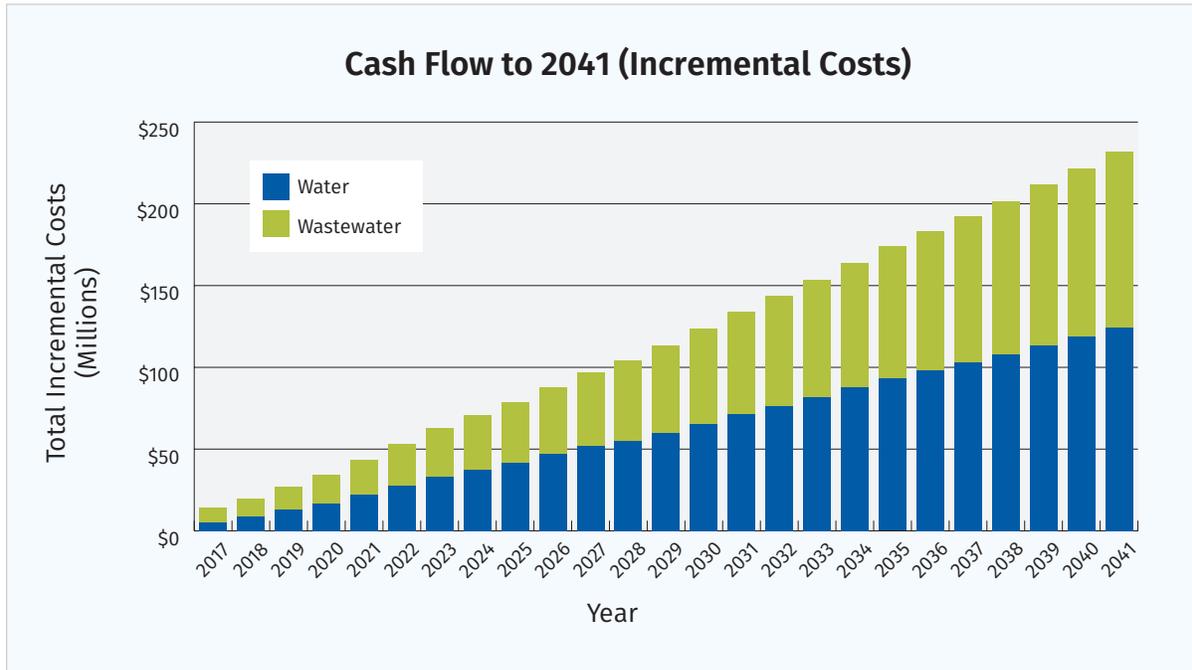


Figure 5.6 - Cash Flow to 2041 (Incremental Costs)

Conclusion

Water and Wastewater Master Plan



This report is a key milestone in updating York Region’s Water and Wastewater Master Plan. It sets out a long-term strategy to ensure residents benefit from water and wastewater services that are safe, reliable and both environmentally and economically sustainable. Its foundation is the new One Water approach, which will reduce the need to build new infrastructure by making the best use of existing infrastructure, conserving water and creating markets to reuse treated water.

Moving ahead, the Region will develop a detailed One Water Action Plan which will lay out the steps it will take to address the six action areas and work with local municipalities, businesses, First Nations and Métis, Regional residents and other stakeholders to ensure the long-term sustainability of its water and wastewater services. Progress will be monitored until the next Master Plan Update in 2021.





Average Day Demand

Average Day Demand is estimated as the sum of daily demand in a calendar year, divided by 365 days.

BARC

The Region is involved with the International Council for Local Environmental Initiatives (ICLEI) Canada, which developed the Building Adaptive and Resilient Communities (BARC) Tool. The BARC Tool provides an innovative means of climate change adaptation planning. It is modelled on a five-milestone framework that leads local government practitioners through the climate change adaptation planning process.

CTC

Credit Valley-Toronto and Region-Central Lake Ontario

EA

The Municipal Engineers of Ontario Municipal Class Environmental Assessment (“Class EA”) is the approved planning process that municipal proponents can use in order to meet the requirements of the Environmental Assessment Act. The Class EA process allows for the evaluation of environmental effects of alternatives to a project and alternative methods of carrying out a project. It includes mandatory requirements for public consultation.

ECA

Environmental Compliance Approvals - covers emissions and discharges related to air, noise, waste or sewage

GHG

Greenhouse Gases

HVA

Highly Vulnerable Area - Areas on the general landscape with underlying aquifers on which external sources have or are likely to have a significant adverse effect, and includes the land above the aquifer.

I&I

Inflow and Infiltration - Extraneous groundwater and/or stormwater that enters into dedicated wastewater or sanitary sewer system.

I&I Reduction Strategy

The Region’s I&I Reduction Strategy, completed in March 2011, targets a 10% reduction of peak flow entering Southeast Collector by 2031 through both water conservation and I&I reduction efforts. This was a condition of the Southeast Collector IEA.

Intra-Basin Transfer

The requirements of the Safeguarding and Sustaining Ontario’s Water Act limit the intra-basin transfer from Lake Ontario to Lake Huron watershed(Lake Simcoe). York Region successfully completed its Prior Notice and Consultation for an Intra-Basin Transfer, which allows the water transfer of up to 105 ML/d from the Lake Ontario to the Lake Huron watersheds

IPZ

Intake Protection Zone - The contiguous area of land and water immediately surrounding a surface water intake, it is based on both distance from the intake as well as on the minimum response time for the water treatment plant operator to respond to adverse conditions or an emergency and the remaining watershed area upstream of the minimum travel time area.



L/s

Litres per second

LID

Low Impact Development is an innovative stormwater management approach with a basic principle that is modelled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls.

Lifecycle Costs

Total costs estimated to be incurred in the capital, operation and maintenance, asset renewal, water and wastewater transfers and program costs of a major system over its anticipated useful life span.

Long-Term Water Conservation Strategy

The Region's Long-Term Water Conservation Strategy was completed in March 2011 and updated in 2016. It builds on the results and success of Water for Tomorrow. The Strategy explores innovative ideas and looks ahead 40 years to a future of sustainable water servicing.

MLD or ML/d

Mega Litres per day (1,000,000 Litres per day)

Official Plan

The York Region Official Plan 2010 (YROP 2010) describes how York Region plans to accommodate future growth and development while meeting the needs of existing residents and businesses in the Region. It sets out directions and policies that guide economic, environmental and community planning decisions.

One Water Approach

The One Water Approach considers the urban water cycle as a single integrated system, in which all urban water flows are recognized as potential resources, and the interconnectedness of water supply, groundwater, stormwater and wastewater is optimized, and their combined impact on flooding, water quality, wetlands, watercourses, estuaries and coastal waters is recognized.

PCC

Public Consultation Centre - an information event for the general public to give the public an opportunity to review future servicing alternatives and recommendations, and provide ideas and feedback.

PTTW

Permit to Take Water. A PTTW is required to take 50,000 litres of water a day from the environment (lake, stream, river, pond, groundwater)

SGBLS

South Georgian Bay-Lake Simcoe Source Protection Region

SGRA

Significant Groundwater Recharge Area - Areas on the general landscape, which recharge aquifers to a more significant degree than other areas.

Source Water Protection

A requirement of the Clean Water Act, 2006, which introduced a new level of protection for the Province's drinking water resources. Protecting sources of drinking water before they are overused or polluted is the most cost effective way of ensuring the safety of our drinking water for generations to come.



SPP

Source Protection Plan - identifies actions required to reduce, manage, or eliminate current threats to municipal drinking water sources, as well as to prevent future potential threats.

The Lake Simcoe Protection Plan

Describes the Provincial Government's intended policies for reducing phosphorus loadings, reducing pathogen loadings so that beach closings are eliminated, and reducing contaminants to levels that meet Provincial Water Quality objectives.

TP

Total Phosphorus

UYSS

Upper York Sewage Solutions - An individual EA to determine the preferred long-term wastewater servicing solution to support approved growth in Aurora, East Gwillimbury (Queensville, Holland Landing, Sharon), and Newmarket

Vision 2051

Document developed on the occasion of the 40th anniversary of the York Region to provide a pathway to shape the way the Region evolves over the next 40 years. It includes a series of goals and actions that intended to inform the decisions of Regional Council and guide corporate initiatives.

Watermain

Transmission line for potable water

WHPA

Wellhead Protection Area - The surface and subsurface area surrounding a water well or well field that supplies a municipal residential system or other designated system through which contaminants are reasonably likely to move so as to eventually reach the water well or wells

WPCP

Wastewater Pollution Control Plant - Wastewater treatment facility

WRC

Water Reclamation Facility - Wastewater treatment facility

WRRF

Water Resource Recovery Facility - Wastewater treatment facility

WTP

Water Treatment Plant

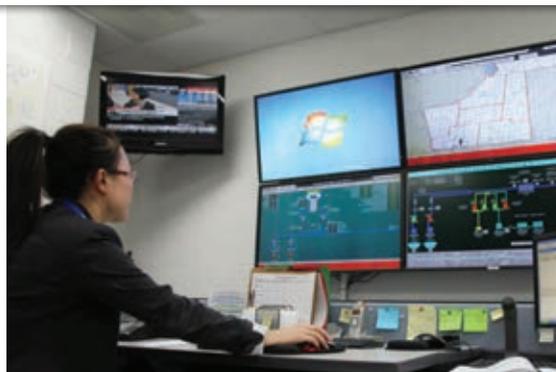
YDSS

York-Durham Sewage System



We are committed to York Region residents

“York Region will continue to research and implement new infrastructure and servicing strategies in order to provide safe, reliable and sustainable water and wastewater services.”





The Regional Municipality of York
Water and Wastewater
Master Plan



For more information on York Region's Water and Wastewater Master Plan please contact:

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York Region



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