TOWNSHIP OF SOUTH STORMONT
LONG SAULT AND INGLESIDE
MASTER SERVICING PLAN

FINAL REPORT

22-2047
June 14, 2024

WT INFRASTRUCTURE
PRACTICAL INNOVATION

OFFICE
17-370 Stone Road West
P.O. Box 25002
Guelph, ON N1G 4T4
T: 519.400.6701
www.wtinfrastructure.ca

REPORT SNAPSHOT

Project Snapshot is a WT Infrastructure Solutions Inc. initiative to communicate the five to ten key pieces of information that are important for the reader to take away from the report. It is not intended to replace a comprehensive review of the report.

- The existing infrastructure in Long Sault and Ingleside including transportation, water, sanitary and storm is able to service the existing population without any critical system bottlenecks or deficiencies; however, due to the age of the infrastructure, the Township may begin to see a higher rate of deterioration (e.g. watermain breaks) within the next 10 – 20 years.
- There are existing bottlenecks (sanitary and water) in the system that will need to be addressed within the 0–5-year time period. These projects represent an anticipated cost of $12.0M ($2024).
- The proposed growth in Long Sault and Ingleside will reach the capacity of some water and wastewater system components (pipes and pumping stations) within the next 5-10 years depending on the pace of growth and the Long Sault Logistics Village development. This will require some upgrades to the existing infrastructure within that timeframe with an anticipated cost of $9.5M ($2024). This work will need to be staged to ensure that it is in place before development is complete.
- The existing water system is currently operating in accordance with industry standards and performance expectations. As development occurs, there will be a need to reinforce the system through the upsizing of existing and proposed localized mains to achieve fire flow requirements. In the 10 – 20-year time horizon, it will be necessary to add storage in the Long Sault Pressure Zone and upgrade the transmission main capacity in both communities in order to improve water supply operations. The estimated cost of these works to the Township is $9.0 M ($2024).
- The existing sanitary collection system is operating in accordance with industry standards; however, it is anticipated that there is significant inflow and infiltration (I/I) in both systems due to a combination of age and historical practices related to servicing that increases the amount of groundwater/rainwater entering the collection system. It has been identified that a potential significant source of inflow is associated with historical private servicing techniques that result in basement perimeter drains being indirectly connected to the sanitary sewer service. It is recommended that the Township develop a strategy to address these private side issues via subsidy, enforcement or application of a rate premium in order to rectify the situation. There are some bottlenecks in the system that will need to be corrected in order to facilitate growth and the future expansions need to be coordinated with developers to ensure that the build-out of both communities results in an operational efficient collection system. However, in the 5 – 10-year time horizon and the 10 – 20-year time horizon, there are no planned works to be covered by the Township.
- Stormwater management in both communities is rudimentary using mostly open ditches and culverts with some localized storm sewer collection systems. New developments have included stormwater quantity and quality management; however, the original town sites do not have any formalized quantity or quality control. It is recommended as part of the renewal of the infrastructure in the communities that stormwater quality treatment be provided in all areas incrementally with development or renewal. In areas that do not discharge directly to Lake St. Lawrence, stormwater quantity control may be required to reduce localized flood risks. The stormwater management upgrades to the system are not recommended to be completed

independently, but rather be integrated with the renewal and reconstruction of streets over time. The estimated total cost to the Township of these works is $10.5M ($2024).

- Transportation servicing in both Long Sault and Ingleside meets or exceeds minimum standards for traffic flow except for impacts from the Emergency Detour Routing from Highway 401. There are areas where there are no sidewalks and inadequate pedestrian crossing opportunities along pedestrian desire lines. It is recommended that these issues be resolved in coordination with the Counties of SDG who have jurisdiction over both the EDR and pedestrian crossing concerns. Furthermore, in order to improve active transportation opportunities beyond strictly recreational purposes, the addition of a multi-use trail from Long Sault to Ingleside is recommended. With the exception of the projects to be coordinated with the Counties, it is recommended that any identified transportation upgrades be integrated with development, renewal or reconstruction of streets over time rather than proceeding with them as stand-alone capital projects. The estimated total cost to the Township of these works is $5.5M ($2024)
- In order to maintain a sustainable and reliable system, new developments will need to have their infrastructure sized in a holistic manner that allows for development related infrastructure to fit into the overall planning for the community rather than strictly the requirements of the individual developments. This upsizing of infrastructure is generally minor in nature and should be part of the cost of the development.
- The recommendations and implementation plan for this Master Servicing Study is spread over a 20-year time horizon. An estimated 50-75% of the buried infrastructure that is over 65 years old, where the average lifespan of buried infrastructure is 75-100 years. Therefore, the Township is in a situation where infrastructure planning and renewal must be addressed proactively in order to mitigate the risk and associated escalated costs of emergency repairs. It is recommended that the Township implement a strategy to use the Master Servicing Study to prioritize street reconstruction in both Long Sault and Ingleside on an annual basis to begin addressing the infrastructure deficit. This approach will have the added downstream impact of reducing minor watermain leaks and sanitary I/I into the system. When combined with addressing private site I/I, this has the potential of reducing the per capita water and wastewater demand and either deferring capital investment in wastewater/water treatment or reducing the cost per connection due to the increased number of connections per unit of treatment capacity.
- In summary, the recommendations from the Master Servicing Study have an estimated capital cost of $ 106.5 ($2024) that will need to be implemented over 20 years in the following increments including consideration for the impacts of inflation on the cost:
  - 0 – 5 years: $31.35M plus $6.1M (inflation) ~ $7.5M/yr.
  - 5 – 10 years: $32.25M plus $12.6M (inflation) ~ $9.0M/yr.
  - 10 – 20 years: $42.9M plus $25.3M (inflation) ~ $6.8M/yr.

  These costs are full cost including engineering and contingency and do not allow for any external funding source (i.e. provincial, federal) or project partnerships (i.e. developer, Counties).

June 14, 2024

Township of South Stormont
2 Mille Roches Road
PO Box 84
Long Sault, ON K0C 1P0

Re: Final Report
Master Servicing Plan
22-2047 | VERSION 1

WT Infrastructure Solutions Incorporated (WT) is pleased to submit the following report as part of the project delivery for the Long Sault and Ingleside Master Servicing Plan.

In accordance with the project schedule, we have allowed for ten (10) days for client review and comments. Please let us know if you need additional time or have any questions regarding this document. We look forward to your comments and the opportunity to advance this project to completion.

Respectfully submitted,

WT INFRASTRUCTURE SOLUTIONS INCORPORATED

Jamie Witherspoon, P.Eng., LEED AP
President
Project Manager

17-370 Stone Road West
P.O. Box 25002
Guelph, ON N1G 4T4

jamie.witherspoon@
wtinfrastructure.ca

519.400.6701

@solutions_wt

TABLE OF CONTENTS

COVER LETTER

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1 INTRODUCTION

1.1 Project Scope

The Township of South Stormont, located on Lake St. Lawrence, part of the St. Lawrence Seaway upstream of the Moses-Saunders Hydroelectric Generating Station west of the City of Cornwall, has experienced significant growth in recent years and proposed development is anticipated to continue the community growth over the next decade.

As both the communities of Long Sault and Ingleside were originally developed in the late 1950s as part of the St. Lawrence Seaway project, the majority of the existing servicing infrastructure dates either from the original development of the community or the early 1990s and 2000s, when the treatment plants (water and wastewater) were all upgraded.

To plan for proposed growth as well as ensure that the existing serviced areas are provided with an appropriate level of service, the Township is undertaking a Master Servicing Study to inform capital investment planning and decisions.

The Township is following the Municipal Class Environmental Assessment Process for a Master Planning project to consult with the public, agencies and Indigenous communities and facilitate the efficient progression of the projects from planning to implementation.

1.2 Class Environmental Assessment Process

The Environmental Assessment Act of Ontario, R.S.O 1990 (EA Act) provides for the protection, conservation, and management of the environment in Ontario. The Ministry of the Environment, Conservation and Parks (MECP) is responsible for administration of the EA Act.

The Municipal Class Environmental Assessment (MCEA) is an approved Class EA under the EA Act that applies to municipal infrastructure projects including roads, water, wastewater, and transit. This process provides a comprehensive planning approach to consider alternative solutions and evaluate their impacts based on a set of criteria (e.g., environmental, transportation, socio-economic, engineering considerations) and determine mitigating measures to arrive at a preferred alternative for addressing an identified problem or opportunity.

The MCEA process, illustrated in Figure 1-1, involves a rigorous public consultation component that includes various provincial and municipal agencies, Indigenous communities, and the public.

The MCEA is undertaken prior to modifications or additions to municipal infrastructure, to consider potential impacts associated with all project aspects.

The MCEA process consists of the following phases:

- Phase 1: Identify the problem/opportunity.
- Phase 2: Identify and evaluate alternative solutions.
- Phase 3: Identify and examine alternative design concepts for the preferred solution.
- Phase 4: Formally document the planning process.
- Phase 5: Proceed to implementation of the project.

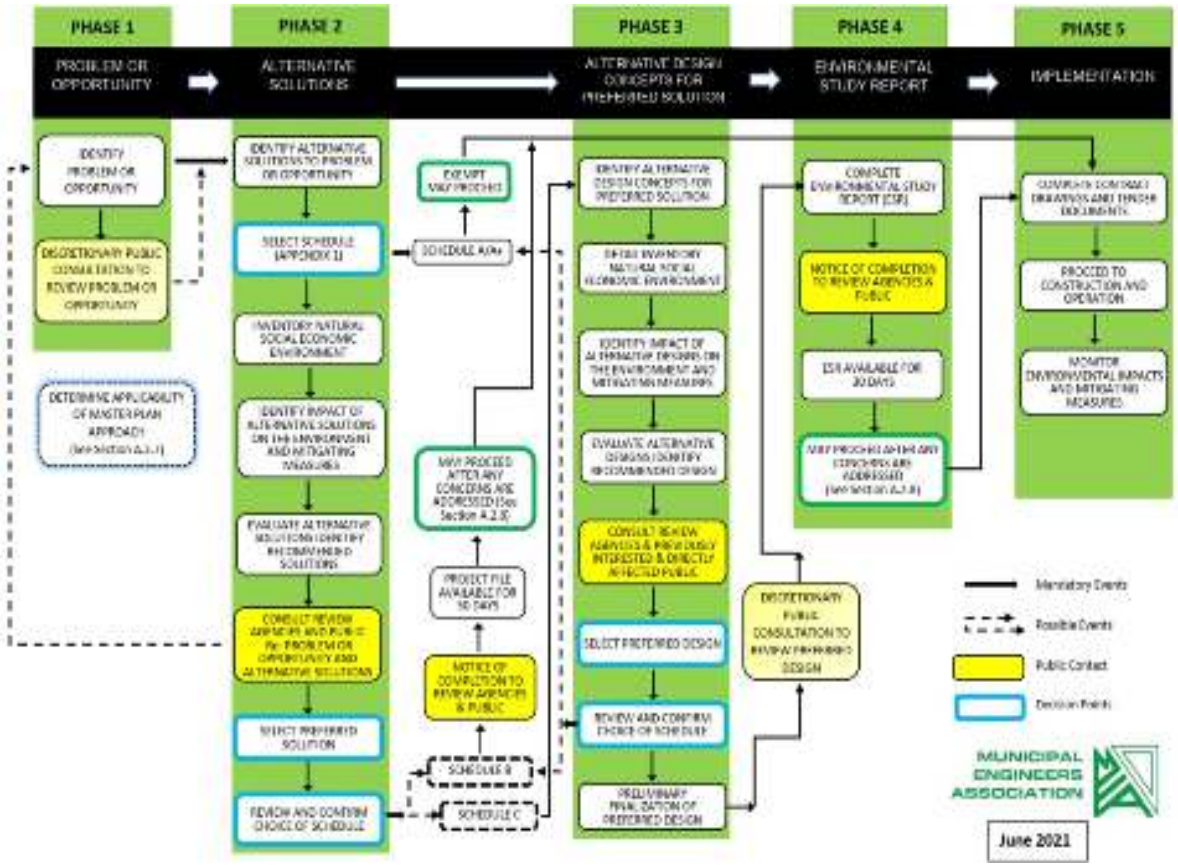


Figure 1-1 - Municipal Class Environmental Assessment Process Flowchart

Based on the nature of a project and its anticipated impacts to the surrounding environment, the MCEA document specifies four different schedules summarized in Table 1-1. The specific requirements for each project can vary, depending on the complexity of the project.

Table 1-1 - Municipal Class EA Schedules and Project Requirements

Class EA schedule	Projects
Exempt Projects	These projects, most of which were formerly classified as Schedule A and A+ projects, include various municipal maintenance, operational activities, rehabilitation works, minor reconstruction or replacement of existing facilities, and new facilities that are limited in scale and have minimal adverse effects on the environment. These projects are exempt from the requirements of the Environmental Assessment Act.
Eligible for Screening to Exempt	Some projects may be eligible for exemption based on the results of a screening process. Proponents may choose to complete the applicable screening process to determine whether their project is eligible for exemption from the EA or proceed with the applicable Schedule B or C process.

Schedule B	Projects that have the potential for some adverse environmental impacts and, therefore, the proponent is required to proceed through a screening process, including consultation with affected parties. Generally, these projects include improvements and minor expansions to existing facilities. Projects within this category are subject to Phases 1, 2, and 5.
Schedule C	Projects that have the potential for greater environmental impacts and are subject to all five Class EA Phases. Generally, these projects include the construction of new facilities and major expansions to existing facilities.

1.3 Problem/Opportunity Statement

The Township has recently seen significant residential and Industrial, Commercial, and Institutional (ICI) growth within the water and wastewater service areas of Ingleside and Long Sault. Population growth and an aging infrastructure in both communities has placed the existing infrastructure under stress. Therefore, the Township of South Stormont is considering alternative ways to support the potential forecasted growth in a sustainable and financially responsible manner.

This study is intended to support the forecasted growth based on the following objectives:

- Assess future capacity requirements related to municipal servicing, including water, wastewater, stormwater, and transportation services.
- Provide reliable water, wastewater, stormwater, and transportation services to accommodate the projected residential, commercial, institutional, and industrial development in the communities of Long Sault and Ingleside.
- Develop a long-term servicing strategy and capital forecast to ensure the maintenance of services for existing residents and businesses as well as to support current and future development within the project areas.

The overall goal will be to identify the preferred servicing solutions and associated infrastructure needs to support projected growth while looking at the land available within the project area, examine how the land is distributed, and establish the overall pattern of the development to sustain the expected growth.

1.4 Regulatory Framework

Under the Municipal Act, the Province has given municipalities the power to finance and provide water and sewage services. In very general terms, municipalities may have sole responsibility, or the responsibility may be shared, for the oversight and delivery of these services. The legislative and regulatory changes of the past 15 to 20 years have improved water and wastewater quality in Ontario and ultimately these utilities are recognized as global leaders in the management and delivery of these services. These changes however have significantly increased the role and responsibility of municipalities, who as owners, oversee the management and operation of these services. A brief description of regulatory framework subject to this study is presented below.

1.4.1 Water

Key Acts and Regulations and Guidelines which water system owners and operators are subject to include:

Safe Drinking Water Act, 2002 (SDWA)

The SDWA sets the framework for safe drinking water in Ontario. It is based on a multi-barrier approach to clean water including water source protection from contamination; effective treatment; frequent

and comprehensive testing; vigilant monitoring and reporting; the training and competence of waterworks operators; a secure distribution system; and a quick response when problems are found.

Key components include drinking-water quality standards, licensing for water-testing laboratories, approvals process for private water supply systems, duties of owners, operating authorities, and an annual drinking water report published by the Minister.

Regulations under the Act include:

- Ontario Drinking Water Quality Standards (DWQMS) Regulation (O. Reg. 169/03).
- Drinking Water Systems Regulation (O. Reg. 170/03) as amended.
- Compliance & Enforcement (O. Reg. 242/05).
- Drinking Water Testing Services Regulation (O. Reg. 248/03).
- Certification of Drinking-water System Operators & Water Quality Analysts (O. Reg. 128/04).
- Financial Plans Regulation (O. Reg. 453/07) which includes requirement for water and wastewater system owners to move towards the goal of sustainable financing of the full asset life cycle.
- Licensing of Municipal Drinking Water Systems (O. Reg. 188/07).

Clean Water Act, 2006

Together with the Safe Drinking Water Act, 2002, the Clean Water Act, 2006 captures the multi-barrier response recommended by the Walkerton Inquiry. The Act seeks to protect sources of municipal residential drinking water systems by establishing multi-stakeholder, decision-making source protection committees which include municipalities. The committees are responsible for developing source water protection plans and for ensuring that activities (e.g., municipal planning decisions), conform to that source water protection plan.

Water Opportunities and Water Conservation Act, 2010

This Act intends to foster innovative water, wastewater and stormwater technologies, services, and practices in the private and public sectors; create opportunities for economic development and clean-technology jobs in Ontario; conserve and sustain water resources for present and future generations; and prepare sustainability plans for municipal water, wastewater, and stormwater services.

Infrastructure for Jobs and Prosperity Act, 2010

Specifically, O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure. Steps to incorporating responsible asset management include establishing strategic asset management policies and developing increasingly sophisticated asset management plans and technical service level targets.

Ontario Water Resources Act, 1990

The purpose of this Act is to provide for the conservation, protection, and management of Ontario's waters and for their efficient and sustainable use, to promote Ontario's long-term environmental, social, and economic well-being. Regulation 129/04 requires licensing of sewage works operators.

Ministry of the Environment, Conservation and Parks Design Guidelines for Drinking Water Systems, 2008.

The Design Guidelines for Drinking Water Systems are intended to provide guidance during the design of drinking water infrastructure. These guidelines include design criteria based on generally accepted good engineering practice in Ontario such as:

- Guidelines for the Design of Water Treatment Works (1982)
- Guidelines for Water Distribution Systems (1979, 1985)
- Guidelines for Water Storage Facilities (1979, 1985)
- Guidelines for Servicing in Areas Subject to Adverse Conditions (1985)
- Guidelines for Water Supply for Small Residential Developments (1985)
- Guidelines for Seasonally Operated Water Supply Systems (1985)

Provincial Policy Statement (PPS), 2020

The 2014 Provincial Policy Statement (PPS) provided updated policy direction on matters of provincial interest related to land use planning and development. As a key part of Ontario's policy-led planning system, the Provincial Policy Statement sets the policy foundation for regulating the development and use of land. It provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment.

Moreover, the 2014 Provincial Policy Statement issued under the *Planning Act* advises planning authorities of the need to consider development that reduces greenhouse gas emissions and reduces the potential risk of climate change related events like droughts or intense precipitation. A partial listing of applicable policies in the 2014 Provincial Policy Statement include:

- Policies 1.6.2, 1.6.6.7 — Encourage green infrastructure (e.g., permeable surfaces) and strengthen stormwater management requirements.
- Policy 1.8 — Require the consideration of energy conservation and efficiency, reduced greenhouse gas emissions and climate change adaptation (e.g., tree cover for shade and for carbon sequestration).
- Policy 3.1.3 — Requires consideration of the potential impacts of climate change that may increase the risk associated with natural hazards (e.g., flooding due to severe weather).

In 2020, the PPS received a revision to better integrate economic, social, and environmental considerations; respond to rural and northern challenges; clarify policies to better support implementation; and provide direction for emerging issues.

Within the Ontario Provincial Policy Statement, there are some main provisions concerning planning for water and wastewater services. The policies are mainly based in planning for future infrastructure in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs. In particular, Planning for sewage and water services shall:

- accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing infrastructure.
- ensure that these systems are provided in a manner that:
  - can be sustained by the water resources upon which such services rely.
  - prepares for the impacts of a changing climate.
  - is feasible and financially viable over their lifecycle; and
  - protects human health and safety, and the natural environment.
- promote water conservation and water use efficiency.
- integrate servicing and land use considerations at all stages of the planning process.

Endangered Species Act, 2007

The Endangered Species Act, 2007 (Endangered Species Act) provides for the protection of species that are listed as endangered, threatened, or extirpated and their habitat. The purposes of the Endangered Species Act are to:

- identify species at risk based on the best available scientific information, including information obtained from community knowledge and Aboriginal traditional knowledge.
- protect species that are at risk and their habitats, and promote the recovery of species that are at risk, and,
- promote stewardship activities to assist in the protection and recovery of species at risk.

According with the MCEA requirements, avoiding impacts to species at risk and their habitat is an integral part of protection and recovery. Where impacts cannot be avoided, an authorization in the form of a permit or an agreement or compliance with a regulatory provision (which in some cases requires registration with the ministry) can allow those activities to occur under certain conditions (e.g., creating and following a mitigation plan, providing beneficial actions for a species).

1.4.2 Wastewater

Key Acts, Regulations and Guidelines which wastewater system owners and operators are subject to include:

- Fisheries Act, 2019 as amended.
- Ontario Water Resources Act (OWRA).
- Clean Water Act (CWA).
- Nutrient Management Act (NMA).
- Environmental Protection Act (EPA).
- Ministry of the Environment, Conservation and Parks Design Guidelines for Sewage Works, 2008.

A brief description of each regulation is provided below.

Fisheries Act, 2019

The Fisheries Act provides provisions on the conservation and the protection of freshwater and marine fish habitat to sustain fish species. The Fisheries Act focuses on the protection of the productivity of commercial, recreational, and Aboriginal fisheries, improved implements for both compliance and protection, enhanced stakeholder partnerships (e.g., government agencies, local groups) and ensuring regulatory requirements are clear and consistent.

Ontario Water Resources Act, 1990 (OWRA)

See Section 1.4.1.

Clean Water Act, 2006 (CWA)

See Section 1.4.1.

Provincial Policy Statement (PPS), 2020

See Section 1.4.1

Endangered Species Act, 2007

See Section 1.4.1

Nutrient Management Act, 2002 (NMA)

As part of Ontario's Clean Water Strategy, the Nutrient Management Act, 2002 was designed to reduce the potential for water and environmental contamination from some agricultural practices. The Act establishes the framework for best practices regarding nutrient management. The Nutrient Management Act also provides standards for nutrient storage and how nutrients are applied to farmland, to reduce the likelihood of ground or surface water contamination.

Environmental Protection Act (EPA)

The Environmental Protection Act is the primary pollution control legislation in Ontario and can be used interchangeably with the Water Resources Act. The legislation prohibits discharge of any contaminants into the environment that cause or are likely to cause adverse effects. Amounts of approved contaminants must not exceed limits prescribed by the regulations. The Act also requires that spills of pollutants be reported and cleaned up promptly.

Ministry of the Environment, Conservation and Parks Design Guidelines for Sewage Works, 2008

The Design Guidelines for Sewage Works are intended to provide guidance during the design of sewage works. Guidelines with associated Procedures that should be consulted include:

- Guideline F-5, Levels of Treatment for Municipal and Private Sewage Treatment Works Discharging to Surface Waters (1994):
- Guideline F-6, Sewer and Watermain Installation: Separation Distance Requirements (1994):
- Guideline F-8, Provision and Operation of Phosphorus Removal Facilities at Municipal, Institutional and Private Sewage Treatment Works (1994):
- Procedure F-8-1, Determination of Phosphorus Removal Requirements for Municipal, Institutional and Private Sewage Treatment Works

1.4.3 Stormwater

Stormwater management is required to mitigate the effects of urbanization on the hydrologic cycle including increased runoff, and decreased infiltration, of rain and snowmelt. Without proper stormwater management, reduced baseflow, degradation of water quality, and increased flooding and erosion can lead to reduced diversity of aquatic life, fewer opportunities for human uses of water resources, and loss of property and human life.

Stormwater regulations and guidelines for the project area include:

- Provincial Policy Statement (PPS), 2014
- Ontario Stormwater Planning and Design Manual, 2003.

Provincial Policy Statement (PPS), 2020

Within Ontario Provincial Policy Statement, there are some main provisions concerning planning for stormwater management. The policies are based on minimizing the contaminated load, changes in water balance and erosion, property damages, human health, and safety risks, maximizing the vegetative and pervious surfaces, stormwater attenuation and re-use and promoting stormwater management best practices and low impact developments.

These six provisions are mentioned under planning for stormwater management:

- integrate with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term.

- minimize, or, where possible, prevent increases in contaminant loads.
- minimize changes in water balance and erosion.
- not increase risks to human health and safety and property damage.
- maximize the extent and function of vegetative and pervious surfaces.
- promote stormwater management best practices, including stormwater attenuation and re-use, and low impact development.

Ontario Stormwater Planning and Design Manual, 2003

Ontario's stormwater manual has a combination of lot level, conveyance, and end of pipe management practices to mitigate the negative impacts of stormwater. The main purpose of the manual is to maintain the hydrologic cycle, protection of water quality, and preventing increased erosion and flooding.

The strategy of the manual is to control the stormwater on-site through the following methods:

- **Lot Level and Conveyance Control:** Lot levels and conveyance controls include methods to increase storage and infiltration such as rooftop storage, planting grass, trees, and vegetables, making stormwater corridors and directing stormwater to backyard ponds to capture stormwater as much as possible on-site. The purpose is for to reduce stormwater runoff rate during peak hours, which is important to decrease overflows due to stormwater.
- **End Of Pipe Control:** End of Pipe control include methods to decrease the impacts of stormwater discharge to waters which come through the stormwater conveyance facilities by treating it. Wetlands, wet ponds, dry ponds, and infiltration basins are defined as End of Pipe management facilities.

1.5 Community Background

The Township of South Stormont is the amalgamation of the former Townships of Cornwall and Osnabruck in 1998. Long Sault and Ingleside represent the largest communities in the Township and were planned communities as part of the St. Lawrence Seaway project in 1958. In the 1950s, the construction of the St. Lawrence Seaway led to the flooding of several communities along the St. Lawrence River. Many of the community's residents were forced to relocate, and several historic buildings were lost. The communities of Long Sault and Ingleside were newly built to accommodate displaced residents of the flooded villages. As such, all the water, wastewater and stormwater infrastructure in both communities was constructed at the same time and started operating in 1958 with the settlement of both communities. However, as both communities were developed in the late fifties, neither system was originally designed for significant growth with the largest watermains leading from the treatment plants to the elevated storage tank or former elevated storage tank in the case of Long Sault.

The Township of South Stormont has experienced moderate growth since 2001. Between 2011 and 2016, the Township grew faster than Cornwall and all the United Counties of Stormont, Dundas and Glengarry (SDG).

In the past years, most of the growth within the Township boundaries has occurred within the water and wastewater service areas of Ingleside and Long Sault. To date, the higher than anticipated growth has placed the existing infrastructure under stress. The Wastewater Treatment Plant in Ingleside currently has minimal capacity left, experiencing failures, in particular, under wet weather events, while Long Sault is at approximately 60% capacity.

As both communities are continuing to grow, the "planning for growth" will be a critical component of this study in order to provide the framework and vision for long-term servicing needs within Long Sault and Ingleside.

1.5.1 Water System

The Long Sault and Ingleside water systems were both initially developed at the time of the Seaway construction in the late 1950s. At the time, the communities were supplied via separate surface water systems drawing water from the St. Lawrence.

In the mid-2000s the water systems were combined into a regional water supply system with the primary treatment plant being located on the inside of Moulinette Island and using the former Long Sault Water Treatment Plant as a low lift pumping station. The treatment plant consists of ultrafiltration membranes, carbon filtration and chlorine disinfection. The system has a rated capacity of 8,575 m^3/day. The Moulinette Island facility has 1,760 m^3 of clearwell storage and high lift pumps with a firm capacity of 239 L/s.

This facility services Long Sault via a transmission main extending across Mille Roches Island to the original distribution system, which is primarily cast iron watermain original to the post-seaway period. The watermain extends to Lakeview Heights and the industrial buildings on County Rd 36 as well as all of the development north and south of County Rd 36.

There is no elevated storage within the Long Sault Pressure Zone (Lakeview Heights to the east edge of Ingleside). The water pressure is provided exclusively from the high lift pumps at the regional water treatment facility. The system has been in operation since 2005 and, to date, there have been no extended water supply interruptions within this pressure zone.

Ingleside is serviced via a 400 mm transmission main extending from the transmission main from the Regional Water Treatment Plant in Long Sault, along Manning Rd and Colonial Rd, to the former water treatment plant in Ingleside that was repurposed as a reservoir, rechlorination, and pressure booster station.

This facility has 1,829 m^3 of treated water storage. The high lift pumps at this facility have a firm capacity of 155 L/s. The high lift pumps discharge into the Ingleside Pressure Zone which is controlled by the water level in the Ingleside Elevated Storage Tank with a capacity of 944 m^3. The elevated storage tank is original to the system and dates back to the late 1950s but has been maintained and recently rehabilitated in 2021. The majority of the core distribution system is anticipated to be original cast iron watermain as well.

In addition to the fully serviced areas of Long Sault and Ingleside, the water system provides water to the areas without sanitary servicing along the transmission main from Long Sault to Ingleside (Wales Rd, Vin Vista, Colonial Dr., Manning Rd, Osnabruck Ctr.) as well as east of Long Sault to Lakeview Heights.

1.5.2 Wastewater System

The wastewater collection and treatment systems in Long Sault and Ingleside were also constructed at the time of the Seaway with two very similar primary treatment plants, both since replaced in mid 1990s.

The Long Sault Wastewater Treatment Plant (WWTP), constructed in 1993, is rated at an average daily flow (ADF) of 2,700 m^3/day and peak day flow (PDF) of 11,500 m^3/day. Wastewater is collected via a gravity sewer for the majority of the original Town site that extends from Saunders Ave south through

the park area to Simcoe Street and through an easement adjacent to the Municipal Offices to County Rd to and then to Robin Rd to the WWTP.

The northeast section of the community and all lands to the east are conveyed to an existing wastewater pumping station on County Rd 36 with a rated capacity of 47L/s.

There is an additional sanitary pumping station located within the right-of-way on Mille Roches Rd with a rated capacity of 5.8 L/s that services a small catchment area in the north, and discharges to the gravity collection system.

The Ingleside WWTP, constructed in 1993, is rated at an ADF of 4,045 m^3/d and PDF of 10,027 m^3/d. Wastewater is collected via north south trunk sewers on Farran and Dickinson Drive to a primary west to east trunk sewer along the waterfront lands south of County Rd 2 to a sanitary pumping station with a rated capacity of 140 L/s that conveys all the wastewater to the plant for treatment.

1.5.3 Stormwater Management

In general terms, both the Long Sault and Ingleside have very rudimentary stormwater collection and management systems. The majority of the original town sites and new development in the community consist of shallow roadside ditches and limited outlet controls. There are municipal stormwater management facilities in the following locations:

- Long Sault
  - North end of Mille Roches Rd – Open Ditch limited controls
  - Chase Meadows Stormwater Wet Pond – County Rd 36/Jim Brownell Blvd.
  - Fenton Farms Stormwater Management Facility - County Rd/Clover Lane
  - Forrest Hill Stormwater Management Facility
  - Forrest Hill Stormwater Management Facility (Phase 6)
  - Long Sault Drain
- Ingleside
  - Numerous small stormwater collection leading towards County Road 2 and crossing County Road 2 to divert water to the four outlets south of County Road 2.
  - Four outlets south of County Rd 2 to naturalized outlets which discharge to the St. Lawrence.
  - No formal municipal stormwater management facilities servicing developments.

There are small sections of storm sewer within the system to provide outlets for the ditching; however, the majority of the runoff is discharged via surface runoff which either directly discharges to the Lake St. Lawrence or indirectly via the South Branch of the Raisin River and its tributaries in Long Sault and to Hoople Creek in Ingleside.

1.5.4 Transportation

Long Sault and Ingleside are very similar communities in terms of their transportation access. County Rd No. 2 is the primary waterfront arterial route between the communities allowing for conveyance to the west to South Dundas and to the east into Cornwall. Both communities also have an interchange to the Provincial Highway 401 located parallel to County Rd No. 2 and approximately 1 km north of the communities. In both cases, the connecting link between Highway 401 and the communities is a County Road, County Rd 35 (Moulinette Rd) in Long Sault and County Rd 14 (Dickinson Drive) in Ingleside. All of these routes are used for commuting and personal transportation between communities. The County Roads are operated and maintained by the upper tier government of the United Counties of Stormont, Dundas and Glengarry.

Due to the length, speed, and traffic volumes in both communities, the interior roads in, and between, Long Sault and Ingleside, with the exception of Post Rd (County Rd 36), are considered as local roads. There are some roads such as Mille Roches Rd, Simcoe St. and French St. that act more like collector roads, but by definition are still considered local.

There currently is no local or regional transit system serving Long Sault and Ingleside.

Due in part to the proximity to the waterfront, there is a robust active transportation facility with cycling/pedestrian off-road facilities from Ingleside to Long Sault via the Long Sault Parkway and east to Cornwall via the waterfront trail. There are currently limited defined active transportation connections or facilities within either community.

1.6 Background Studies

1.6.1 Community Strategy Plan

The Township of South Stormont Community Strategy Report (2021) was developed with the intent to set goals and objectives to help direct future planning according to specific guiding principles that encompass the values of the community and the municipality, serving as a lens through which to evaluate all decisions, extending beyond the life of the strategic plan. Those guiding principles are:

- **Collaborative:** Collaboration is a foundational pillar on which the Township strives for unity and mutual benefit among residents, businesses, visitors, our neighbouring communities, and other levels of government.
- **Considerate:** Operating in a considerate manner will strengthen trust and cooperation among the community, while enhancing our reputation as caring and fair.
- **Progressive:** Proactively anticipating and responding to changes, challenges and opportunities that impact the community
- **Welcoming and Safe:** Through physical design, inclusive practices, and partnerships, the Township will demonstrate thoughtful decision making that promotes safe and welcoming spaces for all, and a work environment that reflects an employer of choice philosophy.
- **Informed Decision-making:** The Township will ground decisions in evidence, consider the options and consequences, listen, and confidently execute decisions that support the community's best interest.

According to the aforementioned principles and based on the feedback from Council, staff, residents, and businesses, a set of strategic themes and priorities emerged, goals and objectives were developed and expanded based on the strategic themes, assembled in priority sequence, focusing on the Township's ability to influence change. These goals and objectives, reported in Figure 1-2, support the creation of a community brand, upon which the rest of the strategy is built.

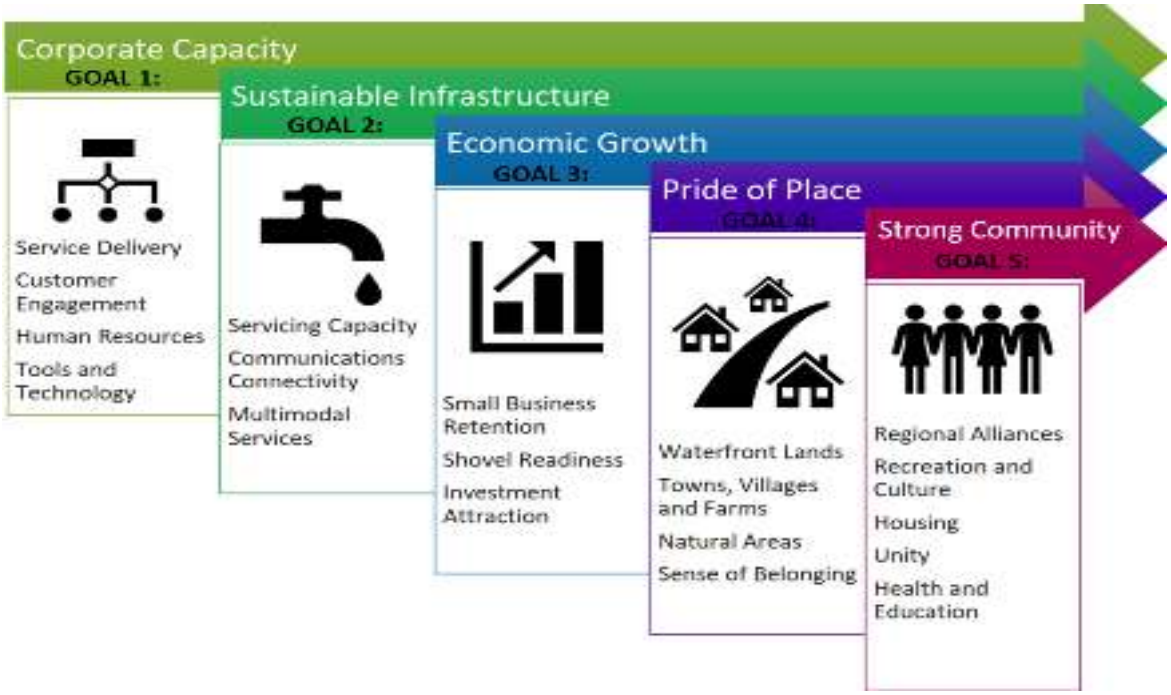


Figure 1-2 Strategic Themes and Priorities

Those goals and objectives have been summarized in the Township's Mission Statement reported as follow:

"Through dedicated leadership and strong infrastructure, the Township of South Stormont delivers sustainable, quality services to its residents and businesses while ensuring a vibrant and healthy community for future generations."

To date, several infrastructure studies, community strategic planning, and economic studies have been prepared in order to assess the Township needs, review risk assessment approach, and generate future initiatives that can help sustain the current and forecasted growth while meeting community goals. A review of those studies has been provided in the next sections.

1.6.2 Core Asset Management Plan

In 2021, the Township developed a **Core Asset Management Plan** (AMP) for the Township-owned roads, structure such as bridge and major culverts, stormwater, water, and wastewater infrastructure. The plan details information about infrastructure assets with actions required to provide an agreed level of service in the most cost-effective manner and defines what funds are required to be provided over the 10-year planning period.

The AMP reported that the total value of all the Township's core assets on a full-replacement basis in 2021 is $367,5M with water, wastewater and stormwater infrastructure replacement representing approximately 56% of the overall costs. The average age-based condition ratings for roads, water, wastewater, and stormwater services can be summarized as follow:

- **Roads:** The replacement value of the road network on a full-replacement basis in 2021 dollars is approximately $150.7M. A total of 80% of the inspected roads have been assigned a condition of "fair" or better.
- **Water Service:** The replacement value of the entire water network in 2021 dollars is $67.1M. Approximately 76% of the Township's assets are in "fair" or better condition state. In

particular, the majority of ductile iron watermains are in very poor conditions with signs of deterioration in crucial components of the network, while all the water towers appear to be in fair condition and are beginning to require more serious attention.

- **Wastewater Service:** The replacement value of the entire water network in 2021 dollars is $65.2M. Approximately 82% of the Township's assets are in "good" or better condition state, with only 12% of the asset being in poor conditions. The 12% of the asset being in poor conditions include asbestos cement and vitrified clay sewer mains.
- **Stormwater Service:** The replacement value of the entire stormwater network in 2021 dollars is $71.1M. Approximately 80% of the Township's assets are in "fair" or better condition state. It must be noted that 15% of the asset (culverts) has not been assessed.

1.6.3 Long Sault Wastewater Master Plan

In 2022, the Township completed the Long Sault Wastewater Masterplan with the intent to evaluate the performance of existing Long Sault sanitary collection system and its ability to meet current and future needs, as well as to develop a strategy to overcome identified bottlenecks.

The document reported that, currently, the Long Sault sanitary system does not have any sewers over capacity. However, when the system was assessed to meet forecasted flow, a length of the sanitary sewer on St. Laurent Avenue was flagged as over capacity as a result of future allocations. In particular, this sewer section is being calculated as over capacity due to the construction of Phase 4 of the Parkway Estates subdivision.

It must be noted that, in the Long Sault Wastewater Masterplan, the peak extraneous flow allowance for the Long Sault sanitary sewer system was calculated to be 0.49 L/s/ha, being higher than the 0.28 L/s/ha value suggested by the Township Subdivision Guidelines. Therefore, it is evident that the system presents high infiltration and inflow (I&I) as results of infrastructure age.

1.6.4 Ingleside Infiltration and Inflow Study

WSP was retained by the Township in 2017 to complete an Infiltration and Inflow (I/I) Study with the objective of identifying problematic areas and providing recommendations with regards to upgrades or repairs to the existing network. This study included both desktop and flow monitoring to assess the magnitude of I/I in the system. The results of the investigations were that I/I is a significant issue, but is ubiquitous across the community. Their conclusions were as follows: "Therefore, due to the fact that the I&I issues appear to be common across all catchment areas within the collection system, and due to the significant costs to continue field investigation measures to identify the source of the I&I, it was concluded through discussions with the Township that the present study would not continue."

Subsequent to that study, there is anecdotal evidence of widespread connections between residential perimeter drains and the sanitary service lateral either directly or by perforating the sanitary lateral to allow groundwater to inflow into the sanitary system in order to reduce groundwater impacts around basements. These are private side issues that impact the overall system.

1.6.5 Uncommitted Reserve Capacity Study

Of relevance to this study is the Uncommitted Reserve Capacity (2022) study developed by EVB. Findings from the study are reported as follow:

- Long Sault and Ingleside Water Treatment Plant (WTP): The Long Sault and Ingleside WTP is currently operating at approximately 80% of the design capacity and has 48 m^3/d of uncommitted reserve capacity, which is equivalent to 20 residential lots. The analysis is based

on the maximum day flow of 6,885 m^3/d occurred on May 29th, 2020, which is equivalent to 19 residential lots.

- Long Sault Wastewater Treatment Plant (WWTP): The Long Sault WWTP is currently operating at approximately 59% of the design capacity and has 488 m^3/d of uncommitted reserve capacity, which is equivalent to 310 residential lots.
- Ingleside Wastewater Treatment Plant (WWTP): The Ingleside WWTP the Ingleside WWTP is currently operating at approximately 95% of the design capacity and has 109 m^3/d of uncommitted reserve capacity, which is equivalent to 69 residential lots.

1.6.6 Development Charges Background Study

A detailed analysis of the residential and non-residential growth forecasts was undertaken as basis for the 2022 Development Charges (D.C.) Background Study developed by Watson & Associated Economists Ltd. A major component of this study is the forecasted growth in order to determine the D.C. that may be imposed.

The D.C. growth forecast has been developed over a 10-year (mid-2022 to mid-2032) and longer-term (mid-2022 to mid-2036) time horizon. Findings from this study are reported as follows:

- Residential Growth:
  - Population: The document reported that the population in South Stormont is anticipated to reach approximately 15,560 by mid-2032 and 16,380 by mid-2036, resulting in an increase of approximately 1,820 and 2,630 persons, respectively.
  - New Housing Forecasted Growth: Over the 2022 to 2036 forecast period, the Township is anticipated to average 88 new housing units per year.
  - Location of the Residential Growth: The report identified that approximately 55% of the forecasted residential growth will occur in Long Sault, while 25% will occur in Ingleside.
- Non-Residential Growth:
  - Gross Floor Area: The Township-wide incremental Gross Floor Area (G.F.A.) is anticipated to increase by 37.1 ha over the 10-year forecast period and 52 ha over the longer-term forecast period.
  - Location of the Non-Residential Growth: The report identified that approximately 83% of the non-residential growth will occur in Long Sault, with the Long Sault Logistic Village covering 77% of the total growth in Long Sault. The non-residential growth in Ingleside will be equal to 15%.

1.6.7 Parks and Recreational Master Plan

The purpose of the Parks and Recreation Master Plan for South Stormont is to guide municipal planning for parks and recreation assets and services based on a 10-year planning horizon. The parks and recreation facilities and services offered in South Stormont are an essential part of the quality-of-life equation in the Township and are valued by residents as a core municipal service.

A vision for parks and recreation in South Stormont was developed as part of the 2007 Plan, recently updated in 2020, many aspects of which are still relevant today. The vision has been updated to better reflect the Township's current priorities and focus:

"The Township of South Stormont's parks, recreation facilities and recreational programs support a high quality of life for its residents and in turn drive a vibrant local economy. These essential assets provide opportunities for active living through a wide variety of quality recreation services and accommodate a diverse range of groups."

The Master Plan is guided by the following identified goals:

- **Goal #1: Facility Renewal & Investment:** Renewal of aging assets based on effective asset management planning and prioritize investments to maintain existing facilities that have a viable lifespan before investing in new facilities.
- **Goal #2: Promote Active Living & Wellness:** Promote community health, active living, and wellness through the provision of innovative recreation opportunities such as active modes of transportation and outdoor recreational amenities.
- **Goal #3: Integrated & Responsive Service Delivery:** Achieve balance between community development facilitation of programs versus direct programming by the Township while facilitating new and emerging needs for recreation activities and programs which are responsive to demographic and community change.

The Master Plan recognizes Long Sault, Ingleside, and St. Andrews West as the primary service areas for recreation or "community recreation hubs," offering the broadest range of Township-operated recreation facilities and services. Moreover, in this master plan, the Township identified the Waterfront as an important recreational asset. Therefore, with a long-term vision for an active waterfront, potential acquisition and/or long-term lease arrangements will be important going forward and obtaining control of key properties or project areas will be instrumental in cementing the path forward.

1.6.8 Waterfront Master Plan

The Waterfront Master Plan, formed in conjunction with the Parks and Recreation Master Plan, identifies opportunities to develop the waterfront focused at five key locations within South Stormont owned by the St. Lawrence Parks Commission. As showed in Figure 1-3, this includes Long Sault Waterfront, Ingleside Waterfront, County Road 2 linear opportunity, Hoople Bay, and Lakeview Park.

Figure 1-3 Key Waterfront Properties and Projects

The essential goal of the Waterfront Plan is to achieve an 'agreement in principle' with the St. Lawrence Parks Commission for making significant improvements to waterfront areas. The Township's Plan has been built upon thorough community and stakeholder engagement and includes discourse on related economic development opportunities.

The vision of the Waterfront Plan for Township is to create access to the water's edge and provide connectivity along its shoreline in order to foster social and culture activities and support environmental sustainability and economic development. As mentioned previously, key properties and projects identified in the Waterfront Plan are listed as follows:

- Ingleside Waterfront Park: is envisioned as a family oriented, community node that is anchored by a waterfront centre building and focused on a central spine of flexible and seasonal 'market-style' structures.
- Hoople Bay Waterfront Park: will provide a destination along South Stormont's waterfront that will have an environmental focus for anglers, cyclists, and nature lovers. The informal, natural state of this park can provide opportunities for multi-season outdoor learning and environmental interpretation.
- Long Sault Waterfront Park: is envisioned to become a destination on South Stormont's waterfront for year-round community events and outdoor recreation. The park will facilitate both motorized and non-motorized boating and become a focus for water recreation in South Stormont.
- Lakeview Waterfront Park: will provide a quiet retreat along South Stormont's waterfront for swimming and picnicking and will provide a rest-stop, with amenities, along the Waterfront Trail.
- County Road 2 Multi-use Trail: is envisioned as a new 9 km long path, on the south side of County Road 2 linking Farran Park on the west to Long Sault to the east. This multi-use path would provide an important east-west active transportation corridor, improving village linkages to existing and new waterfront facilities, in all seasons.

1.6.9 Road Needs Study

In 2021, the Township performed a review of the Township's existing road network in order to assess its physical condition. This review was summarized in the 2021 Road Needs Study Report developed by D.M. Wills Associates. Findings from the study are reported as follow:

- Road infrastructure system: The Township's Road network spans a total of 310 km primarily within a rural setting, with small areas of urban and semi-urban development. The road network includes surfaces ranging from gravel to hot mix paved (asphalt). The Township has approximately 10 km of earth roads, 103 km of gravel roads, 84 km of surface treated roads (low class bituminous (LCB)), and 113 km of hot mix asphalt paved roads (high class bituminous (HCB)).
- Road Conditions: Two (2) primary indicators of the relative health of a road are the structural adequacy and surface condition ratings. The current average structural adequacy rating for the Township's Road network is 13.9/20. The current average surface condition rating for the Township's Road network is 7.2/10. Approximately 70% of the Township's network is in good or better condition, with 30% in fair or worse condition.
- Preservation Management: a dedicated preservation management approach is required. The goal of preservation management is to extend the useful life of a road and road network, maximizing the Township's investment over the road life cycle. Based on typical degradation rates for hard top roads a total resurfacing and preservation program, is estimated at $1.3M per year. Gravel resurfacing is handled as an operational cost by the Township and is therefore not part of the Capital Plan. It would be estimated at $0.45M per year if outside forces were conducting the work.

1.6.10 SDG Growth Studies

In order to long-term goals and broad objectives for growth and development within the United Counties of Stormont, Dundas and Glengarry, The County performed growth studies that have been

reported within the United Counties of Stormont, Dundas and Glengarry (SDG) Official Plan. The most recent study is the Growth Management Strategy developed by Watson & Associates Economists Ltd. Findings from these studies have been reported as follows:

- Population Projections: The County is expected to grow to approximately 78,300 to 89,500 by 2051. This represents an increase of approximately 9,800 to 21,000 persons between 2021 and 2051 with an annual growth rate between 0.5% to 0.9%.
- Housing Projections: The housing unit forecast is projected to comprise 65% low-density (singles and semi-detached), 12% medium-density (townhouses) and 23% high-density (apartment) units, for a total of 1,850 units by 2051.
- Employment Projections: Employment is forecast to grow to between approximately 27,300 and 30,400. This represents an increase of approximately 5,200 to 8,300 jobs between 2021 and 2051.

1.7 Environmental Inventory

1.7.1 Natural Environment

Local Ecology and Aquatic Environment

In Ontario, the Ministry of Natural Resources (MNR) defines ecological units on the basis of bedrock, climate (temperature, precipitation), physiography (soils, slope, aspect) and corresponding vegetation, creating an Ecological Land Classification (ELC) system.

Ontario's ELC system is founded on Angus Hills' Site Regions and Districts, first adopted in the 1950s. The Ontario's ecological land classification system has six units. The six ecological land classification units are reported in Figure 1-4. From largest to smallest, they are classified as follows:

- **Ecozones:** Ecozones are defined by broad climate patterns and the type of underlying bedrock, which influence ecosystem processes and the plants and animals that can occur. Ecozones are used for reporting the status and trends of aquatic stress, land cover type, and vegetative growing season.
- **Ecoregions:** Ecoregions are defined by patterns in temperature, precipitation, humidity and other climate variables and they are used to identify and assess significant wildlife habitat and report on the status and trends of forest cover and disturbance.
- **Ecodistricts:** are defined based on bedrock and topography. This determines local vegetation and habitats in each ecodistrict.
- **Ecosections:** Ecosections are defined based on patterns in slope, landforms, soil texture and soil moisture. Ecosections have not been developed or used in Ontario.
- **Ecosites:** Ecosites are based mainly on physical features (e.g., moisture, soils, etc.) that influence what plant species are present. Each ecosite has a dominant vegetation type and substrate type. Ecosites are used by sustainable forest license holders, resource managers, municipalities and conservation authorities for land use planning, sustainable forest management, and wildlife habitat management.
- **Ecoelements:** Ecoelements are the smallest of Ontario's land classification units, and they are used to understand the composition of ecosites and to support fine scale planning in southern Ontario. Ecosites contain many Ecoelements. Each Ecoelement has a single type:

- Substrate: Substrate types are the materials that plant species grow in (e.g., amount of water in the soil, depth of the soil, texture of the soil).
- Vegetation: Vegetation types are recurring groups of plants that grow in similar conditions.

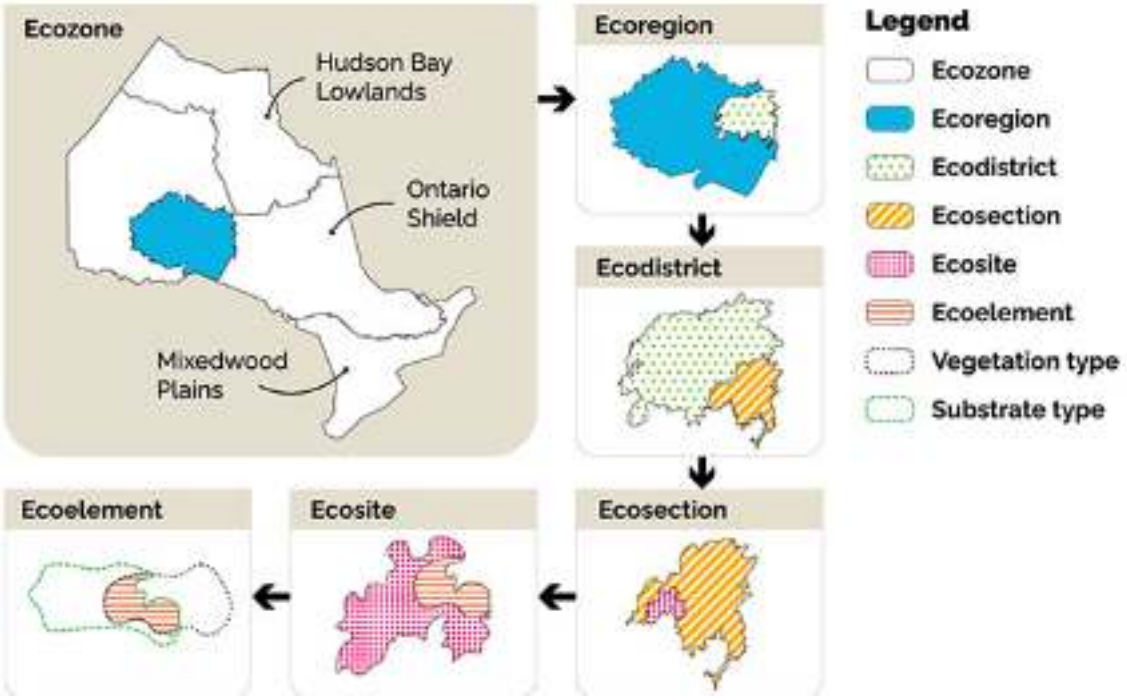


Figure 1-4 The Six Ecological Land Classification Units and Ecodistricts.

As can be seen in Figure 1-5, both Long Sault and Ingleside are part of the **Southern Ontario's Mixed Wood Plains Ecozone**. The Ontario's southernmost ecozone, occupying less than 10% of the province, is defined by the limestone and dolostone bedrock that occurs south of the Precambrian Shield. This ecozone is bounded in the south and west by Lake Huron, Lake Erie, Lake Ontario, and the St. Lawrence River. The predominant type of natural disturbance in forest ecosystems is gap-phase dynamics, although major wind events and insect outbreaks can cause more extensive disturbance. In wetland systems, beavers are a major force of change. Vegetation is diverse, despite the conversion of many natural lands for agriculture and urban development. Mixed forests of deciduous and coniferous trees occur, as well as areas dominated by deciduous tree species as in Carolinian forests. Two globally imperilled ecosystems occur in the ecozone: tallgrass prairie and limestone barrens called 'alvars.' Wetlands are numerous in certain areas, although many have been drained. Plants and wildlife in this ecozone are among the most diverse in Canada, but they face significant challenges due, in large part, to habitat loss and fragmentation. Characteristic wildlife in this ecozone include White-tailed Deer, Red Fox, Coyote, Raccoon, Striped Skunk, Eastern Gray Squirrel, Great Blue Heron, Red-tailed Hawk, Black capped Chickadee, Wood Thrush, Yellow Warbler, Painted Turtle, Red backed Salamander and Smallmouth Bass. Alien invasive species are an increasing threat to native species in this ecozone.

Both communities are also part of the **Lake Simcoe - Rideau Ecoregion (6E).** The Lake Simcoe – Rideau Ecoregion extends southward from a line connecting Lake Huron in the west to the Ottawa River in the east. The underlying bedrock is primarily dolostone and limestone. Many areas along the northern fringe of this ecoregion are characterized by extensive bare bedrock plains. Alvar species are present on some of these limestone plains. Conversely, the remainder of the ecoregion is draped with thick

deposits of glacial and post-glacial sediments in the form of massive moraines (Oak Ridges) and broad till sheets. The Niagara Escarpment, most of which is included in the Lake Simcoe - Rideau Ecoregion, provides an exception to the otherwise relatively flat landscape. Wetlands and water bodies comprise 5% and 4% of the area, respectively. The ecoregion also falls within the Great-Lakes St. Lawrence Forest Region, with a greater diversity of southern species than the Georgian Bay Ecoregion. Currently, 57% of the ecoregion exists as agricultural land, with deciduous and mixed forests covering a majority of the remaining natural landscape.

The Lake Simcoe - Rideau Ecoregion (6E) is characterized by 16 Ecodistricts. Long Sault and Ingleside are part of the Kemptville Ecodistrict. The Kemptville Ecodistrict is a plain of limestone and sandstone bedrock covered shallowly to deeply with siliceous and low- base sand, low-base silt and moderate to high lime clay and loam. Champlain Sea sediments (clays and sands) dominate most of the site district, together with some areas of glacial tills.

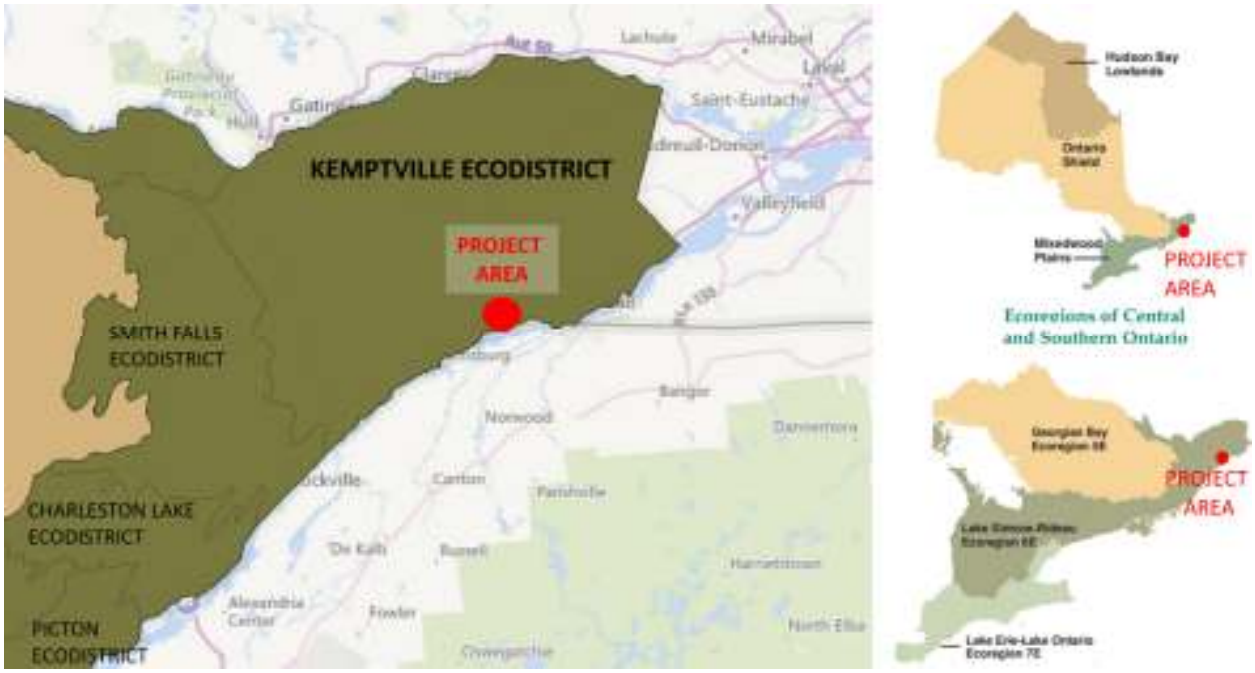


Figure 1-5 Ecological Land classification for Long Sault and Ingleside

With regard to the aquatic environment, the Ministry of Natural Resources and Forestry (MNRF) is responsible for sustainably managing and deriving economic benefit from the fisheries and water resources in the ~500,000 km of Ontario's rivers and streams. The purpose of the aquatic ecosystem classification (AEC) is to provide a universal and consistent spatial framework for Ontario's flowing waters that captures the general ecological nature of streams and rivers. The AEC reduces the complexity of these vast aquatic networks using consistent and quantitative methods to build a standardized data foundation that helps MNRF staff with landscape level planning and policy development.

Both Long Sault and Ingleside are part of the so called "St. Lawrence Waterbody" area. The St. Lawrence harbours a complex ecosystem whose physical properties vary from upstream to downstream. It includes lakes and freshwater reaches, a long estuary, and a gulf with marine features. The area is home to richly diverse habitats and an equally rich diversity of flora and fauna.

Table 1-2 reports the fish species that are part of the St. Lawrence Waterbody area accordingly to the information reported by the Ontario GeoHub.

Table 1-2 Fish Species present into the St. Lawrence Waterbody

	Fish Species
St. Lawrence Waterbody	Alewife, American Eel, Banded Killifish, Black Crappie, Bluegill, Bluntnose Minnow, Brook Stickleback, Brown Bullhead, Brown Trout, Central Mudminnow, Common Carp, Common Shiner, Creek Chub, Cutlip Minnow, Emerald Shiner, Fallfish, Gizzard Shad, Golden Shiner, Johnny Darter x Tesselated Darter ,Lake Chub, Lake Whitefish, Largemouth Bass, Logperch, Longnose Gar, Mooneye, Mottled Sculpin, Muskellunge, Northern Pike, Pumpkinseed, Rainbow Smelt, River Redhorse, Rock Bass, Sauger, Shorthead Redhorse, Silver Redhorse, Smallmouth Bass, Spottail Shiner, Stonecat, Threespine Stickleback, Trout-Perch, Walleye, White Perch, White Sucker, Yellow Perch

Areas of Natural and Scientific Interest

Areas of Natural and Scientific Interest (ANSI) are areas of land and water containing natural landscapes or features which have been identified as having values related to protection, natural heritage appreciation, scientific study, or education. There are 2 kinds of ANSIs:

- **Earth science ANSIs:** Are geological in nature and contain significant examples of bedrock, fossils, landforms, or ongoing geological processes.
- **Life science ANSIs:** Represent biodiversity and natural landscapes. They include specific types of forests, valleys, prairies, wetlands, native plants, native animals, and their supportive environments. Life science ANSIs contain relatively undisturbed vegetation and landforms and their associated species and communities.

Figure 1-6 identifies ANSI Areas located within or near to the project areas. Although three ANSI areas have been identified outside the boundaries of Ingleside, no ANSI areas have been reported within the boundaries of both Long Sault and Ingleside.

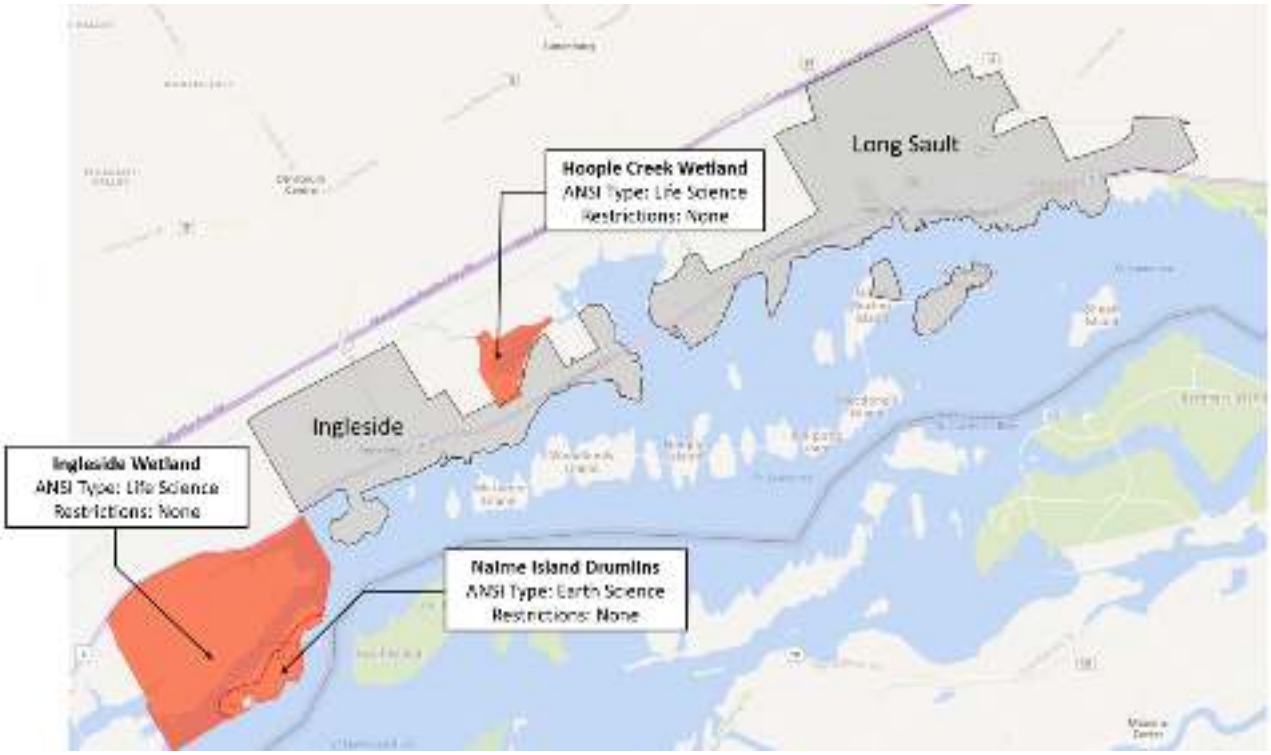


Figure 1-6 Areas of Natural and Scientific Interest within Long Sault and Ingleside

1.7.2 Social Environment

Community Demographics

The Township's age distribution profile generally aligns with that of the United Counties, although with a lower proportion of young adults particularly those between the ages of 25 and 34 years. The largest age cohort in both the Township and SDG are those residents between the ages of 55 and 59 years.

As can be seen in Figure 1-7, Long Sault is reflecting the same age distribution trend identified within the community of South Stormont with the largest age of residents being between the ages of 55 and 59 years while the largest age distribution in Ingleside in slightly high being between the ages of 60 and 64 years.

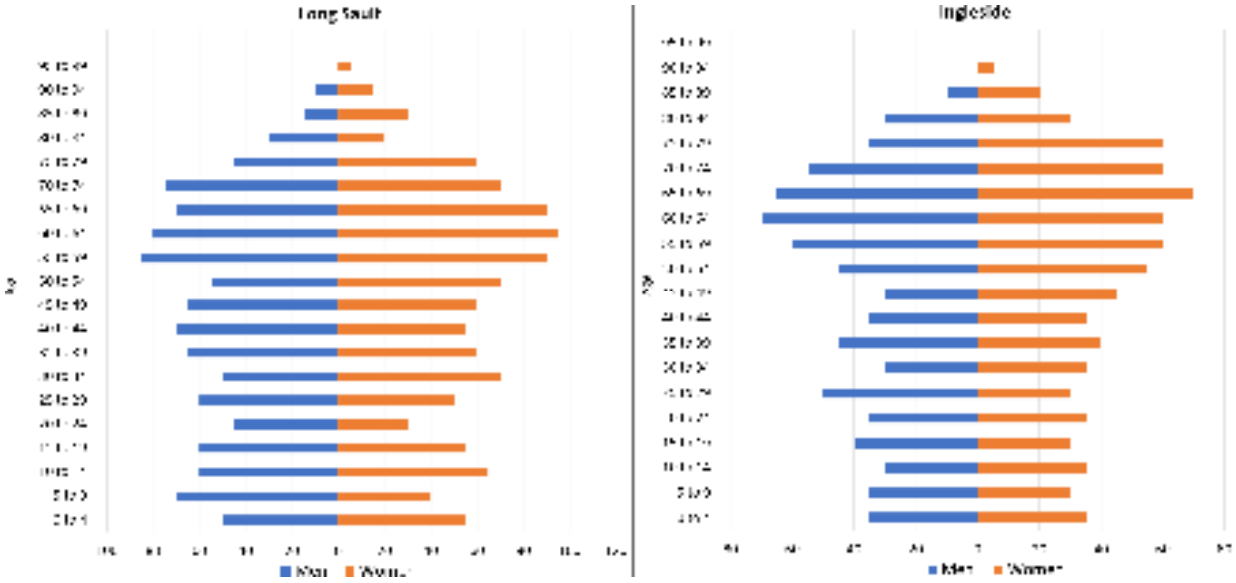


Figure 1-7 Age Distribution Comparison between the Township of South Stormont and United Counties of SDG (Source: Canada Census 2021)

The average age of the population in Long Sault and Ingleside is 45.2 and 47.8 years, respectively, based on 2021 Census data. This is slightly higher than Ontario's average age at 41.0 years, signifying a higher concentration of older adults within the southern urban centres. Specifically, in both Ingleside and Long Sault, more than 30% of the population is over the age of 65 and less than 15% of the population is under 15 years of age.

Cultural Heritage

The Ontario Heritage Act (OHA), R.S.O. 1990, c.018) is the guiding piece of provincial legislation for the conservation of significant cultural heritage resources in Ontario. The OHA gives provincial and municipalities governments the authority and power to conserve Ontario's heritage. The following are key concepts for any discussion pertaining to cultural heritage resources:

- **Cultural Heritage Value or Interest (CHVI)**, also referred to as Heritage Value, is identified if a property meets one of the criteria outlined in O. Reg. 9/06 namely historic or associate value, design, or physical value and/or contextual value. Provincial significance is defined under Ontario Heritage Act (OHA) O. Reg. 10/06.
- **Built Heritage Resource (BHR)** can be defined in the PPS as: "a building, structure, monument, installation or any manufactured or constructed part or remnant that contributes to a property's cultural heritage value or interest as identified by a community, including Indigenous community. Built heritage resources are located on property that has been designated under Parts IV or V of the Ontario Heritage Act, or that may be included on local, provincial and/or federal and/or international registers" (MMAH 2020:41).
- **Cultural Heritage Landscape (CHL)** is defined in the PPS as: "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Indigenous community. The area may include features such as buildings, structures, spaces, views, archaeological sites, or natural elements that are valued together for their interrelationship, meaning or association. Cultural heritage landscapes may be properties that have been determined to have cultural heritage value or

interest under the Ontario Heritage Act or have been included on federal and/or international registers, and/or protected through official plan, zoning by-law, or other land use planning mechanisms.)" (MMAH 2020:42).

- **Protected heritage property** is defined as "property designated under Parts IV, V or VI of the Ontario Heritage Act; property subject to a heritage conservation easement under Parts II or IV of the Ontario Heritage Act; property identified by the Province and prescribed public bodies as provincial heritage property under the Standards and Guidelines for Conservation of Provincial Heritage Properties; property protected under federal legislation, and UNESCO World Heritage Sites" (MMAH 2020:49).

The Township keeps a Municipal Heritage Register that outlines properties of cultural heritage value and are identified as being important to the community. As can be seen in Figure 1-8, no Heritage Points of Interest (POI) have been identified within the boundaries on Ingleside. On the other hand, three Heritage POIs have been identified within the boundaries of Long Sault. Those are listed as follow:

- **Lost Villages Museum:** located in Ault Park on Fran Laflamme Drive, 3 kilometres east of Long Sault, Ontario, the museum site consists of ten heritage buildings, moved, and restored to Ault Park from The Lost Villages and surrounding townships by the members of The Lost Villages Historical Society. Both the interiors and exteriors of the buildings have been restored, and they have been assembled in a village-like setting at Ault Park. The buildings commemorate the inundation of lands to the south of the museum complex on July 1, 1958.
- **Ault Park & Museum:** Located at 16383 Ault Park Rd in Long Sault, this single detached brick building with a Mansard style roof was originally built for George C. Forbes as a reading room (library) for the Village of Newington in 1901. This building one of the most historic buildings in the Township of South Stormont, constructed as a public institution. The Forbes Memorial Reading Room was given as a gift to the community of Newington in the name of Mrs. Peter Forbes (Isabella), mother of George C. Forbes. On October 7, 1901, a meeting was held for the purpose of starting a Public Library on the grounds donated by Dr. Munroe. The only condition was that it should always be kept open to all races and creeds.
- **St. Lawrence Valley Cemetery:** Located on 15570 County Road 2, the St. Lawrence Valley (Union) Cemetery is an all-denominational, not-for-profit, charitable cemetery that was established in 1957 as a direct result of the St. Lawrence Power Project of the Ontario Hydro Electric Commission with involvement from the governments of Canada and the United States. The purpose of the project was to construct, maintain and operate power development works in the International Rapids section of the St. Lawrence River, which necessitated the flooding of the land where eighteen cemeteries were located.

Figure 1-8 Heritage Point of Interest (POI) in Long Sault and Ingleside

1.7.3 Economic Environment

Population Economic Position

According to the 2021 census, Long Sault and Ingleside have an average household income (after-tax) of $78,500 and $74,000, respectively, which is lower than the Township of South Stormont ($81,000) as a whole, but higher than the household income in The United Counties of Stormont, Dundas and Glengarry (SDG) ($66,000). Approximately forty percent (40%) of the people living in Long Sault and Ingleside have an income of $100,000 or more, compared to thirty percent (30%) of households in SDG.

The prevalence of households that fall under the Low-Income Cut-Off After Tax (LICO-AT) within Long Sault and Ingleside is 1.2% and 1.3%, respectively which less than the provincial average (5.3%).

Affordability Factors

Table 1-3 reports the water and wastewater rates for both Ingleside and Long Sault compared with Rosedale Terrace/St. Andrews/Eamers Corners and Hamlet of Newington customers within the Township boundaries.

Water rates in areas serviced by the Long Sault/Ingleside water systems are comprised of a consumptive charge per cubic metre of metered water volume and a minimum quarterly water bill. In addition to the water billing rates, there is a charge levied on existing constituents for the repayment of existing debt issued for the expansion of the water systems.

Wastewater rates in the serviced areas of the Long Sault and Ingleside wastewater systems are imposed based on 225% of the quarterly water bill. In addition to the wastewater rates imposed on wastewater customers, constituents of Long Sault and Ingleside also pay a special area sewer capital levy as part of their property taxes. The proceeds from this levy go towards funding the ongoing operation and maintenance of the wastewater systems.

Table 1-3 Current Water and Wastewater Rates within the Township of South Stormont

	Water Rates		
	Long Sault and Ingleside	Rosedale Terrace / St. Andrews West/Eamers Corners	Hamlet of Newington
per m^3	$1.428	$1.709	$2.121
per m^3 (>6,000 m^3 annually)	$1.141	n/a	n/a
Minimum Bill	Based on 38.5 m^3 per quarter		
Minimum Bill (Multiple Dwelling Unit)	Based on 25.7 m^3 per quarter		
	Wastewater Rates		
per m^3	$4.443	n/a	n/a
per m^3 (>6,000 m^3 annually)	$3.550	n/a	n/a
Minimum Bill	Based on 38.5 m^3 per quarter		
Minimum Bill (Multiple Dwelling Unit)	Based on 25.7 m^3 per quarter		

The Township's water services non-rate revenue is collected via capital levy payments (related to existing debt and for new connections) and fines/penalties. Fines and penalties are forecast to increase with annual inflation. Capital levy payments for existing debt are forecast to decrease from $362,000 to $191,000 by the end of the period, consistent with the repayment schedule. Municipal Act Capital levies for new connections to the system are forecast based on the existing rates (plus inflation) and the anticipated new connections to the system. The greatest source of revenue is secured from the consumptive water rates (i.e. $/$m^3$ of water consumption) and minimum bills.

The total annual operating revenues (consumptive rate revenue) are forecast to increase from $1.5 million in 2020 to $2.7 million by 2029.

The Township's wastewater service revenue is collected from fines and penalties, special area tax levy, Municipal Act capital levies, and from agreements with the Township's large non-residential customer (Lactalis). Fines and penalties are forecast to increase with annual inflation. The special area tax levy is proposed to be discontinued, with the $418,000 in annual funding becoming an obligation of the wastewater rates. Municipal Act capital levies for new connections to the system are forecast based on the existing rates (plus inflation) and the anticipated new connections to the system. Wastewater revenue from Lactalis is has been forecast based on the conditions of the existing agreements. Lactalis direct billing has been forecast to increase by 2% annually (approximately $1.1 million annually), in line with forecast annual increases in operating costs.

Revenue secured from the consumptive wastewater rates (i.e. $/$m^3$ of water consumption) represents the greatest share of the annual wastewater rate revenue.

The total annual operating revenues (including consumptive rate revenue) are forecast to increase from $2.7 million in 2019 to $4.3 million by 2032.

In 2019, a typical residential customer with average demand patterns would have a total annual water bill of $188 in Long Sault/Ingleside. As per the water financial plan and the rate forecast, the consumptive rate would increase to $1.982 per m^3 of water consumption by 2029. These changes would result in an increase to the annual bill for Long Sault/Ingleside customers of 6.8% per year or a $17 average annual increase.

On the other hand, in 2019, a typical residential customer with average demand patterns (i.e. 182 m^3 water volume) would have a total annual wastewater bill of $421.

In addition to wastewater rates, constituents of Long Sault and Ingleside also pay a special area sewer tax levy as part of their property tax bill that goes towards the funding of the Long Sault and Ingleside wastewater systems. Based on an assessed residential property value of $200,000, the special areas sewer tax bill would be $207. In total, the annual charges paid towards the wastewater systems in Long Sault and Ingleside are $628. As per the wastewater financial plan, with the removal of the special area sewer tax levy, the average annual wastewater charges would increase by 6.0% every year up to the 2029, resulting in a $44 average annual increase per year.

As each household will be required to pay for the cost of servicing extensions/implementation with available after-tax income, the 2021 Census Data on the 2020 household income was used to identify the median after tax household income in order to determine the affordability of the water servicing extension project.

Using the most recent Census Data, the following measures of affordability will be used:

- If the annual household cost of the extending service is equal to, or less than 5% of the median after-tax household income, the project would be considered affordable.
- If the annual household cost of the extending service is greater than 5% but less than 10% of the median after tax household income, the project would require additional analysis to determine affordability, including:
  - Consideration of local support of servicing extension.
  - Consideration of additional financial support from the Township in order for the project to proceed to meet the affordability threshold of 5%.
- If the annual household cost of the extending services is equal to or greater than 10% of the median after tax household income, the project would be deemed unaffordable for both the Town and the benefitting property owners.

The 2021 Census Data outlined that the Long Sault and Ingleside median after-tax income of households is $78,500 and $74,000, respectively.

	Long Sault	Ingleside
Median after Tax Income per household (2020)	$78,500	$74,000
Affordable (≤ 5%)	$3,925/yr. per household	$3,700/yr. per household
Unaffordable (>10%)	$7,850/yr. per household	$7,400/yr. per household

2 DESIGN CRITERIA

2.1 Population Growth

The Township of South Stormont has experienced population growth since 2001. Based on population projections included in the SDG Official Plan and the Township of South Stormont Waterfront Master Plan (2021), population within the Township of South Stormont is growing faster than expected and it is expected to continue to grow over the long term. In the next section, current and future population growth have been provided for both Long Sault and Ingleside.

2.1.1 Long Sault

As identified in the previous section, the Township is growing faster than expected, with the majority of the growth occurring in Long Sault.

According to the 2016-2021 Census, the population in Long Sault increased by approximately 10.5% in 5 years, with 1,951 people in 2016 and 2,154 in 2021 and resulting in an annual growth rate of 2.1%. However, based on the Development Charges developed by Watson & Associates Economists Ltd. (2022), the population in Long Sault is expected to reach approximately 3,842 by mid-2036, resulting in an increase of approximately 1,686 persons.

Table 2-1 Long Sault: Current and Future Population

	Population	Annual Growth Rate	Comments
2016	1,951	2.1%	Based on the 2016-2021 Census
2021	2,154		
2026	2,649	3.9%	Based on the Development Charges developed by Watson & Associates Economists Ltd (2022)
2031	3,257		
2036	3,842		
2041	4,922		Assumed according to the Development Charges developed by Watson & Associates Economists Ltd (2022)

2.1.2 Ingleside

Based on the 2016-2021 Census, the population in Ingleside increased by approximately 7.5% in 5 years, with 1,384 people in 2016 and 1,487 in 2021 and resulting in an annual growth rate of 1.5%.

However, according to the Development Charges developed by Watson & Associates Economists Ltd. (2022), the population in Ingleside is expected to reach approximately 2,186 by mid-2036, resulting in an increase of approximately 698 persons.

Table 2-2 Ingleside: Current and Future Population

	Population	Annual Growth Rate	Comments
2016	1,384	2.1%	Based on the 2016-2021 Census
2021	1,487		
2026	1,691	2.6%	Based on the Development Charges developed by Watson & Associates Economists Ltd (2022)
2031	1,922		
2036	2,185		
2041	2,485		Assumed according to the Development Charges developed by Watson & Associates Economists Ltd (2022)

2.2 Planned and Forecast Development

The United Counties of Stormont, Dundas and Glengarry Official Plan was adopted on July 17, 2017, with the intent to provide the strategy and policy framework to guide development and growth over a 20-year time horizon.

The County Official Plan is an upper tier Plan with detailed policies that reflect provincial, County, and local interests. Local Municipalities rely on the County Official Plan as a single tier Official Plan and may further distinguish land use categories, detailed development requirements, or specific land use

districts by means of a secondary plan or a zoning By-law which are intended to articulate the structure of the community and how the community is intended to evolve over time in accordance with that structure.

Secondary Plans allow a more detailed level of planning than found in an Official Plan. A Secondary Plan applies to a specific area of a Municipality and is adopted into the Official Plan as an amendment. This gives the Secondary Plan the same status as an Official Plan document.

Of relevance to this study is Schedule 'A', Land Use Designations, which designates Long Sault and Ingleside as Urban Settlement Areas as reported in Figure 2-1 and Figure 2-2. Within Urban Settlement Areas, the Residential, Commercial and Employment Districts are areas where the primary permitted land uses are residential, commercial, and industrial, respectively. In particular, with respect to the Employment Districts, uses may include a mix of industrial uses, manufacturing, construction, warehousing, offices, employment supportive commercial uses, public service facilities and institutional uses.

As can be noted in Figure 2-1, two Special Land Use Areas have been identified in the Long Sault settlement area:

- **Special Land Use Areas - SLA4b**: on the south side of Highway 401, extending south to the Canadian National Railway corridor, from County Rd 35 to County Rd 15 immediately north of the Urban Settlement Area of Long Sault as shown on Schedule SLA4b to allow for Employment uses.
- **Special Land Use Areas - SLA4c:** The Long Sault County Rd 36 Special Study Area includes lands north of County Rd 36 and west of County Rd 15 within the Rural District that are adjacent to the Long Sault settlement area boundaries. The Township of South Stormont, in consultation with the County, will initiate a comprehensive review to determine whether the Long Sault County Rd 36 Special Study Area should be added to the Long Sault urban boundary.

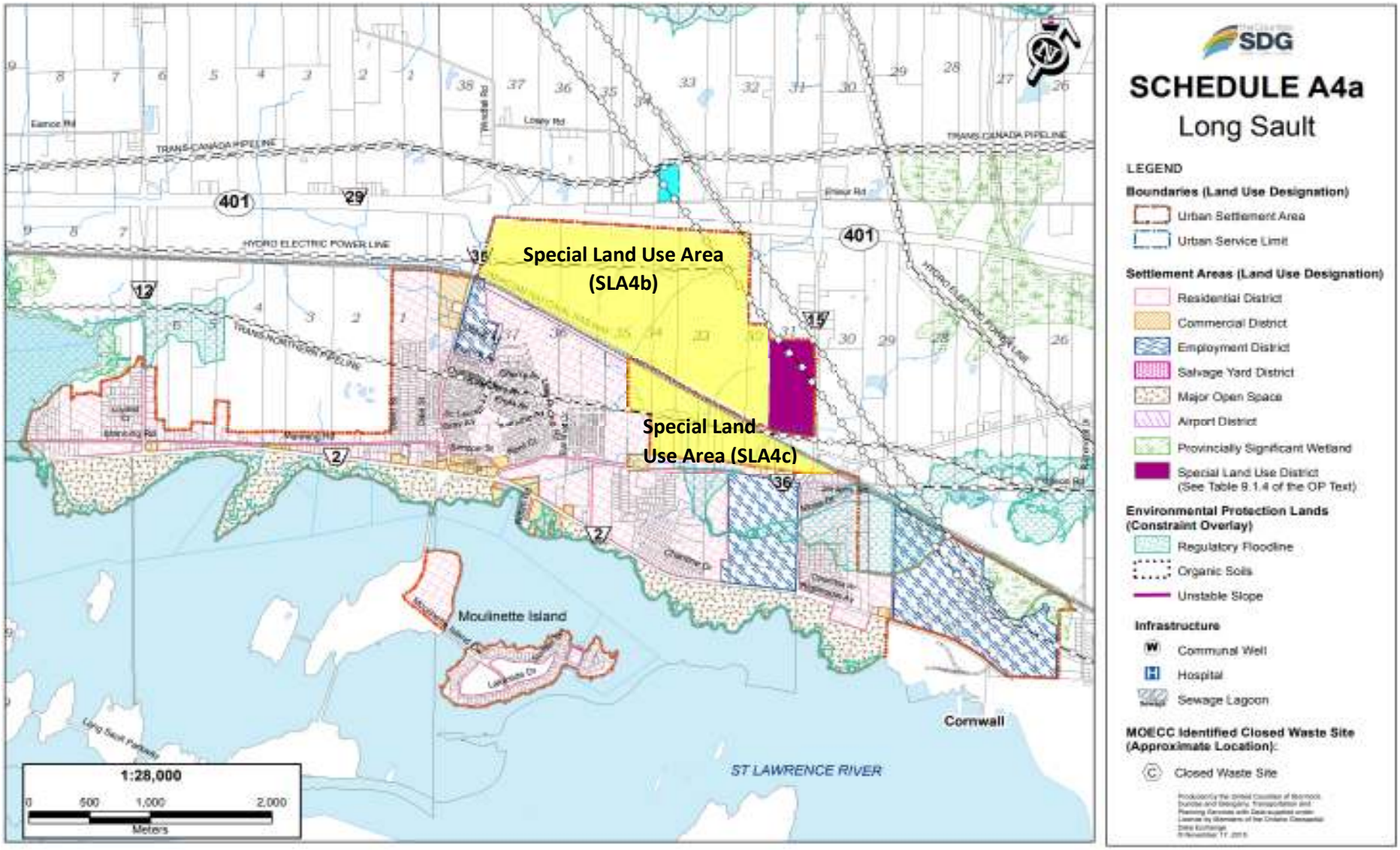


Figure 2-1 Long Sault Land Used Designation

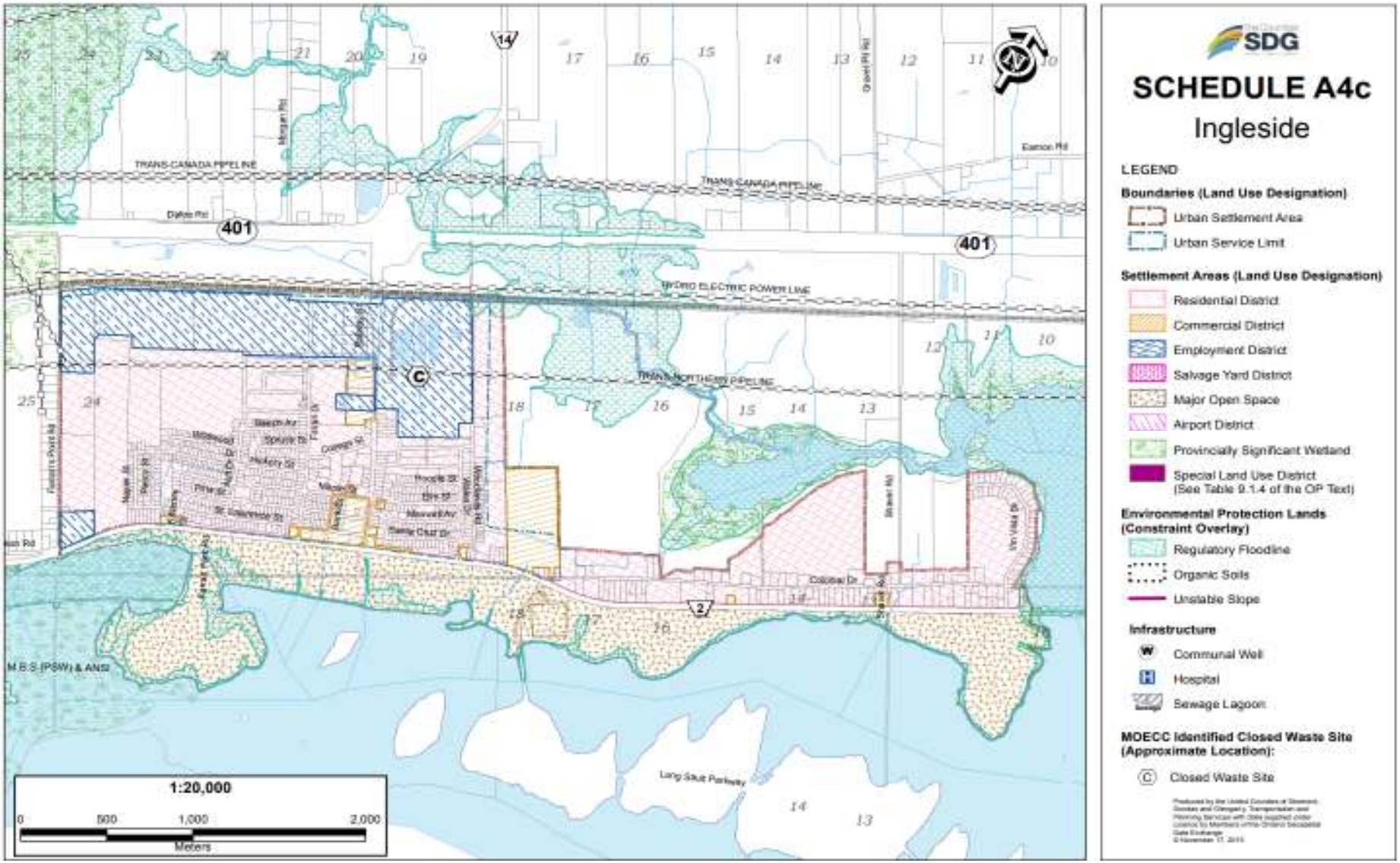


Figure 2-2 Ingleside Land Used Designation

2.2.1 Existing Conditions

Currently, the total number of existing residential and commercial lots within the project area is 2,200, distributed as follows:

- Long Sault Area
  - 1391 Residential Units
  - 62 Non-Residential Lots

Of the total residential units and non-residential lots within the Village of Long Sault, 901 residential units and 36 non-residential lots are serviced by wastewater.

- Ingleside Area
  - 748 Residential Units
  - 40 Non-Residential Lots

Of the total residential units and non-residential lots within the Village of Ingleside, 672 residential units and 39 non-residential lots are serviced by wastewater.

2.2.2 Current Planned Development

Figure 2-3 identified the planned development within the Long Sault boundaries. To date, no planned development is currently identified within the Ingleside area. Subject to approvals and economic conditions, the timeline for the identified development was assumed as follow:

- **5-20 Year Timeframe: Planned Development -** This timeframe is characterized by areas that have development applications currently in place.
- **> 20 Year Timeframe: Build-out -** This timeframe is characterized by areas that do not have development applications currently in place but are identified for future development.

Based on review of background information and the Township Subdivision Tracker, the current planned development in Long Sault is equal to 678 new residential units and 276 ha of industrial and commercial development, identified as follows:

- Residential Development
  - Fenton Farm Development: 43 residential units
  - Parkway Estates Development (Phase 3 and Phase 4): 82 residential units
  - Whitetail Avenue Development: 16 residential units
  - Chase Meadows Development 426 residential units
  - Moulinette Road Subdivision: 111 residential units
- Non-Residential Development
  - Long Sault Logistics Village Development (Phase 1 and Phase 2): 274 ha of industrial development – 1,200 potential employees
  - Long Sault Gas Station: 0.75 ha of commercial development
  - Sixsmith Drive: 1.5 ha of commercial development

Although not active development applications are currently in place in Ingleside, several committed areas were identified as potential medium-term development. It must be noted that, as there are no current plans for those areas, the number of units for residential developments were calculated assuming 0.1 ha as per typical existing lots.

- Residential Development
  - Residential area west of Farran Drive and north of Beech Street: 126 units.
  - Residential area north of Hoople Street: 74 units.
- Non-Residential Development

- Industrial area south of the CN railway: 25 ha of industrial development.

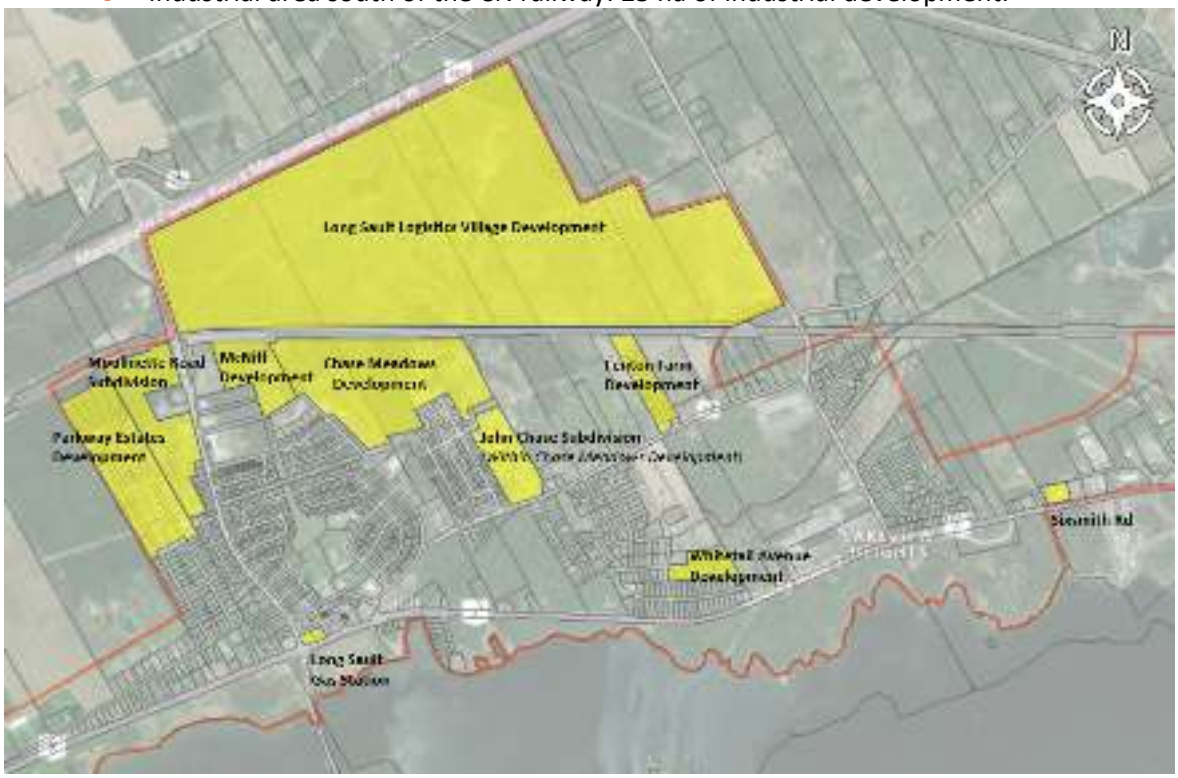


Figure 2-3 Long Sault Planned Development

2.2.3 Build-out Conditions

Table 2-3 identifies potential development under build-out conditions according to the Zoning By-Law 2011-100 and its amendments for both Long Sault and Ingleside.

For calculations of potential units and residents, the following assumptions have been applied:

- 0.1 ha as per typical existing lot size with exception of rural zones where the minimum lot size was identified as 0.4 ha as per the Township Subdivision Guidelines
- 3 person per units according to the Township Subdivision Guidelines.

The timeline for the identified planned development is between 10 to 20-years.

Table 2-3 Potential Development under Build-out Conditions for Long Sault and Ingleside

	Long Sault			Ingleside		
	Land Available	Potential Units	Potential Residents	Land Available	Potential Units	Potential Residents
Residential Development	115 ha	565	2,000	160 ha	1,400	4,200
Industrial and Commercial Development	65 ha	N/A	N/A	30.5 ha	N/A	N/A

2.2.4 Sensitivity of Growth Impacts

One of the challenges with the development of infrastructure to support growth is the potential impacts of changes to the conditions that promote or inhibit growth. In order for municipal

infrastructure to support growth, it needs to be in place in advance or concurrently with the development. However, the timeline for development and municipal infrastructure do not necessarily correspond. Typically, from land acquisition to the connection of the first constructed house is a two-to-three-year process (minimum). Conversely, municipal projects that are exempt from the Class EA process will take a minimum of two years from inception to delivery with larger scale projects such as pumping stations and plants taking three to five years from inspection to commissioning. As such, in order to meet demands, the Township may need to start enabling projects one to three years in advance of development commencing. There is an inherent risk that Township funded enabling works are constructed and development is delayed or cancelled without payment of development charges to defer the project costs, thus increasing the Township debt load.

The sensitivity of growth impacts or in other words the variability of impacts on municipal infrastructure of either more or less growth than anticipated can be significant. As part of the evaluation and prioritization of projects, it is important for the Township to be proactive in mitigating that risk through agreements with developers and where possible partnering with developers to share the upfront costs of projects to minimize the risk to ratepayers of projects being deferred by the development community. This is particularly the case with large developments such as Chase Meadows and Long Sault Logistics Village which may represent 20 – 75% of the current average day demand.

2.3 Water Demand

For the purposes of a master servicing study, water demand considers two key components: domestic water demand, and fire flow. Domestic Water Demand is day to day water use and includes metered flow, non-revenue water and lost water. Metered flow is the water that is measured and billed to existing connections. Fire flow is event-based demand required by the Fire Department or onsite sprinkler systems to fight a fire in order to protect the public and mitigate the risks of loss and damage to buildings. The design limitation for water systems in Canada for communities such as Long Sault and Ingleside is fire flow as watermains, and pumping systems are sized to convey fire flow with adequate flow and pressure to the fire location. Domestic demand has little to no impact on pipe size in these communities.

2.3.1 Existing Water Demand Conditions

The water demand in the study area is primarily residential with limited commercial (~250 m^3/day ~6%) with the exception of Lactalis in Ingleside which used an average of 1,770 m^3/day (approximately 40%) of the system average day demand. Table 2-4 illustrates the existing water demand trends in the Regional System.

Table 2-4: Existing Water Demand Trends

Year	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Maximum Day Factor
2017	3,827	5,001	1.31
2018	4,249	6,107	1.44
2019	4,320	6,285	1.45
2020	4,317	6,885	1.59
2021	4,175	6,138	1.47

2022	4,546	5,982	1.32
2023 (YTD)	4,450	6,464	1.45
Annual Change (%)	+2.5%		

The existing water demand seasonal variability in the two communities is displayed in Figure 2-4 below. This graphic illustrates the seasonal variation of water demand that is associated with summer peak use and fall/winter low demand period. The impact of a single large industrial user (Lactalis) on the system, which would typically use a consistent volume of water per day, is that the maximum day factor is depressed. Following the MECP guidelines for a population of approximately 4,000, the maximum day peaking factor would be 2.00, where the current maximum day peaking factor in recent years has been between 1.32 and 1.59. However, it should be noted that the maximum day factor for Lactalis is 1.45, which is similar to the remainder of the community. A low maximum day factor can be indicative of a significant lost water issue because of a high base discharge. This will be discussed further in the non-revenue water section of the report.

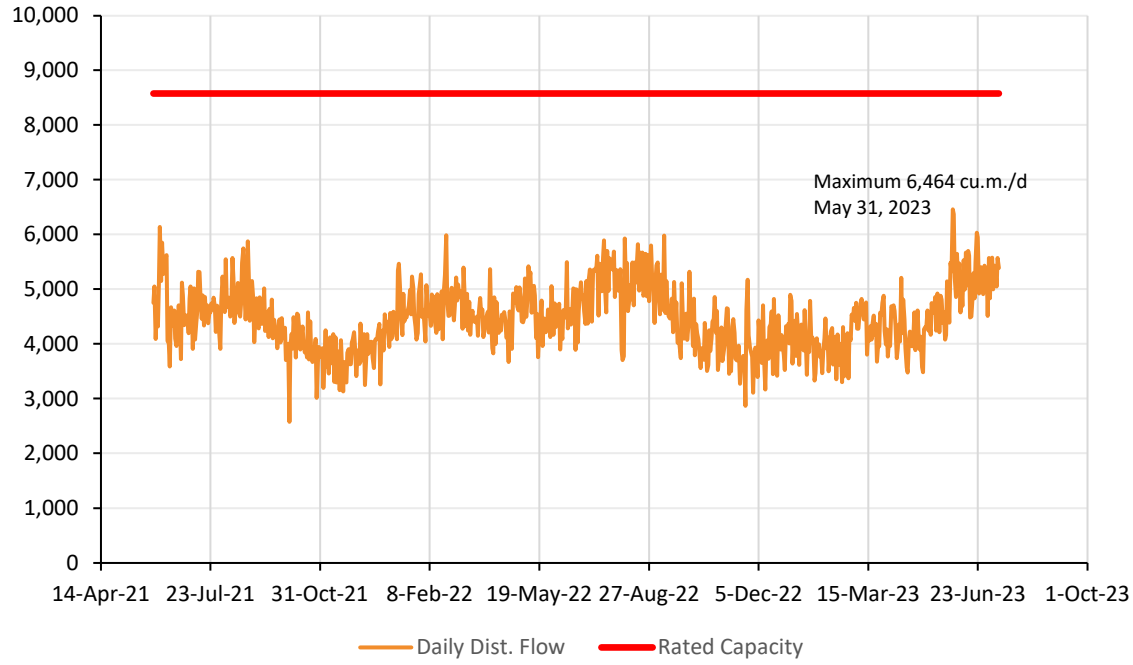


Figure 2-4 Current Water Demand Characteristics

2.3.2 Non-Revenue Water

Non-revenue water is water that the municipality produces but does not get paid for. Examples of non-revenue water include leakage, water used for fire or maintenance purposes (flushing) that is not metered and documented, unmetered users, theft (meter by-pass or hydrants) and potentially meter inaccuracies due to age or condition. Non-revenue water as a percentage of the total water production can vary depending on the size of the distribution system, age of the infrastructure, water accounting practices and scarcity of water in the area.

Globally, the lower end of non-revenue water is approximately 5% of the total, with a well managed tight system falling around 10%; however, 20-40% non-revenue water is not uncommon in Ontario. A recent article in Environmental Science and Engineering (June 2023) authored by Township staff

indicated that in 2018, non-revenue water was above 60%. Through a comprehensive program of leak detection and water audits, they were able to reduce the non-revenue water percentage to 30% from 2018 to 2022.

Non-revenue water is an important factor in the assessment of infrastructure in terms of both efficiency and cost recovery. The water and wastewater systems are utilities that are not dissimilar to gas or electricity in terms of the user pay principle. The user pay principle is essentially that the more a connection uses, the more they should pay as a reflection of their individual use. The Long Sault and Ingleside water systems were metered as part of the upgrades in the early 2000s.

A review of the water metering data for the period of 2021 and 2022 illustrates the distribution of treated water use in the community. The data indicates that the non-revenue water in the South Stormont system represents approximately 30% of the total water production. In the evaluation, it was identified that there are municipal uses (flushing, fire fighting, street cleaning, gravel maintenance) that are currently not formally documented; however, it is the Township's intent to improve record keeping and to track these uses more closely. Additionally, the Township has previously undertaken leak detection investigations, but depending on the size of the leaks in the system they may be below the identifiable threshold.

It is anticipated that the majority of the non-revenue water is associated with small leaks in the aging cast iron watermain in the system. The estimated non-revenue water represents a leak of approximately 16 L/s, which divided across the 53.7 km of watermain, equates to approximately 0.3 L/s per km of watermain. As such, it would only take a few leaks in the system to account for this volume of loss; however, small leaks are difficult to locate using standard approaches. Furthermore, a single watermain break can discharge several hundred cubic metres of water which is not necessarily accounted for by the Township but can have an impact on the data.

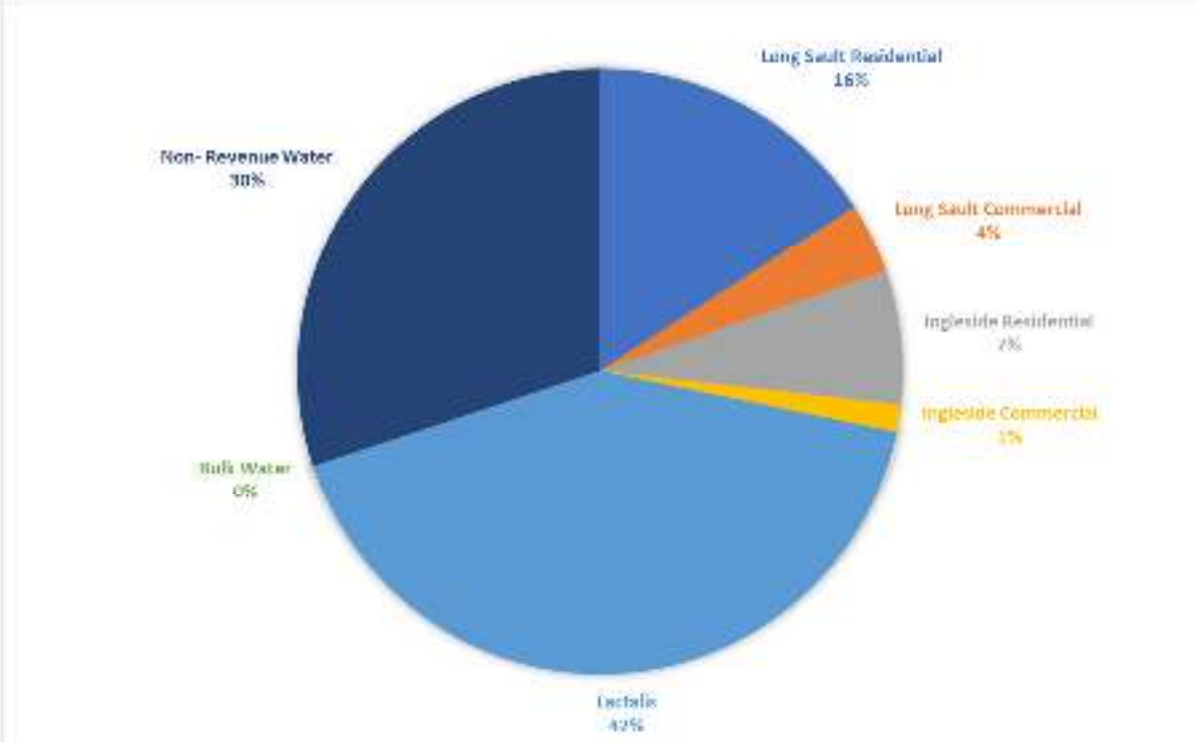


Figure 2-5: 2021-2022 Distribution of Water Use

The reduction in non-revenue water that is not associated with a beneficial use (i.e. leaks) will allow for an increase in the available capacity for generating revenue and supporting development demands. The reduction and elimination of non-revenue water in a system is difficult to achieve, but monitoring of the quantity and variation of non-revenue water can help target opportunities to achieve reductions which then becomes available for revenue-based consumption. The Township should prioritize the ongoing monitoring of the non-revenue water in the system including tracking the impacts of watermain replacement projects and watermain breaks.

2.3.3 Forecast Water Demand

As identified in Section 2, the population of the two communities in 2021 was 2,154 in Long Sault and 1,487 in Ingleside for a total population of 3,641. The 2041 population for the community is forecast to be 4,922 in Long Sault and 2,485 in Ingleside for a total population of 7,407, which represents a 100% population increase.

This is significant as the original water system design allowed for 17% water demand growth from an average day in 2001 of 4,823 m^3/d to 5,646 m^3/d in 2021. As indicated in Section 1.8.1, the 2021 average day demand was 4,175 m^3/d. This is approximately 14% less than the 2001 water demand, which is indicative of lower water demand from new residences and the impacts of metered water. Additionally, in recent years, there have been high maximum day events that represent greater than the 99th percentile of flows; however, the MECP calculations for uncommitted reserve capacity require that those peak numbers be used which results in limitations on reserve capacity.

Based on a review of available data, design standards and discussion with Township staff, average and maximum daily flow rate parameters used to estimate future water demand are presented below. According to the MECP and Township Subdivision Guidelines those parameters were obtained using the following design standards:

- Average Residential Flow = 450 Lpcd (~0.45 m^3/person/day)
- Average Persons per Unit = 3 person/unit
- Average Industrial, Commercial and Institutional Flow = 28 m^3/ha/d
- Peaking Factor: 2.0 as per MECP Guidelines.

Table 2-5 summarizes water demand based on current conditions, planned development, and build-out conditions. Subject to approvals and economic conditions, the timeline for the identified planned development and build-out conditions was assumed to be as follows:

- Planned development: between 5-20 years.
- Build out: > 20 years.

For the purposes of this study, it is assumed that the current demand from existing residences and ICI users will neither increase nor decrease with time. Additionally, for existing users, the maximum day factor will be set at 1.6 to be consistent with current demand. This is conservative because infrastructure renewal will result in reductions in non-revenue water in the system and it is evident by the historical water demands that the current average day is less than the average day 20 years ago. We have allowed for an average day demand for Lactalis of 1,800 m^3/day.

The other significant development that impacts future water demands is the Long Sault Logistics Village (LSLV) and servicing the Long Sault Parkway. The LSLV lands represent approximately 274 ha of development lands which, using conventional allowances of 28 m^3/ha, would result in a flow of 7,672 m^3/d being associated with these lands. This is not reasonable as the single development would represent the existing rated capacity of the water system.

In review of the water demand with the developer and similar developments in Eastern Ontario, they are mostly warehouse and logistics facilities with no planned wet industries. The estimated demand presented in their functional servicing plan is 181.3 m^3/d. For design purposes, the 400 m^3/d will be used to allow for some flexibility in future water use in that system.

The Township has also fielded requests from the St. Lawrence Parks Commission (SLPC) regarding future water and wastewater connections to the Long Sault and Ingleside ends of the Parkway. This flow will account for a maximum day of 925 m^3/d.

Table 2-5: Forecast Water Demand

	Long Sault		Ingleside		Regional Water Supply Water Demand
	Number of units / Land Available for Commercial and Industrial	Water Demand	Number of units / Land Available for Commercial and Industrial	Water Demand	
Existing Residential Units / Commercial & Industrial lots					
Serviced by municipal systems	904 units (Residential) 34 lots (Non residential)	ADF: 1,500 m^3/d MDF: 2,400 m^3/d	723 units (Residential) 40 (lots (Non residential)	ADF: 3,000 m^3/d MDF: 4,800 m^3/d	ADF: 4,500 m^3/d MDF: 7,200 m^3/d
Not Serviced by municipal systems	417 units (Residential) 19 lots (Non residential)	ADF: 590 m^3/d MDF: 950 m^3/d	155 units (Residential) 3 lots (Non residential)	ADF: 220 m^3/d MDF: 350 m^3/d	Not Serviced Units/Land * Average Flow * MDF
Total Existing Potential Connections (A)	1,321 units (Residential) 53 lots (Non residential)	ADF: 2,090 m^3/d MDF: 3,350 m^3/d	878 units (Residential) 43 lots (Non residential)	ADF: 3,220 m^3/d MDF: 5,150 m^3/d	ADF: 5,310 m^3/d* MDF: 8,500 m^3/d*
Development areas (5-20 years)					
Planned development (B)	678 units + LSLV + SLPC + 2 ha ICI lands	ADF: 4,000 m^3/d MDF: 7,645 m^3/d	SLPC	ADF: 225 m^3/d MDF: 565 m^3/d	ADF: 4,225 m^3/d MDF: 8,210 m^3/d
20-year Design Flow Conditions (A+B)	1,999 residential units + 53 non-residential units + LSLV + SLPC + 2 ha ICI lands	ADF: 6,090 m^3/d MDF: 10,995 m^3/d	878 units (Residential) 43 lots (Non residential) SLPC	ADF: 3,445 m^3/d MDF: 5,715 m^3/d	ADF: 9,535 m^3/d MDF: 16,710 m^3/d
Build-out (> 20 years)					
Ultimate Build-out Conditions (C)	565 units / 65 ha	ADF: 2,583 m^3/d MDF: 5,166 m^3/d	1400 units / 30.5 ha	ADF: 2,744 m^3/d MDF: 5,488 m^3/d	ADF: 5,327 m^3/d MDF: 10,654 m^3/d
Ultimate Build-out Design Flows (A+B+C)	2,564 residential units + 53 non-residential units + LSLV + SLPC + 67 ha ICI land	ADF: 8,673 m^3/d MDF: 22,156 m^3/d	2,278 units (Residential) 43 lots (Non residential) SLPC + 30.5 ha ICI land	ADF: 6,189 m^3/d MDF: 11,203 m^3/d	ADF: 14,860 m^3/d MDF: 33,360 m^3/d

** Note: This is within the current design capacity of the existing system.*

2.3.4 Fire Flow

Fire flow demand is based on the population of the community and additional demands as identified for industrial/commercial needs. Historically, MECP guidelines were used to calculate fire flow demands and storage requirements. The current industry standard is to use the Fire Underwriter's Survey (FUS) Water Supply for Public Fire Protection (2020) calculations based on the type of buildings being protected. The vast majority of the communities are single family residential with a mix of wood frame and masonry construction.

Using the FUS simple method, which is appropriate at this scale, the required flow for a fire on the water system would be between 6,000 – 8,000 L/m (100 – 133 L/s). This is significantly higher than the historical 38 L/s that was the basis of the MECP design guidelines.

Fire storage is based on population and flow requirement as defined in the MECP guidelines. The original system design was based on a design population of 6,086 with a design fire flow of 159.7 L/s for three hours. The design allowed for a reduction in municipal storage due to the local fire storage at the existing industrial complexes (Avonmore Road and Lactalis). This resulted in a storage of 1,725 m^3.

Table 2-6 Current and Future Fire Flow requirements

Year	Population Served	Fire Flow Required (L/s)	Fire Flow Duration (hours)	Total Fire Storage Required (m^3)
2024	4,045	126	2	906
2029	4,826	141	2	1,013
2034	5,625	153	2	1,104
2039	6,819	165	3	1,784
2044	8,380	177	3	1,910

The projected 2044 population for the two communities is 8,380 which equates to a 177 L/s for three hours. This equates to a fire flow storage requirement of 1,910 m^3.

2.3.5 General Water Distribution Philosophy

In general terms, the Long Sault and Ingleside systems date back to an era where houses were smaller and fire demands were primarily met using a pumping truck that would draw from the hydrant to a vacuum if necessary to fight a fire. As such, the majority of the watermains are the minimum size of 150mm diameter. While this is generally acceptable for drinking water, it is limiting for fire demands, and it is no longer acceptable to allow the system to fall below 140 kPa (20 psi) even during a fire event due to the increased risk of drawing contaminants into the distribution system if the fire pumping draws a vacuum condition.

As such, the objective of this Master Servicing Plan is to provide the necessary tools to upgrade the infrastructure to make it more reliable, resilient, and sustainable. Independent of the current operation, the following objectives should be met in the development of the design approach to the servicing within the communities:

1. Watermain looping must consider upsizing of the watermain to a minimum size of 200 mm or more (as supported by modelling) for watermains that connect into the primary transmission or distribution mains from a pumping or storage system. An example of this is a watermain on a street the loops the perimeter of the community. This would not apply to watermains that service a small area (crescent).

2. Watermains between key infrastructure components (pumps and reservoirs) must be a consistent size with no restrictions and minimal head loss to ensure that the path of least resistance between these components, rather than a more diffuse distribution. An example of this is between the Ingleside Booster Station and the Ingleside Elevated Storage Tank, in which case, the watermain between the two should be sized to allow for efficient flow without having the branch along multiple flow routes.
3. Watermains in new developments should be upsized beyond the requirements for the specific development where they connect to two or more points in the existing or future distribution system and there is the justification in order to meet Point No. 1 and 2 above.

This approach will be applied to the assessment of the infrastructure in Long Sault and Ingleside.

2.4 Wastewater Production

An essential element in the design of sanitary sewer infrastructure is the consideration of initial flow and subsequent build-up of flow with time according to population growth, the design horizon and per capita wastewater production.

2.4.1 Existing Wastewater Conditions

Based on a review of available flow data collected at the plants between the 2017-2021, average and maximum daily flow for both Long Sault and Ingleside is provided in Table 2-7.

Table 2-7 Current Wastewater Production

	Long Sault - *Avg Rated Capacity: 2,700 m³/d* - *Peak Design Flow: 11,500 m³/d*		**Ingleside** - *Rated Capacity: 4,054 m³/d* - *Peak Design Flow: 10,027 m³/d*	
	Average Day Flow (m³/d)	**Maximum Day Flow (m³/d)**	**Average Day Flow (m³/d)**	**Maximum Day Flow (m³/d)**
2017	1,878	9,076	4,304	12,869
2018	1,485	8,142	3,857	10,921
2019	1,730	8,310	3,875	11,994
2020	1,476	8,977	3,472	10,256
2021	1,435	7,411	3,609	9,544
5-yr Average	**1,601**	**8,383**	**3,823**	**11,117**
WWTP % of Capacity Rated	**62%**		**100%**	

As can be seen in the Table above, the Long Sault WWTP is currently operating at approximately 62% of its rated capacity, while the Ingleside WWTP reached its rated capacity. The Township has undertaken a Municipal Class Environmental Assessment (MCEA) to increase the Ingleside WWTP rated capacity to meet 5,400 m^3/d and/or 6,300 m^3/d average flow depending on the growth scenario of Lactalis Ingleside Facility.

2.4.2 Infiltration and Inflow

Infiltration and Inflow (I/I) is extraneous water (groundwater or runoff) that enters the sanitary sewer system taking up excess capacity without generating any revenue for the utility. Infiltration is typically groundwater that enters the sanitary system through leaky pipe joints, cracks in pipes or deteriorated maintenance holes. Inflow is runoff that enters the sanitary system through direct connections to the sanitary piping usually associated with downspouts, sump pumps or perimeter drains. Similar to

concerns regarding non-revenue water as indicated in Section 2.3.2, inflow and infiltration is an issue in Long Sault and Ingleside. As evident from the data in the previous section, the maximum day flow to average day flow ratio is 5.24 (8,383/1,601) in Long Sault and 2.9 (11,117/3,823) in Ingleside. Comparatively, the maximum day to average day flow ratio for water is 1.31-1.59. There isn't a direct relationship between the water and sanitary flows due to storage in the water system and other factors; however, considering the large sanitary contribution of Lactalis which would skew the ratio downward and the high ratio in Long Sault of 5.24, it is evident that I/I is a concern that should be addressed.

WSP completed an assessment of I/I in Ingleside in 2016-2017 which concluded that the Ingleside system does experience "a significant amount of infiltration and inflow"; however, because the results were generally consistent across the community, there wasn't a problematic area that could be focused on to resolve the I/I issues. The ultimate conclusion was as follows:

> *"Dwellings with footing drainage connected to the sanitary sewers, either from sump-pump discharge or gravity connections outside the dwelling, are also a typical source of the infiltration issues observed. Methods to correct this issue are expensive, as it typically involves both underground work outside the home and plumbing work inside, and are politically sensitive.*
>
> *Therefore, due to the fact that the I&I issues appear to be common across all catchment areas within the collection system, and due to the significant costs to continue field investigation measures to identify the source of the I&I, it was concluded through discussions with the Township that the present study would not continue."*

Since the time of the report, both the demand for sanitary capacity and the long term benefits of reducing I/I has become more critical and the cost benefit of additional investigations may be warranted.

As part of this study, WT engaged EVB Engineering to install three flow meters in existing maintenance holes in Long Sault.

Figure 2-6: Long Sault I/I Flow Monitoring Locations (2023-2024)

The locations are shown in Figure 2-6 illustrate the locations where the flow meters were installed. These locations were selected based on preliminary modelling results that indicated an increased potential of diminished pipe capacity in these locations.

A review of the data collected from the flow meters indicated that the baseline I/I into the system is approximately 385 m^3/day with the vast majority being associated with the north half of the original Long Sault town site (approximately 300 m^3/day) and very little (less than 5 m^3/day) is associated with the area east of the original town site consisting of Chantine Meadows and Industrial properties on Avonmore Road (County Rd 15). This is the baseline I/I and does not capture the peak I/I flows associated with storm events, which is evident in the maximum day multiplier in Long Sault of 5.24 or approximately 6,800 m^3/day during peak events.

It is anticipated that the I/I problems are a combination of infiltration associated with groundwater around the existing piping and leaks as well as inflow from the private side. Anecdotal evidence from the community indicates that original residences have intentionally perforated the sanitary service proximate to the foundation wall in order to collection groundwater around the perimeter drain. It is anticipated that the majority of these connections are in the original town site. As these connections are on private property, rectifying the problem will require resident participation.

It must be noted that I/I infiltration and inflow are common problems in dated sanitary sewer systems. Several municipalities are currently dealing with I/I. With the intention of facing these challenges, the Federation of Canadian Municipalities (FCM) and the National Research Council (NRC) have joined forces to deliver the National Guide to Sustainable Municipal Infrastructure: Innovations and Best Practices. The Guide project aims to provide a decision-making and investment planning tool as well as a compendium of technical best practices for the implementation of I/I control/reduction program with the focus on sanitary sewers. This document is a focal point for the Canadian network of practitioners and municipal governments focused on infrastructure operations and maintenance.

2.4.3 Forecast Wastewater Production

Based on a review of available data, design standards, and discussion with Township staff, average and maximum daily flow rate parameters used to estimate future wastewater production are presented in below. According to the MECP and Township Subdivision Guidelines those parameters were obtained using the following design standards:

- Average Residential Flow = 450 Lpcd (~0.45 m^3/person/day)
- Average Persons per Unit = 3 person/unit
- Average Commercial Flow = 28 m^3/ha/d
- Average Industrial Flow = 35 - 50 m^3/ha/d based on type of industry
- Peaking Factor: Harmon formula
- Allowance for Infiltration and Inflow (I&I):
  - Existing areas: 0.49 L/s/ha
  - New Development areas: 0.19 L/s/ha

Table 2-8 summarizes wastewater production based on current conditions, planned development, and build-out conditions. Subject to approvals and economic conditions, the timeline for the identified planned development and build-out conditions was assumed to be as follows:

- Planned development: between 5-20 years.
- Build out: > 20 years.

Table 2-8 Current and Forecasted Wastewater production.

	Long Sault *Peak Design Flow: 11,500 m³/d*			Ingleside *Peak Design Flow: 10,027 m³/d*			Wastewater Calculation
	Number of units / Land Available for Commercial and Industrial	Average Flow	Peak Flow	Number of units / Land Available for Commercial and Industrial	Average Flow	Peak Flow	
Existing Residential Units / Commercial & Industrial lots							
Serviced by municipal systems	904 units (Residential) 34 lots (Non residential)	1,600 m³/d (19 L/s)	8,383 m³/d (97 L/s)	723 units (Residential) 40 (lots (Non residential)	3,823 m³/d (44 L/s)	11,117 m³/d (128 L/s)	Table 2-6 Current Wastewater Production
Not Serviced by municipal systems	417 units (Residential) 19 lots (Non residential)	1,400 m³/d (16 L/s)	5,600 m³/d (65 L/s)	155 units (Residential) 3 lots (Non residential)	1,100 m³/d (12 L/s)	3,200 m³/d (37 L/s)	Not Serviced Units/Land * Average Flow * Peak Factor + I&I
Development areas (5-20 years)							
Planned development	678 units / 276 ha	8,370 m³/d (97 L/s)	27,800 m³/d (322 L/s)	200 units 2 lots (Non residential)	4,900 m³/d (56 L/s)	14,300 m³/d (166 L/s)	Existing units + Planned development
Build-out (> 20 years)							
Ultimate Build-out Conditions	565 units / 65 ha	12,650 m³/d (147 L/s)	36,200 m³/d (420 L/s)	1400 units / 30.5 ha	8,310 m³/d (96 L/s)	25,000 m³/d (290 L/s)	Existing units + Planned development + Build-out

Note: Total may not sum due to rounding

2.5 Stormwater Management

Long Sault and Ingleside have the benefit of being waterfront communities on one of the larger controlled river systems in the world. As such, there is an outlet for stormwater runoff from the communities that has excess capacity and the controls to limit the potential for community flooding. As indicated in this section, there are some nuances regarding stormwater management related to the Raisin River and Hoople Creek.

Figure 2-7 - Typical Road Cross-Section (Source: Google Maps)

The general road cross-section that was used in both Long Sault and Ingleside is typical of the community age in the late 1950s where the road had steep sloped ditches on both sides with narrow sidewalks (typically 900 – 1200mm width) close to property line. This approach provides some localized stormwater quantity control as well as infiltration depending on the soil type. As the majority of the soils in South Stormont are glacial till, there is limited opportunity for significant infiltration. However, this design approach does provide detention storage with flow limitation from small diameter culverts in the system.

2.5.1 Existing Stormwater Conditions

The project area is within the Raisin River Watershed. The Raisin River is a natural watercourse with the watershed encompassing South Stormont and South Glengarry, United Counties of Stormont, Dundas and Glengarry a portion of North Stormont, North Glengarry, and the city of Cornwall as well. It empties into Lake Saint Francis on the Saint Lawrence River near the community of Lancaster. The watershed is under the jurisdiction of the Raisin Region Conservation Authority.

Stormwater management facilities within the project area consist of a mix of piped services, infrastructure such as ponds and lot-level controls, and overland drainage. The current overland flow pattern and runoff coefficient (C) for both Long Sault and Ingleside is illustrated in Figure 2-7 and Figure 2-8, respectively.

In Long Sault, the majority of the pipes and stormwater runoff currently discharge into the Raisin River. On the other hand, the areas located to the south side of the Village of Ingleside mainly discharge into the St. Lawrence River, while the areas located to the north side of the Village discharge into the Hoople Creek.

Figure 2-8 Long Sault Drainage Map including runoff coefficient for each catchment area.

Figure 2-9 Ingleside Drainage Map including runoff coefficient for each catchment area.

2.6 Transportation Demand

Transportation demand is essentially the quantification of population and how they use the existing streets in the communities. The following section details the anticipated growth and design criteria related to traffic in the communities.

The Township is currently working with commercial and residential developers on a number of development projects that include:

- A 680+/- acre logistics development (employment lands) with the potential for a railyard.
- Multiple one million square feet warehouses; and
- Residential projects that could lead to more than 400 and 100 serviced lots in the Long Sault and Ingleside communities, respectively.

Long Sault Logistics Village and Chase Meadows Subdivision Development are two of the major development projects planned in the Township.

C.F. Crozier & Associates Inc. undertook a Traffic Impact Study (TIS) for Long Sault Logistics Village and provided their report in February 2023. GHD undertook a TIS for Chase Meadows Subdivision Development and provided their report in April 2023. Both developments are located south of Highway 401 within the two main settlement areas.

The extensive planned growth has identified a need to have a transportation study that can assist the Township meet design guidelines without conflicting with the *2021 Township of South Stormont 2021 Community Strategic Plan*. The Township carried out a road needs study in 2021 to update the current road inventory and assess the road condition within the Township's jurisdiction. Based on the *2021 Township of South Stormont Road Needs Study Report*, the Township's Road network spans a total of 310 kilometres. The roads primarily exist within a rural setting, with small areas of urban and semi-urban development around the communities of Ingleside and Long Sault. The majority of the roads (98%) are local roads, with the remaining 2% being collector roads. There are no arterial roads or freeways under the Township's jurisdiction.

2.6.1 Existing Transportation Conditions

Table 2-9 shows the road classification and length, based on the *2021 Road Needs Study Report*. Of the 310 kilometres of roads inventoried, a total of 31 kilometres was found to be critically deficient, requiring reconstruction within the next five years. This includes all roads in South Stormont, not only Long Sault and Ingleside.

Table 2-9 Road Classification and Length

Road Class	Road Length (km)
Arterial	0
Collector	6
Local	304
TOTAL	**310**

2.7 Existing Transportation System

The Township is nestled along the St Lawrence River and attracts a large number of tourists, especially during the summer months. The post-COVID-19 pandemic conditions may have also contributed to the increase in number of visitors and residents. Based on the *2013 South Stormont Economic*

Development Strategic Plan, the Township intends to enhance traffic operations, safety, and active transportation and provide quality user experience to tourists, visitors, and Township residents.

2.7.1 Traffic Operations

The Township recognizes the importance of an efficient and well managed road system to sustain its business, agriculture, and industry. Based on the *2021 Road Needs Study Report*, the Township strives to operate and manage its road network efficiently through comprehensive strategies, technology adoption, and collaboration with stakeholders.

Transportation Impact Studies (TISs) for the Long Sault Logistics Village and Chase Meadows Subdivision developments indicate that the road network is operating acceptably under the existing 2023 conditions.

The study Measures of Effectiveness (MOEs) do not indicate any notable operational concerns at any of the study intersections and the majority of the study network roads are currently operating at Level of Service B (LOS B) or higher, meaning they can adequately service current traffic needs without any requirements for road improvements.

The traffic counts obtained from both TISs indicate that majority of Township roads are operating with significant excess capacity during both the weekday AM and PM peak hours. This signifies that the existing road network can accommodate increased traffic volumes before capacity is exceeded. Given the consistent road network conditions found throughout the Township, it is likely that traffic conditions are operating at acceptable levels on the roads outside of the study area network.

2.7.2 Road Safety

The Township strives to promote road safety for all road users, including pedestrians, cyclists, and motorists. This is evident from the safety measures observed at some of the main intersections within the Township. Clear and visible signage, including stop signs, yield signs, and advance warning signs are present at the main intersections. Access management techniques, including dedicated turn lanes, raised medians and pedestrian islands, can also be observed at intersections.

The *Ontario Road Safety Annual Report (ORSAR)* contains insights about long term and emerging collision trends throughout the Province of Ontario, including the Township of South Stormont. A review of five years of ORSAR data between 2015 and 2019 (inclusive) was reviewed to better understand road safety conditions on the Township's network.

Table 2-10 illustrates the vehicle collisions observed in the Township between 2015 and 2019, based on the *Ontario Road Safety Annual Reports*.

Table 2-10 Vehicle Collisions in South Stormont Between 2015 And 2019

Year	Percent Change	Total Collisions	Class of Collision		
			Fatal	Personal Injury	Property Damage
2015	-	120	0	21	99
2016	7.5%	129	1	23	105
2017	-17.8%	106	0	16	90
2018	-13.2%	92	0	17	75
2019	35.9%	125	0	10	115

It is evident from Table 2-9 that the total number of collisions in the Township has remained consistent. The data suggests that the Township is experiencing a decrease in personal injury collisions, but an increase in collisions involving property damage. Fatal collisions are almost non-existent in the Township. Given the continued increase in both population and automobile usage, the consistent total number of collisions is a positive indication for the Township. Moreover, the decreasing number of personal injury collisions and continued lack of fatal collisions is evidence of improving road safety. This is similar to the Vision Zero initiative's goal of reducing killed or seriously injured (KSI) collisions. The Township would be well served to continue their efforts to reduce vehicle collisions through mitigative efforts where possible.

2.7.3 Active Transportation

A review of the of the pedestrian network indicates that the majority of existing sidewalks are concentrated in the communities of Long Sault and Ingleside. Sidewalks are provided on at least one side of the majority of the study roads. However, there are sections of roads where the sidewalks are not continuous, which is especially notable near the plazas that attract greater pedestrian footfall.

The communities of Long Sault and Ingleside each have one major shopping plaza. The plaza in Long Sault is bounded by Simcoe Street to the north, Long Sault Drive to the south, residential houses to the east and Plaza Street to the west. There are no sidewalks along Plaza Street. In addition, there is no sidewalk link along Long Sault Drive, between Plaza Street and Moulinette Road. The Ingleside shopping plaza is bounded by Maple Street to the north, Thorold Lane to the south, Dickinson Drive to the east and Bank Street to the west. The sidewalk along Bank Street is disconnected at the Maple Street intersection. There also is no crosswalk or any linked sidewalk for pedestrians at the Bank Street and Maple Street intersection.

The Township currently has a few crosswalks, especially near schools and health centres, which provide safe passage for pedestrians to crossroads. However, signage, pavement markings, tactile walk surface indicators and other features, such as illuminated overhead lights and pedestrian push buttons are not frequently present. There is an opportunity to enhance active transportation by providing clearly marked and designated spaces for vulnerable road users to cross the road by alerting motorists of their presence.

The Township currently maintains the South Stormont Recreation Trail as well as a portion of the Great Lakes Waterfront Trail. Most of the trails through the Township follow off-road designated paths. However, there are parts of Great Lakes Waterfront Trail that currently follow the Long Sault Parkway across islands. In these sections, the route is typically an on-road space shared with motorists. Long Sault Parkway is a paved road with a narrow shoulder that circulates users in an area away from the primary settlement areas of Ingleside and Long Sault. From Long Sault to Cornwall, the Great Lakes Waterfront Trail is an off-road multi-use trail (MUT). Currently, the Great Lakes Waterfront Trail crosses the public right-of-way at some locations without OTM-recommended signage or pavement markings.

Dedicated cycling facilities are not observed on the study roads within Ingleside and Long Sault, with motorists and cyclists required to share the road. There are narrow, unpaved shoulders along the shared on-road routes that can pose risks to cyclists. The 2020 Township of South Stormont Parks and Recreation Master Plan identifies the need to improve signage and pavement design to help cyclists safely navigate through the recreational trail system.

2.7.4 Street Lighting

An important component of the road safety and security is roadway illumination. In general terms, roadway illumination is not necessarily for vehicle-vehicle interaction, but rather for pedestrian-vehicle interaction and illumination of potential obstacles on the road.

Luminance is the recommended calculation to evaluate roadway lighting. The following table was extracted from IESNE RP-08-14 and provides the recommended illuminance level for sidewalks as well as the RP-8 requirements base on road type. In both Long Sault and Ingleside, there are only local roads.

Table 2-11: IEC RP-8-14 Recommended Practice for Straight Streets

Roadway Classification	Pedestrian Conflict	Avg. Luminance L_{avg} (cd/m^2)	Avg. Uniformity Ratio (L_{avg}/L_{min})	Max. Uniformity Ratio (L_{max}/Lmin)	Max. Veiling Luminance Ratio (L_{vmax}/L_{avg})	Sidewalk Average illuminance E_{avg} (lux)
Local	Low	0.3	6.0	10.0	0.4	3.0
	Medium	0.5	6.0	10.0	0.4	5.0
	High	0.6	6.0	10.0	0.4	10.0
Collector	Low	0.4	3.0	8.0	0.4	3.0
	Medium	0.6	3.5	6.0	0.4	5.0
	High	0.8	3.0	5.0	0.4	10.0
Arterial	Low	0.6	3.5	6.0	0.3	3.0
	Medium	0.9	3.0	5.0	0.3	5.0
	High	1.2	3.0	5.0	0.3	10.0

Where:
L_{avg} – minimum maintained average pavement luminance
L_{min} – minimum pavement luminance
L_{vmax} – maximum veiling luminance (a measure of the glare produced by the lighting system)
Sidewalk Average Illuminance – minimum maintained average horizontal illuminance (lux)

2.8 Forecast Transportation Conditions

In order to assess the transportation conditions in the future, both the growth in population and changes in the population are important areas to be assessed. The population growth has been discussed in Section 2.1; however, demographic changes are also important. The *2021 Township of South Stormont Budget Context* highlights the importance of meeting the needs of a growing aging population. The Township currently has approximately 23% of the population aged 65 years and above, which is already more than the national average of 19%. The proportion of the senior population is expected to rise in future. This can be attributed to the seasonal residents who retire to this area and continue to stay as they age. The Township strives to create a more sustainable, healthy, and livable environment that prioritizes the needs and safety of all transportation users.

This population and the considerations for the demographics will be used in the review of transportation alternatives. In the review of the capacity of the existing system, the increase in population will have an impact on traffic; however, the distribution of population does not support a significant impact on the level of service within the Township roadways.

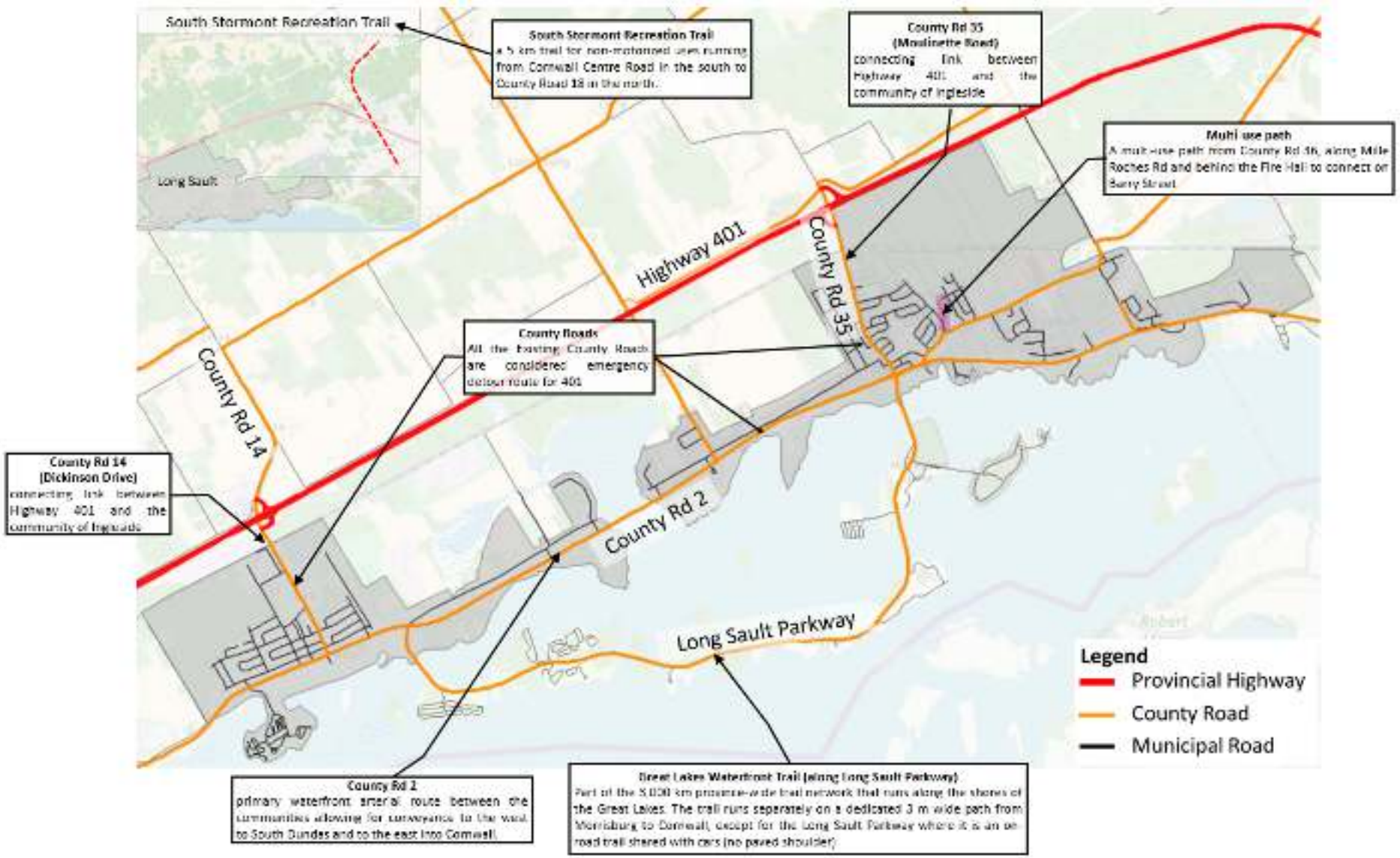


Figure 2-10 Existing Transportation Configuration

3 SYSTEM MODELLING

The following section details both the current and future operational models of the water, sanitary and storm systems to assess the functionality of the existing system relative to current and future demands. The objective of this exercise is to identify any bottlenecks or restrictions in the existing system that may be limiting the operation of the systems and what are the impacts of growth on the system. This will tie into the alternative generation and evaluation as well.

3.1 Baseline Information

Understanding the existing limitations of the system is important in the evaluation of the servicing capacity of the area. The following section documents the boundary conditions of the existing systems in terms of system capacity of the key unit processes relevant to the servicing of the community.

3.1.1 Water Treatment Capacity

Regional Water Treatment Plant

The rated capacity of the Regional Water Treatment Plant (WTP) is currently based on an average day flow of 5,050 m^3/d and maximum day flow of 8,575 m^3/d. The primary treatment components the ultrafiltration membrane system has inherent expandability within the same footprint of up to an average day flow of 9,500 m^3/d and a maximum day of 13,900 m^3/d or approximately 60% additional capacity. This will require a Schedule "C" Class EA to proceed and there will be additional capital improvements required to meet this capacity.

The Regional WTP has a clearwell with an active treated water storage capacity of 2,000 m^3 and four high lift pumps with a firm capacity of approximately 239 L/s. Since, there is no elevated or floating storage in the Long Sault pressure zone, the firm capacity of the pumps is the total water supply capacity in this area.

Ingleside Water Booster Station and Storage

The repurposed Ingleside Water Booster Station (WBS) operates as a ground level storage reservoir with pressure zone separation from the Long Sault Pressure Zone. The facility has 2,025 m^3 of treated ground level storage and three high lift pumps with a firm capacity of 154 L/s. The original Ingleside elevated storage tank provides floating storage in the system with a total volume of 909 m^3. The total treated water storage in the Ingleside system is 2,934 m^3.

3.1.2 Wastewater Treatment Capacity

The Long Sault Wastewater Treatment Plant at the end of Robin Rd was the first Municipal SBR in Ontario. This facility was commissioned in 1996. It is served via a pumping station located on County Rd 36 and a trunk sewer along County Rd 2. The Ingleside WWTP is located near the west entrance to the Long Sault Parkway is fed via a forcemain from a pumping station south of Dickinson Dr.

The Long Sault WWTP has a rated capacity of 2,700 m^3/d average daily flow and 11,500 m^3/d peak daily flow while Ingleside WWTP has a rated capacity of 4,045 m^3/d average daily flow and 10, 037 m^3/d peak daily flow.

The infrastructure in both communities was not originally designed for large community expansions. Based on a review of available flow data collected at the plants between 2017 and 2021, the Long Sault WWTP is currently operating at approximately 62% of its rated capacity, while the Ingleside WWTP reached its rated capacity and components of the facility are surcharging and flooding during wet weather flows and peak flow events. Therefore, the Township is currently undertaking a Municipal

Class Environmental Assessment (MCEA) to increase the Ingleside WWTP rated capacity to future wastewater demand according to population growth.

The Long Sault WWT is a 28-year-old plant with 20-years design capacity. In the next 3-5 years it is expected that the growth within Long Sault will exceed the WWTP maximum capacity. Currently, the Township is reviewing optimization opportunities, but the plant expansion is the anticipated outcome.

3.1.3 Stormwater Management Criteria

The overall strategy adopted to construct the master hydrology model for the Township included the following criteria:

- Use of the dual drainage system was developed using information derived by the Town's GIS database, augmented with engineering drawings and field survey data.
- The Ontario Digital Terrain Model (Lidar-Derived) was used to determine the topography of the project area. Surface data and overland flow direction are correlated from this model using the DTM and may not be accurate to the real-world conditions. Topographic survey of the Town would be required to confirm identified problem areas.
- Hydrologic parameters were assigned as per the Township of South Stormont Site Plan & Subdivision Design Guidelines, including, Manning's 'n' coefficients, and depression storage values.
- Assess impact of 5-year and 100-year event with storm intensities derived from m Environment Canada (EC) Station 6101874 – Cornwall, in accordance with the Township of South Stormont Site Plan & Subdivision Design Guidelines.

Subcatchments were discretized using parcel data as a basis. All subcatchments were linked to the upstream node of the storm sewer system. Key sub-catchment attributes include the following:

- **Area:** Subcatchment areas were calculated in PCSWMM using the subcatchment GIS coordinates. A receiving node was also identified for each sub-catchment to represent the location where flows generated in the subcatchment were discharged into the stormwater system.
- **Width/Flow length:** According to the Township guidelines, the width parameter for each subcatchment was considered to be equal to twice the length of the street segment if the catchment area is on both sides of the street, or equal to the length of the street segment if the catchment area is only on one side of the street.
- **Surface Slope:** Surface slope was obtained using the DTM as input data. As this is correlated to the DTM and may differ from real-world conditions, topographic survey of the Town would be required to confirm model data.
- **Runoff Coefficient:** Based on surface development type according to Table 4-5 of the Township Guidelines
- **Depression Storage:** 1.57 mm for impervious areas, and 4.67 mm for pervious areas according to the Township Guidelines
- **Percent Imperviousness:** The percent imperviousness of each subcatchment was estimated using an area-weighted average based on Zoning, parcels and orthophoto. Impervious areas including buildings, parking lots and roads were assumed to have an impervious value of 100% while in areas defined as being zoned as open space a value of 0% was used. As general approach, an impervious value of 75% was assumed for residential subcatchments. This value was adjusted manually accordingly to the subcatchment characteristics.

The urban drainage system within the project area consists of storm sewers, gutters, overland flow and catch basins. For the purpose of this study, the stormwater drainage system was considered as follow:

- **Minor System:** Storm sewer system is termed as the '*minor*' system. The minor stormwater conveyance system shall be sized to convey up to and including the 5-year storm event. The shapefiles for the various data layers for pipes and maintenance holes provided by the Township were updated using survey data collected as part of this study. Fields not mapped to the model database and required by the model software were entered manually using reasonable assumptions. Those include:
  - Manning's roughness: Based on channel material according to Table 4-8 of the Township guidelines.
  - Pipe Slope: Using maintenance hole inverts or linearly interpolating between upstream and downstream known inverts if the pipes are continuous sections.
- **Major System:** The major system hall be designed to prevent flooding or excessive ponding up to and including the 100-year storm event. Within the project area, the major system is characterized by the overland flow listed as follow:
  - **Ditches:** Ditches were created manually and added to the conduit layer as open channels having trapezoidal cross-section
  - **Road network:** Roads are represented as conduits and were created by the "*Dual Drainage Creator*" in PCSWMM as parallel conduits to the minor system. For areas where there were no storm sewer networks, the major system was created manually. the road transects were created in accordance with the Township of South Stormont Site Plan & Subdivision Design Guidelines.

3.2 Water Distribution System

The water distribution system in Long Sault and Ingleside is presented in Figure 3-1 and Figure 3-2.

The system can be divided into three primary time periods which is relevant to the evaluation of the system as follows:

- **Seaway Era:** This is the original towns sites of Long Sault and Ingleside with the majority of the watermain being smaller diameter (less than 300mm) cast iron watermain.
- **Regional Water Supply:** This is the work that was completed in the early 2000s as part of the development of the new WTP on Moulinette Island and consists of the approximately 10 km long - 400mm ductile iron watermain from the entrance to the Long Sault Parkway along Manning and Colonial to the Ingleside BPS site.
- **Development:** This is essentially all of the new watermain that has been constructed as part of the growth of the community over the last 20 years including areas such as Chantine Meadows, Arrowhead Estates, Chase Meadows, David Brown Subdivision, and other areas. This watermain is primarily small diameter (150-200mm diameter) and of PVC construction.

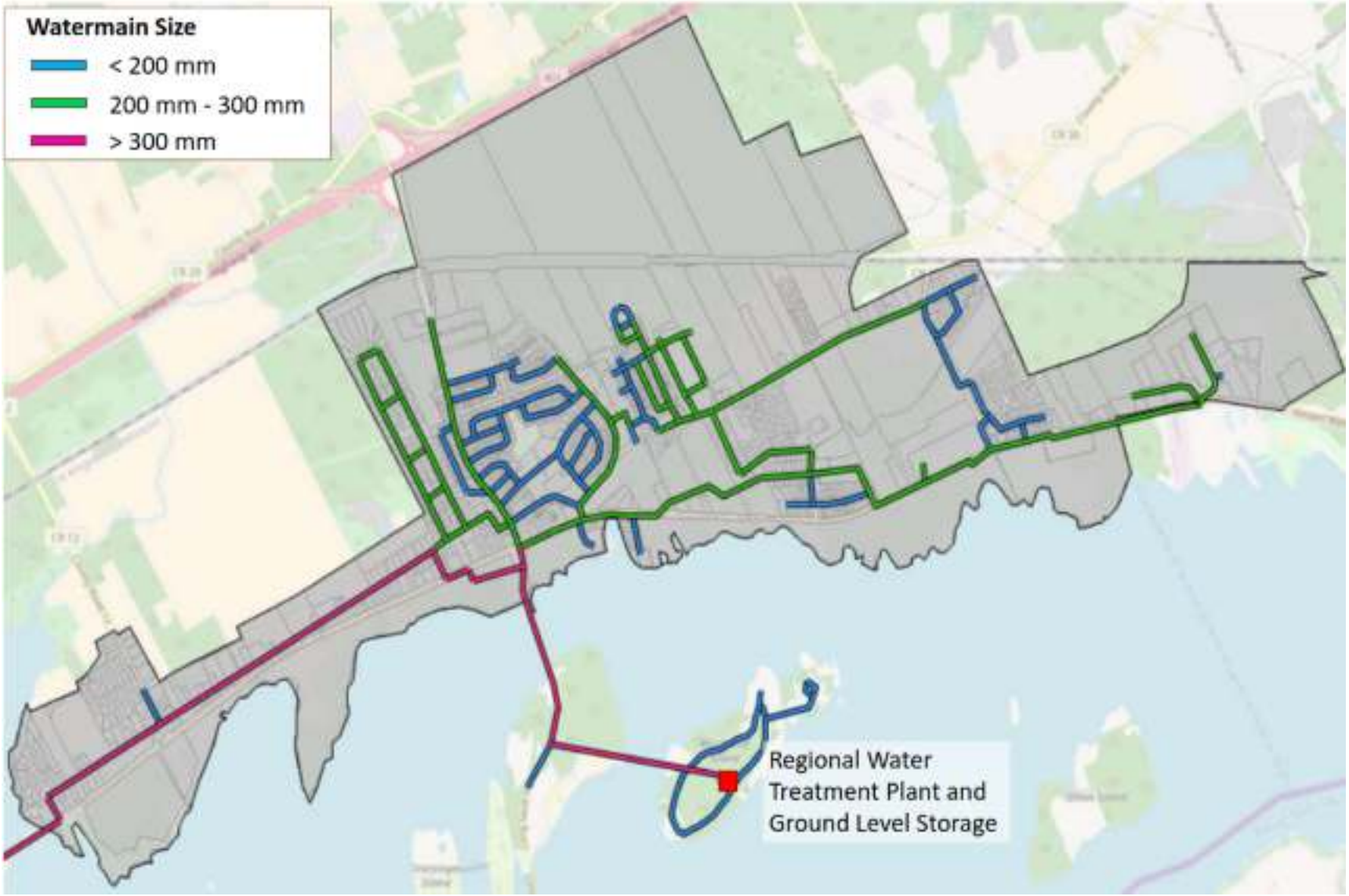


Figure 3-1 Long Sault Water Distribution System

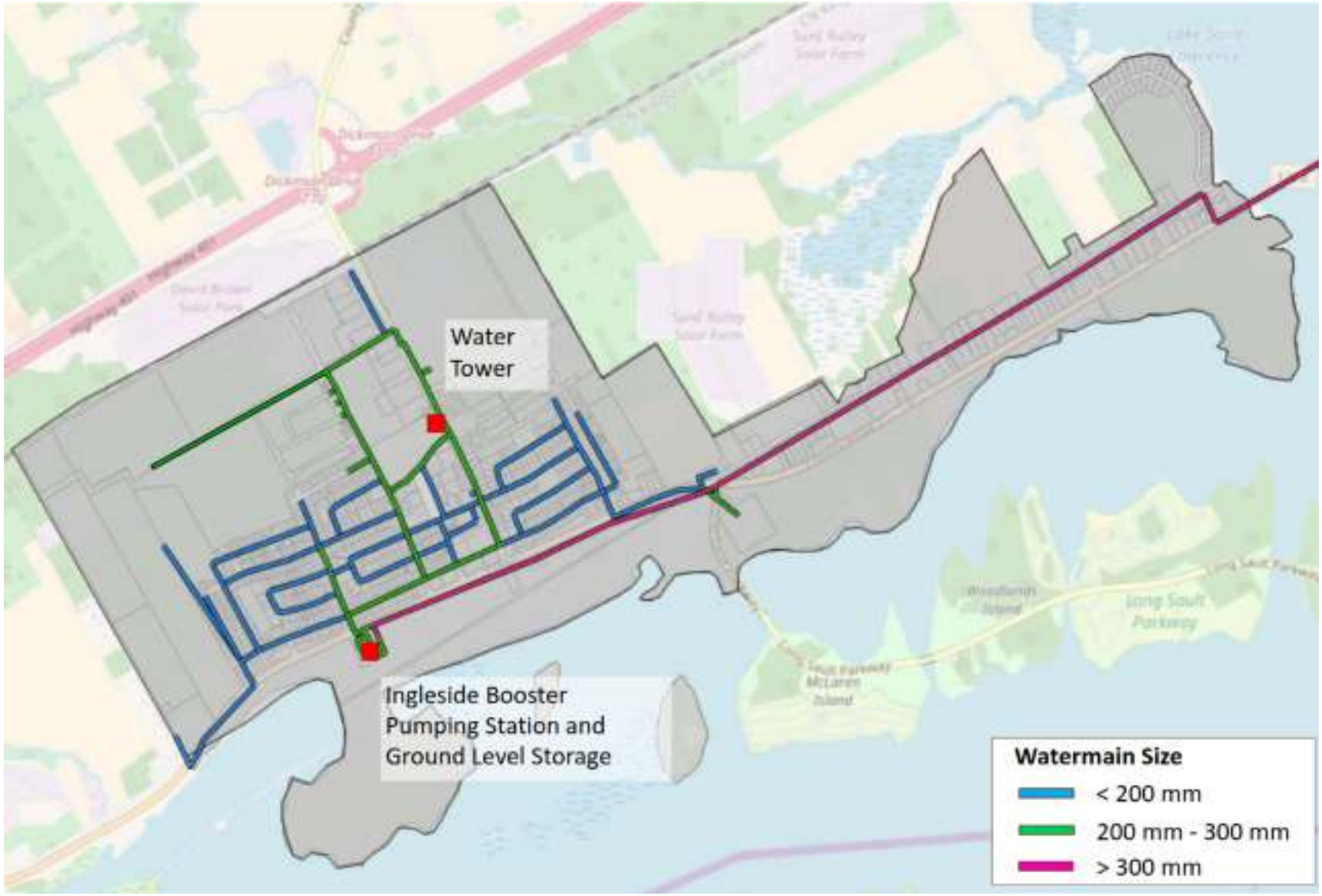


Figure 3-2 Ingleside Water Distribution System

3.2.1 Model Limitations and Objectives

The water model is same basic WaterCAD model that was used to develop the design of the Regional Water Supply System in 2000. It has been updated and optimized based on new developments and changes to the system to maintain accuracy to field conditions. The existing water model for the South Stormont Regional Water Supply is a design-based model that has not been fully calibrated to match field conditions; however, checks against the model in terms of fire hydrant testing as shown that the model is accurate to within reasonable design accuracy levels.

Furthermore, the model is a topographic based model which means that the elevations indicated in the model are a minimum of 1.8 m (17 kPa or 2.5 psi) higher than the actual watermain in the street and the pressures measured in the residences would be up to 4.5 m (44 kPa or 6.4 psi) lower than the model indicates.

In accordance with the Township Site Plan and Subdivision Guidelines, the operating parameters for the system should fall within the range as indicated in Table 3-3 of the manual and Table 3-1 below:

Table 3-1: Township Water Supply Design Standards

Scenario	Minimum Pressure (kPa / psi)	Maximum Pressure (kPa / psi)
Maximum Day + Fire Flow	140/20	n/a
Average Day Demand	350/50	480/70
Maximum Day Demand	350/50	480/70
Maximum Hourly Demand	275/40	n/a
Minimum Hourly Demand	n/a	700/100

Table 3-1 applies for all new and expanded areas; however, for the purposes of evaluation of the existing system, pressures between 350 – 550 kPa should be considered acceptable and pressures outside of this range can be considered individually regarding the prioritization of correcting high and low pressures.

3.2.2 Current Scenario

The current scenario is intended to illustrate the base line of how the system reacts currently and is based on actual flow data from the Township. Table 3-2 indicates the flow anticipated under this scenario.

Table 3-2: Existing Water Model Scenario Parameters (2021-2023)

	Long Sault Pressure Zone	Ingleside Pressure Zone*	Total
Minimum Day Flow	860 m^3/d	1,716 m^3/d	2,576 m^3/d
Average Day Flow	1,490 m^3/d	2,967 m^3/d	4,457 m^3/d
Maximum Day Flow	2,155 m^3/d	4,309 m^3/d	6,464 m^3/d
Fireflow (per node)	38 L/s	38 L/s	159.7 L/s

** Note: This allows for the flow associated with Lactalis.*

Table 3-3 illustrates the range of pressures that are encountered in the system currently. This is considered the baseline for the design evaluation for the master servicing plan.

Table 3-3: Current (2022) Water Model Scenario

	Minimum Pressure	Average Pressure	Maximum Pressure
Average Day	366 kPa (53 psi) – Ingleside – Maxwell Ave.	481 kPa (69.7 psi)	669 kPa (97 psi) – Lakeview Heights – Columbia/Thompson
Maximum Day	365 kPa (53.1 psi) – Ingleside – Maxwell Ave.	474 kPa (68.8 psi)	655 kPa (95 psi) – Lakeview Heights – Columbia/Thompson

At average day and maximum day at current flows, there are limited watermain based friction losses and, therefore, ground elevation has a more significant impact on pressure in the system.

Table 3-4 illustrates the fire flow conditions based on current design standards and the MECP guidelines for fire flow total flow which is 159.7 L/s. Based on these parameters, only two hydrants do not meet the minimum standards, both being in the west end of Ingleside and on dead-ends.

Table 3-4: Current (2022) Fire Flow Results

	Number of Hydrants	Minimum Flow	Maximum Flow
Meets Fire Flow Requirements	197	39.7 L/s – Ingleside – Colonial Drive near former Drive-In.	Majority of remaining nodes.
Does Not Meet Fire Flow Requirements	8	31.6 L/s – Ingleside - St. Lawrence Dead End	33.03 L/s - Farran Point Road Dead-End

Therefore, in the current scenario, the system is operating well and, with eight exceptions, is providing the necessary fireflow to meet current needs based on current standards. All of the non-compliant hydrants are located in Ingleside and at dead end points in the system. This is due to the limitation of the hydraulic gradeline (elevation) of the Ingleside Elevated Storage Tank.

In addition to the pressure and flow, one issue of concern is velocity in the piping which can limit future growth if there are high velocities in the upstream piping. In this situation, there are no velocities over 1 m/s which is indicative of a system that is not currently stressed.

3.2.3 20-year Design Scenario

The design scenario is the 2041-2043 development condition with currently identified developments in full build-out. This will include the Long Sault Logistics Village, Chase Meadows, Fenton Farms and Moulinette Subdivision.

Table 3-5: 20-year Design Water Model Scenario Parameters (2041-2043)

	Long Sault Pressure Zone	Ingleside Pressure Zone	Total
Minimum Day Flow	1,200 m^3/d	1,860 m^3/d	3,060 m^3/d
Average Day Flow	2,090 m^3/d	3,220 m^3/d	5,310 m^3/d
Maximum Day Flow	3,350 m^3/d	5,150 m^3/d	8,500 m^3/d
Fireflow (per node)	100 – 133 L/s	100 L/s – 133 L/s	177 L/s

Table 3-6 illustrates the range of pressures that will be encountered upon development of the current developments and additional infill.

Table 3-6: 20-year Design (2042) Water Model Scenario

	Minimum Pressure	Average Pressure	Maximum Pressure
Average Day	366 kPa (53.1 psi) – Ingleside – Maxwell Ave.	487 kPa (70.6 psi)	667 kPa (96.7 psi) – Lakeview Heights – Columbia/Thompson
Maximum Day	363 kPa (52.6 psi) – Ingleside – Maxwell Ave.	479 kPa (69.5 psi)	654 kPa (94.9 psi) – Lakeview Heights – Columbia/Thompson

Even with the higher flows, average day and maximum day, there are limited watermain based friction losses and, therefore, ground elevation has a more significant impact on pressure in the system. Furthermore, the addition of watermain looping through Long Sault and the larger diameter loop (300mm) through the Long Sault Logistics Village that will be constructed as part of the growth will further stabilize the pressures in the system.

Table 3-7 illustrates the fire flow conditions based on Fire Underwriter's Survey and the MECP guidelines for fire flow total flow, which is a minimum of 100 L/s at all hydrants and 177 L/s total. Based on these parameters only two hydrants do not meet the minimum standards, both being in the west end of Ingleside and on dead-ends.

Table 3-7: 20-year Design (2042) Fire Flow Results

	Number of Hydrants	Minimum Flow	Maximum Flow
Meets Fire Flow Requirements	167	100.1 L/s – Long Sault – Long Sault Logistics Village – Building 8	35 existing locations out of 167 locations (21%)
Does Not Meet Fire Flow Requirements	76	24.2 L/s – Ingleside – Farran Point Dead End	99.6 L/s - Ingleside Fire Hall

Therefore, without increasing the size of the watermains in the system, approximately 30% of the hydrants will not meet the Fire Underwriter's Survey flow requirements. The majority of those are in Ingleside due to the limitations caused by the elevation of the elevated storage; however, there are some in Long Sault including the newer areas. Methods of addressing those are included in the alternatives section of this report.

3.2.4 Build-out Scenario

The build-out scenario consists of the extension of water services within the settlement areas to the limits of current zoning. As these developments have not been fully identified, the demand nodes were selected proximate to the appropriately zoned areas. Table 3-8 illustrates the design flows to be used for the ultimate build-out scenario.

Table 3-8: Build-out Model Scenario Parameters

	Long Sault Pressure Zone	Ingleside Pressure Zone	Total
Minimum Day Flow	860 m^3/d	1,716 m^3/d	2,576 m^3/d
Average Day Flow	6,058 m^3/d	6,189 m^3/d	12,247 m^3/d
Maximum Day Flow	11,161 m^3/d	11,203 m^3/d	22,364 m^3/d
Fireflow (per node)	100 - 133 L/s	100 - 133 L/s	275 L/s

Table 3-9 illustrates the range of pressures that will be encountered upon build-out with no additional upgrades to the water system. The purpose of this assessment is to ensure that the master servicing study addresses long term needs for infrastructure that may have a 75-year lifespan.

Table 3-9: Build-out Design Water Model Scenario

	Minimum Pressure	Average Pressure	Maximum Pressure
Average Day	359 kPa (52 psi) – Ingleside – Maxwell Ave.	459 kPa (66.5 psi)	606 kPa (87.9 psi) – Lakeview Heights – Columbia/Thompson
Maximum Day	161 kPa (23.4 psi) – Long Sault – Sixsmith Dr. Dead End	388 kPa (56.3 psi)	596 kPa (86.5 psi) – Long Sault – Water Treatment Plant Discharge

It is evident that between average day and maximum day in the ultimate situation, the system operation reaches a tipping point where demand exceeds pipe capacity due to head loss. Furthermore, beyond the minimum pressure location indicated, the entire area around Sixsmith Drive has very low pressures due to the addition of demand in the industrial park in the ultimate condition. Therefore, in the ultimate condition, there will be upgrades required to the system to meet demands and maintain operational effectiveness.

Table 3-10 illustrates the fire flow conditions based on Fire Underwriter's Survey and the MECP guidelines for fire flow total flow, which is a minimum of 100 L/s at all hydrants and 177 L/s total. Based on these parameters only two hydrants do not meet the minimum standards, both being in the west end of Ingleside and on dead-ends.

Table 3-10: Build-out Design Fire Flow Results

	Number of Hydrants	Minimum Flow	Maximum Flow
Meets Fire Flow Requirements	56	101.73 L/s – Ingleside – Ingleside Plaza	275 L/s – Two locations – Nodes adjacent to Ingleside ET
Does Not Meet Fire Flow Requirements	188	1.53 L/s – Lakeview Heights Area - Warner Drive	89.2 L/s - Ingleside – Maple St. (End of Crescent)

Therefore, without increasing the size of the watermains in the system, approximately 80% of the hydrants will not meet the Fire Underwriter's Survey flow requirements. The majority of those are in Long Sault as at the high ultimate maximum demand, the pumping system in Long Sault would not have capacity to provide both maximum day demand and fire flow. Conversely, Ingleside does better because of the elevated storage that is not tied to pumping capacity.

Fire flow requirements are based on equivalent population and, excluding large industrial users that have their own fire fighting capacity, equates to an equivalent population of 20,600 in the build-out scenario.

3.2.5 Fire Storage

As indicated in the above sections, the volume of fire storage required increases with population on an equivalent basis. In the both the 20-year and ultimate scenario, a significant number of locations do not meet the minimum fire flow requirements (FUS) and, once you get to the ultimate scenario, this is becoming a function of the access to storage rather than strictly pipe sizes. Table 3-11 indicates the required storage for fire flow for the different scenarios.

Table 3-11: Fire Storage Requirements - Current to Build-out

	Required Fire Flow (L/s)	Duration (hrs)	Volume Required (m^3)	Storage Deficit/Surplus (m^3)
Existing Condition	159.7	3	1,725	-
20-year Design	177	3	1,910	316
Build-out condition	275	5	4,950	3,225

3.2.6 Pumping Capacity

The Regional water supply has two primary high lift pumping locations, the Regional Water Treatment Plant on Moulinette Island in Long Sault, and the Ingleside Water Booster Station in Ingleside. It is important to note that in Ingleside there is 944 m^3 of elevated storage. During a fire flow event, the amount of pumping capacity required must consider the contribution of the elevated storage tank such that the combination of the two flows must meet the required flow capacity. In Table 3-12, the fire flow requirement is based on the individual communities, while the system flow is based on both communities together. The basic assumption is that two independent major fire events that were concurrent in the two communities is an extremely unlikely event. However, both systems will be able to operate independently and fight the fires. If this were to occur, the emergency storage is available in both communities to contribute the additional volume. Long Sault currently does not have any elevated or additional pressurized storage, so the entire flow must come from the high lift pumps at the plant.

Table 3-12 Pumping Capacity and requirements.

	Fire Flow Requirement	Maximum Day Flow	Available Pumping Capacity *	Pumping (Deficit)/Surplus
Long Sault				
Existing Condition	98.8 L/s	27.8 L/s	239.2 L/s	112.6 L/s
20-year Design	142.5 L/s	127.3 L/s	239.2 L/s	-30.6 L/s
Build-out condition	161.3 L/s	256.4 L/s	239.2 L/s	-178.5 L/s
Ingleside				
Existing Condition	79.9 L/s	55.6 L/s	153.8 L/s	18.3 L/s
20-year Design	102.3 L/s	66.1 L/s	153.8 L/s	-14.6 L/s
Build-out condition	162.4 L/s	129.7 L/s	153.8 L/s	-138.3 L/s

Therefore, as there is no elevated storage in the Long Sault Pressure Zone, either the pumping system capacity must be increased or elevated storage needs to be in place before the end of the 20-year study period.

For Ingleside, the true available pumping capacity is the booster station capacity plus the elevated storage contribution. Through the 20-year study period, fire flow is required for a minimum of two

hours, therefore, the available flow contribution from the storage can be estimated at 118 L/s, assuming the pumps are turned on at 90% of the elevated tank capacity. As such, additional pumping capacity is not required until well past the 20-year study period. Due to the age of the existing reservoir and anticipated timeline for build-out, it is most likely that the existing elevated storage will be replaced to meet future requirements; however, that is beyond the timeline of this project.

3.3 Wastewater Collection System

PCSWMM was selected as modelling platform for this study. The software uses the United States Environmental Protection Agency (USEPA) SWMM5 as computational engine (dynamic wave) and is capable of modelling hydraulic conditions in a mixed gravity and pressure hydraulic network, with dynamic effects of flow routing, backwater, as well as complex pumping dynamics.

The model required detailed information on sanitary sewers, maintenance holes, pumping stations, and forcemains. Key information required to build the model included sanitary sewer data, pumping station data and subcatchment data. The model was developed using the following data:

- Township's GIS database, augmented with engineering drawings and field survey data. Specifically, the Township's GIS layers used in model developed included maintenance holes, sanitary sewers, pumping stations, and land parcels.
- Township's Flow readings from the Ingleside WWTP.
- Long Sault Wastewater Masterplan which included flow and catchment information.

Sanitary sewer flow was calculated according to the Township Design Guidelines considering the following assumptions:

- Residential lot: 3.0 people/dwelling.
- Average daily per capita domestic flow rate: 450 L/cap/day.
- The Peak extraneous flow allowance:
  - New sanitary sewers: 0.19 L/s/ha
  - Old sanitary sewers: 0.49 L/s/ha

The Average Daily Flow was then multiplied by typical diurnal pattern in order to identify typical hourly flow variations and peak flow. Note that hourly flow data was not available and, therefore, diurnal patterns for both week and weekend days were manually created based on data from previous projects with similar characteristics.

Figure 3-3 and Figure 3-4 display the existing sanitary sewer system for both Ingleside and Long Sault, respectively.

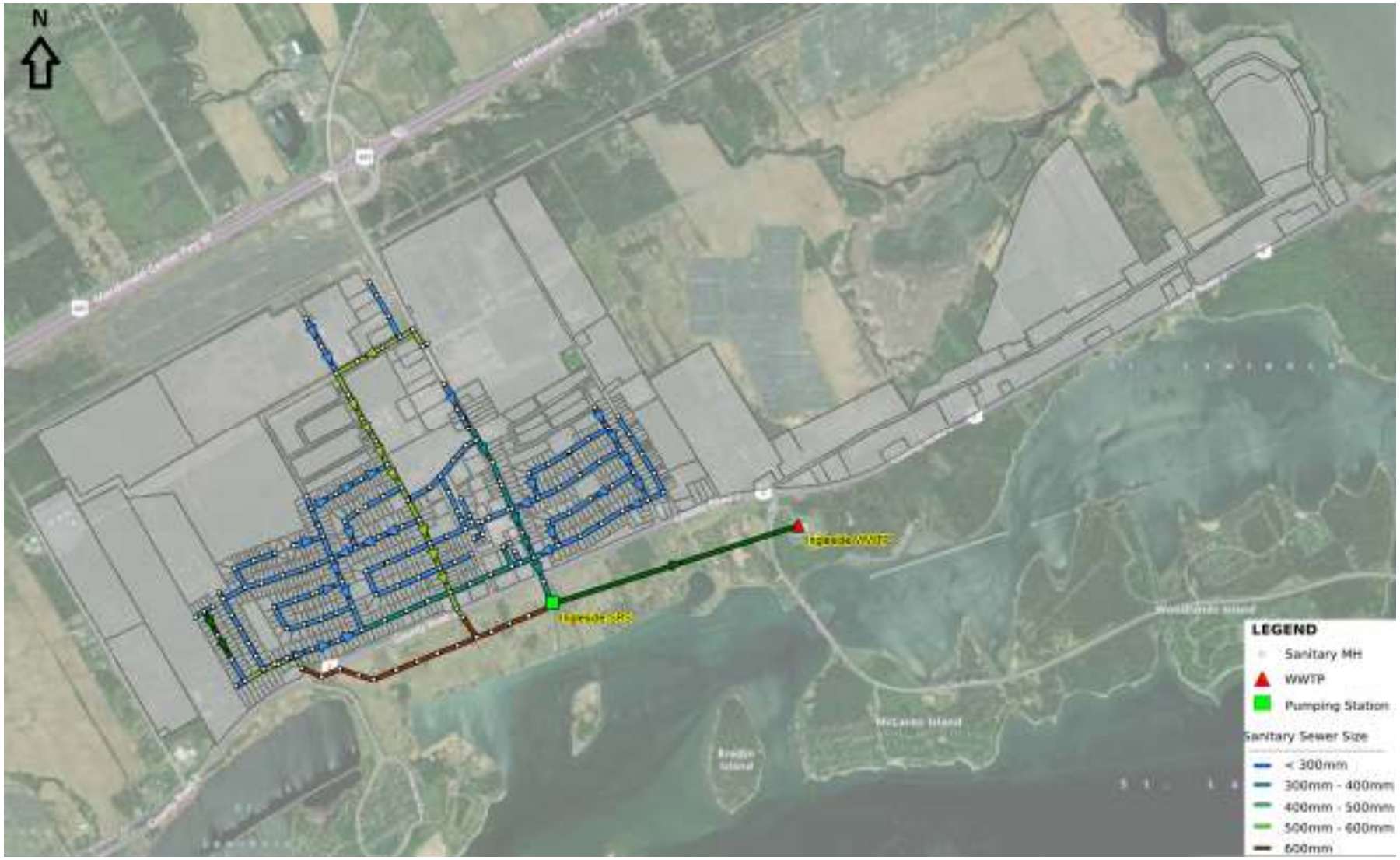


Figure 3-3 Existing sanitary sewer within the Village of Ingleside

Figure 3-4 Existing sanitary sewer within the Village of Long Sault

Ingleside Wastewater System

The majority of the pipes within the Ingleside service area are between 200 mm and 300 mm diameter. A 525 mm sewer (green line) starts on 45th Parallel Drive and runs along Farran Drive for approximately 1.2 km and converge with the 1800 mm sewer south of County Rd 2. Wastewater is delivered via a 1.2 km 400 mm diameter forcemain from the Ingleside Sewage Pumping Station (SPS) to the WWTP.

The Ingleside SPS is Located at the south corner of Highway No. 2 and Dickinson Drive. The Pumping Station is a wet-well style pumping station with three VFD driven submersible pumps which transfer all wastewater from the Ingleside Wastewater Collection System to the Ingleside WWTP via forcemain.

Long Sault Wastewater System

Sewage from the Village of Long Sault is collected via a series of sanitary sewers and two sanitary pumping stations, all of which ultimately discharge to the wastewater treatment plant located on Robin Rd.

There are two existing pumping stations within the Long Sault Sanitary collection system:

- **Mille Roches Rd. Pumping Station:** Located at the intersection of French St. and Mille Roches Rd. This is a duplex station with two 1.7 kW (2.3 HP) pumps discharging via a 100 mm diameter forcemain to the maintenance hole located at the corner of Cherry St. and Mille Roches Rd.
- **County Rd. 36 Pumping Station:** Located at the intersection of Forest Hill Rd. and County Rd. 36. This is a duplex station with two 22.4 kW (30 HP) pumps discharging via a 250 mm diameter forcemain to the maintenance hole located at the intersection of County Rd. 2 and Robin Rd

For both Ingleside and Long Sault Sanitary Service Systems, catchment areas were derived on a maintenance hole-to-maintenance hole basis using parcel data as a basis. Key sub-catchment attributes include the following:

- **Subcatchment area:** Subcatchment areas were calculated in PCSWMM using the subcatchment GIS coordinates. A receiving node was also identified for each sub-catchment to represent the location where flows generated in the subcatchment were discharged into the sanitary sewer system.
- **Population:** Population was distributed to each subcatchment based on the number of parcels in each subcatchment and a person per unit value of 3, according to background material.

All subcatchments were linked to the sanitary system nodes placed just upstream of the catch basin storage nodes.

3.3.1 Model Limitations

The limitations of the developed model are reported as follow:

- The model is not calibrated and is considered a design level model rather than an operational model.
- Flow data from the WWTP was only available as average daily inflow received at the plants. Therefore, the model was not calibrated to represent the short-, medium-, and long-term response of the sanitary sewer to different weather conditions.
- Diurnal flow patters for both week and weekend days were manually created based on data from previous projects with similar characteristics.
- The Town's GIS did not include invert and rim elevations of each node/pipe. Missing information/gaps were identified during the review of background information. A field

program was conducted to fill all the data gaps; however, fields not mapped to the model database and required by the model software were entered manually using reasonable assumptions. Those include:

- Pipe roughness coefficient: 0.013 (Manning's coefficient) for gravity sewers; or 120 (Hazen-William's coefficient) for forcemains.
- Pipe Slope: Using maintenance hole inverts or linearly interpolating between upstream and downstream known inverts if the pipes are continuous sections.

3.3.2 Current Scenario

A performance and capacity assessment of existing wastewater infrastructure was carried out in order to have a clear understanding of current conditions and bottlenecks. The following discusses the results of the hydraulic performance analysis.

Long Sault Sanitary Sewer System

- A few sections of the sanitary sewer along County Rd 36 have been identified as near to 80% capacity. In particular, modelling studies identified the followings:
  - The 250 mm sanitary sewer south of County Rd 36 and connecting to the sanitary sewer on County Rd 36 was identified at 80% capacity under current conditions. The flagged sanitary sewer serves as the major outlet for the industrial area located south-east on Structured Products Drive and the residential area located south-west on Chantine Drive and Forest Hill Rd. As this sewer was originally constructed to serve only the industrial area on Structured Products Drive, it may now be near to full capacity due to the construction of the new residential area on Chantine Drive.
  - The 300 mm sewer on the east upstream side of County Rd SPS is currently at 75% capacity and its ability to convey additional flow is limited. As this sewer would collect all the flow coming from developed and undeveloped areas around County Rd 36, under current conditions it would limit future development.
- The pumping station was assessed for capacity by comparing the peak inflow rate with the firm capacity of the pumps. If the pumping station inflow rate were greater than the pump firm capacity, the pump station would be identified as not having adequate capacity. County Rd SPS and Mille Roches SPS have a firm capacity equal to approximately 47 L/s and 6 L/s, respectively. During the simulation period, the inflow rate was not higher than the firm capacity.

Ingleside Sanitary Sewer System

- Under design conditions, most of the sanitary sewers are under 50% of capacity. Therefore, no bottlenecks were identified by the model under this scenario.
- The Ingleside SPS rated capacity is 140 L/s. During the simulation period, the inflow rate was not higher than the firm capacity.

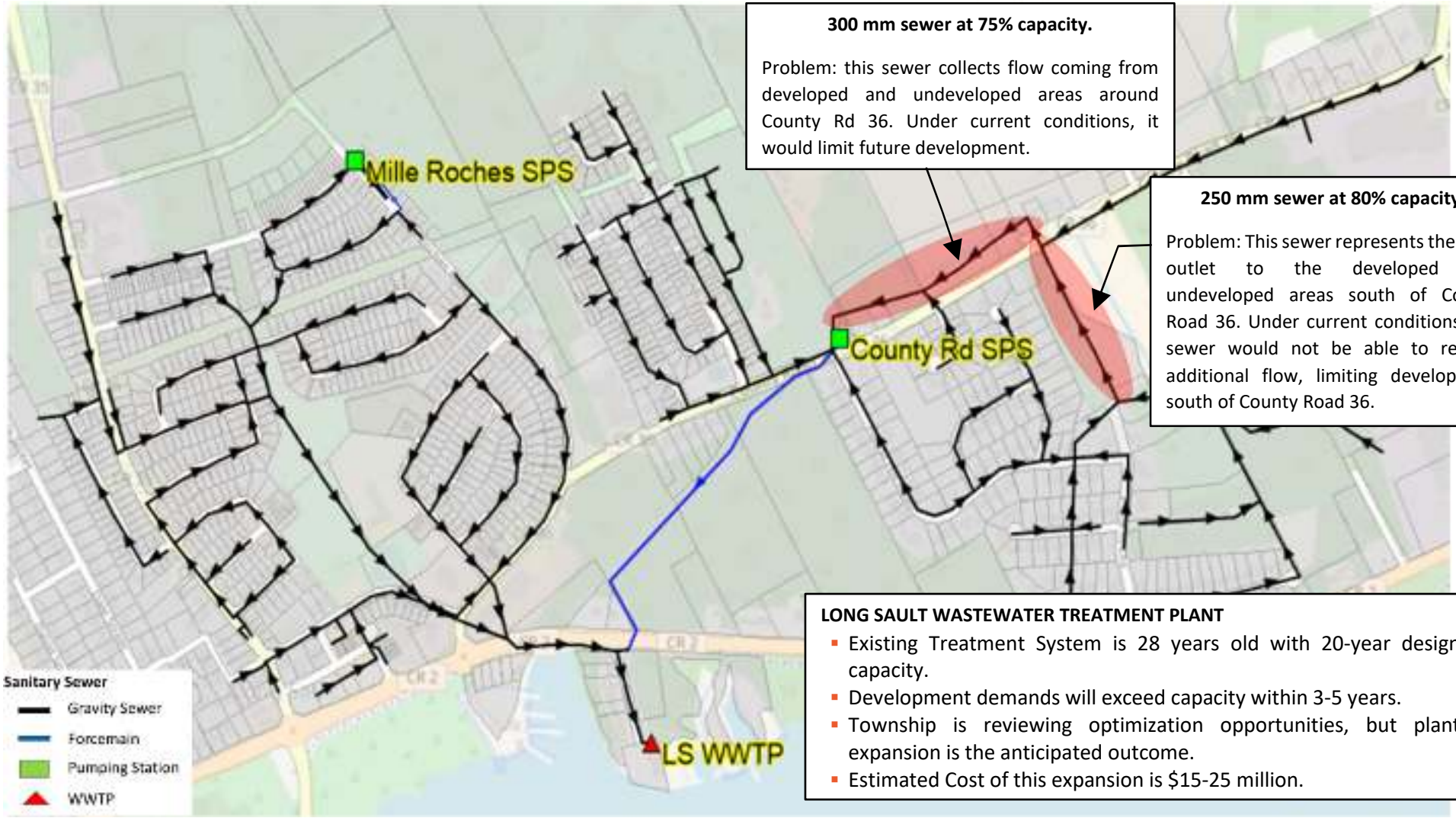


Figure 3-5 Long Sault Sanitary Sewer Performance Assessment Under Current Conditions

3.3.3 20-year Design Scenario

The design scenario is the 2041-2043 development condition with currently identified developments in full build-out. This will include the Long Sault Logistics Village, Chase Meadows, Fenton Farms and Moulinette Subdivision. The results for the sanitary sewer capacity assessment using the developed design model are presented below.

Long Sault Sanitary Sewer System

Under this scenario, the following results were identified as consequences of planned development:

- Fenton Farms Development: The 300 mm sewer upstream of County Rd SPS reached 80% capacity at 43 L/s as a consequence of additional flow produced by this development. This section was already identified as critical point for future development along County Rd 36.
- Chase Meadows Development: This development consists of a total of approximately 426 residential units at full build-out. The development will occur in phases, with Phase 1 having 124 new residential units planned. The following model results were noted:
  - Phase 1: The 124 new units constructed during Phase 1 will connect to the 200 mm sanitary sewer along Mille Roches Rd that extends approximately 78m south of the existing maintenance hole located at the intersection of French Avenue and Mille Roches Rd. Phase 1 development will produce a peak flow of approximately 11 L/s. As the Mille Roches SPS rated capacity is about 6 L/S, the facility will not have capacity to convey additional flow coming from this development.
  - Build-out development: While the Phase 1 sewage will be directed to the existing pumping station along Mille Roches Rd, sewage from future phases, including the existing units on Cherry / French Avenue, will be directed to a new sewage pumping station to be located at the northeast limits of the subject development. From the new pumping station, a forcemain will discharge flow into the existing sewer on Forrester Way to ultimately direct flow by gravity to the existing County Rd SPS. As the expected flow to be directed to the existing County Rd SPS is approximately 22 L/s, the sanitary sewer at the intersection of Jim Brownell Boulevard and County Rd 36 will not be able to convey build-out flow coming from this development.
- Parkway Estates Development: The 250 mm sanitary sewer located at the eastern limit of Moulinette Rd and directed to the St. Laurent Avenue reached 70% capacity due to the construction of Phase 4 of the Parkway Estates subdivision.
- Moulinette Road Subdivision: The 250 mm sanitary sewer located at the eastern limit of Moulinette Rd and directed to the St. Laurent Avenue reached 90% capacity due to full build-out of this development.
- Long Sault Logistics Village Development: The sanitary sewer on County Rd 36 crossing Jenkins Rd was the proposed outlet identified by the LSLV servicing study report. According to the LSLV servicing study, Phase 1 and Phase 2 of construction would produce approximately 4,400 m^3/d of wastewater at the build-out. County Rd SPS will reach rated capacity once Phase 1 of the LSLV is completed. Moreover, the 300 mm sanitary sewer at the eastern upstream of the County Rd SPS will not be able to convey flow coming from Phase 1 of this development. This section was already identified as critical point for future development along County Rd 36.

Ingleside Sanitary Sewer System

- Residential Development north of Hoople Street: The Ingleside SPS will reach close to 85% capacity as result of flow coming from this development.

- Residential and Industrial Development on Farran Drive: The 525 mm trunk sewer along Farran Drive at the intersection with Maple Street does not have enough slope and therefore would reach 70% as a result of potential residential development west of Farran Drive and north of Beech Street. It must be noted that this sewer would also receive flow from the committed industrial area south of the CN railway. Based on the Zoning By-Law, this area is designated as Heavy Industrial. According to MECP guidelines, a total of 50 m^3/ha/d of wastewater produced was assumed. Thus, it is expected that the area would produce an additional flow equal to approximately 20 L/s, bringing the sewer to 80% capacity. The Ingleside SPS will not be able to convey flow coming from those two development areas.
- Industrial area south of CN railway: Based on the Zoning By-Law, this area is indicated as Heavy Industrial. According to MECP guidelines, a total of 50 m^3/ha/d of wastewater produced was assumed. Thus, it is expected that the area would produce an additional flow equal to approximately 20 L/s, bringing the sewer to 80% capacity.

3.4 Stormwater System

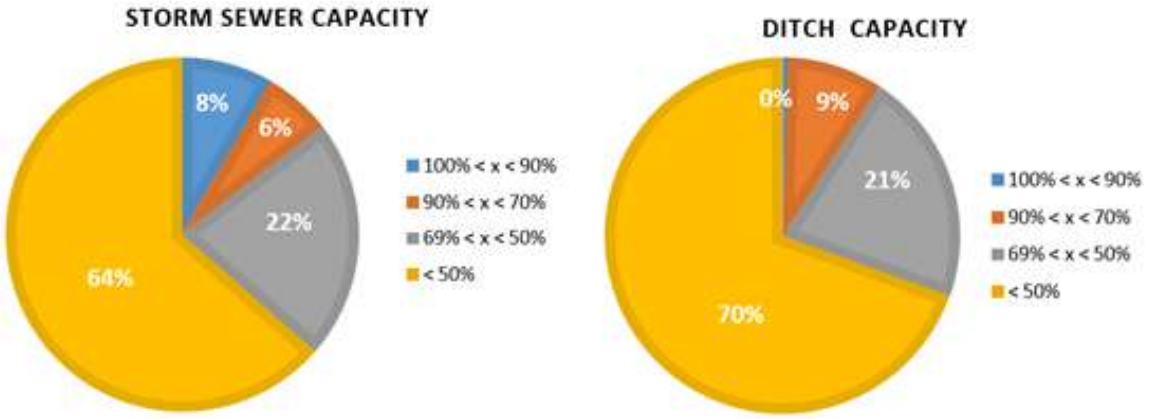
Hydrologic studies have been carried out in PCSWMM and the performance of the stormwater system has been assessed under 5-year and 100-year event with storm intensities derived from Environment Canada (EC) Station 6101874 – Cornwall, in accordance with the Township of South Stormont Site Plan & Subdivision Design Guidelines. The following section describes the current system conditions under 5-year and 100-year design storm.

3.4.1 Long Sault

5-Year Design Storm

The following discuss the simulation results under the 5-year Design Storm:

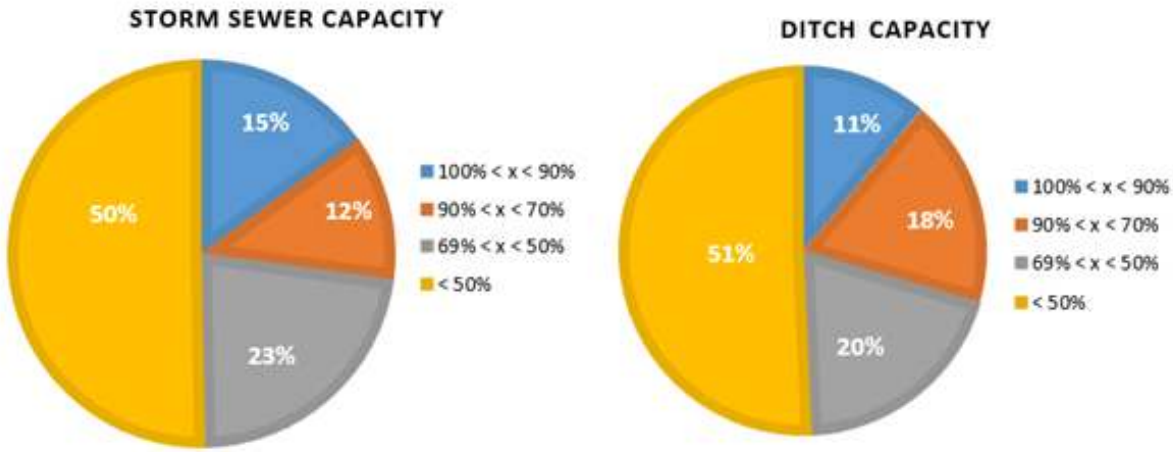
- **Storm Sewers:** The modelled storm sewer does not identify any pipe being overcapacity. As shown in the graph below, most of the pipes are under 70% capacity. Under the design conditions, the system would be able to handle the 5-year design storm.
- **Ditches:** As per the storm sewer, the majority of the ditches are under 70% capacity with the remainder of the ditches being under 90% capacity. Although no signs of flooding are identified under this scenario, the ditches along Dale Street have been identified by the model as being at full capacity. During field review, those two areas, identified in Figure 6-4 below, were flagged as being in poor condition with most of the buried driveway culverts. This would reduce pipe capacity under storm events. However, in this area, Big “O” pipes have been installed to divert water to avoid ditch overflow. Although the Design Model did not report any restrictions, it should be noted that the 600mm storm sewer along Mille Roches and County Rd 36 was identified as not resilient to the 5- and 10-yr Design Storm by the South Stormont Asset Management Plan due to the age of the pipes.
- **Road Network:** No flooding onto the road surface was identified under this modelled scenario.



100-Year Design Storm

The following discusses the simulation results under the 100-year Design Storm:

- **Storm Sewers:** The modelled scenario identified pipes being overcapacity under the 100-year design storm. However, the storm sewer is part of the minor system, and this result was expected as the minor system is not required to convey 100-year return period flow.
- **Ditches:** Simulation results show that 11% of the ditches are at full capacity with sections of the ditches being overcapacity along Dale Street and David Street as indicated in Figure 3-6. However, in this section, Big-O pipes have been installed during development to allow for full depth open ditches operation. Based on discussion with the Town, issues were identified during heavy rainfall events.
- **Road Network:** The model reported surface ponding observed within the surficial portion of the areas which correlates to the surcharging locations of the storm sewer system.



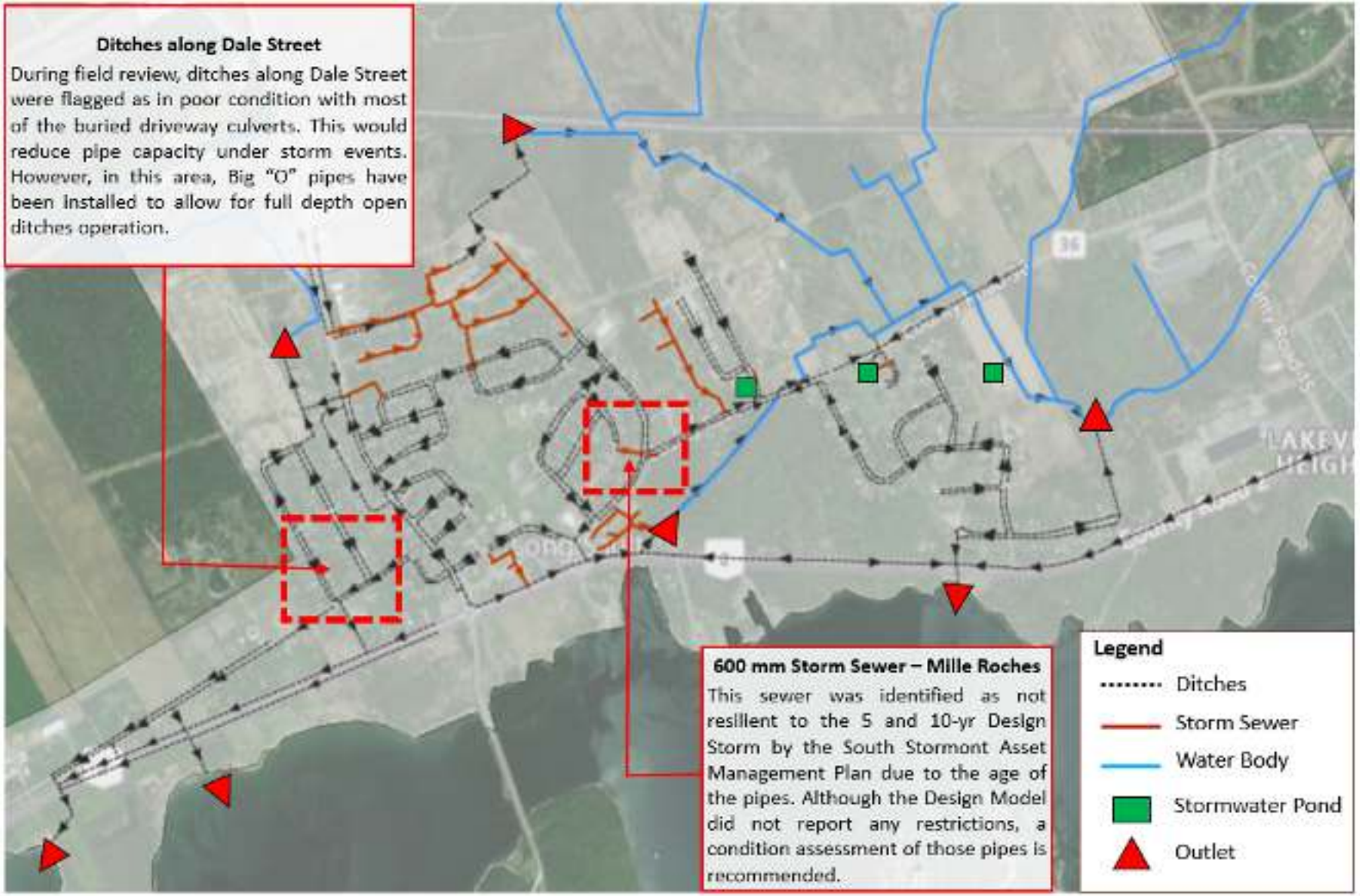


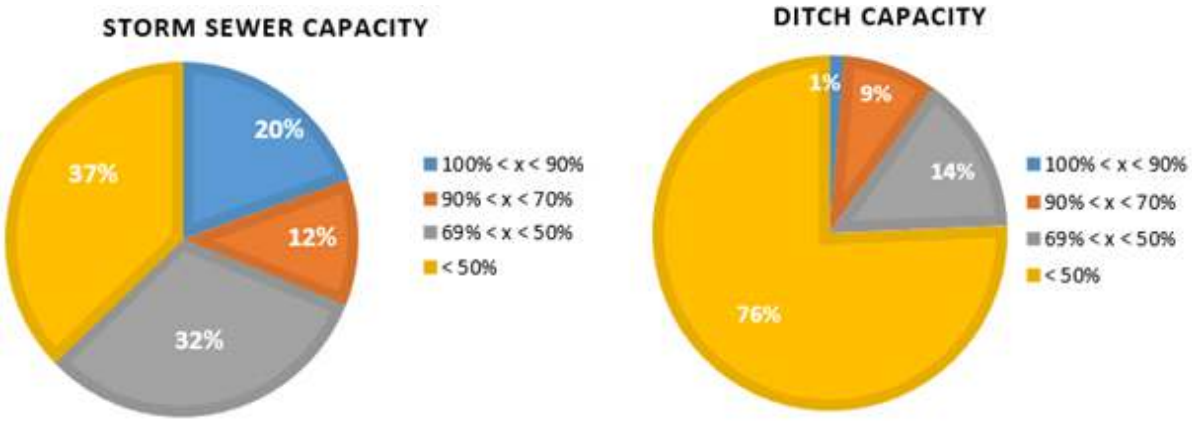
Figure 3-6 Long Sault Storm sewer System Limitations

3.4.2 Ingleside

5-Year Design Storm

The following discusses the simulation results under the 5-year Design Storm:

- **Storm Sewers:** The majority of the pipes are under 70% capacity. The storm sewers report signs of pipes being overcapacity along Hoople Street, with water backing up on the surface as reported in Figure 3-7. In this section, the sewer starts at 200 mm diameter and increases to 300 mm diameter on Elm Street. The sewer appears to be undersized as it is not able to convey the 5-year design storm. From Elm Street and south to Maxwell Avenue, the pipes appear to be at full capacity, however the model did not report any water backing up on the surface. Simulation results also show a section of the 400 mm storm sewer along College Street not being able to convey the 5-year design storm and is identified as surcharged, while a section of the 600mm storm sewer is indicated as being at full capacity along Hickory Street and Cypress Lane.
- **Ditches:** Similar to the storm sewer, the majority of the ditches are under 50% capacity with the remainder of the ditches being under 90% capacity. No signs of flooding were identified under this scenario.
- **Road Network:** The surface ponding reported / observed within the surficial portion of the model correlates to the surcharging location along Hoople Street.



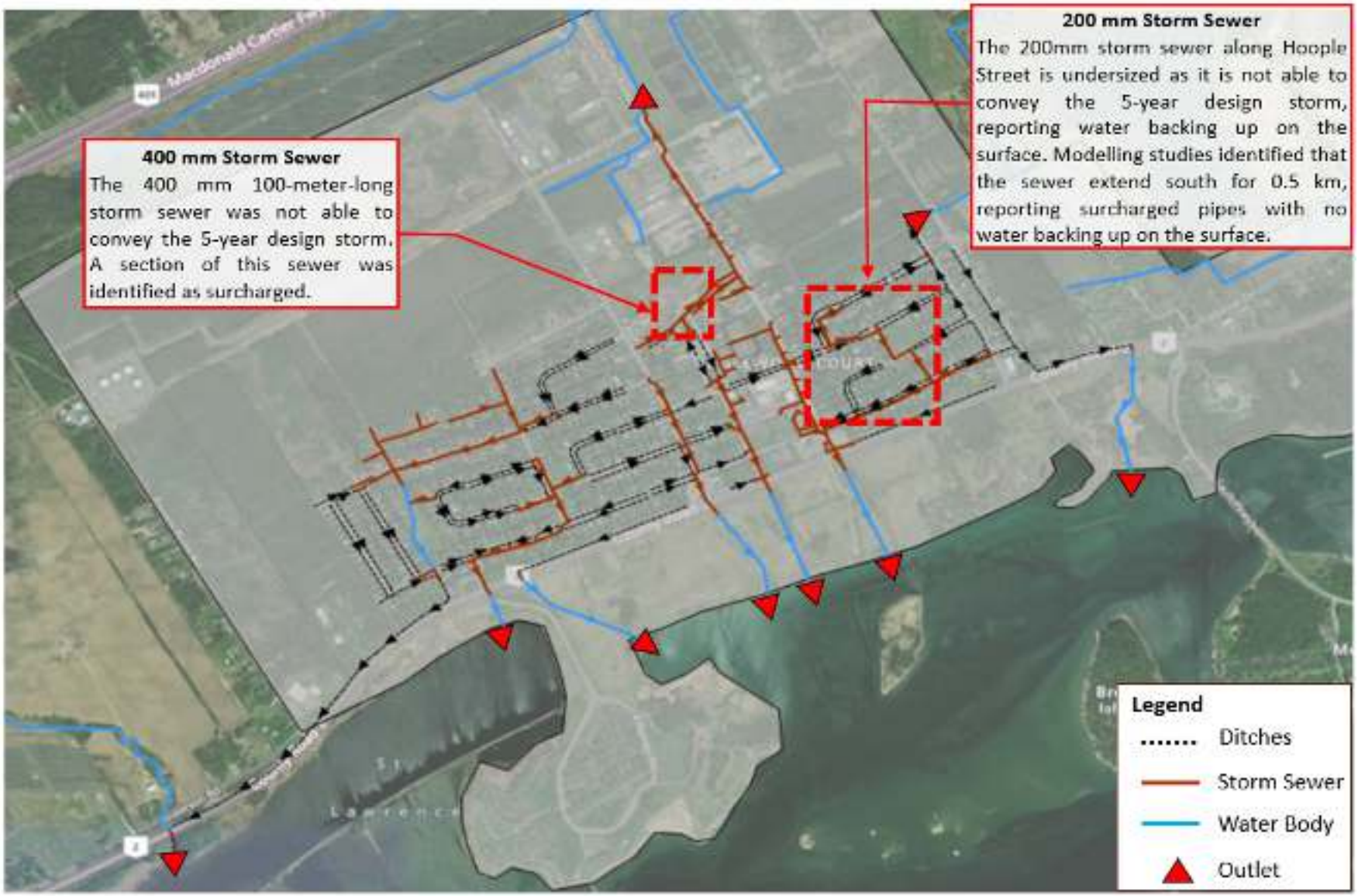


Figure 3-7 Storm Sewer System Limitations

100-Year Design Storm

The following discusses the simulation results under the 100-year Design Storm:

- **Storm Sewers:** The modelled scenario identified the storm sewer being over capacity under the 100-year design storm. However, the storm sewer is part of the minor system, and therefore this result was expected as the minor system is not required to convey 100-year return period flow.
- **Ditches:** Simulation results shown that the majority of the ditches are under 69% capacity, being able to handle the 100-yr design storm. On the other hand, 12% of the ditches are at full capacity. The model did not predict flooding under this scenario.
- **Road Network:** The modelling reported surface ponding observed within the surficial portion of the model which correlates to the surcharging locations of storm sewer system.

3.5 Transportation

3.5.1 Illumination

As part of the review of the existing conditions, the streetlighting on four streets was evaluated as representative of the conditions in the community:

- Long Sault: Cherry Avenue and Johnson Crescent
- Ingleside: Hoople Street and Cyprus Lane.

As outlined in the table below, South Stormont typically uses two styles of luminaire. On Cyprus Lane and Hoople Street, the most common streetlight is the Lumec Urbanscape LED Post-Top light operating at 95W. The other main style of streetlight is the StreetView LED Cobra Head operating at 49W and 78W. See **Appendix A** for maps of the existing streetlight locations.

Table 3-13: Existing Street Light Specifications

Road	Wattage	Pole Height (m)	Pole Spacing (m)	Luminaire Model
Cyprus Lane	95	4.6	44 - 55	MPTC-80W48LED4k
Hoople Street	78	7.6	26	SVM-72W48LED4K
	95	4.6	59 – 79	MPTC-80W48LED4k
Cherry Avenue	49	7.6	40 – 46	SVM-48W32LED4k
	78	7.6	40 – 46	SVM-72W48LED4K
Johnson Crescent	78	7.6	76	SVM-72W48LED4K

On both Johnson Crescent and Cyprus Lane, one of the existing streetlights is completely obstructed by a tree. WT recommends the trees be trimmed back in a manner that they no longer obstruct the lights.

WT Infrastructure worked with the lighting supplier to determine the effectiveness of the current lighting situation in terms of RP-8 compliance.

Table 3-14: Lighting Assessment Calculation Summary

Road	Calculation	Units	Average	Max	Min	Average Uniformity Ratio	Max Uniformity Ratio
Cherry Avenue	Illuminance	Lux	6.86	27.9	0.8	8.58	34.88
Cyprus Lane	Illuminance	Lux	4.34	14.2	0.0	N/A	N/A
Cyprus Lane Cul-de-sac	Illuminance	Lux	4.52	27.8	0.1	45.2	278
Hoople Street	Illuminance	Lux	4.88	28	0.0	N/A	N/A
Johnson Crescent	Illuminance	Lux	5.21	26.5	0.0	N/A	N/A

Based on the requirements outlined in Section 2.7.4, the existing streetlights exceed the average luminance, assuming the roads are classified as Local Low. However, due to the existing pole spacing, the average uniformity does not meet the RP-8 requirements. Adding or moving existing streetlights would be required to improve the overall lighting levels, though it should be acknowledged that it is sometimes difficult to meet the required uniformity ratio.

4 SYSTEM BOTTLENECKS

The following section is intended to document system bottlenecks or components of the individual systems that restrict the capacity of the overall system. Some of these issues were identified in Section 3 and the following section is intended to provide context of the impacts of these issues. In general terms, this is infrastructure that is either missing or is not sized for either existing or future requirements.

For the purposes of the Master Servicing Study, these bottlenecks are considered as pre-existing conditions or deficiencies in the system that may be impacting the current functionality of the system(s). The general correction for these items will be replacement of the deficient infrastructure within the same alignment and configuration but sized for both current and future capacity requirements. Under the Municipal Class EA process, these projects would generally be classified as Exempt projects as they are in an existing municipal right-of-way or pre-existing municipally owned land or registered easement.

4.1 Regional Water Distribution System

As previously indicated, with the exception of the transmission main between Long Sault and Ingleside, some localized watermain replacement projects and any new developments in either community, the majority of the existing watermain infrastructure consists of late 1950s era cast iron watermain.

4.1.1 Long Sault Water Distribution System

Existing Conditions

In the existing condition, there are no identified bottlenecks of any significance in the Long Sault distribution system. Under maximum day conditions, the water pressure is generally between 350 kPa and 550 kPa, as per MOECP Guidelines.

There are a number of locations on dead end streets where the final junction in the system is on a 150mm diameter watermain and fireflow (FUS requirement – 66 L/s or 4,000 Lpm) is not achieved; however, in reality, many of these locations do not have fire hydrants that match the location of the water model nodes. In the majority of the cases, if the dead end is shorter than 150 m in length, the closest fire hydrant would be located at the nearest intersection rather than on the actual dead-end street. If a dead-end street is longer than 120 m, the pressure loss in a 150mm watermain may exceed allowable limits resulting in inadequate residual water pressure in the system.

In Long Sault the specific areas where available fire flow is less than the FUS standard and the distance to the nearest hydrant that does meet the FUS standard is more than 150 m are as follows:

- East end of Moulinette Island (Lakeside and East Island Road) – Dead-end
- West end of Chantine Drive – Dead-end
- East end of Jenkins Road – Dead-end

It should be noted that most of these areas do meet the former standard of 38 L/s and, while they do not meet the current design standard, it will take significant effort and investment to correct this issue.

20-yr Design Scenario

In the 20-year Design Scenario, the maximum day demand increases by approximately 30%; however, the impact on operating pressures in the system is minimal, as indicated in Section 3.2, where pressure variation at maximum day flows is less than 10 kPa (1.5 psi). This is due to the configuration of the system with the primary plant close to the primary population centre, the overall level of looping in the system, and the storage/separate pressure zone in Ingleside.

Similar to the existing condition, the same locations are deficient for fire flow for the same reasons; they are on dead ends, at marginally higher elevations, and are close to the extents of the distribution system.

In both the Current and 20-year Design Scenario, there are limited options for improving fireflow in the majority of the identified areas without having other consequences in the system (overpressure conditions). For the Business Park (Warner/Sixsmith Dr.), the option of connecting this area to the City of Cornwall system may be feasible to provide localized pressure improvements for fire fighting purposes. This will be reviewed in the alternatives section of the study.

The growth impacts on the distribution system and storage will be addressed as part of the generation of alternatives section of the study.

4.1.2 Ingleside Water Distribution System

Existing Conditions

In the existing condition, there are no identified significant bottlenecks in the Ingleside Water Distribution System with respect to normal operating pressures. The system is operated off the floating storage in the Ingleside Elevated Storage Tank, which maintains the system within the 350 kPa to 550 kPa operating range.

Similar to Long Sault, the dead-ends around the perimeter of the community typically do not meet the available fire flow dictated by the FUS. Again, this is a recent change and the impact of this change on design is that the majority of the looped watermains should be a minimum size of 200 mm in order to meet the fireflow requirements, where the majority of the watermains currently in Ingleside are 150 mm diameter.

In Ingleside, the specific areas where available fire flow is less than the FUS standard and the distance to the nearest hydrant that does meet the FUS standard is more than 150 m are as follows:

- All of the nodes on the west end of the community bounded by Farran Point Road, Napier, Piercy due to the lack of any 200 mm diameter watermains west of Ault Drive.
- Wales Drive dead-end.
- Colonial Drive (original watermain not connected to the transmission main) east of the Parkway entrance.

20-yr Design Scenario

Similar to the Long Sault situation, there is no significant change in operating pressure between the current and future design conditions due to the network layout and proximity of elevated storage to this distribution system.

Additionally, the same locations are deficient for fire flow for the same reasons; they are on dead ends, at marginally higher elevations, and are close to the extents of the distribution system.

The options for improving the existing condition in Ingleside will be primarily driven by additional looping of the system with larger watermains and increasing some of the core watermains as part of an ongoing infrastructure renewal program.

The growth impacts on the distribution system and storage will be addressed as part of the generation of alternatives section of the study.

4.2 Sanitary Sewer System

4.2.1 Long Sault Sanitary System

Existing Conditions

- Several sections of the sanitary sewer along County Rd 36 have been identified as near to 80% capacity. In particular, modelling studies identified the following:
  - The 250 mm sanitary sewer south of County Rd 36 and connecting to the sanitary sewer on County Rd 36 was identified at 80% capacity under current conditions.
  - The 300 mm sewer on the east upstream side of the County Rd SPS is currently at 75% capacity and its ability to convey additional flow is limited. As this sewer would collect all the flow coming from developed and undeveloped areas around County Rd 36, under current conditions, it would limit future development.

20-yr Design Scenario

Several planning applications have been identified within the Long-Sault area which are mainly located in the North-Central area of the Village. In their planning applications, the identified developments have proposed their own servicing systems which would result in the following system restrictions:

- The Mille Roches SPS does not have the required capacity to convey flow coming from future development. Therefore, the Mille Roches SPS would require an upgrade to increase its firm capacity or would need to be decommissioned and flow be re-directed.
- The County Rd SPS will reach rated capacity before Phase 1 of the LSLV is completed. Therefore, additional capacity would be required to promote growth upstream of the facility.
- The 200 mm sewer at the intersection of Jim Brownell Boulevard and County Rd 36 is currently at 50% capacity but it would not be able to convey build-out flow coming from the Chase Meadows development.
- The 250 mm sanitary sewer located at the eastern limit of Moulinette Rd and along Strachan Avenue is currently at 60% capacity and would reach 70% capacity due to the construction of Phase 4 of the Parkway Estates subdivision. Although this is not a concern at this time, it would be near to full capacity with additional flow coming from the Moulinette Rd Subdivision development.

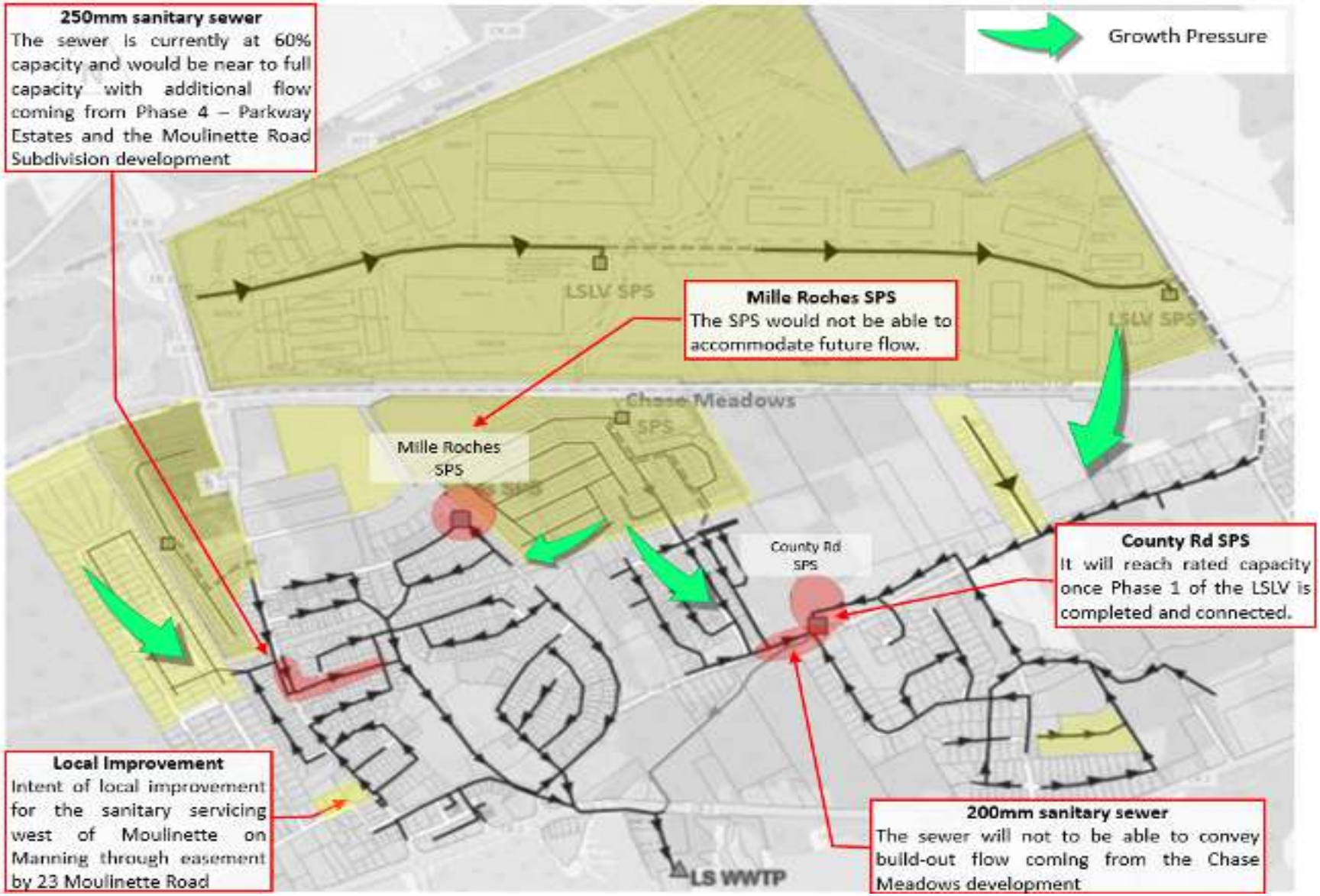


Figure 4-1 Long Sault Sanitary System – Bottlenecks to Future Development

4.2.2 Ingleside Sanitary System

Existing Conditions

- Most of the pipes within the Ingleside Sanitary Servicing area are under 50% capacity. Therefore, no bottlenecks were identified under current conditions.

20-yr Design Scenario

The following bottlenecks were noted as consequences of planned development:

- The 525 mm trunk sewer along Farran Drive at the intersection with Maple Street does not have enough slope and, therefore, would reach 80% capacity as a result of potential residential development west of Farran Drive and north of Beech Street. It must be noted that this sewer would also receive flow from the committed industrial area south of the CN railway. Based on the Zoning By-Law, this area is zoned as Heavy Industrial. According to MECP guidelines, a total of 50 m^3/ha/d of wastewater produced was assumed. Thus, it is expected that the area would produce an additional flow equal to approximately 20 L/s bringing the sewer to 80% capacity. Although the additional flow coming from future growth would bring pipes up to 80% capacity, it is not expected that this section of the sewer will reach full capacity in the future as no planning applications or future development areas are expected to connect upstream. Therefore, this section of the trunk sewer is not of concern at this time.
- The Ingleside SPS will reach capacity once 100 residential units are added into the sanitary system. This is a consequence of either the residential development west of Farran Drive and north of Beech Street, or the residential development north of Hoople Street, depending on which of the two developments will come first.
- Flow from future growth areas located on the east and west side of Ingleside were connected to the existing sewer system at the following connection points:
  - On the 200mm sanitary on Napier Street.
  - On the 450mm sanitary on Piercy Street.
  - On the 200mm sewer which increases to 525 mm on St. Lawrence Street.

  According to the design model, the existing sanitary sewer would be able to receive additional flow from future development without negative impacts on the existing sewer network with the exception of the existing Ingleside SPS which would need to be upgraded from 140 L/s to 280 L/s to accommodate the ultimate build-out.

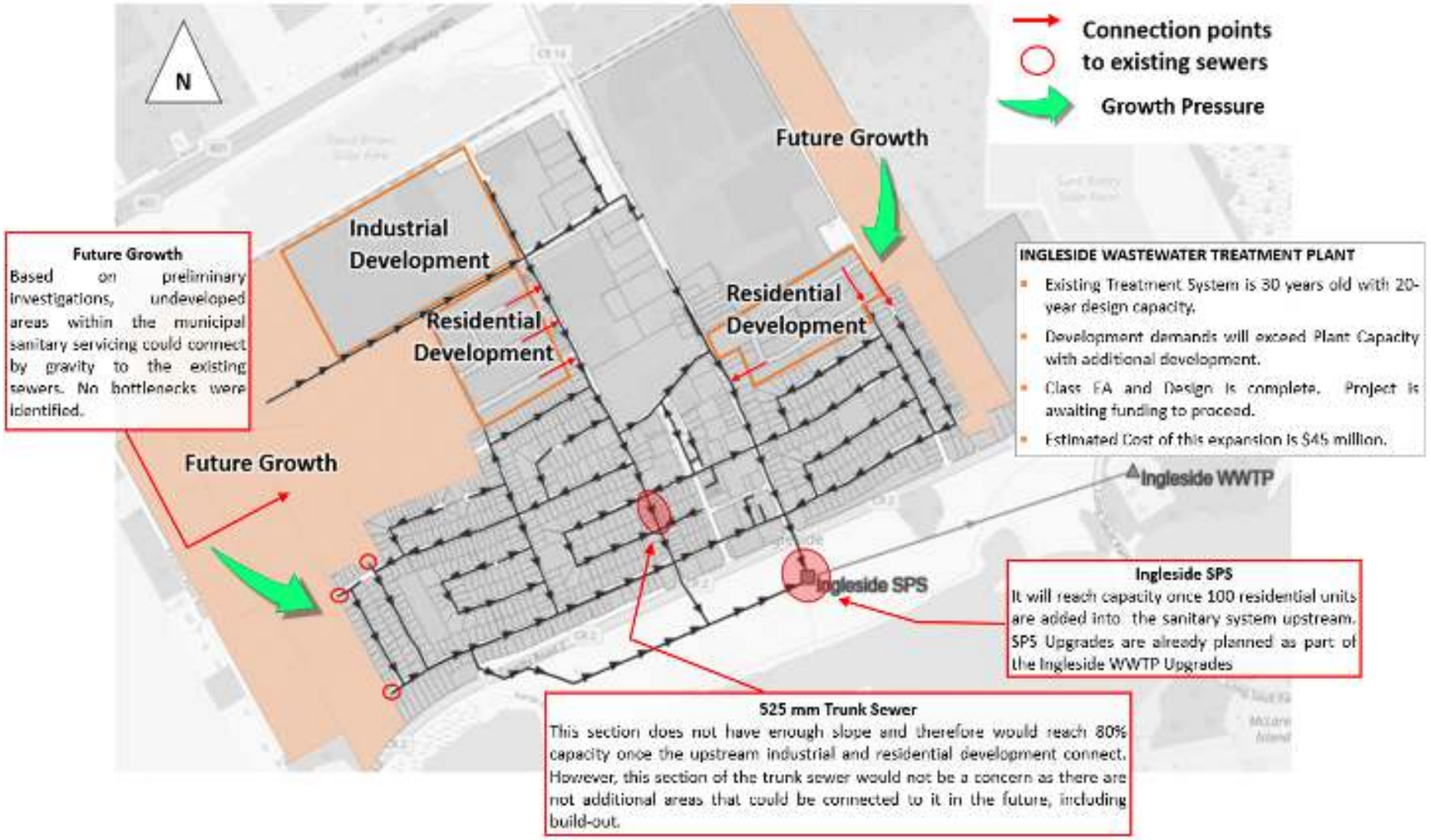


Figure 4-2 Ingleside Sanitary Sewer - Existing and Future Growth Bottlenecks

4.3 Stormwater Collection System

4.3.1 Long Sault Stormwater Collection System

As previously indicated, modelling studies were performed to assess current conditions and bottlenecks of the Long Sault Stormwater Collection System under both the 5-year and 100-year design storm. In the existing condition, there are no identified bottlenecks of any significance in the Long Sault distribution system; therefore, the focus of the master servicing study will be on providing direction to accommodate future growth.

Although population growth does not directly impact stormwater in the traditional sense as any intensification is required to manage stormwater to pre-development conditions or better, a result of population growth is the potential need for expanded road transportation networks and/or an increase in impervious areas, which in turn requires upsized or enhanced stormwater drainage.

The options for addressing potential impacts to the future growth in Long Sault will be primarily driven by mitigating the effects of urbanization on the hydrologic cycle including increased runoff and decreased infiltration of rain and snowmelt, as well as protection of water quality. A combination of lot level, conveyance, localized treatment, and end-of-pipe stormwater management practices will be considered to meet the multiple objectives of stormwater management.

4.3.2 Ingleside Stormwater Collection System

As reported in Section 3, the majority of the sewers within the Ingleside Stormwater collection system have adequate capacity for the 5-year and 100-year storm event with the exception of the 200 mm sewer along Hoople Streets which reported pipes being overcapacity and not being able to convey the 5-years design storm. Solutions such as increasing pipe capacity or re-routing flow will be explored to overcome the identified bottleneck.

Similar to Long Sault, with regard to future development, any intensification planned is required to manage stormwater to pre-development conditions or better. However, a result of population growth is the potential need for an expanded road transportation which will result in increasing impervious area, runoff and flow from land drainage.

The options for improving and addressing potential impacts to the future growth in Long Sault will be primarily driven by mitigating the effects of urbanization on the hydrologic cycle including increased runoff and decreased infiltration of rain and snowmelt, as well as protection of water quality. A combination of lot level, conveyance, localized treatment, and end-of-pipe stormwater management practices will be considered to meet the multiple objectives of stormwater management.

4.4 Transportation Network

Figure 4-3 shows the existing transportation network in both Long Sault and Ingleside. As can be seen, the existing transportation networks in Long Sault and Ingleside are essentially local roads with SDG County roads operating as the collector and arterial network to the east and west and north to Highway 401. As indicated in Section 2.7, the existing road networks in Long Sault and Ingleside have excess capacity, so the focus of the master servicing study will be on safety, efficiency, and promotion of multi-modal transportation.

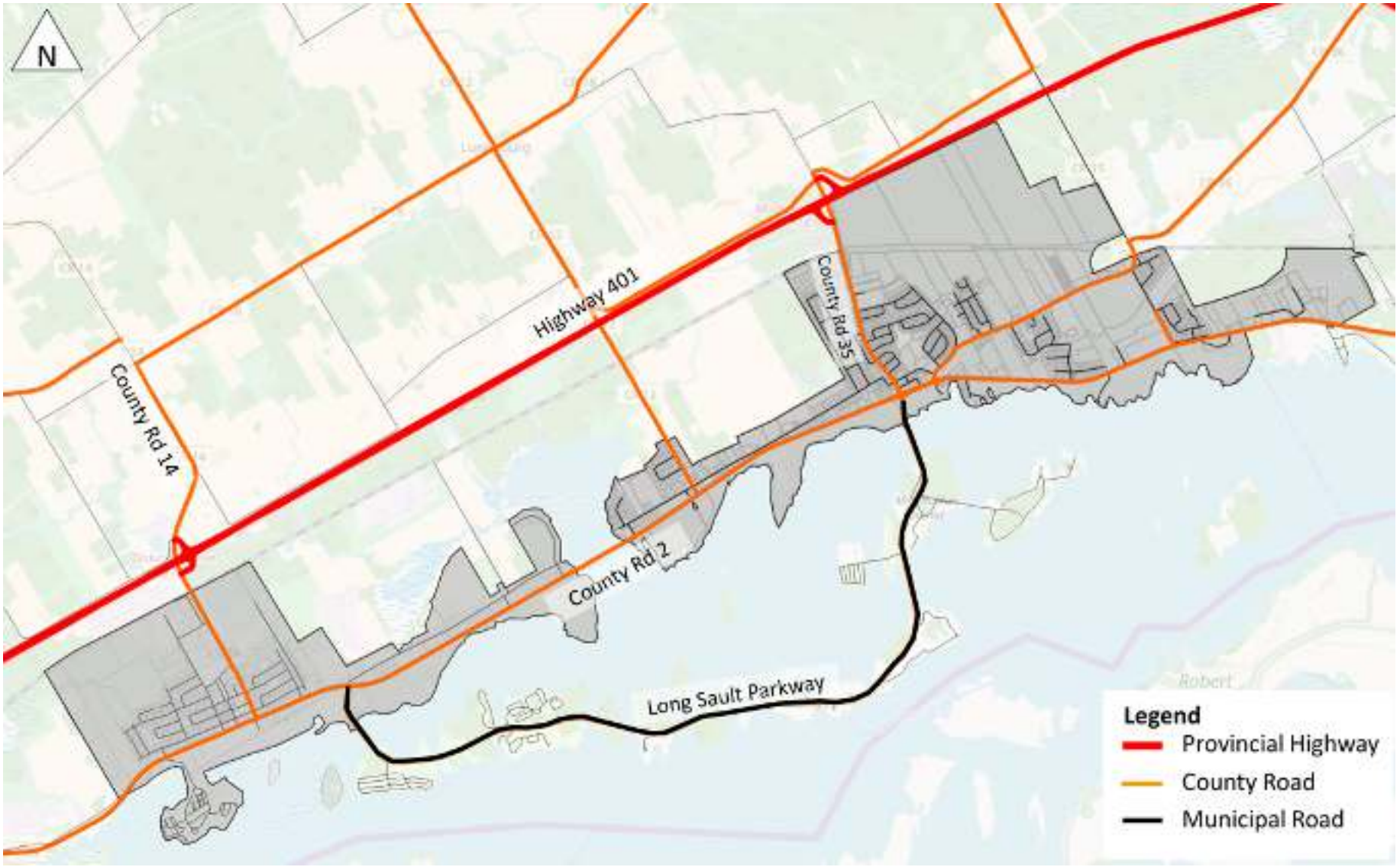


Figure 4-3 Long Sault and Ingleside: Existing Transportation Network

4.4.1 Long Sault Road and Active Transportation Network

There are no identified transportation or active transportation bottlenecks in the Long Sault area. However, there are areas where sidewalks are not provided as shown in Figure 4-4; this is less of a capacity bottleneck than an item of safety concern and design inconsistency that will be addressed under this study.

Figure 4-4 Long Sault Active Transportation Network

4.4.2 Ingleside Road and Active Transportation Network

There are no identified transportation or active transportation bottlenecks in the Long Sault area. There are areas where sidewalks are not provided and pedestrian crossings do not exist as shown in Figure 4-5; however, this is less of a capacity bottleneck than an item of safety concern and design inconsistency that will be addressed under this study.

One issue that may be considered as a bottleneck is the impact of the lack of a signal or roundabout at the intersection of County Rd. No. 2 and County Rd. No. 14 (Dickinson Dr.). This has been an area of concern during an EDR event on Highway 401. This is an area of concern to the Township, but within the jurisdiction of the Counties of SD&G.

Figure 4-5 Ingleside Active Transportation Network

4.4.3 Transportation Related Issues

In addition to the issues related to the road layout and the integration of multimodal transportation within the communities, there are additional concerns with respect to safety in terms of traffic speed and visibility within the communities. These are considered bottlenecks because they are an impediment to the safe and comfortable transportation in the community.

Traffic Calming

One item that was raised through public consultations was the issue of traffic speed on residential streets. The roads are signed for low speed, but the conditions of the road in terms of space and lack of perceived restrictions result in higher traffic speeds. Reducing speeds on residential streets can be a challenge particularly where low volumes preclude effective speed enforcement by the Police. Table Figure 4-6 provides some traffic calming options that may be considered. Some of these alternatives have additional maintenance requirements due to winter conditions in Ontario. This needs to be considered in the selection of options.

In addition to the items addressed in the table below, an option to be considered is the addition of stop signs to minimize the length of travel for vehicles without stopping. In Long Sault, this would be an option on Mille Roches and on roads entering the community to force speeds down both on entry and exit. Alternatively, the addition of small roundabouts, can be used to slow traffic without impeding flow. Unfortunately, the majority of the areas of concern are County Roads (County Rd. 36, County Rd. 2, County Rd. 35 (Moulinette Road) and County Rd. 14 (Dickinson Dr.) which are outside of the Township jurisdiction.

	Raised Crosswalk	Speed Hump	Chicane	Vertical Centerline Treatment	Speed Display Devices	Right-In/Right Out Island
Examples						
Potential Installation Location	A raised crosswalk can help reduce speed and avoid collisions. It also increases visibility of pedestrians and highlights pedestrian priority at intersections.	A speed hump is typically beneficial for reducing vehicle speeds. It increases safety for pedestrians and cyclists by slowing the speed of approaching vehicles.	A chicane can help reduce speed and manage traffic flow. Their design flexibility can help create safer and more livable streetscapes.	A flexible post-mounted delineator or raised pavement markers that act as a median can help direct traffic, increase visibility, and enhance safety on roads.	Speed display devices can help encourage responsible driving behavior, enhance road safety, and raise awareness about the importance of adhering to speed limits.	A right-in/right-out island can help enhance safety by reducing conflict points at intersections.
Potential Installation Location	Raised crosswalks can be installed at high-pedestrian crossings near schools and shopping centers.	Speed humps can be effective on local streets in residential areas and commercial activity centers.	Chicane can be installed on long and straight residential streets to prevent excessive speeding.	Vertical centerline treatments can be installed in residential areas and school zones. It can also be used to define and separate cycle lanes	Speed display devices can be installed wherever there is a long straight stretch of free-flowing traffic. It should especially be considered near existing and upcoming industrial areas that attract heavy vehicle movements	A right-in/right-out island can be installed at private accesses for major industrial or commercial activity center

Figure 4-6 Traffic Calming Options

Street Illumination

As identified in Section 3.5, in general the illumination in the community is reasonable and while it does not meet RP-8 standards, it does not represent either a bottleneck to transportation safety or traffic operations.

5 CLIMATE CHANGE

Climate change and related extreme weather events continue to create changing weather conditions which will impact municipalities' infrastructure. The scientific community expects that the increase in temperature and severe weather events due to climate change will lead to increased intensity and frequency of future storm events.

Municipal systems are heavily dependent on the use of Intensity-Duration-Frequency (IDF) curves for planning, design, and operation of municipal water infrastructure. Nowadays, there is a need in almost every municipality to adapt existing IDF curves to represent future conditions considering climate change. The Township's Site Plan & Subdivision Design Guidelines currently reference the Environment Canada (EC) Station 6101874 – Cornwall IDF curve data to be used for stormwater calculation. For the purpose of this study, the Cornwall IDF curves were analyzed and compared with new IDF curves corresponding to projected precipitation-change climate models. The new IDF curves were generated using a web-based tool, the IDF_CC tool, developed by the Facility for Intelligent Decision Support (FIDS) in collaboration with the University of Western Ontario.

The precipitation-change climate models rely on emission scenarios by which greenhouse gas emissions can be assumed to peak and decline, hold steady, or climb by a specified rate over time. In this study, two emissions scenarios were considered as follows:

- The global green house gas emission concentrations will not peak until 2040, but will then decline; and
- The global green house gas emission concentrations will continue to rise throughout the 21st century.

The IDF data released for the Cornwall Station #6101874 during the 2015 was selected for the base period for this analysis. In table 5-1 and Table 5-2, the projected rainfall intensity data for the 2044 and 2084 were compared to the Cornwall Station data to quantify the average percent increase for the 1:2-year through 1:100-year return periods for the 5-minute, 10-minute, 15-minute, 30-minute, 1-hour, 2-hour, 6-hour, 12-hour and 24-hour storm durations. Please note that the 2044 and 2084 data used was representative of the worst-case scenario which includes time series of emissions and concentrations of the full suite of greenhouse gases, aerosols, and chemically active gases, as well as land use and land cover factors identified as Representative Concentration Pathways (RCPs).

The resulting average percent increases from the base period data was calculated to be 7% for 2044, and 15% for 2080, considering all emissions scenarios. The percent increases varied between each emissions scenario but remained consistent for each return period/duration combination.

Table 5-1 2044 - IDF Percentage Increase based on Climate Change

Base Period (2015) Cornwall Station Historical Data								
Minutes	T:2-years	T:5-years	T:10-years	T:20-years	T:25-years	T:50-years	T:100-years	
5	95.49	118.6	128.57	135.45	137.2	141.61	144.8	
10	68.72	87.86	96.37	102.37	103.92	107.88	110.81	
15	55.02	70.37	77.1	81.8	83.01	86.08	88.33	
30	34.59	43.54	47.94	51.29	52.21	54.64	56.58	
60	21.7	27.02	29.85	32.14	32.79	34.59	36.12	
120	12.82	16.99	20.14	23.48	24.61	28.34	32.41	
360	5.86	8.26	10.11	12.09	12.77	15.01	17.34	
720	3.43	4.84	5.87	6.94	7.29	8.08	8.67	
1440	2.18	2.85	3.25	3.61	3.72	4.04	4.33	
2044 Climate Change Projection (RCPS 8.5 - worst case scenario)								
Minutes	T:2-years	T:5-years	T:10-years	T:20-years	T:25-years	T:50-years	T:100-years	
5	101.59	127.38	138.44	146.55	148.84	154.61	157.69	
10	73.16	94.31	103.93	110.82	112.81	117.86	120.74	
15	58.58	75.55	83.17	88.55	90.09	94.09	96.34	
30	36.65	46.75	51.71	55.58	56.77	59.25	61.06	
60	22.92	28.97	32.23	34.82	35.58	37.25	38.78	
120	13.59	18.06	21.56	24.92	26.04	30.4	34.85	
360	6.16	8.79	10.79	12.79	13.41	16.07	18.69	
720	3.61	5.15	6.28	7.37	7.73	8.66	9.35	
1440	2.3	3.05	3.52	3.93	4.05	4.38	4.69	
	IDF Curves - Climate Change Percentage Increase in 2044							
Minutes	T:2-years	T:5-years	T:10-years	T:20-years	T:25-years	T:50-years	T:100-years	
5	6%	7%	8%	8%	8%	9%	9%	
10	6%	7%	8%	8%	9%	9%	9%	
15	6%	7%	8%	8%	9%	9%	9%	
30	6%	7%	8%	8%	9%	8%	8%	
60	6%	7%	8%	8%	9%	8%	7%	
120	6%	6%	7%	6%	6%	7%	8%	
360	5%	6%	7%	6%	5%	7%	8%	
720	5%	6%	7%	6%	6%	7%	8%	
1440	6%	7%	8%	9%	9%	8%	8%	
Average	**6%**	**7%**	**8%**	**8%**	**8%**	**8%**	**8%**	**7%**

Table 5-2 2084 - IDF Percentage Increase based on Climate Change

Base Period (2015) Cornwall Station Historical Data								
Minutes	T:2-years	T:5-years	T:10-years	T:20-years	T:25-years	T:50-years	T:100-years	
5	95.49	118.6	128.57	135.45	137.2	141.61	144.8	
10	68.72	87.86	96.37	102.37	103.92	107.88	110.81	
15	55.02	70.37	77.1	81.8	83.01	86.08	88.33	
30	34.59	43.54	47.94	51.29	52.21	54.64	56.58	
60	21.7	27.02	29.85	32.14	32.79	34.59	36.12	
120	12.82	16.99	20.14	23.48	24.61	28.34	32.41	
360	5.86	8.26	10.11	12.09	12.77	15.01	17.34	
720	3.43	4.84	5.87	6.94	7.29	8.08	8.67	
1440	2.18	2.85	3.25	3.61	3.72	4.04	4.33	
2084 Climate Change Projection (RCPS 8.5 - worst case scenario)								
Minutes	**T:2-years**	**T:5-years**	**T:10-years**	**T:20-years**	**T:25-years**	**T:50-years**	**T:100-years**	
5	107.55	135.83	148.43	157.57	159.6	165.43	170.12	
10	77.43	100.55	111.31	119.06	120.89	126.35	130.61	
15	61.99	80.4	89.06	95.16	96.59	100.84	104.13	
30	38.95	49.78	55.3	59.56	60.59	63.75	66.43	
60	24.4	30.84	34.46	37.3	38.03	40.29	42.36	
120	14.35	19.31	23.09	27.09	28.49	32.53	37.09	
360	6.57	9.38	11.58	13.96	14.74	17.18	19.58	
720	3.84	5.5	6.71	8	8.38	9.24	9.96	
1440	2.45	3.25	3.75	4.18	4.3	4.69	5.08	
	IDF Curves - Climate Change Percentage Increase in 2084							
Minutes	T:2-years	T:5-years	T:10-years	T:20-years	T:25-years	T:50-years	T:100-years	
5	13%	15%	15%	16%	16%	17%	17%	
10	13%	14%	16%	16%	16%	17%	18%	
15	13%	14%	16%	16%	16%	17%	18%	
30	13%	14%	15%	16%	16%	17%	17%	
60	12%	14%	15%	16%	16%	16%	17%	
120	12%	14%	15%	15%	16%	15%	14%	
360	12%	14%	15%	15%	15%	14%	13%	
720	12%	14%	14%	15%	15%	14%	15%	
1440	12%	14%	15%	16%	16%	16%	17%	
Average	**12%**	**14%**	**15%**	**16%**	**16%**	**16%**	**16%**	**15%**

Based on our review of the available literature, there is a high level of uncertainty among approaches for projecting future IDF curves, and it should be noted all approaches are experimental in nature and represent a best effort to predict future trends. It appears there is not one definitive approach to adjust IDF curves to account for climate change. However, adjusting the current IDF curves by a percent increase is proposed as a conservative strategy to be used during the design of servicing infrastructure.

In particular, during the development of servicing alternatives, two approaches for considering and addressing climate change will be considered:

- Climate change mitigation: Reducing a project's impact on climate change.
- Climate change adaptation: Increasing the project and local ecosystem's resilience to climate change.

This master plan will follow the Municipal Class Environmental Assessment (MCEA) process which requires evaluation of alternative solutions to determine a preferred solution to ensure the best solution possible is selected. For all determined system deficiencies, Low Impact Development Best Management Practices (LID BMPs) will be considered as alternative solutions following the MCEA process, where possible. Through the process of determining existing systems deficiencies, the master plan will cross reference existing public works and roads/transportation projects and timelines to determine implementation timelines which align with existing planned water/wastewater/roads system upgrades, ultimately ensuring that system upgrade and proposed LID costs and timelines are aligned and bundled with existing proposed projects.

Accounting for increases in intensity, duration, and frequency of storm events within the stormwater system model will ensure the Township can plan and adapt to future climate scenarios, while proposing LID projects will help build resiliency to the potential effects of climate change on servicing infrastructure.

6 IDENTIFICATION OF ALTERNATIVES

As previously indicated, the infrastructure in Long Sault and Ingleside was not originally designed for large community expansions. The following section identify potential alternatives and servicing strategies in order to serve current and future growth within the community of Long Sault and Ingleside.

The general solutions would require system upgrades and conveyance of current and future flow with the expansion of existing infrastructure that would require pumping stations, changes to the existing sewers to extend the system, and increased storage capacity. In particular, the identified alternatives have been categorized as follows:

- **Existing Conditions:** System bottlenecks have been identified under current conditions. The identified bottlenecks would currently limit future development and are not meeting the necessary design requirements under current conditions. Therefore, alternatives have been identified to overcome existing system limitations and to set the basis for long-term growth strategies.
- **Growth within Settlement Area:** Water, wastewater, stormwater, and transportation infrastructure upgrades will be required to service areas already approved for development as well as future residential and non-residential lands within the existing Settlement Areas. Therefore, under this category, solutions have been identified to provide the improvements to better service the existing communities within the Long Sault and Ingleside service areas and to provide servicing strategies to accommodate future growth and development within the existing settlement areas.
- **Stormwater Management:** Solutions have been provided to develop an environmentally sound and sustainable stormwater strategy for addressing existing issues and accommodating future growth.
- **Transportation Improvements:** The objective of this category is to provide solutions for new and expanded transportation and utility facilities in order to serve the current and future development areas. The integration of transportation facilities, together with

water/wastewater, and stormwater processes will ensure the implementation of a sustainable growth strategy within both communities.

A description of each alternative is included in the next section.

6.1 Provincial Policy Impacts

A Master Plan integrates existing and future land-use planning and the planning of servicing infrastructure with the principles of environmental assessment planning. In agreement with the MCEA process, when generating and evaluating the project alternative solutions, the following considerations were taken into account:

- **Land Use Planning Objectives:** Land Use Planning objectives refer to the plans and policies identified in provincial plans and municipal Official Plans and Secondary Plans. Those plans contain goals, objectives, and policies established primarily to manage and direct physical change and the effects on the social, economic, and natural environment. They provide the specific municipal policies and objectives that need to be considered including, but not limited to, those for: urban areas, growth areas/corridors, rural areas, neighbourhoods and residential areas, employment areas, transit and transit supportive development, commercial, institutional, recreational, natural, open space, agricultural, and special policy areas. Background studies, official plans and secondary plans have been reviewed at the early stage of this study with the intent to develop an MSS in agreement with the goals and objectives to help direct future planning according to specific guiding principles that encompass the values of the community and the municipality.
- **Natural and Heritage Features:** as described in the background section of this study, significant natural and heritage features. This includes elements such as valley lands, fish habitat, evaluated wetlands (including Provincially Significant Wetlands), significant portions of the habitat of threatened and endangered species, Areas of Natural and Scientific Interest (ANSI), and Environmentally Sensitive Areas (ESAs). In order to comply with the MCEA requirements and determine if significant features are present and anticipate any potential impacts, natural heritage features have been identified during the early stage of this EA process. Few significant natural and heritage features have been identified during the screening process and are located near to the boundaries of Ingleside. It is anticipated that no planned work or proposed alternatives would impact the identified natural heritage features. No heritage features have been identified in Long Sault.
- **Social Environment:** The social environment includes existing communities, residential areas, and recreational areas. As the goal of a Master Servicing Plan is to define long-term servicing objectives and goals as a supplement to water, wastewater, stormwater, and transportation needs, impacts on the community cannot be avoided. However, in agreement with the MCEA requirements, proposed alternatives have been developed considering the overall community impacts such as residential property and access, community facilities and access, recreational facilities and access, pedestrians, cyclists, noise impacts and air quality on a case-by-case basis. Once potential impacts have been identified, mitigation measures have been explored in order to minimize any adverse impact.
- **Economic Environment:** The economic environment includes commercial and industrial land uses and activities. It also includes the financial costs associated with the alternatives, including construction, operation, maintenance, and property costs. One of the important considerations for this type of project is the economic viability of the solution since even the least cost alternative may put excessive fiscal burden on the Township and ratepayers. At the

early stage of this EA, an analysis of the economic position of both the population and the Township have been performed with the intent of developing project affordability metrics to be used consistently during the development of each of the proposed alternatives in order to guarantee a solution that would be viable under both an economic and financial prospective.

6.2 Existing Conditions

The existing water, wastewater, stormwater and transportation systems for both Ingleside and Long Sault present existing bottlenecks that need to be addressed in order to accommodate future growth. In this section, several alternatives have been explored for each bottleneck.

6.2.1 Regional Water Supply

There are three different types of projects that may be undertaken as part of the Master Servicing Study as follows:

- **Bottleneck or Redundancy/Capacity Upgrades:** As identified in Section 4, there are minor water system bottlenecks that exist currently primarily related to fire flow demands. Additionally, there are areas in the system that are critical components of the distribution system and a failure in these locations may cause a loss of water supply to the system for an extended period. Specifically, these are the transmission main crossing from Moulinette Island to Long Sault and the lack of any storage directly in the community of Long Sault. It is important to note that there was a deliberate decision to remove storage from the community when the regional water plant was constructed due to the condition of the Long Sault Elevated Tank; however, with the current community growth and distribution of the growth in the north and east areas of the community, the additional reliability of system storage is advisable.
- **Functional Improvements:** The original town sites were designed over 65 years ago and much of the infrastructure still dates to the time when fire flow demands were significantly lower, and the community consisted of mostly smaller post-war housing. With the expanded community footprint in both Long Sault and Ingleside, the efficient distribution of water from storage to use requires larger diameter watermains to provide a path of least resistance between major system components. These components include the Long Sault Water Treatment Plant to water storage in Long Sault and from the Booster Station in Ingleside to the existing elevated storage tank.
- **Development Related Improvements:** Development projects are completed independently with the focus on the meeting the requirements for their specific demands. However, the Township requires that all developments operate as a complete system. In some cases, where different developments are, or will be, connected, the requirements that the development needs vs. what the Township needs for a complete system can be significantly different. The Township, as part of the approval process, can identify the need to upsize watermains in order to meet the complete needs of the pressure zone distribution.

Section 6.3 and Section 6.4 address the alternatives for water servicing in the Township relative to these issues.

6.2.2 Long Sault Sanitary System

For each of the identified bottlenecks reported in Section 4, several alternatives have been identified as reported in Table 6-1. Most of the current bottlenecks within the Long Sault Sanitary system are related to pipes being near to full capacity and mainly located around County Rd 36. Two approaches have been explored and summarized as follows:

- **Re-routing upstream flow:** This alternative was considered with the intent to explore if potential re-routing flow options were feasible and cost-efficient in order to increase pipe capacity in the flagged sanitary sewer sections.
- **Upsizing sewers:** This alternative was explored in order to increase pipe capacity as required to meet future sanitary sewer capacity.

Each alternative was explored while considering Technical, Natural, Social/Cultural and Economic aspects. In particular:

- **Technical:** The technical aspect of each alternative determines if the alternative is feasible or, in other words, if the alternative will work. Then the focus on the efficiency of the design in terms of operational considerations (simple vs. complex), energy efficiency, and does it provide any other technical advantages such as does it open up other opportunities or is it a temporary solution that meets current needs but does not provide a long-term ultimate solution. Each of the proposed alternatives was developed with the intent to address the project goals and to deliver a long-term solution by providing the required technical effectiveness in terms of the user experience, operational effectiveness, and general efficiency of approach.
- **Natural Environment:** The natural environmental assessment is intended to evaluate both temporary and permanent impacts on the natural environment. This may include species at risk, loss of habitat, impacts on natural features (waterways, etc.), impairment of soil, air, and water as a result of activities and changes to the natural environment as a whole. If one of the alternatives were to have significant absolute impacts that cannot be effectively mitigated, those would not be selected as preferred alternative even if it is the least impactful of the actionable alternatives.
- **Social/Cultural Heritage Environment:** The Social/Cultural environment criteria is focused on the impacts (positive or negative) on land use, enjoyment, nuisance, recreational impacts, safety, unreasonable change in conditions, etc. The preferred alternative would be the one having the least social/cultural impacts on the community.
- **Economic Environment:** The economic environmental assessment is more than simply the cost of the project. It is an assessment of the cost of the project as well as the economic impacts of proceeding (or not) with the proposed solution that meets the project objectives. Capital cost is a significant factor in the evaluation of alternatives as is the limitation and enabling of community growth. As all the alternatives would have similar impacts on the aforementioned criteria, the economic environment would be the primary driver in the selection of the preferred alternative to overcome existing bottlenecks. This includes consideration of capital cost of the infrastructure required for each alternative.

Table 6-1 Long Sault Sanitary System Alternatives to existing Bottlenecks

Location	Identified Problem	Alternative	Capital Costs [(a)] (+/- 25%)
South of County Rd 36	The 250 mm sanitary sewer south of County Rd 36 is at 80% capacity. This sanitary sewer represents the main outlet to the developed and undeveloped areas south and along of County Rd. Under current conditions, the sewer would not be able to receive additional flow, limiting development south of County Road 36.	**Alternative A:** Do Nothing	-
		Alternative B: Upsizing the 250mm sanitary sewer	$1.2 M

		Alternative C: Re-routing upstream flow	$4.7 M
Eastern upstream of the County Rd SPS	The 300 mm sanitary sewer at the eastern upstream end of the County Rd SPS is at 75% capacity. This sanitary sewer will collect all the flow coming from County Rd 36 and directed to County Rd SPS. Under current conditions, the sewer would not be able to receive additional flow, limiting development along County Rd 36.	**Alternative A:** Do Nothing	$2.8M
		Alternative B: Upsizing the 300mm sanitary sewer	$1.5M

[a] Capital costs include engineering and contingency

6.2.3 Ingleside Sanitary System

Under current conditions, the design model did not report any anticipated bottlenecks of the existing sanitary system.

6.2.4 I/I Reduction

As indicated in Section 2.4.2, I/I is a widespread concern in both Long Sault and Ingleside. Unfortunately, the lack of a specific and localized source of the I/I will require a more broad approach to reducing the I/I. In Long Sault and Ingleside, it is anticipated that the I/I represents up to 10% of the total dry weather flow into the system. This equates to approximately 300 lots of residential wastewater capacity lost due to I/I representing annual property tax revenues of more than $2M.

The lack of a specific "low hanging fruit" type solution does not allow for specific alternatives, but rather a deliberate approach to infrastructure renewal that will both address the community infrastructure deficit and over time result in reduced I/I. The majority of the existing original town site area in both communities has not been fully reconstructed since the formation of the communities during the Seaway development. As such, the approach to addressing I/I should consist of a two stage approach as follows:

1. **Stage 1: Annual Renewal of Original Town Site Streets:** This would consist of upgrading the street to the Township urban standard including new sanitary, storm and watermain in the correct locations including servicing for all utilities to the property line.
2. **Stage 2: Private Side Sanitary Sewer Replacement:** This would consist of a program (potentially partially Township subsidized) to replace the services on private property to the house connection including resolving the perimeter drain collection issue either through sump pump or storm service connection where feasible.

Ultimately, I/I is anticipated with all systems; however, extraneous I/I that can be corrected will benefit the community in terms of a lower cost of wastewater operations per connection which benefits both the Township and the end-user.

6.3 Growth within Settlement Area

The previous section addressed the existing conditions and any system deficiencies that exist within the system. The next stage of the servicing review is to assess the impact of identified growth potential on the infrastructure and the necessary upgrades to the system to meet that demand. The following sections address that issue specifically and identify the alternatives that may be considered.

6.3.1 Regional Water Supply

The Regional Water Supply consists of the Long Sault and Ingleside pressure zones with the water treatment plant located within the Long Sault Pressure Zone. The existing conditions and deficiencies or potential bottlenecks are addressed in the previous section. The following section is intended to address the impacts on the system of growth both with respect to any system expansion and necessary upgrades to the existing system to meet future needs. For the purposes of the MSS, the alternatives are focused on modifications to the expansions necessary for the bigger picture rather than on the individual developments or basic water distribution to connections that may be added to the system.

Storage and Pumping

As identified in Section 3, there currently is not a deficiency in the storage or pumping capacity within the system. However, over the 20-year forecast period covered by this MSS, population and demand will exceed current available storage. In the original design of the system, excess storage was provided in Ingleside in order to mitigate the risk of a transmission main failure between Long Sault and Ingleside. At the end of the 20-year period, this excess storage will continue to meet those future demands for the Ingleside Pressure Zone. As such, the storage deficiency is in the Long Sault Pressure Zone.

Ultimately, there are innumerable alternatives that could be considered for locating a new storage system; however, in general, storage facilities are selected based on three criteria:

1. **Elevation:** Independent of whether the storage is a gravity driven elevated storage reservoir (tank) or a pump driven ground level storage reservoir, the higher the elevation of the reservoir, the more efficient the operation will be. If an elevated storage tank is located at higher elevation, it can be shorter in height and thus less costly. Similarly, ground level storage at higher elevation can have pumps with lower pressure requirement, thus saving pumping costs by using the natural elevation to create pressure.
2. **Location:** There are two aspects to location, functional and social. Functionally, having storage close to users is preferred as the longer the distance between storage and use, the more pressure is lost, and, in general terms, pressure equals cost. Conversely, storage facilities are a significant landmark and, in some situations, can cast a shadow or consume valuable land. As such, some residents may oppose the siting of a storage facility proximate to their residence for aesthetic purposes. In our experience, both concerns are valid; however, beyond visual impacts, storage facilities are generally innocuous upon operation and become important landmarks to the entire community.
3. **Reliability:** There are also two aspects to reliability, functionality, and resiliency. From a functionality standpoint, elevated storage tanks do not require back-up power and will maintain pressure in the system in all circumstances where ground level storage depends on pumping to supply water and therefore requires back-up power. With current technologies, both options are feasible; however, elevated storage has a small advantage because independent of the potential failure, gravity is a constant. The resiliency aspect is tied to the ability to supply water to the community under different failure conditions. For example, if the storage and water treatment plant are on the same site and a watermain between the site and the user fails, then neither component (plant nor storage) can supply water to the users. Alternatively, if the plant is in one location and the storage is in another location and the same watermain fails, either the storage or the plant would be able to continue to supply water to the community until the failure can be corrected.

Considering the above criteria combined with an evaluation of the existing distribution network, the following alternatives have been generated to address the storage requirements.

- **WT-S1: Expand Storage at Regional Water Treatment Plant Site:** This alternative consists of expanding the ground level storage at the Regional Water Treatment Plant site by adding on to the east side of the reservoir with a separate tank with between 3,500 m^3 to 4,500 m^3 of storage depending on the growth situation at the time of construction. The elevation of the storage would be limited by the existing reservoir in order to use the same pump well and chlorine contact chamber. The high lift pumps at the plant will need to be upgraded in order to be able to supply maximum day plus fire flow from the reservoirs. This site would be innocuous to the public on an existing developed site.
- **WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena:** This alternative consists of a 3,500 m^3 to 4,500 m^3 elevated storage tank located on the former elevated storage tank site in Long Sault on Mille Roches Rd. opposite of Bethune Ave. between the Arena and Fire Hall. This site is central to the demand in the system and with additional distribution upgrades will be able to supply the entire pressure zone efficiently. This site is central to the population and therefore, will be very visible in the community.
- **WT-S3: New Elevated Storage between Long Sault and Ingleside:** This alternative consists of a 3,500 m^3 to 4,500 m^3 elevated storage tank located along the 400mm transmission main between Long Sault and Ingleside with the most likely selected location between Wales Road and Hoople Creek due to elevation and location between the two communities. This location is remote from the majority of the demand but can supply both Long Sault and Ingleside.
- **WT-S4: New Elevated Storage in Northeast Corner of LSLV:** This alternative consists of a 3,500 m^3 to 4,500 m^3 elevated storage tank located on the northeast quadrant of the LSLV site north of the CNR near Avonmore Road (County Rd. 15). This is the highest elevation in the distribution system but is remote from the majority of the community with the exception of the commercial buildings proposed as part of this development. There is no residential population proximate to the site. The location of the site near Highway 401 would provide branding opportunities due to the high visibility of the site to the travelling public.

For these alternatives, since development is already underway and planning allows for further development, the do-nothing alternative is not feasible. With the implementation of a storage alternative with the exception of WT-S1 (Ground level storage), high lift pumping capacity does not need to be increased as the original design allowed for maximum day plus fire flow and with the addition of storage, that demand will be reduced since fire flow and peak demands will be primarily sourced from the elevated storage.

Transmission

There are two primary ways of moving water in a water supply system: transmission mains and distribution mains. This section will describe the relevance of transmission mains in the South Stormont system and provide the explanation where new transmission mains may be considered.

Transmission mains are used for the bulk transfer of water within water system, typically between pressure zones or from a source to storage or pumping. In the South Stormont system there are no formally designated transmission mains; however, the watermain from Moulinette Island to Long Sault and portions of the 400mm watermain from Long Sault to Ingleside fit the definition of a transmission main and should be designated as such. One common attribute to transmission mains is that they usually do not directly service users. They are intended for the bulk transfer of water only and often there is a desire to allow them to operate above or below normal operating pressures in order to meet

that goal, which may not be appropriate for service connections. Furthermore, adding service saddles every 20-30 metres along a watermain increases the risk of failure and the intent of transmission mains are to be core system attributes that are protected against risk. In some situations, transmission mains are buried deeper than standard watermains to protect them from damage due to excavation or frost.

From a functional perspective, one of the key attributes of transmission mains it the intent of getting water from source to storage and then to distribution in an efficient manner. In situations where a storage facility is located in a distribution system such that there is no direct connection and the water has to go via a circuitous route or splits into different loops of the network in order to achieve the bulk transfer of water to fill storage, there can be both an increase in pressure loss (i.e. higher pumping costs) and the water may be redirected directly to users which can result in greater water age in the storage. This can result in the formation of trihalomethanes and/or Haloacetic acids which are disinfection byproducts or loss of chlorine residual which can increase operational costs. The overall objective of a distribution system is to maintain the minimum water age by turning over the water in the storage every 24-48 hours at average day. Optimally, there is a direct transmission main between source and storage, but, as a minimum, the most direct route within the distribution system should allow be the alignment with the least pressure loss.

In the review of the distribution system in South Stormont, it was identified that, both for the existing storage in Ingleside and the new storage in Long Sault, there was not a direct connection to the storage that made it the path of least resistance. Under the existing and immediate future, there are no concerns with the current operation; however, as flows increase there will be more demands that divert water away from the direct supply to the storage when there is a call to fill the reservoir.

The alternatives to improve the transmission in both pressure zones is as follows:

- Long Sault Pressure Zone
  - The most direct connection between the water treatment plant and the proposed elevated storage sites are as follows:
    - **WT-S1: Expand Storage at Regional Water Treatment Plant Site:** No transmission main required due to the proximity to the treatment plant.
    - **WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena:** The most direct route is from the intersection of County Rd No. 2 and the Parkway entrance along County Rd No. 2 to Mille Roches Rd., along Mille Roches Rd. to the storage site and extended onward to the connection with McNiff.
    - **WT-S3: New Elevated Storage between Long Sault and Ingleside:** No additional transmission main is required as the storage is located on the transmission main between Long Sault and Ingleside.
    - **WT-S4: New Elevated Storage in Northeast Corner of LSLV:** The most direct route is from the intersection of County Rd No. 2 and the Parkway entrance north along Moulinette Rd. to Station Lane, across the CNR corridor to Street “A”, and east to the proposed elevated storage site.

There are other potential alignment alternatives; however, in this situation the shortest length is preferred from an operational perspective.

Distribution

The distribution component of the water system is the servicing of individual areas and properties. The goal of this system is to provide potable water within a standardized pressure band of 350 kPa -

550 kPa (50 psi – 80 psi) and adequate fire flow to meet the Fire Underwriter's Survey requirements for residential areas (4,000 Lpm ~ 66.7 L/s).

In the review of the bottlenecks in Section 4, it was identified that there were no immediate actions required to address water supply system deficiencies. All of the identified system deficiencies were tied to the change in fire flow requirements since the original design of the system from MECP to FUS requirements. The primary areas that are impacted are:

- Long Sault Pressure Zone
  - East end of Moulinette Island
  - Dead-ends in Long Sault
  - Dead-end Chantine Drive
  - Jenkins Road Dead-end
- Ingleside Pressure Zone
  - All of the nodes on the west end of the community bounded by Farran Point Road, Napier Street, Piercy Street due to the lack of any 200 mm diameter watermains west of Ault Drive.
  - Wales Drive dead-end.
  - Colonial Drive (original watermain not connected to the transmission main) east of the Parkway entrance.

In general terms, these deficiencies are a function of the high fireflow demand and small diameter (150mm) distribution piping. In many cases, the dead-ends are intentional and do not have any future extension of watermain planned. Therefore, the only feasible solution to improve the fire flow condition is increasing the size of the watermain. In other cases, there may be opportunities to improve the water pressure in the system through other means.

It is important to note that with respect to fire flow, the South Stormont Fire Department has Superior Tanker Shuttle Service accreditation within 8 km of the Long Sault and Ingleside Fire Halls. This is a supplement to the available hydrant capacity, which does allow the Township to make the decision to accept fire flows that are less than the FUS requirements in localized areas. Most, if not all, municipal systems have hydrants and nodes that do not meet the FUS standard. As such, the expectation of 100% compliance is not a reasonable expectation.

6.3.2 Long Sault Sanitary System

With the identified system restrictions as described in Section 4 for future growth, the general alternatives that have been reviewed for the Long Sault sanitary system are detailed in the following sections and are as follows:

- **Alternative A:** Do Nothing
- **Alternative B:** Decentralized Sanitary Systems Servicing the North Central Area.
- **Alternative C:** Centralized Sanitary System Servicing the North Central Area.

Alternative A: Do Nothing

The "Do Nothing" or null alternative is always an alternative that is reviewed to ensure that the project is in fact necessary. The "Do Nothing" scenario means that no changes or improvements to the existing system will be considered. The "Do Nothing" alternative is carried forward into the evaluation process as a base case. It is recognized that the Do Nothing alternative will not meet the future servicing needs of the study area and will result in surcharged sanitary systems and severely limit growth. The Do

Nothing alternative will maximize the use of existing infrastructure but will not meet the future servicing needs.

Alternative B: Decentralized Sanitary Systems Servicing the North Central Area.

In their planning applications, the identified development areas described in Section 2 proposed their own servicing system. Therefore, this alternative would consider the possibility of maintaining system layouts as per proposed development applications. Each servicing system would connect to the existing sanitary sewer, thus reporting several system restrictions. A description of the system restrictions and proposed solutions are discussed in Table 6-2, while the proposed system layout is presented in Figure 6-1.

It is anticipated that the estimated costs covered by the Township for this alternative are in the range of $6.4M (+/- 25%) including engineering and contingency.

Table 6-2 Alternative B: Decentralized Sanitary Systems Servicing the North Central Area

Location	Identified Problem	Alternative	Capital Costs [a] (+/- 25%)
Mille Roches SPS	The Mille Roches SPS does not have capacity to convey flow coming from Phase 1 of Chase Meadows development.	**Alternative A:** Do Nothing	-
		Alternative B: To be decommissioned. Flow to be diverted to the new SPS within the Chase Medows Development.	N/A
County Rd SPS and FM	County Rd SPS will reach rated capacity once Phase 1 of the LSLV is completed, thus limiting upstream development. Twinning the existing forcemain would be required to accommodate additional flow.	**Alternative A:** Do Nothing	-
		Alternative B: County Rd SPS and FM Upgrades.	$2.8M
Intersection of Jim Brownell Boulevard and County Rd 36 up to County Rd SPS	The 200 mm sanitary sewer at the intersection of Jim Brownell Boulevard and County Rd 36 up to County Rd SPS would not be able to convey build-out flow coming from the Chase Meadows development.	**Alternative A:** Do Nothing	-
		Alternative B: Upsizing the 200mm sanitary sewer.	$2.3 M
		Alternative C: Re-routing upstream flow from Chase Meadows, west towards Mille Roches Rd and convey flow directly into the Trunk Sewer. Includes new SPS and forcemain	$5.6 M
Eastern limit of Moulinette Road	The 250 mm sanitary sewer located at the eastern limit of Moulinette Rd and directing to the Strachan Ave. would reach 70% capacity due to the construction of Phase 4 of the Parkway Estates subdivision, and it would be near to full capacity with additional flow coming from the Moulinette Rd Subdivision development	**Alternative A:** Do Nothing	-
		Alternative B: Upsizing the 200mm sanitary sewer	$1.2 M
		Alternative C: Re-routing upstream flow coming from the Moulinette Rd Subdivision east and discharge wastewater flow directly into the Trunk Sewer.	$1.0 M
		TOTAL ESTIMATED COSTS	**$ 6.4 M (+/- 25%)**

[a] Capital costs include engineering and contingency

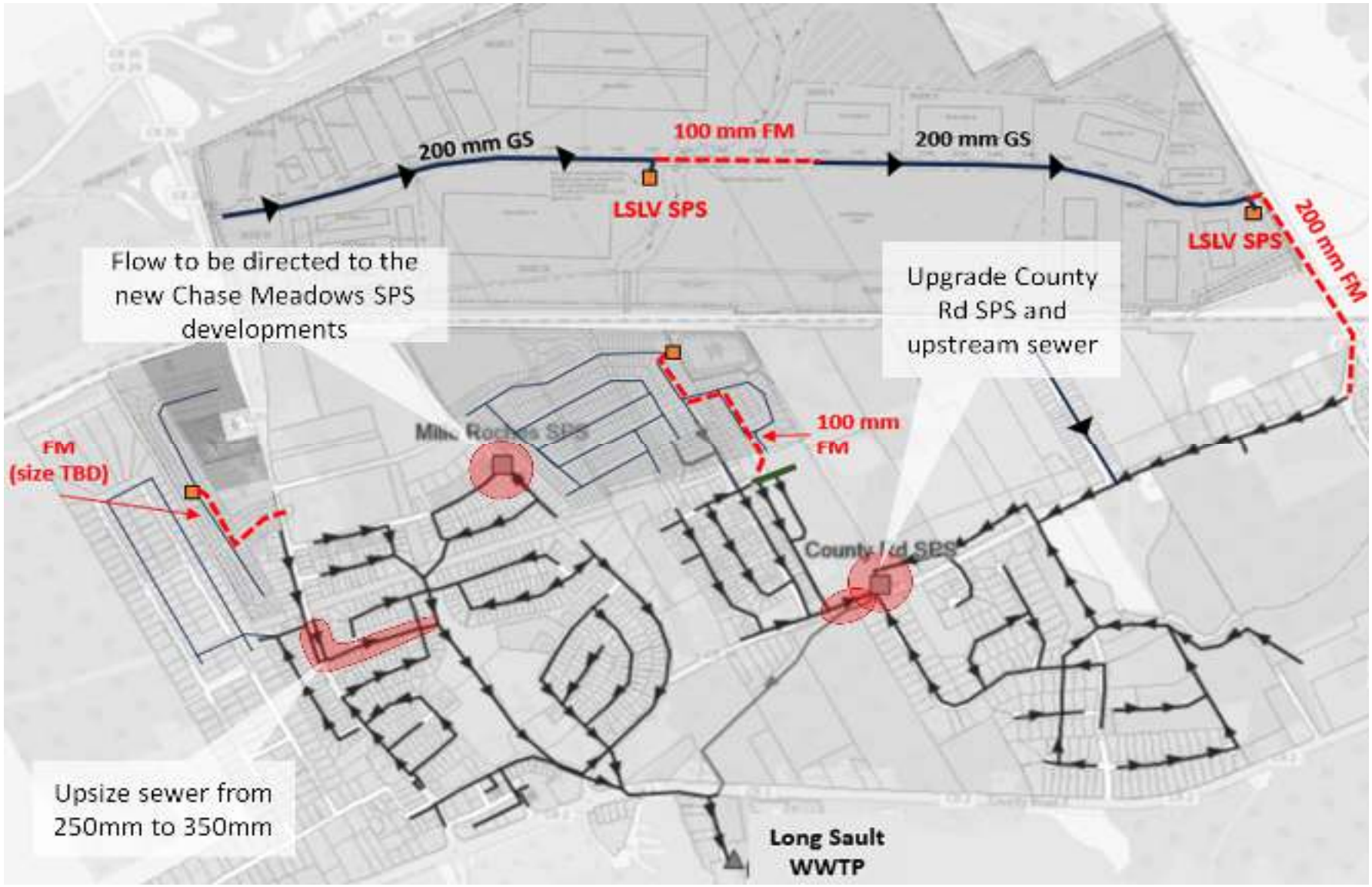


Figure 6-1 Alternative B: Decentralized Sanitary Systems Servicing the North Central Area

Alternative C: Centralized Sanitary System Servicing the North Central Area.

This alternative would consider the opportunity of creating a centralized sanitary system which would convey flow from all the identified development areas in the North Central Area of Long Sault. A description of the system requirements and proposed solutions to the identified bottlenecks are discussed in Table 6-3, while the proposed system layout is presented in Figure 6-2.

It is anticipated that the estimated costs covered by the Township for this alternative are in the range $5.5 M (+/- 25%) including engineering and contingencies.

Table 6-3 Alternative C: Centralized Sanitary System Servicing the North Central Area

Alternative C: Centralized Sanitary System Servicing the North Central Area			
Location	**System Requirements**	**Solution to the Bottleneck**	**Cost Estimate**
Long Sault Logistics Village Development Area	▪ Install an 800m long – 200 mm diameter gravity sewer from the proposed road crossing the LSVL development and extending south towards the Chase Meadows Development. ▪ 600 m of the proposed 200 mm gravity sewer proposed by the LSLV would need to be re-directed to west. ▪ The proposed 300 m long – 200 mm gravity sewer servicing Phase 2 of this development will be maintained as proposed by LSLV.	This option would allow to: ▪ Discharge flow coming from Phase 1 of the LSLV development directly into the trunk sewer rather than sending flow to the County Rd SPS and along the County Rd sanitary sewer. ▪ Remove one of the two proposed pumping station within the LSLV development, thus reducing operating costs.	**PAID FOR BY DEVELOPER**
Chase Meadows Development Area	▪ Install an 800m long – 200 mm diameter gravity sewer from the north-west area of this development to the pumping station proposed by the Chase Meadows Development. ▪ Install a 1.5 km long –250 mm diameter forcemain from the proposed pumping station and extending west and to be connected to the existing Trunk Sewer as showed in Figure 6-2.	This option would allow to discharge build-out flow coming from Chase Meadows development directly into the trunk sewer rather than sending flow to the 200 mm sanitary sewer at the intersection of Jim Brownell Boulevard and to the County Rd SPS.	▪ Primary Developer covers cost of internal sewers and base SPS. ▪ Township to finance incremental cost increase for exterior connections, depth, size for other developments and recover that cost from future developments. **Estimated costs to be covered by the Township: $2.7M (+/- 25%)**
Moulinette Road Subdivision	▪ Install a 500m long – 200 mm diameter gravity sewer from Moulinette road and extending east to be connected to the maintenance hole connecting with the proposed 250 mm forcemain as shown in Figure 6-2.	This solution would allow to re-routing flow coming from Moulinette Rd Subdivision to ultimately discharge directing into the Trunk Sewer rather than surcharging the 250 mm sanitary sewer located at the eastern limit of Moulinette Rd and directing to the Strachan Ave	**PAID FOR BY DEVELOPER**
County Road SPS Upgrades and FM	▪ Increase SPS Capacity from 47 L/s to 170 L/s to convey ultimate capacity of the upstream area. ▪ Increase Inlet SPS to 450 mm to convey build-out flow of 170 L/s.	This would be completed incrementally over time with pump replacements as the demand requires it; however, the wet-well will need to be upgraded/twinned to provide adequate volume.	**TOWNSHIP COSTS: $2.8M (+/- 25%)**

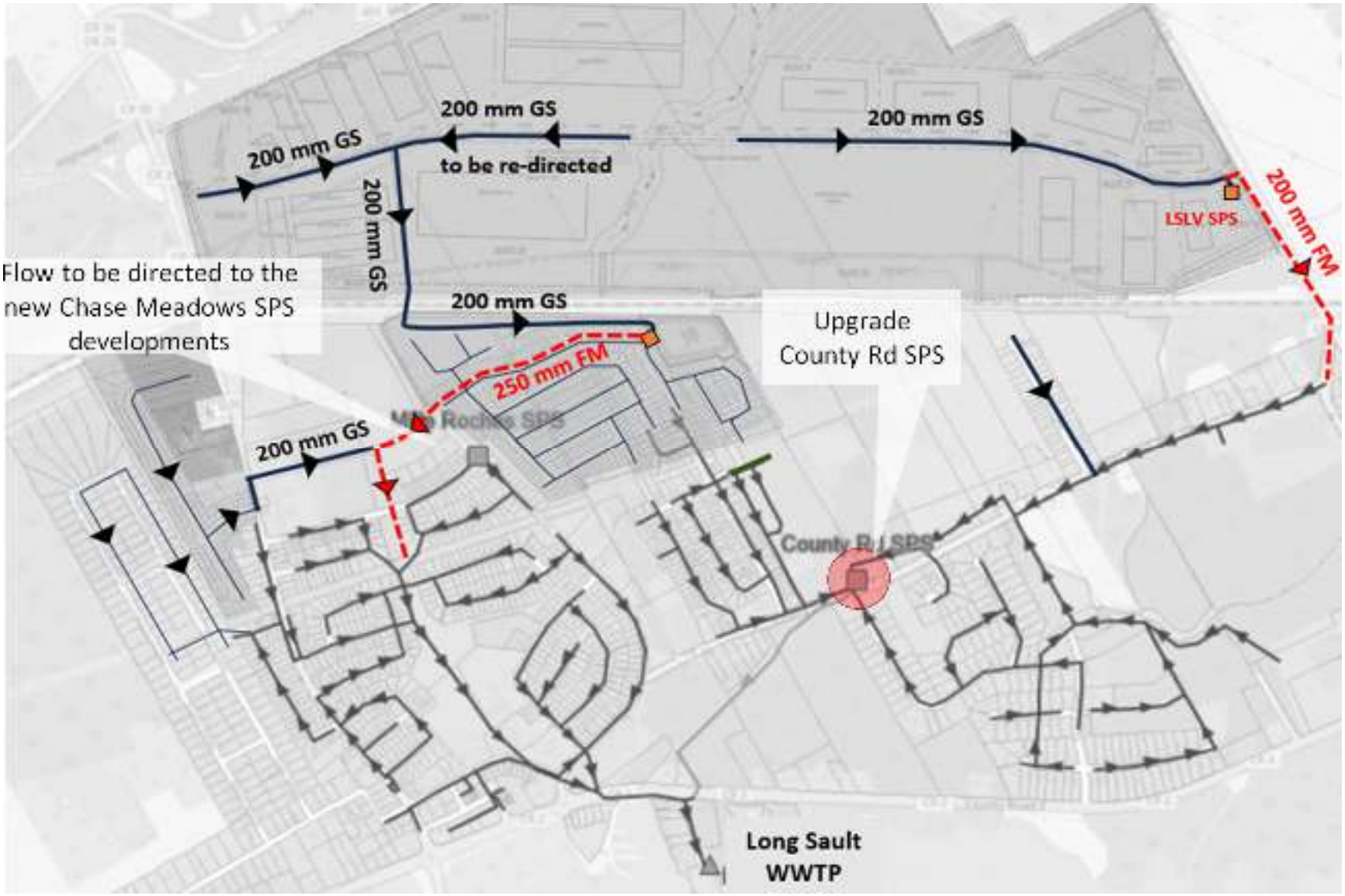


Figure 6-2 Alternative C: Centralized Sanitary System Servicing the North Central Area

6.3.3 Ingleside Sanitary System

Undeveloped areas within the municipal sanitary servicing area are currently located on the west side of the Village of Ingleside and would count a total of 440 single dwellings and 20.5 ha of industrial area. Based on preliminary review of the areas, those undeveloped areas would connect by gravity at the following connection points:

- At the 200mm sanitary on Napier Street.
- At the 450mm sanitary on Piercy Street.
- At the 200mm sewer which increases to 525 mm on St. Lawrence Street.

It should be noted that the industrial development areas located at the north-west limit of Ingleside would need to be connected to the sanitary sewer on St. Lawrence Street as shown in Figure 6-3 due to a section of the Trunk Sewer having limited capacity due to a shallow sewer at the intersection with Maple Street. Although this sewer would not be a concern as no additional areas would connect to it, it is recommended to investigate the impact of infiltration and inflow by performing a CCTV (closed circuit television) investigation. This would allow for an assessment of the need for rehabilitating leaky pipes or broken lateral connections in order to improve operational efficiency.

According to the design model, the existing sanitary sewer would be able to receive additional flow from future development without negative impacts on the existing sewer network with the exception of the existing Ingleside SPS which would need to be upgraded from 140 L/s to 280 L/s to accommodate ultimate build-out. Upgrades to the existing Ingleside SPS are planned as part of the existing Ingleside WWTP upgrades which are not part of this project scope. Therefore, no future configuration has been planned for future development within the municipal sanitary servicing area of Ingleside.

A description of the system restrictions and proposed solutions are discussed in Table 6-4.

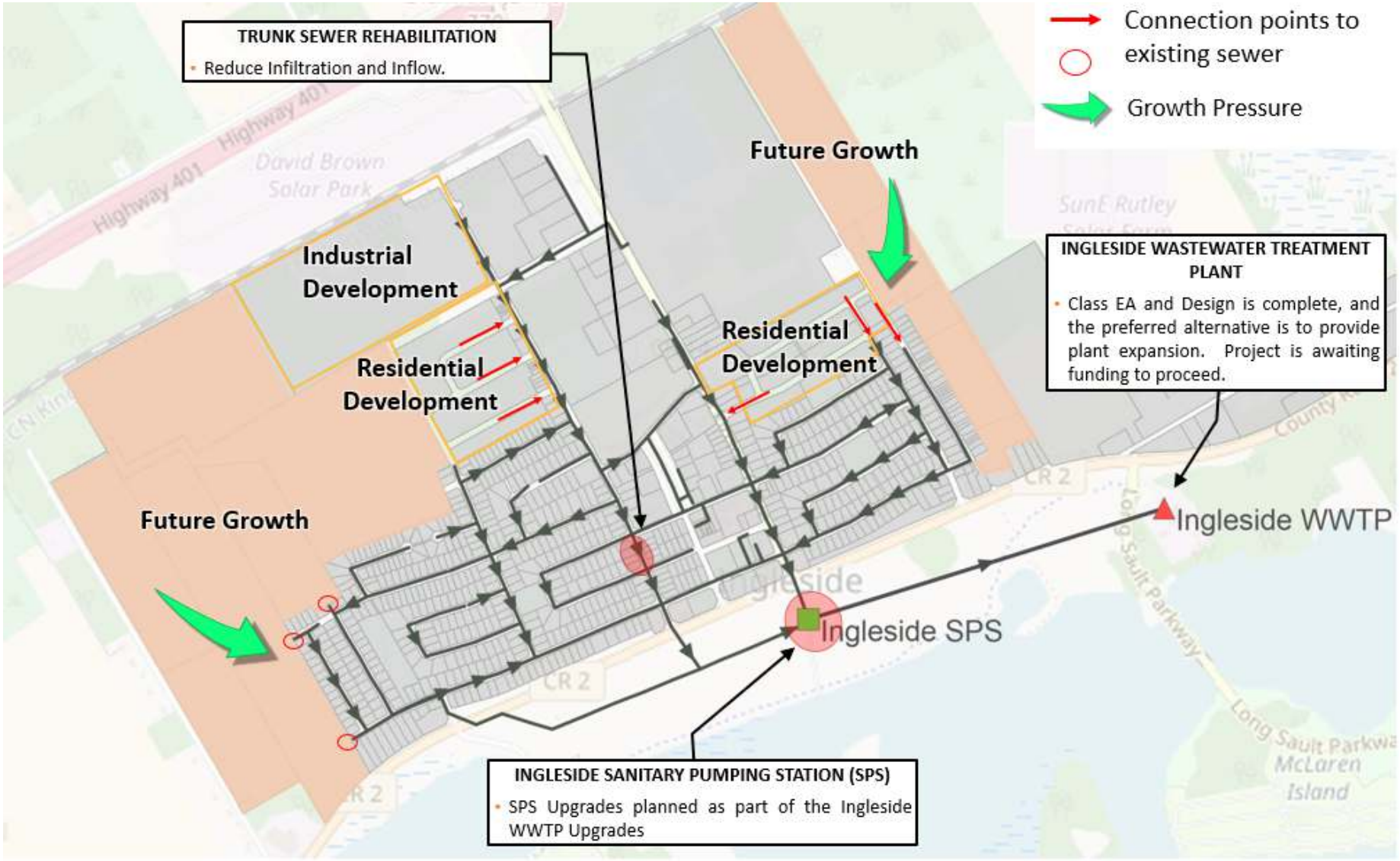


Figure 6-3 Ingleside Future Growth Sanitary Sewer Layout

Table 6-4 Ingleside Future Growth Sanitary Sewer Layout

Location	Identified Problem	Alternative	Capital Costs [a] (+/- 25%)
Farran Drive crossing Maple Street	The 525 mm trunk sewer along Farran Drive at the intersection with Maple Street would reach 80% capacity as a result of potential residential development west of Farran Drive and north of Beech Street, and the connection of the committed industrial area south of the CN railway.	**Alternative A:** Do Nothing	-
		Alternative B: Reduce Infiltration and Inflow by performing the following: ▪ CCTV (closed circuit television) to visualise the inside of pipes by using a small camera that travels down the length of a pipe to produce a visual representation of its condition. This would allow for an assessment of the need for rehabilitating leaky pipes or broken lateral connections.	$0.25K
Ingleside SPS	The Ingleside SPS will reach capacity with the addition of 100 units as a result of the development west of Farran Drive and north of Beech Street, or the residential development north of Hoople Street, depending on which of the two developments will come first	SPS Upgrades are already planned as part of the Ingleside WWTP Upgrades	Costs included in the Ingleside WWTP Upgrades

(a) Capital costs include engineering and contingency.

6.4 Stormwater Management Alternatives

6.4.1 Existing Conditions

Long Sault Stormwater System

During field review, ditches along Dale Street were flagged as being in poor condition, along with most of the buried driveway culverts. This would reduce pipe capacity under storm events. However, in this area, Big "O" pipes have been installed to divert water and mitigate overflow of the ditches. Therefore, no additional actions are required.

Moreover, the 600mm storm sewer along Mille Roches and directed to County Rd 36 was identified as not resilient to the 5- and 10-yr Design Storm by the South Stormont Asset Management Plan due to the age of the pipes. Although the Design Model did not report any restrictions, a condition assessment of those pipes is recommended to confirm sewer conditions.

Ingleside Stormwater System

Under existing conditions, several bottlenecks have been identified for the Ingleside Stormwater System. In Table 6-5, several alternatives have been identified and the preferred solutions have been indicated in agreement with the criteria reported in Section 8.

Table 6-5 Ingleside Storm Sewer Alternatives to Existing Bottlenecks

Location	Identified Problem	Alternative	Capital Costs [a] (+/- 25%)
400 mm storm sewer along College Street	The 400 mm sanitary sewer along College Street was not able to convey the 5-year design storm event. This sanitary sewer represents the main outlet to the upstream institutional / commercial area.	**Alternative A:** Do Nothing	-
		Alternative B: Upsizing the 400mm storm sewer	$1.0M
Storm Sewer From Hoople Street to Maxwell Avenue	The 200 mm sanitary sewer along Hoople Street was not able to convey the 5-year design storm. Additional flow directed downstream resulted in reaching full capacity of the downstream sewer up to Maxwell Avenue.	**Alternative A:** Do Nothing	-
		Alternative B: Upsizing the storm sewer from Hoople Street to Maxwell Avenue.	$1.2M
		Alternative C: Re-routing upstream flow. This alternative consists of upsizing the 200 m long storm sewer from 200 mm to 350 mm from Hoople Street to Elm Street and install a new 350mm pipe from Elm Street to be connected to the existing Maintenance Hole on Dickinson Drive (CR 14) to redirecting flow from Elm Street.	$1.1M

6.4.2 Future Development

Most of the existing urbanized areas as well as planned developments within the Village of Long Sault and Ingleside have been required to adopt Township policy, and municipal standard, of lot-level or subdivision-level control and storage. This means that a planned subdivision is required to meet quantity and quality control requirements within the development areas before discharging to the Township. Planned subdivision developments which have adopted lot level control within the Long Sault area include:

- Fenton Farm Development
- Parkway Estates Development
- Chase Meadows Development
- Moulinette Road Subdivision
- Long Sault Logistics Village Development

WT has assessed several alternatives to identify the optimum stormwater management scheme for both Long Sault and Ingleside. A description of each alternative is presented in Table 6-6.

Table 6-6 Stormwater Management Alternatives - Long Sault and Ingleside

Alternative	General System Requirements	Long Sault	Ingleside
Alternative A: Do nothing	▪ The "Do Nothing" or null alternative is always an alternative that is reviewed to ensure that the project is in fact necessary. The "Do Nothing" scenario means that the Township will not take any actions and the stormwater system will continue to operate as per current conditions.	N/A	N/A
Alternative B: Outfall End-of-pipe treatment	**Stormwater Management Facilities** ▪ Placed at each existing stormwater outfall location and prior to discharging to a natural stream or lake. ○ Facilities that outlet to the St. Lawrence Seaway would be required to meet quality control requirements. ○ Facilities that outlet to the Raisin River would be required to meet both quality and quantity control requirements. ▪ Some design considerations are listed below: ○ Ponds will be located where the land naturally drains. ○ Ponds would be volume-based sizing, designed to treat first flush rain (~25 mm rainfall depth). ○ The max depth of the SWM ponds should not exceed 3.3m, including a max freeboard of 0.3m. ○ The depth of permanent pool must be 1.0-1.5m ○ The 25mm storm event extended detention should discharge over a 24-to-48-hour period.	Three (3) Stormwater Facilities would be required located as reported in Table 8-7. The estimated costs of this alternative are in the range of $4.5M (+/- 25%) including engineering and contingency.	Four (4) Stormwater Facilities would to be constructed by the Township would be required One (1) Planned Stormwater Facility constructed by the developer would need to be sized to meet future municipal development. Facilities to be located as reported in Table 8-8. The estimated costs of this alternative are in the range of $8.0M (+/- 25%) including engineering and contingency.
Alternative C: Localized Treatment	**Stormwater Interceptors (underground treatment maintenance holes) to be installed.** ▪ Phased approach to implementing stormwater quality controls where implementation occurs during road reconstruction projects. ▪ Preferred quality control methodology would likely include the implementation of oil-grit separator (OGS) on a street-by-street level. ▪ Future residential developments must meet quantity and quality control requirements with the construction of SWM facilities.	Approximately Forty (40) Stormwater Interceptors would be required located as reported in Table 6-7. The estimated costs of this alternative are in the range of $6.0M (+/- 25%) including engineering and contingency.	Approximately Twenty (20) Stormwater Interceptors would be required located as reported in Table 6-8. The estimated costs of this alternative are in the range of $3.0M (+/- 25%) including engineering and contingency.

Alternative D: Individual lot-level control and storage	▪ Future developments must meet quantity and quality control requirements within the development areas before discharging to the Township. ▪ Post-development peak runoff must not exceed the corresponding pre-development peak runoff for storm events with return periods of 5 and 100 years.	Capital Costs are responsibility of landowners. Operating costs for the Township will depend by the installed SWM facilities	Capital Costs are responsibility of landowners. Operating costs for the Township will depend by the installed SWM facilities
Alternative E: Implement LID Controls	**Bio-Swales** ▪ Existing Ditches would be retrofitted to Bio-Swales to treat and slow down stormwater discharge in existing neighbours. Some design considerations are listed below: ○ Slope should be between 0.5 and 4%. For slopes steeper than 3%, check dams should be used. Slopes less than 1% enhance the removal rate of pollutants. ○ Bottom width should be between 0.75 and 3.0 m. ○ A maximum flow depth of 100 mm is recommended during a 4-hour, 25 mm Chicago storm event.	The estimated costs of this alternative are in the range of $7.0M (+/- 25%) including engineering and contingency.	The estimated costs of this alternative are in the range of $7.0M (+/- 25%) including engineering and contingency.

Table 6-7 Long Sault – Future Stormwater System Configuration Options

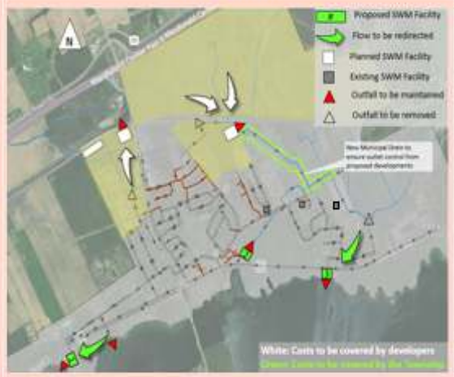
	Alternative A - Do Nothing	Alternative B: Outfall End-of-pipe treatment	Alternative C: Localized Treatment	Alternative D: Individual lot-level control and storage	Alternative E: Implement Low Impact Design (LID) Quality Controls
					
Description	The stormwater system will continue to operate as per current conditions.	Stormwater (SWM) Facilities placed at each existing stormwater outfall location within original Town area. New development areas would use lot-level control	Implementing stormwater quality controls where implementation occurs during road reconstruction projects. Installation of oil-grit separator (OGS) on a street-by-street level, designed to remove oil and grit from stormwater runoff.	Future developments responsible to meet quantity and quality control requirements within the development areas before discharging to the Township.	Existing Ditches would be retrofitted to Bio-Swales to treat stormwater runoff before it enters the sewer system. The natural landscape of the bioswale helps filter out pollutants from rainwater runoff and make sure that it is cleaner when it flows into lakes, rivers and streams.
Advantages	No additional Costs Required	• High level of treatment achieved • Higher amount of flow to be treated/stored • Address impacts within original Town site • New development areas would use lot-level control covering capital costs and operating costs • Cost-effective alternative	• Phased approach to implementing stormwater quality controls where implementation occurs during road reconstruction projects. • Promote infiltration and pollutant removal on a local site-by-site basis	• Suitable for new development and vacant properties • Not dependent upon upstream and downstream drainage facilities • Developers will be responsible for capital and operation and maintenance costs	• Promote infiltration and pollutant removal on a local site-by-site basis. • Focused on more frequent storm events of lower volumes as opposed to less frequent storm events with higher volume.
Disadvantages	Does not address Township Requirements	• Requires property acquisition for SWM facilities • Dependent upon upstream and downstream drainage facilities • Highest relative operating cost due to SWM facilities to be maintained by the Township.	• Construction impacts in localized areas • Increased cost relative to the installation of stormwater interceptors to be maintained • Elevate number of infrastructure required	• Construction impacts in localized areas • Does not address impacts within the original Town site area	• Dependent on type of soil conditions • Leaching from swale vegetation may increase the presence of trace metals and nutrients in the runoff. • Infiltration through the swale may carry pollutants into local groundwater • Construction impacts in residential areas as Bio-Swale implementation will occur where existing ditches currently are • Increased cost relative to vegetation maintenance
Capital Costs (+/- 25%)	**No Capital Costs**	**$4.5M**	**$6.0 M**	**No Capital Costs**	**$7.0 M**
Recommended Solutions?	**NO**	**YES**	**NO**	**NO**	**NO**

Table 6-8 Ingleside – Future Stormwater System Configuration Options

	Alternative A - Do Nothing	Alternative B: Outfall End-of-pipe treatment	Alternative C: Localized Treatment	Alternative D: Individual lot-level control and storage	Alternative E: Implement Low Impact Design (LID) Quality Controls
					
Description	The stormwater system will continue to operate as per current conditions.	Stormwater (SWM) Facilities placed at each existing stormwater outfall location within original Town area. New development areas would use lot-level control	Implementing stormwater quality controls where implementation occurs during road reconstruction projects. Installation of oil-grit separator (OGS) on a street-by-street level, designed to remove oil and grit from stormwater runoff.	Future developments responsible to meet quantity and quality control requirements within the development areas before discharging to the Township.	Existing Ditches would be retrofitted to Bio-Swales to treat stormwater runoff before it enters the sewer system. The natural landscape of the bioswale helps filter out pollutants from rainwater runoff and make sure that it is cleaner when it flows into lakes, rivers and streams.
Advantages	No additional Costs Required	• High level of treatment achieved • Higher amount of flow to be treated/stored • Address impacts within original Town site • New development areas would use lot-level control covering capital costs and operating costs	• Phased approach to implementing stormwater quality controls where implementation occurs during road reconstruction projects. • Promote infiltration and pollutant removal on a local site-by-site basis • Two (2) SWM facilities to be constructed by developers (capital costs covered by developers) and One (1) SWM facility south of 45th Parallel Drive to be upsized to accommodate for future residential areas. • Promote control flow, thus avoiding to upsize existing storm sewer pipes.	• Suitable for new development and vacant properties • Not dependent upon upstream and downstream drainage facilities • Developers will be responsible for capital and operation and maintenance costs	• Promote infiltration and pollutant removal on a local site-by-site basis. • Focused on more frequent storm events of lower volumes as opposed to less frequent storm events with higher volume.
Disadvantages	Does not address Township Requirements	• Requires property acquisition for SWM facilities • Dependent upon upstream and downstream drainage facilities • Highest relative operating cost due to SWM facilities to be maintained by the Township. • Highest capital costs alternative	• SWM facilities operating costs covered by the Township • Construction impacts in existing residential areas • Increased cost relative to the installation of stormwater interceptors to be maintained • Elevate number of infrastructure required	• Construction impacts in localized areas • Does not address impacts within the original Town site area	• Dependent on type of soil conditions • Leaching from swale vegetation may increase the presence of trace metals and nutrients in the runoff. • Infiltration through the swale may carry pollutants into local groundwater • Construction impacts in residential areas as Bio-Swale implementation will occur where existing ditches currently are • Increased cost relative to vegetation maintenance
Capital Costs (+/- 25%)	**No Capital Costs**	**$8.0M**	**$3.0 M**	**No Capital Costs**	**$7.0 M**
Recommended Solutions?	**NO**	**NO**	**YES**	**NO**	**NO**

6.5 Transportation Alternatives

Figure 6-4 and Figure 6-5 show the transportation network alternatives for both Long Sault and Ingleside, respectively.

The majority of the original town site has sidewalks on both sides of the roadway, while the first iteration of new areas (1970-1985) and more estate subdivisions (Forest Hill and Chantine Meadows) have no sidewalks. More recent developments (Chase Meadows and Fenton Farms) have sidewalks on one side of the road only. Additionally, with the development along County Road 36, there has been evidence of increased pedestrian traffic along this alignment as well, which will increase with the population growth in this specific area of the community. There currently is no sidewalk or multi-use trail along County Road 36. County Road 36 is being considered within the MSS due to the potential for it to be downloaded to the Township within the near future.

Sidewalks can be a contentious addition to any road cross-section as long-term residents have acclimatized to the lack of sidewalks and the addition of sidewalks within the right-of-way reduce the sense of privacy residents feel in their front yards. However, in areas where through traffic is evident, sidewalks provide necessary protection from pedestrian vehicle collisions.

In addition to sidewalks, another concern that was identified by the public was the speed of vehicular traffic on local roads. This was not supported by identifiable "hot spots" of pedestrian-vehicle collisions; however, it is evident that there are areas where the road design promotes higher speed progression. Areas that were identified in Long Sault include the following:

- County Road 36
- Mille Roches Road
- French Avenue
- Moulinette Road (County Road 35)
- Manning Road
- Simcoe Street

The common thread between these locations is that they are either the exit/entrance streets to the community or the perimeter roads around the community with limited physical restrictions. This issue is more of a global issue than an identified current limitation. This will be addressed specifically in the traffic calming section of the MSS.

From an active transportation standpoint, the Waterfront Master Plan identified the alternative of a new multi-use trail between Long Sault and Ingleside. This would be placed along the south limit of the County Rd No. 2 right-of-way with the approval of the Counties. The alternatives for this project are to do nothing or to find an alternative alignment.

In addition to the pedestrian and active transportation gaps, there are also identified condition issues related to the existing pavement structures on several streets in Long Sault including: Ouelette Ave., French Ave., Simcoe Ave., Plaza Dr., Chantine Dr., Structured Products Rd., Jenkins Rd., Moss Rd., Thompson Dr., Columbia Ave. (partial) and Warner Dr. These projects are not directly related to the master servicing study as they are condition rather than capacity or functionality related; however, they must be considered in the prioritization of solutions in order to maximize the cost benefit for capital renewal investments.

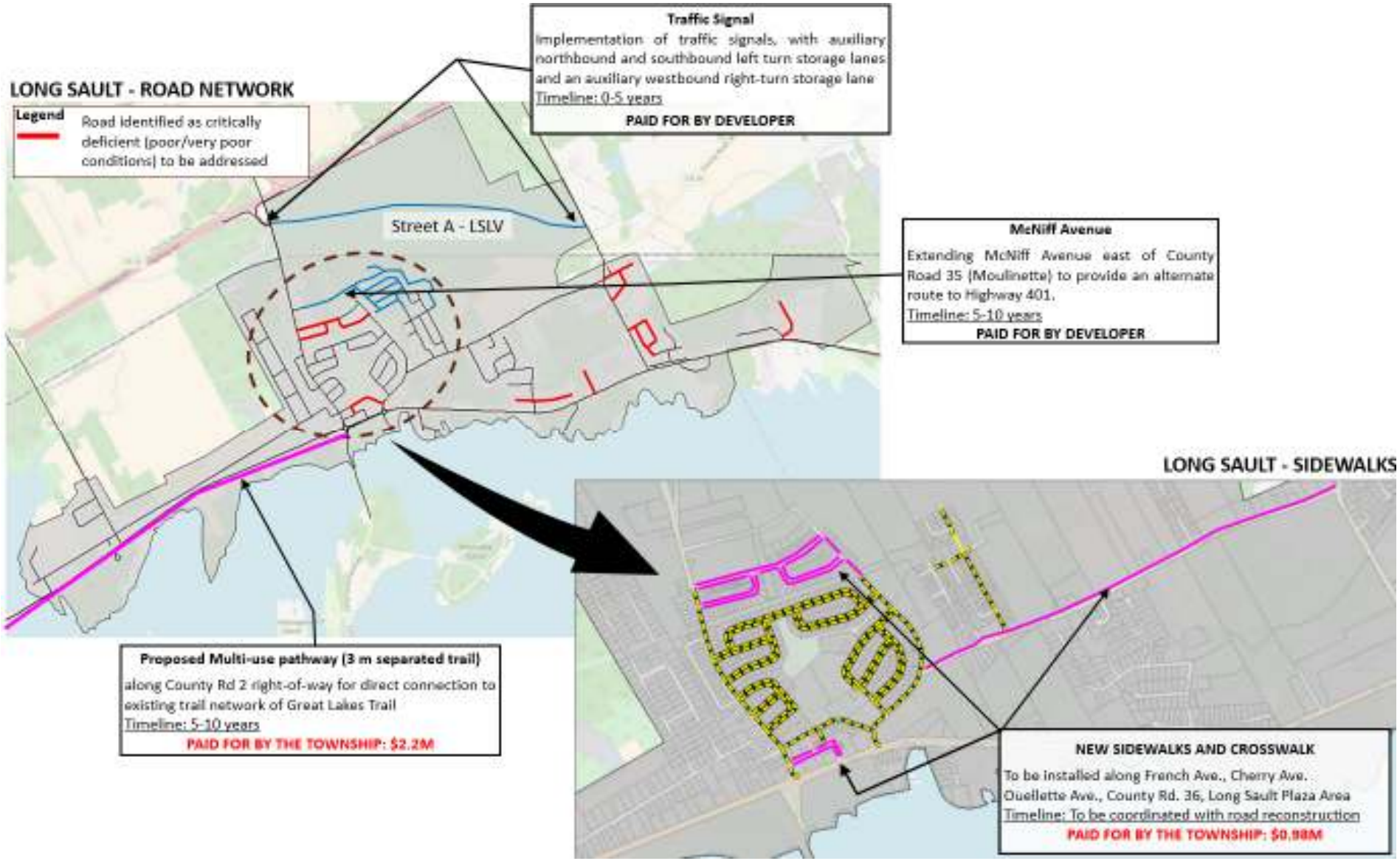


Figure 6-4 Long Sault Transportation Network Alternatives

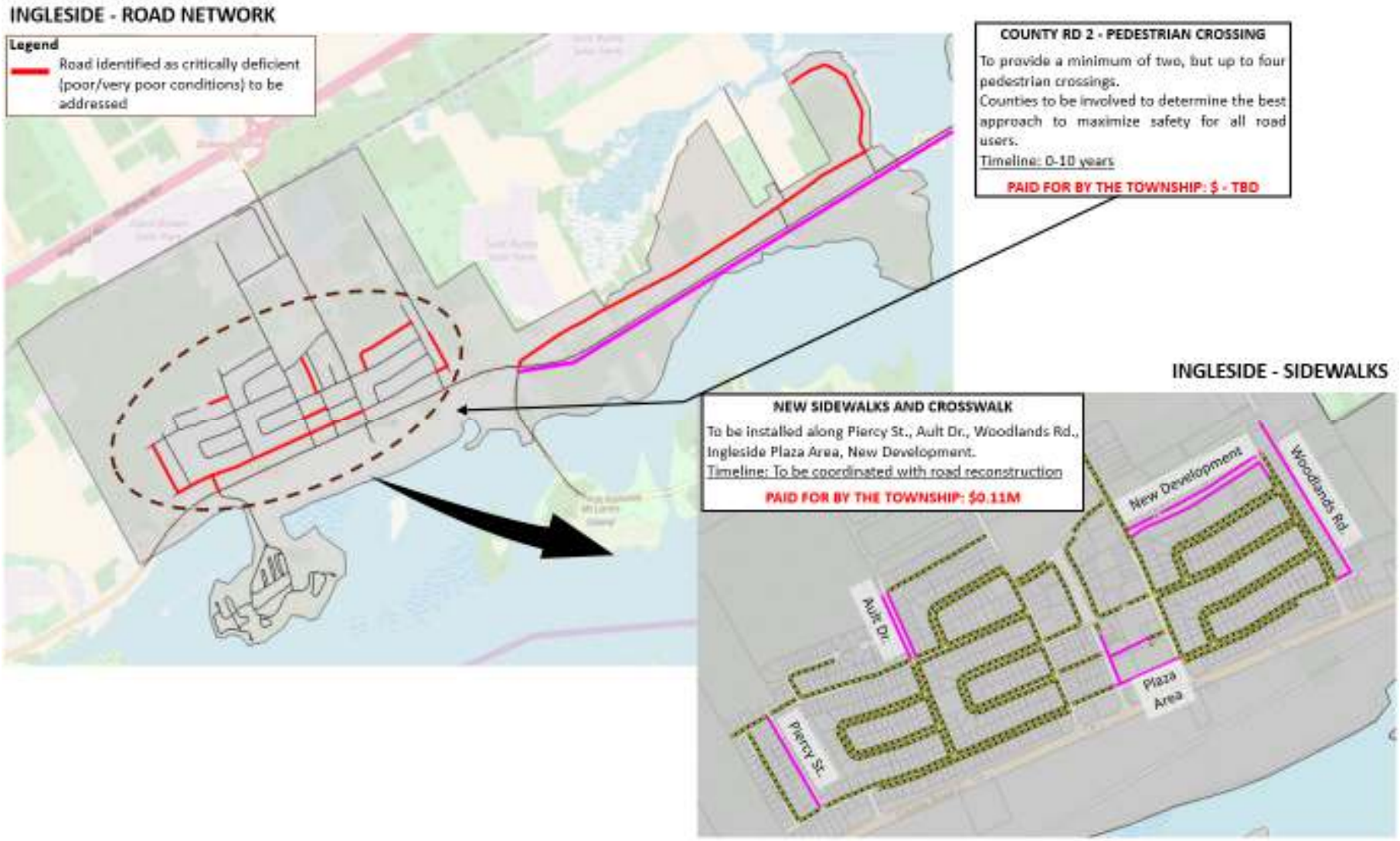


Figure 6-5 Ingleside Transportation Network Alternatives

7 EVALUATION OF ALTERNATIVES

7.1 Alternative Evaluation Criteria

The evaluation of alternatives is intended to be an unbiased assessment of each alternative against the defined design criteria and the Class EA environmental components that will allow for the selection of the preferred alternative. The following is a brief explanation of each of the primary criteria:

1. **Technical –** This is a relative comparison of the technical effectiveness of each alternative in achieving the project goals. It is intended to address both feasibility and efficiency of the proposed alternatives. This criterion addresses the technical effectiveness in terms of the user experience, operational effectiveness, and general efficiency of approach.
2. **Natural Environment –** This is both a relative comparison and absolute assessment of impacts (positive and negative) of the proposed alternatives on the natural environment. Specifically, this is looking at the ecosystem impacts, sensitivity of the project area to change and other impacts including changes to geotechnical or hydrogeologic conditions. If the preferred alternative were to have significant absolute impacts that cannot be effectively mitigated that will impact the selection of the preferred alternative even if it is the least impactful of the actionable alternatives.
3. **Social/Cultural Heritage Environment –** This is both a relative comparison and absolute assessment of impacts (positive and negative) of the proposed alternatives on the social (residents, visitors, community, recreational opportunities) and cultural heritage (Indigenous lands, archaeological).
4. **Economic Environment** – This is both a relative comparison and absolute assessment of impacts (positive and negative) of the proposed alternative associated with the economic environment. This addresses the capital cost of the infrastructure required for each alternative as well as other economic impacts such as loss of land development potential, lost opportunities associated with land acquired for municipal infrastructure and potential economic loss due to changes in business opportunities. Furthermore, the factor of affordability is a consideration in terms of the cost vs benefit to the community and if the return on investment is reasonable.

7.2 Alternative Evaluation Ranking and Weighting

The approach to determining the preferred alternative is intended to be transparent and defensible. Our approach to is score each alternative against the same parameters and then rank the alternatives relatively. The objective of this approach is to compare apples to apples. It is acknowledged that there is some level of subjectivity to this type of analysis and the explanation to support the scoring is intended to provide justification for the assessment of each parameter.

The scoring criteria that are used and examples of what will constitute each scoring situation are included in Table 7-1. Minor variations between similar alternatives will be scored based on the comparative evaluation between each alternative. For example, two alternatives that both are feasible with limited restrictions, but, relatively, the limited restrictions are less significant on one alternative than the other, then the alternative with the least restrictions would score an 8 and the alternative with slightly more restrictions would score a 7.

Table 7-1: Scoring Criteria Examples

	Score				
	0-2	3-4	5-6	7-8	9-10
Relative Impact	**Critical**	**Significant**	**Potential**	**Minor**	**Negligible**
Technical	Does not provide a feasible solution.	Feasible with significant restrictions	Feasible with some restrictions	Feasible with limited restrictions	Feasible with no restrictions
Natural	Definite impacts to species at risk, permanent or irreversible impacts	High potential for impacts to species at risk or natural environment, permanent/semi permanent impacts	Potential for impacts to the natural environment that may have an impact on habitat or natural features, semi-permanent or temporary	Potential for minor impacts to natural environment that can be mitigated to minimize risk.	Limited or no impacts on the natural environment
Social	Major permanent negative impacts on significant population, permanent loss of cultural features	Significant permanent or long-term impacts on social environment, potential for loss of cultural features.	Localized permanent or long-term impacts on social environment, potential for impact on cultural features.	Limited permanent or temporary impacts on social environment, limited potential for impact on cultural features.	Limited to no impacts and any impacts are readily mitigated.
Economic	Unaffordable, catastrophic adverse economic impact on proponent and/or public, return on investment is beyond lifespan of infrastructure	High cost, potential for significant adverse economic impact, return on investment is a significant component of infrastructure lifespan	Relatively high cost, minor potential for adverse economic impact, return on investment is over 10 years.	Relatively low cost, potential for positive economic impact, return on investment is less than 5 years.	Lowest cost, defined positive economic impact, shortest return on investment.

7.3 Existing Conditions

The existing conditions evaluation of alternatives is focused on issues that are current within the system. They will be impacted by growth; however, correction of the issue will also benefit the current operation of the system.

7.3.1 Regional Water Supply – Long Sault Pressure Zone

The evaluation of these alternatives in Long Sault is straightforward with a limited number of alternatives in most cases. Provided there are no alternatives that require work outside of the right-of-way, then the projects will be assessed on a technical basis only as they are exempt from the requirements of the Class EA process. The following table illustrates the issues, alternatives, and recommendations within the Long Sault Pressure Zone.

Table 7-2: Long Sault Water Distribution System Bottleneck Alternatives

Location	Identified Problem	Alternative	Proposed Solution
East end of Moulinette Island	The East Island Causeway hydrant does not meet FUS fire requirements (66.7 L/s) but does meet original MECP requirement (38 L/s).	**Alternative A:** Do Nothing **Alternative B:** Upsize watermain loop on Island to 200mm.	**Alternative A:** Do Nothing. The available fire flow is 90% of the FUS requirement and location is proximate to Lake for an alternative water source during fire event.
Long Sault Dead-ends	Inadequate fire flow at the end of Waldner Ave. and Barry St. There are no hydrants at the end of the streets currently and all residences are within 150 m of a hydrant.	**Alternative A:** Do Nothing **Alternative B:** Upsize local watermains to 200mm.	**Alternative A:** Do Nothing. The current residential areas are covered by compliant fire hydrants. If future extensions of either Waldner or Barry are considered, then looping or upsizing the watermain should be considered.
Chantine Drive Dead-end	The existing 150mm watermain extends approximately 175 m from the nearest pipe intersection. The hydrant at the end of the cul-de-sac does not meet the FUS requirements but does meet the original MECP requirements.	**Alternative A:** Do Nothing **Alternative B:** Upsizing the watermain to 200mm.	**Alternative A:** Do Nothing. The available fire flow is 93% of the FUS requirement.
Jenkins Road Dead-end	The existing 150mm watermain has a hydrant at the end of the road which does not meet the FUS requirement but does meet with original MECP requirements.	**Alternative A:** Do Nothing **Alternative B**: Upsizing the watermain to 200mm.	**Alternative A: Do Nothing.** The available fireflow is 75% of the FUS requirement. There is only one house that is not within 150m of a compliant fire hydrant.

7.3.2 Regional Water Supply – Ingleside Pressure Zone

The evaluation of these alternatives in Ingleside is straightforward with a limited number of alternatives in most cases. Provided there are no alternatives that require work outside of the right-of-way, then the projects will be assessed on a technical basis only as they are exempt from the requirements of the Class EA process. The following table illustrates the alternatives and recommendations in the Ingleside Pressure Zone.

Table 7-3 - Ingleside Water Distribution System Alternatives to Existing Bottlenecks

Location	Identified Problem	Alternative	Proposed Solution
Northwest quadrant of Ingleside (Farran Point, Napier, Piercy, St. Lawrence, Hickory, Cedar)	The entire area has 150mm watermain with limited looping and multiple dead-ends. The hydrants do not meet the FUS requirements but do meet the original MECP requirements.	**Alternative A:** Do Nothing **Alternative B:** Upsize watermain to 200mm on Hickory St. **Alternative C:** Provide looping connections as part of future developments north of Hickory.	**Alternative C:** When development occurs, make the connections to the existing system to facilitate proper looping and size the watermains to ensure fireflow is achieved. Current fire flow is between 75% and 99% of FUS requirements.
Wales Drive/Woodlands Road Dead-ends	Inadequate fire flow at the end of Wales Drive and Woodlands Rd. Woodlands Rd does not meet either MECP or FUS requirements. Watermains are long 150mm unlooped connections.	**Alternative A:** Do Nothing **Alternative B:** Upsize local watermains to 200mm. **Alternative C:** Provide looping connections as part of future developments north of current limits.	**Alternative C:** When development occurs, make the connections to the existing system to facilitate proper looping and size the watermains to ensure fireflow is achieved. Current fire flow is between 50% and 75% of FUS requirements.
Colonial Drive Dead-end	The existing 150mm watermain extends approximately 700m from the nearest pipe intersection at Wales and Santa Cruz. None of the hydrants along this alignment meet either the FUS or MECP Requirements.	**Alternative A:** Do Nothing **Alternative B:** Upsizing the watermain to 200mm. **Alternative C:** Provide a secondary connection from the transmission main that parallels this line.	**Alternative A:** Do Nothing. The cost of upgrades will be significant with minimum fire demands along this alignment. Upgrade when future projects are planned along Colonial.

7.3.3 Long Sault Sanitary System

As reported in Table 7-4, for each of the identified bottlenecks, several alternatives have been considered which would include upsizing the sewer and/or re-routing upstream flow to decrease wastewater quantity. Provided there are no alternatives that require work outside of the right-of-way, then the projects will be assessed on a technical and financial basis only as they are exempt from the requirements of the Class EA process.

Table 7-4 Long Sault Sanitary System Alternatives to Existing Bottlenecks

Location	Identified Problem	Alternative	Proposed Solution
South of County Road 36	The 250 mm sanitary sewer south of County Rd 36 is at 80% capacity. This sanitary sewer represents the main outlet to the developed and undeveloped areas south and along the County Rd. Under current conditions, the sewer would not be able to receive additional flow, limiting development south of County Rd 36.	**Alternative A:** Do Nothing **Alternative B:** Upsizing the 250mm sanitary sewer **Alternative C:** Re-routing upstream flow	**Alternative B: Upsizing sanitary sewer:** This alternative consists of increasing the 450m long sanitary sewer located south of County Rd 36 from 250mm to 350mm to convey flow of up to 60 L/s.

North of County Rd 36	The 300 mm sanitary sewer North of County Rd 36 is at 75% capacity. This sanitary sewer will collect all the flow coming from County Rd 36 and directed to County Rd SPS. Under current conditions, the sewer would not be able to receive additional flow, limiting development along County Rd 36.	**Alternative A:** Do Nothing	**Alternative B: Upsizing sanitary sewer:** This alternative consists of increasing the 500m long sanitary sewer on the eastern upstream of the County Rd SPS. The sanitary sewer would need to be upsized from 300mm to 450mm to convey build-out flow.
		Alternative B: Upsizing the 250mm sanitary sewer	
		Alternative C: Re-routing upstream flow	

From a cost effectiveness perspective, for each of the identified bottlenecks, the preferred alternative was upsizing the sanitary sewers. In both cases, the Do-nothing alternatives would not solve the identified problems, thus limiting future development. With regard to re-routing flow, the sanitary sewer south on County Rd 36 is the main outlet of all the development areas north and east of County Rd SPS. Therefore, re-routing the upstream flow was not considered as a viable solution. On the other hand, re-routing flow upstream of the sanitary sewer south of County Rd 36 would require land acquisition with the construction of a new sanitary pumping station and forcemain, resulting in higher capital costs. Therefore, upsizing the sanitary sewers are the preferred solutions to the identified bottlenecks.

7.3.4 Ingleside Sanitary System

The Design Model did not report any existing restrictions for the Ingleside Sanitary System under current conditions.

7.3.5 Long Sault Stormwater System

The Design Model did not report any existing restrictions for the Long Sault Stormwater System under current conditions.

7.3.6 Ingleside Stormwater System

As reported in Table 7-5, for each of the identified bottlenecks, several alternatives have been considered. In general terms, these deficiencies are a function of the high stormwater flow and small sewer diameter. Solutions to decrease stormwater flow or increase pipe capacity were explored with the intent of developing cost-efficient solutions. The evaluation of these alternatives is straightforward with a limited number of alternatives. Provided there are no alternatives that require work outside of the right-of-way, then the projects will be assessed on a technical and financial basis only as they are exempt from the requirements of the Class EA process.

Table 7-5 Ingleside Storm System Alternatives to Existing Bottlenecks

Location	Identified Problem	Alternative	Proposed Solution
400 mm storm sewer along College Street	The 400 mm sanitary sewer along College Street was not able to convey the 5-year design storm event. This sanitary sewer represents the main outlet to the upstream institutional/commercial area.	**Alternative A:** Do Nothing	**Alternative B: Upsizing storm sewer:** This alternative consists of increasing the 400mm - 300m long storm sewer from 400mm to 525mm to convey the 5-year design storm.
		Alternative B: Upsizing the 400mm storm sewer	
		Alternative C: Re-routing upstream flow	

Storm Sewer From Hoople Street to Maxwell Avenue	The 200 mm sanitary sewer along Hoople Street was not able to convey the 5-year design storm. Additional flow directed downstream results in reaching full capacity of the downstream sewer up to Maxwell Avenue.	**Alternative A:** Do Nothing **Alternative B**: Upsizing the storm sewer from Hoople Street to Maxwell Avenue. **Alternative C:** Re-routing upstream flow.	**Alternative C: Re-routing upstream flow:** This alternative consists of upsizing the 200 m long storm sewer from 200 mm to 350 mm from Hoople Street to Elm Street and install a new 350mm pipe from Elm Street to be connected to the existing Maintenance Hole on Dickinson Drive (CR 14) to redirecting flow from Elm Street.

7.3.7 Transportation System

As indicated in the background section of the study, there are no identified areas of capacity restriction in the existing road network. However, there are identified areas of concern within the community related to pedestrian and active transportation as described in the next sections.

Long Sault

Similar to some of the other existing condition corrections, there are a limited number of alternatives and, realistically, the option in most cases is do nothing or do something. The following table illustrates the alternatives related to these issues.

Table 7-6: Long Sault Existing Condition Transportation Alternatives

Location	Identified Problem	Alternative	Proposed Solution
Sidewalks along Existing Streets in Long Sault (Ouelette, Cherry, French, Barnhart, Plaza Drive)	There is an inconsistency of pedestrian thoroughfares in Long Sault between different vintages of development. In some areas, the lack of sidewalks results in pedestrians needing to walk on the street. Some of these streets (French Ave., Plaza Dr., County Rd. 36) are higher traffic areas with speed or routing concerns. Other areas such as Barnhart and Ouelette are primarily local roads with limited to no through traffic.	**Alternative A:** Do Nothing **Alternative B:** Provide minimum sidewalk on one side of the street in all locations lacking a sidewalk. **Alternative C:** Provide minimum sidewalk on one side of the street on any streets that are considered a minor collector within the community.	**Alternative C: Sidewalks on Prioritized Streets:** This alternative will provide 1.5m sidewalks on French Ave., Plaza Dr., and County Rd 36. This work can be completed with an infrastructure renewal project or independently. The work should be coordinated with pedestrian crossings and traffic calming to reduce the risk of conflicts. Additionally, traffic calming should be provided on the streets with shared pedestrian/vehicular traffic to mitigate the risk of conflict. **Estimated Cost: $980,000**
Active Transportation Network Connectivity	The Great Lakes Waterfront Trail diverts from a separated multi-use trail to a shared road along the Long Sault Parkway. This is appropriate for recreational users with proper signage and traffic speed management; however, for active transportation, this is a diversion from the desire line along County Rd No. 2.	**Alternative A:** Do Nothing **Alternative B**: Construct new multi-use trail from Long Sault to Ingleside on south side of County Rd No. 2 ROW.	**Alternative B: Multi-use Trail along County Rd 2 ROW:** This alternative will require coordination/approval from SDG; however, it provides a direct route to provide options for active transportation across the south limit of South Stormont. **Estimated Cost: $2.2M (Long Sault)**

Ingleside

Ingleside was developed at the same time as Long Sault and therefore has similar existing issues related to the vintage of streets and the associated pedestrian infrastructure that was included. The majority

of the original town site has sidewalks on both sides of the road. There are currently no sidewalks leading to the Ingleside Plaza with full connectivity in terms of either pedestrian crossings or defined pathways to allow for pedestrian access or egress from the site. Additionally, the following streets do not have any existing sidewalks:

- Piercy Street
- Ault Drive North of Hickory
- Woodlands Road

One difference between Long Sault and Ingleside is that Ingleside is closer to a grid pattern and there are not the obvious entrance and exit routes or perimeter roads that are used by larger volumes of vehicular traffic at higher speeds. This may change with additional development; however, the layout of the community does not promote higher risk vehicular/pedestrian conflicts within the main town site with the exception of the area around the Plaza where the combination of the parking lot layout and lack of pedestrian pathways would seem to increase the likelihood of conflicts. It is important to note that this is theoretical, and the accident data does not support this as a critical problem. However, as part of the MSS objectives, improving safety should be proactive rather than reactive where feasible.

Independent from the main town site, County Rd No. 2 is configured and acts very differently than in Long Sault. In Long Sault, there are two roundabouts that act to reduce speed and provide pedestrian/active transportation access to the waterfront. County Rd No. 2 has a speed limit of 80 km/hr up to approximately 200 m before the intersection of County Rd No. 2 and County Rd No. 14 (Dickinson Dr.), at which point it reduces to 70 km/hr. As there is no physical infrastructure that promotes a reduction in speed other than signage, it is anticipated that the average speed through this area would be 80 km/hr or more. There is no signalized or signed pedestrian crossing of County Rd No. 2; however, the waterfront, Waterfront Trail and Farran Park Campground are all desirable destinations for active transportation including pedestrians. As such, there is an existing identified need both for traffic calming and safe pedestrian/active transportation crossing of County Rd No. 2. Since County Rd No. 2 is outside of the jurisdiction of the Township, any recommendations in the MSS will need to be coordinated with the Counties for approval and implementation.

Table 7-7: Ingleside Existing Condition Transportation Alternatives

Location	Identified Problem	Alternative	Proposed Solution
Sidewalks along Existing Streets in Ingleside (Piercy, Ault, Woodlands, Ingleside Plaza)	There is an inconsistency of pedestrian thoroughfares in Ingleside between different vintages of development. In some areas, the lack of sidewalks results in pedestrians needing to walk on the street. Some of these streets (Plaza Area, Ault) are higher traffic areas with speed or routing concerns. Other areas such as Piercy and Woodlands are primarily local roads with limited to no through traffic.	**Alternative A:** Do Nothing	**Alternative C: Sidewalks on Prioritized Streets:** This alternative will provide sidewalks on Ault and around the Plaza. This work can be completed with an infrastructure renewal project or independently. The work should be coordinated with pedestrian crossings and traffic calming to reduce the risk of conflicts. Additionally, traffic calming should be provided on the streets with shared pedestrian/vehicular traffic to mitigate the risk of conflict. **Estimated Cost: $110,000**
		Alternative B: Provide minimum sidewalk on one side of the street in all locations lacking a sidewalk.	
		Alternative C: Provide minimum sidewalk on one side of the street on any streets that are considered a minor collector within the community.	
	County Rd No. 2 is a relatively high speed throughfare with no defined	**Alternative A:** Actuated Pedestrian Signal	The proposed solution is to provide a minimum of two, but

County Rd No. 2 Pedestrian Crossings	pedestrian crossings to access waterfront activities. Three crossings at Killarney, Dickinson and either Wales or the Long Sault Parkway entrance should be considered.	**Alternative B:** Signalized Intersections **Alternative C:** Roundabout at Dickinson and Actuated Pedestrian Signal at other crossings.	up to four pedestrian crossings. Due to the lack of Township jurisdiction, and the potential number of solutions that could be feasible, it is recommended to engage the Counties to have determine the best approach to maximize safety for all road users. **Estimated Township Cost: TBD (County Coordination)**
Active Transportation Network Connectivity	The Great Lakes Waterfront Trail diverts from a separated multi-use trail to a shared road along the Long Sault Parkway. This is appropriate for recreational users with proper signage and traffic speed management; however, for active transportation, this is a diversion from the desire line along County Road No. 2.	**Alternative A:** Do Nothing **Alternative B**: Construct new multi-use trail from Long Sault to Ingleside on south side of County Rd No. 2 ROW.	**Alternative B: Multi-use Trail along County Rd 2 ROW:** This alternative will require coordination/approval from SDG and St. Lawrence Park Commission; however, it provides a direct route to provide options for active transportation across the south limit of South Stormont. **Estimated Cost: $2.2M (Ingleside)**

7.4 Future Development

The existing conditions section of the study looked at servicing deficiencies related to the operation of the system under current demands. The following section is intended to address the impacts of growth on both the existing infrastructure and servicing extensions required for community growth. Some of these projects will be Township led, while other projects will be part of the development works but need to be modified in order to meet future needs.

7.4.1 Regional Water Supply – Long Sault Pressure Zone

As part of the modelling of the system under the MSS, all planned and potential development areas were input into the model using the anticipated road network and anticipated flow demands. A review of the Long Sault Pressure Zone identified the following areas of concern and potential solutions:

- **Water Storage Capacity Increase:** As identified in Section 3.2.5, at the build-out, an additional 3,225 m^3 of treated water storage is required. This storage is preferable in Long Sault due to the anticipated population growth and the current lack of floating storage in this pressure zone. The location and configuration are assessed below.
- **Development Servicing:** There are situations where a development does not border on an existing service. The extension of the servicing outside of the development property boundary is required but may be implemented by either the Township or by the developer with the approval of the Township. In Long Sault, the servicing of the future Long Sault Logistics Village where servicing on both ends of the development will need to be extended from the termination of the water distribution system to the proposed development.
- **Inter-development Connectivity:** The development in Long Sault along County Road 36 includes different developments in varying stages of development. Some of the developed phases will have deficient water supplies until the ultimate connections are made. Consideration for extension of watermains between developments may be recommended/required in order to facilitate fire flow or another limiting condition. This may

be a requirement of development or implemented by the Township and charged back to the developer.

- **Water Supply Augmentation:** The most prevalent upgrade will be water supply augmentation through increasing pipe sizes through proposed developments as a requirement of the subdivision agreement where they connect to the existing water system in more than one location or will in the future.
- **Water System Redundancy:** The Regional Water Supply system has a few locations where the water system is critical and currently lacks redundancy. With increased demand, those key locations without redundancy need to either be easily repaired in the event of a failure (e.g. within the storage capacity on the distribution end of the break or 8-12 hours) or be provided with adequate redundancy. In this case, the primary concern is the watermain the crosses the causeway and bridge from Moulinette Island.

Technical Assessment

The technical assessment for the water servicing projects is tied to the justification and functional effectiveness of each project. In many cases, there are only two alternatives; do nothing, or replace/upsize the watermain.

Table 7-8: Water Storage Evaluation and Rating - Long Sault

LONG SAULT		
Alternatives	**Technical Assessment**	**Score**
WT-S1: Expand Storage at Regional Water Treatment Plant Site	▪ Feasible. ▪ Does not solve lack of redundancy for pump failure. ▪ Lowest capital cost alternative.	6
WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena	▪ Feasible. ▪ Location is Centralized in the pressure zone. ▪ Uses existing municipal land. ▪ Requires significant existing road reconstruction to service storage with adequately sized watermain.	9
WT-S3: New Elevated Storage between Long Sault and Ingleside	▪ Feasible. ▪ Is not centralized in community and is dependant on a single line. ▪ Requires land acquisition. ▪ Higher cost alternative.	7
WT-S4: New Elevated Storage in Northeast Corner of LSLV	▪ Feasible. ▪ Is close to significant industrial flows. ▪ Requires significant infrastructure upgrades to convey the flow. ▪ Highest cost alternative.	6
WT-S5: New Elevated Storage on Johnson Cres. Behind United Church	▪ Feasible ▪ Centralized in the Pressure Zone ▪ Uses existing municipal land ▪ Minimizes length of feedermain and road reconstruction required.	10

Table 7-9: Development Servicing Technical Assessment and Rating - Long Sault

LONG SAULT		
Alternatives	**Technical Assessment**	**Score**
DS-1 -Long Sault Logistics Village Servicing – Do Nothing	▪ Not Feasible – Does not achieve objective of municipal supply. ▪ Would require private servicing (wells). ▪ Lowest capital cost alternative.	4
DS-2 -Long Sault Logistics Village Servicing – Single Supply Connection – East Connection	▪ Feasible for supply. ▪ Fire flow would be limited without looping. ▪ Second lowest cost alternative.	7
DS-3 - Long Sault Logistics Village Servicing – East and West Connection	▪ Feasible. ▪ Location is Centralized in the pressure zone. ▪ Uses existing municipal land/ROW.	10

Table 7-10: Inter-development Connectivity Technical Assessment and Rating - Long Sault

LONG SAULT		
Alternatives	**Technical Assessment**	**Score**
IC-1 - Barry St. – Chase Meadows to Fenton Farm Development Interconnectivity – Do Nothing	▪ Feasible. ▪ Does not address fire flow limitations in Fenton Farms. ▪ Lowest capital cost alternative.	7
IC-2 - Barry St. – Chase Meadows Development Interconnectivity – New 200mm watermain between existing developments.	▪ Feasible. ▪ Provides looping to Fenton Farm. ▪ If an existing development is not proposed, work would be across private property and may not align with future development.	10

Table 7-11: Water Supply Augmentation Technical Assessment and Rating - Long Sault

LONG SAULT		
Alternatives	**Technical Assessment**	**Score**
WSA-A1 - North Community Loop – McNiff (Moulinette to Jim Brownell) - Do Nothing	▪ Does not address fire flow and pressure impacts associated with growth. ▪ Lowest Cost Alternative.	7
WSA-A2 - North Community Loop – McNiff (Moulinette to Jim Brownell) – Increase size to 200mm	▪ Strengthens the loop around the perimeter of Long Sault. ▪ Provides secondary flow capacity in the event of a failure to the east or west. ▪ Minor cost increase to development for next pipe size up.	10
WSA-B1 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Do Nothing	▪ When the storage is in operation, fill time will be limited by the watermain restrictions in the system. ▪ Flow capacity for transmission from elevated storage to Ingleside will be limited by pipe restrictions. ▪ Lowest cost alternative. – No cost	5
WSA-B2 - Water Storage Loop – Long Sault Parkway Transmission	▪ Provides path of least resistance between Plant and Storage Option WT-S2	8

to McNiff via County Rd. 2 and Mille Roches – Increase to 400mm diameter – 1.9 km length	▪ Allows for low pressure drop conveyance to North Community Loop and Ingleside via transmission main. ▪ Highest Cost Alternative. - $6M	
WSA-B3 – Water Storage Loop – Long Sault Parkway Transmission to McNiff via Moulinette, Simcoe, Park Land – New 400mm – 1.4 km length.	▪ Provides path of least resistance to both WT-S5 ▪ Allows for low pressure drop conveyance to North Community Loop and Ingleside via transmission main. ▪ Mid-range cost – $3.5M	10

Table 7-12: Water Supply Redundancy Technical Assessment and Rating - Long Sault

LONG SAULT		
Alternatives	**Technical Assessment**	**Score**
WSR-1 -Transmission Main from WTP to Long Sault – Do Nothing	▪ Does not address lack of redundancy. ▪ System has been without redundancy of this asset for over 65 years without major failure. ▪ Lack of floating storage in Long Sault increases the risk of an extended loss of water supply in the event of failure. ▪ Lowest capital cost alternative.	4
WSR-2 - Twin Transmission Main from WTP to Long Sault – 450mm	▪ Provides desirable redundancy to address failure and increases overall capacity. ▪ Improves ease of maintenance of both existing and new infrastructure. ▪ Improves system resiliency and reliability.	10

Natural Environment Assessment

For all of the different alternatives within the Long Sault Pressure Zone, all of the municipal projects will be completed either in the existing ROW or a ROW that will be defined through a subdivision and will be assessed as part of that subdivision/development. Figure 7-1 illustrates the water projects with reference to the identified natural environmental areas. There are areas within Long Sault that will be impacted by projects related to the MSS that are currently defined as either woodland areas or unevaluated wetland areas. All of the proposed projects that impact these areas are related to development projects and are within properly zoned parcels.

For the purposes of the MSS, it is assumed that there will be an evaluation of the lands prior to implementation of the development and any mitigating factors will be addressed either through realignment or compensation for impacted areas.

Figure 7-1 Long Sault Water Projects within the Natural Environment

There are projects, however, that are not directly development related and/or are not within development parcels. For those projects, the following is the context of their location within the potentially naturally significant areas:

- **New Long Sault Water Storage Facility**
  - ***Alternative WT-S1:*** Expand Storage at Regional Water Treatment Plant: site borders unevaluated wetland area in centre of Moulinette Island.
  - ***Alternative WT-S2:*** New Elevated Storage between Long Sault Fire Hall and Arena: no areas of natural environment significance – vacant landscaped land.
  - ***Alternative WT-S3:*** New Elevated Storage between Long Sault and Ingleside: potential alternatives sites are unevaluated coastal wetland areas.
  - ***Alternative WT-S4:*** New Elevated Storage in Long Sault Logistics Village: potential sites are within unevaluated wetland areas.
  - ***Alternative WT-S5***: New Elevated Storage on southeast side of United Church property on Johnson Cres.: No areas of natural environment significance – vacant landscaped land.
- **Long Sault Logistics Village Water Supply Loop:** The west connection to the LSLV is adjacent to an unevaluated wetland and the east connection to the LSLV along Avonmore Rd. is not proximate to areas of natural environmental significance.
- **Regional Transmission Main Twinning:** There are no defined natural environmental designated areas; however, the proximity of the bridge and causeway to the Lake does pose a risk of impacting the aquatic and near-shore environment. This will need to be evaluated and mitigated prior to implementation.

The following tables illustrate the evaluation and rating of the natural environmental assessment for each of the water servicing components.

Table 7-13: Water Storage Natural Environment Evaluation - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WT-S1: Expand Storage at Regional Water Treatment Plant Site	▪ Majority of area available has been disturbed. ▪ Property borders woodland and unevaluated wetland area.	8
WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena	▪ Site is landscaped area. ▪ Former site of water tower from 1958 to 2005. ▪ Does not border any sensitive areas.	10
WT-S3: New Elevated Storage between Long Sault and Ingleside	▪ Alternative sites are woodland or unevaluated wetland.	6
WT-S4: New Elevated Storage in Northeast Corner of LSLV	▪ Alternative sites have been evaluated as part of LSLV project. ▪ Sites would remove woodland/natural areas from inventory.	7
WT-S5: New Elevated Storage on Johnson Cres. Behind United Church	▪ Site is park land. ▪ Does not border any sensitive areas	9

Table 7-14: Development Servicing Technical Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
DS-1 -Long Sault Logistics Village Servicing – Do Nothing	▪ No environmental impact.	10
DS-2 -Long Sault Logistics Village Servicing – Single Supply Connection – East Connection	▪ No identified natural environmental issues. ▪ Proximate to unevaluated wetland and seasonally flowing watercourses.	8
DS-3 - Long Sault Logistics Village Servicing – East and West Connection	▪ No identified natural environmental issues. ▪ Proximate to unevaluated wetland and seasonally flowing watercourses in two locations.	7

Table 7-15: Inter-development Connectivity – Natural Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
IC-1 - Barry St. – Chase Meadows to Fenton Farm Development Interconnectivity – Do Nothing	▪ No environmental impact.	10
IC-2 - Barry St. – Chase Meadows Development Interconnectivity – New 200mm watermain between existing developments.	▪ Crossing of South Branch of Raisin River. ▪ Currently undisturbed farmland. ▪ Anticipated that future development will occur within the area and the watermain will become part of the extension of Barry St. ▪ Implementation with future development would reduce environmental risk.	7

Table 7-16: Water Supply Augmentation – Natural Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSA-A1 - North Community Loop – McNiff (Moulinette to Jim Brownell) - Do Nothing	▪ No environmental impact.	10
WSA-A2 - North Community Loop – McNiff (Moulinette to Jim Brownell) – Increase size to 200mm	▪ Work would not proceed until development occurs. ▪ Land development will address and mitigate environmental impacts prior to approvals.	8
WSA-B1 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Do Nothing	▪ No impacts.	10
WSA-B2 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via	▪ Entire alignment is within existing developed right-of-way. ▪ No anticipated natural environmental impacts.	9

County Rd. 2 and Mille Roches – Increase to 400mm diameter		
WSA-B3 – Water Storage Loop – Long Sault Parkway Transmission to McNiff via Moulinette, Simcoe, Park Land – New 400mm	▪ Alignment crosses landscaped parkland. No anticipated tree or natural vegetation impacted. ▪ No anticipated natural environmental impacts.	9

Table 7-17: Water Supply Redundancy – Natural Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSR-1 -Transmission Main from WTP to Long Sault – Do Nothing	▪ No environmental impact.	10
WSR-2 - Twin Transmission Main from WTP to Long Sault – 450mm	▪ Proximity to water will require a review and mitigation relative to aquatic and near-shore environment.	7

Social Environmental Assessment

The three primary components of the social environmental assessment are the archaeological impacts, cultural heritage, and current social impacts. Similar to the natural environment, the majority of the existing and proposed water supply projects are either within disturbed areas (ROW, existing utility corridors or vacant disturbed lands) or they are part of future developments that are subject to archaeological and cultural heritage reviews as part of the approval process.

The only area of cultural heritage significance in either Long Sault or Ingleside is 23 Moulinette Rd which is not within 300 m of any of the proposed MSS projects. The majority of the lands between the two communities was historically farmland; however, a significant battle in the War of 1812 occurred in the area of Hoople Creek. It is anticipated that the majority of the area of archaeological significance is underwater due to the St. Lawrence Seaway flooding. Similarly, there are no projects associated with this area at this time.

From a social environmental perspective, all of these projects will have an impact during construction with localized impacts. Furthermore, there will be an improvement to the reliability of the water system, which will result in a marginal improvement to the quality of life in the community.

The following tables illustrate the evaluation and rating of the social environmental assessment for each of the water servicing components.

Table 7-18: Water Storage Social Environment Evaluation - Long Sault

LONG SAULT		
Alternatives	**Social Environmental Assessment**	**Score**
WT-S1: Expand Storage at Regional Water Treatment Plant Site	▪ Localized impacts with construction. ▪ Development on existing site would have no long-term impacts. ▪ Higher operational cost impacts.	8
WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena	▪ Localized impacts with construction. ▪ Elevated storage reservoirs have higher social impacts than ground level storage. ▪ This site is a former elevated storage site.	7

WT-S3: New Elevated Storage between Long Sault and Ingleside	▪ Localized impacts with construction. ▪ Elevated storage reservoirs have higher social impacts than ground level storage.	6
WT-S4: New Elevated Storage in Northeast Corner of LSLV	▪ Localized impacts with construction ▪ Elevated storage reservoirs have higher social impacts than ground level storage. Industrial site location will minimize these impacts.	7
WT-S5: New Elevated Storage on Johnson Cres. Behind United Church	▪ Localized impact with construction. Site can be isolated from adjacent uses. ▪ Elevated storage reservoirs have higher social impacts than ground level storage. ▪ Site location has limited residential frontage in proximity.	7

Table 7-19: Development Servicing Social Environmental Assessment - Long Sault

LONG SAULT		
Alternatives	**Social Environmental Assessment**	**Score**
DS-1 -Long Sault Logistics Village Servicing – Do Nothing	▪ Lack of servicing would adversely impact the ability to develop the lands, impacting employment opportunities.	6
DS-2 -Long Sault Logistics Village Servicing – Single Supply Connection – East Connection	▪ Minor temporary construction impacts. ▪ Improvement in social environment due to increased employment opportunities.	9
DS-3 - Long Sault Logistics Village Servicing – East and West Connection	▪ Minor temporary construction impacts. ▪ Improvement in social environment due to increased employment opportunities.	9

Table 7-20: Inter-development Connectivity – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Social Environmental Assessment**	**Score**
IC-1 - Barry St. – Chase Meadows to Fenton Farm Development Interconnectivity – Do Nothing	▪ Limited to no social impact.	10
IC-2 - Barry St. – Chase Meadows Development Interconnectivity – New 200mm watermain between existing developments.	▪ Work will likely be completed with the development and will have limited social impact.	10

Table 7-21: Water Supply Augmentation – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSA-A1 - North Community Loop – McNiff (Moulinette to Jim Brownell) - Do Nothing	▪ Limited to no natural environmental impact.	10
WSA-A2 - North Community Loop – McNiff (Moulinette to Jim Brownell) – Increase size to 200mm	▪ Work would not proceed until development occurs. ▪ Work will likely be completed with the development and will have limited social impact.	8

WSA-B1 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Do Nothing	▪ No direct social impacts.	10
WSA-B2 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Increase to 400mm diameter	▪ Entire alignment is within existing developed right-of-way. ▪ There will be some social impacts due to construction within existing developed areas.	8
WSA-B3 – Water Storage Loop – Long Sault Parkway Transmission to McNiff via Moulinette, Simcoe, Park Land – New 400mm	▪ Construction through park land will have temporary impacts to park users. No long term impacts. ▪ Use of parkland will reduce impacts on traffic as only 30% of the alignment length will impact traffic.	9

Table 7-22: Water Supply Redundancy – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSR-1 -Transmission Main from WTP to Long Sault – Do Nothing	▪ No social environmental impact.	10
WSR-2 - Twin Transmission Main from WTP to Long Sault – 450mm	▪ Limited social impact beyond construction impacts.	9

Economic Environment Assessment

The economic environment related to these projects is primarily associated with the capital cost of implementation and the benefits achieved through the implementation of the works. Some of the project capital costs will be borne by the Township and will be funded either through upper tier funding or through Township funding of the projects through rates, reserves, or debt financing.

Estimates used in the MSS alternatives are order of magnitude estimates for comparative purposes. Actual implemented costs are subject to final design, impacts of inflation and market conditions at the time of implementation. Estimates would be considered Class "D" or conceptual design level estimates, and the level of accuracy is typically plus or minus 20%; however, due to the potential for cost escalation between the development of estimates and implementation, which may be up to 20 years. This information may be used for planning purposes but should be updated every three to five years for budgeting purposes.

Table 7-23: Water Storage Economic Environment Evaluation - Long Sault

LONG SAULT		
Alternatives	**Economic Environmental Assessment**	**Score**
WT-S1: Expand Storage at Regional Water Treatment Plant Site	▪ Capital cost of approximately $4M. ▪ No land acquisition required. ▪ Twinning of transmission mains would become more critical for system redundancy. ▪ Ongoing operational cost with continuous pumping. ▪ Equal economic benefit to the community.	10
WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena	▪ Capital cost of approximately $9M. ▪ No land acquisition required.	6

	▪ Significant upgrades required to provide transmission main to storage site. ▪ Reduced pumping costs due to floating storage. ▪ Increased reliability equates to lower economic risk associated with loss of water service. ▪ Equal economic benefit to the community.	
WT-S3: New Elevated Storage between Long Sault and Ingleside	▪ Capital cost of approximately $10M. ▪ Land acquisition required. ▪ No additional infrastructure upgrades required. ▪ Reduced pumping costs due to floating storage. ▪ Increased reliability equates to lower economic risk associated with loss of water service. Less than other alternatives due to location on single watermain with no proximate looping. ▪ Equal economic benefit to the community.	7
WT-S4: New Elevated Storage in Northeast Corner of LSLV	▪ Capital cost of approximately $10M. ▪ Land acquisition required (can be condition of development). ▪ Significant upgrades required to provide transmission main to storage site. Increasing proposed pipe sizes. Not an independent project. ▪ Reduced pumping costs due to floating storage. ▪ Increased reliability equates to lower economic risk associated with loss of water service. Less than other alternatives due to location in pressure zone. ▪ Equal economic benefit to the community.	7
WT-S5: New Elevated Storage on Johnson Cres. Behind United Church	▪ Capital cost of approximately $9M ▪ No land acquisition required. ▪ Significant upgrades required to provide transmission main to storage site less than other alternatives. ▪ Reduced pumping costs due to floating storage. ▪ Increased reliability equates to lower economic risk associated with loss of water service. ▪ Equal economic benefit to the community.	8

Table 7-24: Development Servicing Social Environmental Assessment - Long Sault

LONG SAULT		
Alternatives	**Economic Environmental Assessment**	**Score**
DS-1 -Long Sault Logistics Village Servicing – Do Nothing	▪ No capital cost. ▪ Reduces economic viability of development for higher employment uses vs. warehousing only.	5
DS-2 -Long Sault Logistics Village Servicing – Single Supply Connection – East Connection	▪ Capital cost paid by developer. ▪ Minor reduction in economic viability due to potential increased fire flow liability risk. May need to be supplemented by local fire storage.	8

DS-3 - Long Sault Logistics Village Servicing – East and West Connection	▪ Capital cost paid by developer. ▪ Maximizes water use opportunities within the serviced lands.	10

Table 7-25: Inter-development Connectivity – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Social Environmental Assessment**	**Score**
IC-1 - Barry St. – Chase Meadows to Fenton Farm Development Interconnectivity – Do Nothing	▪ No capital cost. ▪ Lack of looping has minor impact on potential for fire loss. Mitigated by local fire department Tanker Shuttle status.	9
IC-2 - Barry St. – Chase Meadows Development Interconnectivity – New 200mm watermain between existing developments.	▪ Incremental capital cost most likely borne by Developer. ▪ Reduces loss risk associated with fire fighting.	10

Table 7-26: Water Supply Augmentation – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSA-A1 - North Community Loop – McNiff (Moulinette to Jim Brownell) - Do Nothing	▪ No capital cost. ▪ Minor reduction in available fire flow may have an adverse impact on fire loss risk.	9
WSA-A2 - North Community Loop – McNiff (Moulinette to Jim Brownell) – Increase size to 200mm	▪ Incremental capital cost most likely borne by Developer. ▪ Reduces loss risk associated with fire fighting.	10
WSA-B1 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Do Nothing	▪ No capital cost. ▪ Lack of direct connection to elevated storage would increase turnover period and may increase operational costs associated with chlorine residual maintenance. ▪ Additional head loss in system would increase annual pumping costs over alternative approach.	10
WSA-B2 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Increase to 400mm diameter	▪ Capital cost of approximately $6M including road reinstatement. ▪ Lifecycle operational costs would be less than do nothing alternative due to more efficient system operation. ▪ Lowers redundancy risk due to ability to feed Long Sault and Ingleside booster system in the event of plant failure.	7
WSA-B3 – Water Storage Loop – Long Sault Parkway Transmission to McNiff via Moulinette, Simcoe, Park Land – New 400mm	▪ Capital cost of approximately $3.5M including road reinstatement. ▪ Lifecycle operational costs would be less than do nothing alternative due to more efficient system operation. ▪ Lowers redundancy risk due to ability to feed Long Sault and Ingleside booster system in the event of plant failure.	8

Table 7-27: Water Supply Redundancy – Social Environment Assessment - Long Sault

LONG SAULT		
Alternatives	**Natural Environmental Assessment**	**Score**
WSR-1 -Transmission Main from WTP to Long Sault – Do Nothing	▪ No capital cost. ▪ Significant economic risk in the event of failure that required repair that may take 8-24 hours. ▪ Risk is reduced with installation of storage in Long Sault.	6
WSR-2 - Twin Transmission Main from WTP to Long Sault – 450mm	▪ Estimated capital cost of $5M. ▪ Redundancy would reduce operational cost and lower risk of water supply loss in the communities.	8

Alternative Evaluation Summary

The following tables illustrate the evaluation of each type of servicing alternative relative to the evaluation criteria for determination of the preferred alternative.

Table 7-28: Alternative Evaluation Ranking Summary – Water Storage Alternatives

	WT-S1: Expand Storage at Regional Water Treatment Plant Site	**WT-S2: New Elevated Storage in Long Sault between Fire Hall and Arena**	**WT-S3: New Elevated Storage between Long Sault and Ingleside**	**WT-S4: New Elevated Storage in Northeast Corner of LSLV**	**WT-S5: New Elevated Storage in Long Sault behind United Church**
Technical	SCORE: 6 RANK: 5th	SCORE: 9 RANK: 2nd	SCORE: 8 RANK: 3rd	SCORE: 7 RANK: 4th	SCORE: 10 RANK: 1st
Natural	SCORE: 8 RANK: 3rd	SCORE: 10 RANK: 1st	SCORE: 6 RANK: 5th	SCORE: 7 RANK: 4th	SCORE: 9 RANK: 2nd
Social/Cultural Heritage	SCORE: 8 RANK: 1st	SCORE: 7 RANK: 2nd	SCORE: 6 RANK: 5th	SCORE: 7 RANK: 2nd	SCORE: 7 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 6 RANK: 5th	SCORE: 7 RANK: 3rd	SCORE: 7 RANK: 3rd	SCORE: 8 RANK: 2nd
Final Score & Ranking	SCORE: 32 (80%) RANK: 2nd	SCORE: 32 (80%) RANK: 2nd	SCORE: 27 (67.5%) RANK: 5th	SCORE: 28 (70%) RANK: 4th	**SCORE: 34 (85%) RANK: 1st**

Therefore, the preferred alternative is the new storage reservoir located on Township owned open space southeast of the United Church property adjacent to the existing outdoor rink site.

Table 7-29: Alternative Evaluation Ranking Summary – Development Servicing

	DS-1 -Long Sault Logistics Village Servicing – Do Nothing	**DS-2 -Long Sault Logistics Village Servicing – Single Supply Connection – East Connection**	**DS-3 - Long Sault Logistics Village Servicing – East and West Connection**
Technical	SCORE: 4 RANK: 3rd	SCORE: 7 RANK: 2nd	SCORE: 10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 2nd	SCORE: 7 RANK: 3rd

Social/Cultural Heritage	SCORE: 6 RANK: 3rd	SCORE: 9 RANK: 1st	SCORE: 9 RANK: 1st
Economic	SCORE: 5 RANK: 3rd	SCORE: 8 RANK: 2nd	SCORE: 10 RANK:1st
Final Score & Ranking	SCORE: 25 (62.5%) RANK: 3rd	SCORE: 32 (80%) RANK: 2nd	**SCORE: 36 (90%) RANK: 1st**

Therefore, the preferred alternative is two connections on the east and west end of the Long Sault Logistics Village in order to provide looped supply to the development.

Table 7-30: Alternative Evaluation Ranking Summary – Inter-Development Connectivity

	IC-1 - Barry St. – Chase Meadows to Fenton Farm Development Interconnectivity – Do Nothing	IC-2 - Barry St. – Chase Meadows Development Interconnectivity – New 200mm watermain between existing developments.
Technical	SCORE: 7 RANK: 2nd	SCORE:10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE:7 RANK: 2nd
Social/Cultural Heritage	SCORE: 10 RANK: 1st	SCORE: 10 RANK: 1st
Economic	SCORE: 9 RANK: 2nd	SCORE: 10 RANK: 1st
Final Score & Ranking	SCORE: 36 (90%) RANK: 2nd	**SCORE: 37 (92.5%) RANK: 1st**

Therefore, the preferred alternative is to provide connectivity between the existing developments to ensure proper looping is achieved. Due to minor difference in score, the benefits are not so great as to require this project to be completed independent of development.

Table 7-31: Alternative Evaluation Ranking Summary – Water Supply Augmentation

	WSA-A1 - North Community Loop – McNiff (Moulinette to Jim Brownell) - Do Nothing	WSA-A2 - North Community Loop – McNiff (Moulinette to Jim Brownell) – Increase size to 200mm	
Technical	SCORE: 7 RANK: 2nd	SCORE:10 RANK: 1st	
Natural	SCORE: 10 RANK: 1st	SCORE:10 RANK: 2nd	
Social/Cultural Heritage	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 1st	
Economic	SCORE: 9 RANK: 2nd	SCORE: 10 RANK: 1st	
Final Score & Ranking	SCORE: 36 (90%) RANK: 2nd	**SCORE: 38 (95%) RANK: 1st**	
	WSA-B1 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Do Nothing	**WSA-B2 - Water Storage Loop – Long Sault Parkway Transmission to McNiff via County Rd. 2 and Mille Roches – Increase to 400mm diameter**	**WSA-B3 – Water Storage Loop – Long Sault Parkway Transmission to McNiff via Moulinette, Simcoe, Park Land – New 400mm**
Technical	SCORE: 5 RANK: 3rd	SCORE:8 RANK: 2nd	SCORE:10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE:9 RANK: 2nd	SCORE:9 RANK: 2nd
Social/Cultural Heritage	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 3rd	SCORE: 9 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 7 RANK: 3rd	SCORE: 8 RANK: 2nd
Final Score & Ranking	SCORE: 35 (87.5%) RANK: 2nd	SCORE: 32 (80%) RANK: 3rd	**SCORE: 36 (90%) RANK: 1st**

Therefore, the preferred alternatives are to add the North Community Loop along McNiff and add a new transmission main through the open space park between behind the United Church and public school from the connection of the regional transmission main, to the preferred elevated storage location in Long Sault and north to McNiff Avenue.

Table 7-32: Alternative Evaluation Ranking Summary – Water Supply Redundancy

	WSR-1 -Transmission Main from WTP to Long Sault – Do Nothing	WSR-2 - Twin Transmission Main from WTP to Long Sault – 450mm
Technical	SCORE: 4 RANK: 2nd	SCORE:10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE:7 RANK: 2nd
Social/Cultural Heritage	SCORE: 8 RANK: 1st	SCORE: 9 RANK: 2nd
Economic	SCORE: 6 RANK: 2nd	SCORE: 8 RANK: 1st
Final Score & Ranking	SCORE: 28 (70%) RANK: 2nd	**SCORE: 34 (85%) RANK: 1st**

Therefore, the preferred alternative is to twin the transmission main across the causeway from Moulinette Island to the connection with the transmission main at the corner of County Rd No. 2 and Moulinette Rd.

7.4.2 Regional Water Supply – Ingleside Pressure Zone

As part of the modelling of the system under the MSS, all planned and potential development areas were input into the model using the anticipated road network and anticipated flow demands. A review of the Long Sault Pressure Zone identified the following areas of concern and potential solutions:

- Water Supply Augmentation: The most prevalent upgrade will be water supply augmentation through increasing pipe sizes through proposed developments as a requirement of the subdivision agreement where they connect to the existing water system in more than one location, or they will in the future.

Due to the configuration of the Ingleside system, the other aspects of the water supply improvements do not apply due to community size and the configuration of the watermain distribution which is more of a grid pattern than Long Sault. As such the water system within the core is well supported through watermain looping.

Technical Assessment

The technical assessment for the water servicing projects is tied to justification and functional effectiveness of each project. In many cases, there are only two alternatives, do nothing or replace/upsize the watermain.

The following tables illustrate the assessment of each of the identified areas of concern based on a review of the system and the hydraulic modelling of the network.

Table 7-33: Water Supply Augmentation Technical Assessment - Ingleside

INGLESIDE		
Alternatives	**Technical Assessment**	**Score**
WSA-C1 – Ingleside West End Servicing – Do Nothing	▪ Does not resolve technical problem of inadequate fire flow along west perimeter of community including future growth.	5
WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road	▪ Provides adequate flow and pressure to supply looping within northwest and southwest quadrants of the community. ▪ Facilitates further expansion of system within development lands.	10
WSA-D1 – Ingleside Northwest Loop – Do Nothing	▪ Does not resolve technical problem of inadequate fire flow along northcentral area of community including future growth.	5
WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands	▪ Provides adequate flow and pressure to supply looping within northcentral area of the community. ▪ Facilitates further expansion of system within development lands.	10
WSA-E1 – Booster to Lactalis via Elevated Stage Augmentation – Do Nothing	▪ Maintains status quo, but in future there is an increased risk of longer turnover period. ▪ System restrictions result in indirect flow to Lactalis increasing pumping costs.	5
WSA-E2 – Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – Farran and College Alignment	▪ Total length of watermain is 1.65 km. ▪ This alignment already has 250mm watermain on part of the length. ▪ Limits length of watermain on County Rd.	9
WSA-E3– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence and Dickinson Alignment	▪ Total length of watermain is 1.75 km. ▪ This alignment has 200mm watermain for majority of alignment. Increasing the pipe size on this alignment provides a more significant benefit in terms of pressure loss. ▪ St. Lawrence is easier construction than other streets, while Dickinson (County Rd) is more complex due to traffic.	8

Natural Environment Assessment

The majority of the projects in Ingleside are both on existing rights-of-way and in built-up areas. As such, the natural environmental impacts will not be direct impacts in most cases. Figure 7-1 illustrates the water projects with reference to the identified natural environmental areas while Table 7-34 illustrates the assessment of the natural environment for each of the potential projects.

Table 7-34: Water Supply Augmentation Natural Environmental Assessment - Ingleside

INGLESIDE		
Alternatives	**Natural Environmental Assessment**	**Score**
WSA-C1 – Ingleside West End Servicing – Do Nothing	▪ No impacts.	10
WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road	▪ Project is fully within existing developed right-of-way. ▪ No impacts provided proper erosion and sediment control measures are maintained through construction and reinstatement period.	9
WSA-D1 – Ingleside Northwest Loop – Do Nothing	▪ No impacts.	10
WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands	▪ Watermain installation will occur with the development of the area. ▪ Existing area is a defined woodland and unevaluated wetland that would need to be assessed and any impacts mitigated before approval and construction could occur.	8
WSA-E1 – Booster to Lactalis via Elevated Stage Augmentation – Do Nothing	▪ No impacts.	10
WSA-E2 – Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – Farran and College Alignment	▪ Project is fully within existing developed right-of-way. ▪ No impacts provided proper erosion and sediment control measures are maintained through construction and reinstatement period.	9
WSA-E3– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence and Dickinson Alignment	▪ Project is fully within existing developed right-of-way. ▪ No impacts provided proper erosion and sediment control measures are maintained through construction and reinstatement period.	9

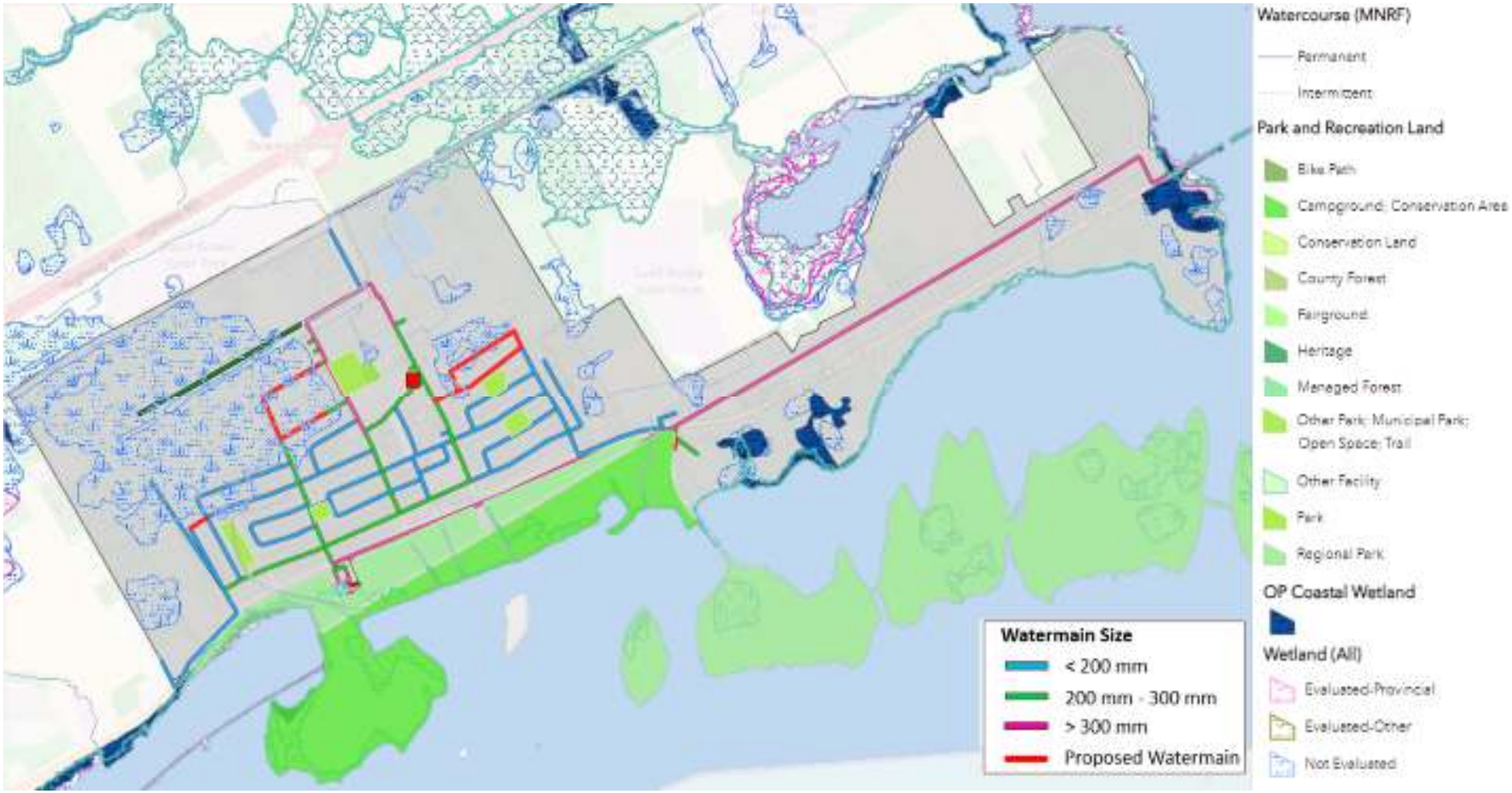


Figure 7-2 Ingleside Water Projects within the Natural Environment

Social Environmental Assessment

The social environmental issues in Ingleside are similar to the issues in Long Sault with limited anticipated archaeological or cultural heritage potential within the existing right-of-way and proposed development area. Furthermore, due to the location of the projects, there may be some impacts during construction to residents in the project area and those transiting through the community. These alternatives can be mitigated and once the projects are complete there will be no adverse impact. Beneficial impacts of the project will include more reliable water supply both for domestic and fire demands.

The following table illustrates the social environmental impacts related to the proposed Ingleside water servicing projects.

Table 7-35: Water Supply Augmentation Social Environment Assessment - Ingleside

INGLESIDE		
Alternatives	**Social Environmental Assessment**	**Score**
WSA-C1 – Ingleside West End Servicing – Do Nothing	▪ No impacts.	10
WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road	▪ Minor construction impacts to local residents.	9
WSA-D1 – Ingleside Northwest Loop – Do Nothing	▪ No impacts.	10
WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands	▪ No significant impacts as construction will occur on closed roads, so not direct impact to local residents.	9
WSA-E1 – Booster to Lactalis via Elevated Stage Augmentation – Do Nothing	▪ No impacts.	10
WSA-E2 – Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – Farran and College Alignment	▪ Project will impact core of the community during construction. There will be impacts to residents.	8
WSA-E3– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence and Dickinson Alignment	▪ Project will impact core of the community during construction. There will be impacts to residents and traffic on Dickinson Dr. for an extended period.	8

Economic Environment Assessment

The economic environment related to these projects is primarily associated with the capital cost and the benefits achieved through the implementation of the works. Some of the project capital costs will be borne by the Township and will be funded either through upper tier funding or through Township funding of the projects through rates, reserves, or debt financing.

Estimates used in the MSS alternative are order of magnitude estimates for comparative purposes. Actual implemented costs are subject to final design, impacts of inflation and market conditions at the time of implementation. Estimates would be considered Class "D" or conceptual design level estimates, and the level of accuracy is typically plus or minus 20%; however, due to the potential for cost escalation between the development of estimates and implementation, which may be up to 20 years. This information may be used for planning purposes but should be updated every three to five years for budgeting purposes.

Table 7-36: Water Supply Augmentation Economic Environment Assessment - Ingleside

INGLESIDE		
Alternatives	**Economic Environmental Assessment**	**Score**
WSA-C1 – Ingleside West End Servicing – Do Nothing	▪ No impacts. ▪ May impact future development's ability to meet fire flow requirements.	10
WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road	▪ Capital cost of $4.5M including road reinstatement. Work could be done as part of infrastructure renewal over several construction seasons. ▪ Increases future expansion capacity with increased supply potential.	8
WSA-D1 – Ingleside Northwest Loop – Do Nothing	▪ No impacts.	10
WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands	▪ Capital cost will be borne by the Developer. ▪ Provides sustainable capacity through development lands to the benefit of local residents.	9
WSA-E1 – Booster to Lactalis via Elevated Stage Augmentation – Do Nothing	▪ No impacts ▪ Minor long-term impacts of increased pumping costs due to increase head loss in piping network.	8
WSA-E2 – Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – Farran and College Alignment	▪ Capital cost of approximately $4.25M including road reinstatement. Work could be done as part of infrastructure renewal projects over several construction seasons.	8
WSA-E3– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence and Dickinson Alignment	▪ Capital cost of approximately $4.5M including road reinstatement. Work could be done as part of infrastructure renewal projects over several construction seasons. ▪ Minor long-term impact of reduced pumping costs due to reduced pressure loss in the system.	8

Alternative Evaluation Summary

The following tables illustrate the evaluation of each type of servicing alternative relative to the evaluation criteria for determination of the preferred alternative.

Table 7-37: Alternative Evaluation Ranking Summary – Water Supply Augmentation - Ingleside

	WSA-C1 – Ingleside West End Servicing – Do Nothing	WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road
Technical	SCORE: 5 RANK: 2nd	SCORE:10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd
Social/Cultural Heritage	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 2nd
Final Score & Ranking	SCORE: 35 (87.5%) RANK: 2nd	**SCORE: 36 (90%)** **RANK: 1st**
	WSA-D1 – Ingleside Northwest Loop – Do Nothing	**WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands**
Technical	SCORE: 5 RANK: 2nd	SCORE:10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE:8 RANK: 2nd
Social/Cultural Heritage	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd
Final Score & Ranking	SCORE: 35 (87.5%) RANK: 2nd	**SCORE: 36 (90%)** **RANK: 1st**

	WSA-E1 – Booster to Lactalis via Elevated Stage Augmentation – Do Nothing	WSA-E2 – Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – Farran and College Alignment	WSA-E3– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence and Dickinson Alignment
Technical	SCORE: 5 RANK: 3rd	SCORE: 9 RANK:1st	SCORE: 8 RANK: 2nd
Natural	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd	SCORE: 9 RANK: 2nd
Social/Cultural Heritage	SCORE: 10 RANK: 3rd	SCORE: 8 RANK: 1st	SCORE: 8 RANK: 1st
Economic	SCORE: 8 RANK: 1st	SCORE: 8 RANK: 1st	SCORE: 8 RANK:1st
Final Score & Ranking	SCORE: 33 (82.5%) RANK: 2nd	**SCORE: 34 (85%)** **RANK: 1st**	SCORE: 33 (82.5%) RANK: 2nd

Therefore, the preferred alternatives are:

- Implement the upsizing of the watermains servicing the west end (WSA-C2) to be completed by the Township,
- Implement the upsizing of the watermain servicing the future Ingleside Northwest Loop (WSA-D2) when development occurs, and
- Implement the upsizing of the interconnection between the booster station and Lactalis via the elevated storage reservoir (WSA-E2).

7.4.3 Long Sault Sanitary System

As part of the modelling of the system under the MSS, all planned and potential development areas were input into the model using the anticipated flow demands. A review of the Long Sault Sanitary System identified the following concerns and potential solutions:

- Pumping Station Capacity Increase: As identified in Section 3, the level of growth within the Long Sault Sanitary System will require upgrades to the existing County Rd. SPS and forcemain. Its upgrades will occur overtime with pump replacements as the demand requires it.
- Development Servicing: As per the water system, there are situations where a development does not border on an existing service and an extension of the servicing outside of the development property boundary will be required but may be implemented by either the Township or by the developer with the approval of the Township. In Long Sault, the servicing of the future Long Sault Logistics Village, where servicing on both ends of the development will need to be extended from the termination of the sanitary system to the proposed development.
- Inter-development Connectivity: The development in Long Sault includes different developments in varying stages of development. The preferred solution should allow for maximizing gravity conveyance to the WWTP in order to reduce the number of facilities required, additional operating costs, and impacts to the natural environment and community. Consideration for the construction of a centralized system between developments and the existing system may be recommended/required. This may be a requirement of development or implemented by the Township and charged back to the developer.

In the review and development of alternatives to support future growth, it was found that the aforementioned approach should be used consistently. Further to the overall approach, area-specific alternatives were reviewed where warranted. A description and assessment of the impacts of the proposed solutions is presented in the next section.

Technical Assessment

Table 7-38 illustrates the comparison and scoring of the technical evaluation according to the criteria listed in Section 9-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-38: Technical Assessment Evaluation - Long Sault Sanitary System

LONG SAULT		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Feasible. ▪ Does not allow for growth. Limited to capacity of the existing sanitary system.	4
B – Decentralized Sanitary Systems Servicing the North Central Area	▪ Feasible. ▪ Less efficient in comparison with Alternative B due to more (4) SPSs required. ▪ Extensive interaction with existing infrastructure.	7
C – Centralized Sanitary System Servicing the North Central Area	▪ Feasible. ▪ Most efficient solution for maximizing gravity conveyance to WWTP and less SPSs required. ▪ Coordination among developers required.	10

From a technical perspective, the highest ranked alternative for the Long Sault Sanitary System is Alternative B - Centralized Sanitary System Servicing the North Central Area.

Natural Environment Assessment

Table 7-39 illustrates the comparison and scoring of the natural environment evaluation according to the criteria listed in Section 7-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative. Figure 7-3 illustrates the water projects with reference to the identified natural environmental areas.

Table 7-39: Natural Environment Assessment Evaluation - Long Sault Sanitary System

LONG SAULT		
Alternative	**Natural Environment Assessment**	**Score**
A – Do Nothing	▪ No impacts since no work is proposed.	10
B – Decentralized Sanitary Systems Servicing the North Central Area	▪ Limited clearing of treed areas. ▪ Erosion and sediment risks during construction of linear components. Decentralize system will require the construction of additional facilities resulting in higher environmental impacts due to construction. Risk of off-site erosion and sediment impacts during construction to be reduced, but not eliminated with required erosion and sediment control measures. ▪ No identified Species at Risk. Majority of area is previously disturbed or actively occupied (road allowances). ▪ Timing of works can be coordinated to minimize risk to breeding birds and other species.	7

C – Centralized Sanitary System Servicing the North Central Area	▪ Limited clearing of treed areas. ▪ Erosion and sediment risks during construction of linear components. Centralizing wastewater related components will mitigate impacts associated with the construction of additional facilities reducing the impacts on the environment. Risk of off-site erosion and sediment impacts during construction to be reduced, but not eliminated with required erosion and sediment control measures. ▪ No identified Species at Risk. Majority of area is previously disturbed or actively occupied (road allowances). ▪ Timing of works can be coordinated to minimize risk to breeding birds and other species.	8

From a natural environmental impact perspective, the highest ranked alternative is Alternative A, as there are no natural environment impacts associated with doing nothing.

Social Environment Assessment

Table 7-40 illustrates the comparison and scoring of the social/cultural heritage environment evaluation according to the criteria listed in Section 7-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-40: Social Assessment Evaluation - Long Sault Sanitary System

LONG SAULT		
Alternative	**Social Assessment**	**Score**
A – Do Nothing	▪ Limiting growth potential within collection system will adversely impact tax base and employment opportunities within sanitary service area. ▪ Proposed independent upgrades to facility will address some of these issues.	5
B – Decentralized Sanitary Systems Servicing the North Central Area	▪ Enabling growth will have positive impacts in terms of increased tax base to share in community costs and population growth. It will also have negative impacts in terms of traffic impacts, changes to landscape associated with development. ▪ Decentralize system will require the construction of additional facilities (e.g., new several sanitary pumping stations) which will reduce available land for development and will have localized temporary construction impacts and minor long-term impacts on adjacent landowners.	7
C – Centralized Sanitary System Servicing the North Central Area	▪ Enabling growth will have positive impacts in terms of increased tax base to share in community costs and population growth. It will also have negative impacts in terms of traffic impacts, changes to landscape associated with development. ▪ Centralizing wastewater related components will mitigate impacts associated with the construction of additional facilities (e.g., several sanitary pumping stations) reducing the impacts on the community.	9

From a social impact perspective, the highest ranked alternative is Alternative C as it has the least inherent social negative impacts due to the possibility of constructing a centralized system which will reduce the number of required facilities (e.g., sanitary pumping stations) while allowing for planned community growth which will benefit new residents and ratepayers by expanding the tax base and providing homes for community growth.

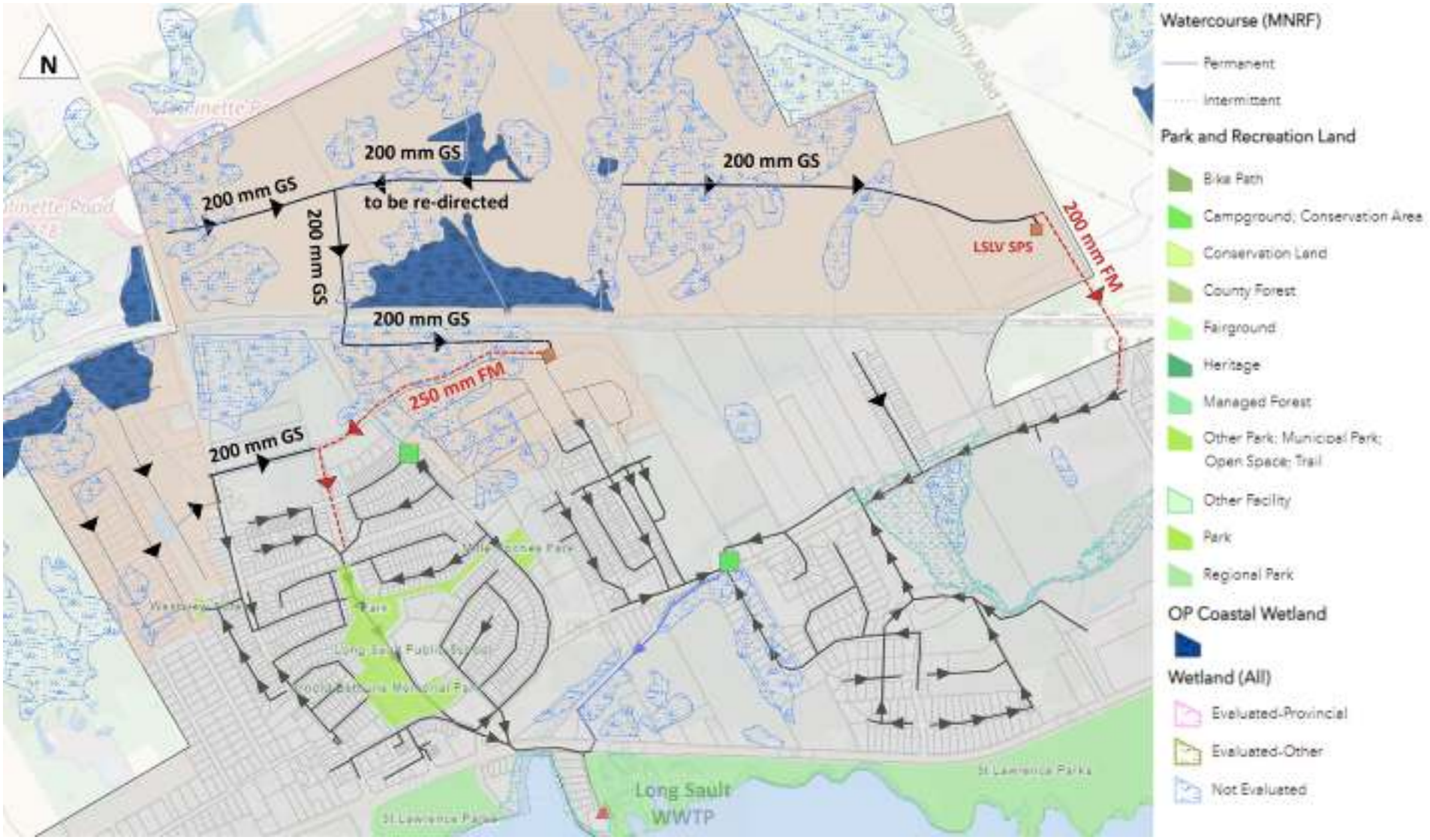


Figure 7-3 Long Sault Wastewater Projects within the Natural Environment

Economic Environment Assessment

The economic environmental assessment is more than simply the cost of the project. It is an assessment of the cost of the project as well as the economic impacts of proceeding (or not) with the proposed solution that meets the project objectives. Capital cost is a significant factor in the evaluation of alternatives as is the limitation and enabling of community growth.

Table 7-41 illustrates the comparison and scoring of the economic environment evaluation according to the criteria listed in Section 7-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-41: Economic Environment Evaluation - Long Sault Sanitary System

Alternative	Economic Assessment	Score
A – Do Nothing	▪ Capital Cost: $0. ▪ Operating Cost Impact: No change from current operational cost. ▪ Limitation on growth will have an adverse economic impact on landowners that may be considering development, reduced supply of housing will increase cost of existing residences, reduced development will reduce Township tax revenue.	6
B – Decentralized Sanitary Systems Servicing the North Central Area	▪ Capital Cost covered by the Township: $6.4 million. ▪ Capital costs for sanitary system infrastructure within development areas will be covered by Developers. ▪ Operating Cost Impact: Highest relative operating cost due to the construction of four (4) SPSs. ▪ Removing limitation on growth will allow for significant economic benefit in terms of tax base and economic development.	5
C – Centralized Sanitary System Servicing the North Central Area	▪ Capital Cost covered by the Township: $5.5 million. ▪ Capital costs for sanitary system infrastructure within development areas will be covered by Developers. ▪ Operating Cost Impact: Increased cost relative to the construction of two (2) SPSs, but less than Alternative B. ▪ Removing limitation on growth will allow for significant economic benefit in terms of tax base and economic development.	8

From an economic environment perspective, the highest ranked alternative is Alternative C, as it has the lowest cost of solutions that are able to fully solve the defined problem by meeting community growth objectives.

Alternative Evaluation Summary

Based on the evaluation from the previous sections, the alternative assessment can be summarized in Table 7-42.

Table 7-42: Alternative Evaluation Ranking Summary - Long Sault Sanitary System

	Alternative A – Do Nothing	Alternative B – Decentralized Sanitary Systems Servicing the North Central Area	Alternative C – Centralized Sanitary System Servicing the North Central Area
Technical	SCORE: 4 RANK: 3rd	SCORE: 7 RANK: 2nd	SCORE: 10 RANK: 1st
Natural	SCORE: 10 RANK: 1st	SCORE: 7 RANK: 3rd	SCORE: 8 RANK: 2nd

Social/Cultural Heritage	SCORE: 5 RANK: 3rd	SCORE: 7 RANK: 2nd	SCORE: 9 RANK: 1st
Economic	SCORE: 6 RANK: 2nd	SCORE: 5 RANK: 3rd	SCORE: 8 RANK: 1st
Final Score & Ranking	SCORE: 25 (62.5%) RANK: 3rd	SCORE: 26 (65%) RANK: 2nd	**SCORE: 35 (87.5%) RANK: 1st**

Therefore, the preferred alternative is Alternative C – Centralized Sanitary System Servicing the North Central Area.

7.4.4 Ingleside Sanitary System

Undeveloped areas within the municipal sanitary servicing area of Ingleside will be connected to the existing sanitary sewer to the following points:

- At the 200mm sanitary sewer on Napier Street.
- At the 450mm sanitary sewer on Piercy Street.
- At the 200mm sewer which increases to 525 mm on St. Lawrence Street.

According to the design model, the existing sanitary sewer would be able to receive additional flow from future development without negative impacts on the existing sewer network with exception of the existing Ingleside SPS. However, upgrades of the existing Ingleside SPS are planned as part of the existing Ingleside WWTP upgrades which are not part of this project scope. Therefore, no future configuration has been planned for future development within the municipal sanitary servicing area of Ingleside.

7.4.5 Long Sault Stormwater System

As part of the modelling of the system under the MSS, all planned and potential development areas were input into the model and system conditions were analyzed under 5-year and 100-year design storm. Unlike the water and sanitary system, population growth does not directly impact stormwater in the traditional sense as any intensification is required to manage stormwater to pre-development conditions or better. This provides a unique methodology in determining and evaluating stormwater concepts. However, indirectly, a result of population growth is the potential need to expand road transportation networks and/or increase impervious areas, which, in turn, requires upsized or enhanced stormwater drainage. As such any growth-related road/impervious area needs should translate into stormwater needs.

When reviewing stormwater servicing options, 2-key factors were considered in the development of a preferred strategy:

- **Water Quality and Quantity Control:** Stormwater management is required to mitigate the effects of urbanization on the hydrologic cycle including increased runoff and decreased infiltration of rain and snowmelt. A combination of lot level, conveyance, and end-of-pipe stormwater management practices are usually required to meet the multiple objectives of stormwater management such as maintaining the hydrologic cycle, protection of water quality, and preventing increased erosion and flooding. Maintaining the current accepted approaches for stormwater management will adequately mitigate the impacts of future development on flooding, erosion and water quality in the existing watercourses flowing through the study area. There are no challenges for implementation of this approach, as it is considered standard practice for new development and will adhere to all current Township,

provincial and federal requirements for stormwater management and environmental protection.

- **Impacts within the original Town site area:** As result of this MSS, it is anticipated that the Township will continue to incorporate sidewalk construction into its capital works program. This will increase the amount of impervious area within the original Town site, thus resulting in decreasing the number of pervious areas, ditches and change in drainage. Consideration for the installation of technologies to promote infiltration and pollutant removal on a local site-by-site basis or the construction of centralized stormwater facilities will be recommended. Recommended solutions will be implemented and phased concurrently with road reconstruction projects.

In the review and development of alternatives to support future growth, it was found that the aforementioned approach should be used consistently. A description and assessment of the impacts of the proposed solutions is presented in the next section.

Technical Assessment

Table 7-43 illustrates the comparison and scoring of the technical evaluation according to the criteria listed in Section 7-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-43 Technical Assessment Evaluation of Alternatives - Long Sault Stormwater System

LONG SAULT		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Does not address Township requirements.	4
B – Outfall End-of-Pipe Treatment	▪ High level of treatment achieved. ▪ Higher amount of flow to be treated/stored. Thus, it requires lands and property acquisition reducing land available for development. ▪ Address impacts within original Town site. ▪ Dependent upon upstream and downstream drainage facilities.	10
C – Localized Treatment	▪ Feasible. ▪ Promote infiltration and pollutant removal on a local site-by-site basis. ▪ Phased approach to implementing stormwater quality controls where implementation occurs during road reconstruction projects. ▪ Not dependent upon upstream and downstream drainage facilities.	9
D – Individual Lot-Level Control and Storage	▪ Suitable for new development and vacant properties. ▪ Not dependent upon upstream and downstream drainage facilities.	8
E – Implement LID Controls	▪ Feasible. ▪ Promote infiltration and pollutant removal on a local site-by-site basis. ▪ Focused on more frequent storm events of lower volumes as opposed to less frequent storm events with higher volume. ▪ Dependent on type of soil conditions.	7

From a technical perspective, the highest ranked alternative for Long Sault Stormwater System is Alternative B - Outfall End-of-pipe treatment.

Natural Environment Assessment

Figure 7-4 illustrates the water projects with reference to the identified natural environmental areas. Table 7-4 illustrates the comparison and scoring of the natural environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-44 Natural Environmental Assessment - Long Sault Stormwater System

LONG SAULT		
Alternative	**Natural Environment Assessment**	**Score**
A – Do Nothing	▪ No Impacts.	10
B – Outfall End-of-Pipe Treatment	▪ Limited clearing of treed areas. ▪ New sewers that route to a communal SWM facility may be required resulting in potential impacts during construction.	8
C – Localized Treatment	▪ Potential impacts during construction. ▪ Impacts will be lower if coordinate with road reconstruction.	9
D – Individual Lot-Level Control and Storage	▪ Tree removal may be required depending on development areas. ▪ Potential impacts during construction.	8
E – Implement LID Controls	▪ Leaching from swale vegetation may increase the presence of trace metals and nutrients in the runoff. ▪ Infiltration through the swale may carry pollutants into local groundwater.	7

From a natural environmental impact perspective, the highest ranked alternative is Alternative A, as there are no natural environment impacts associated with doing nothing.

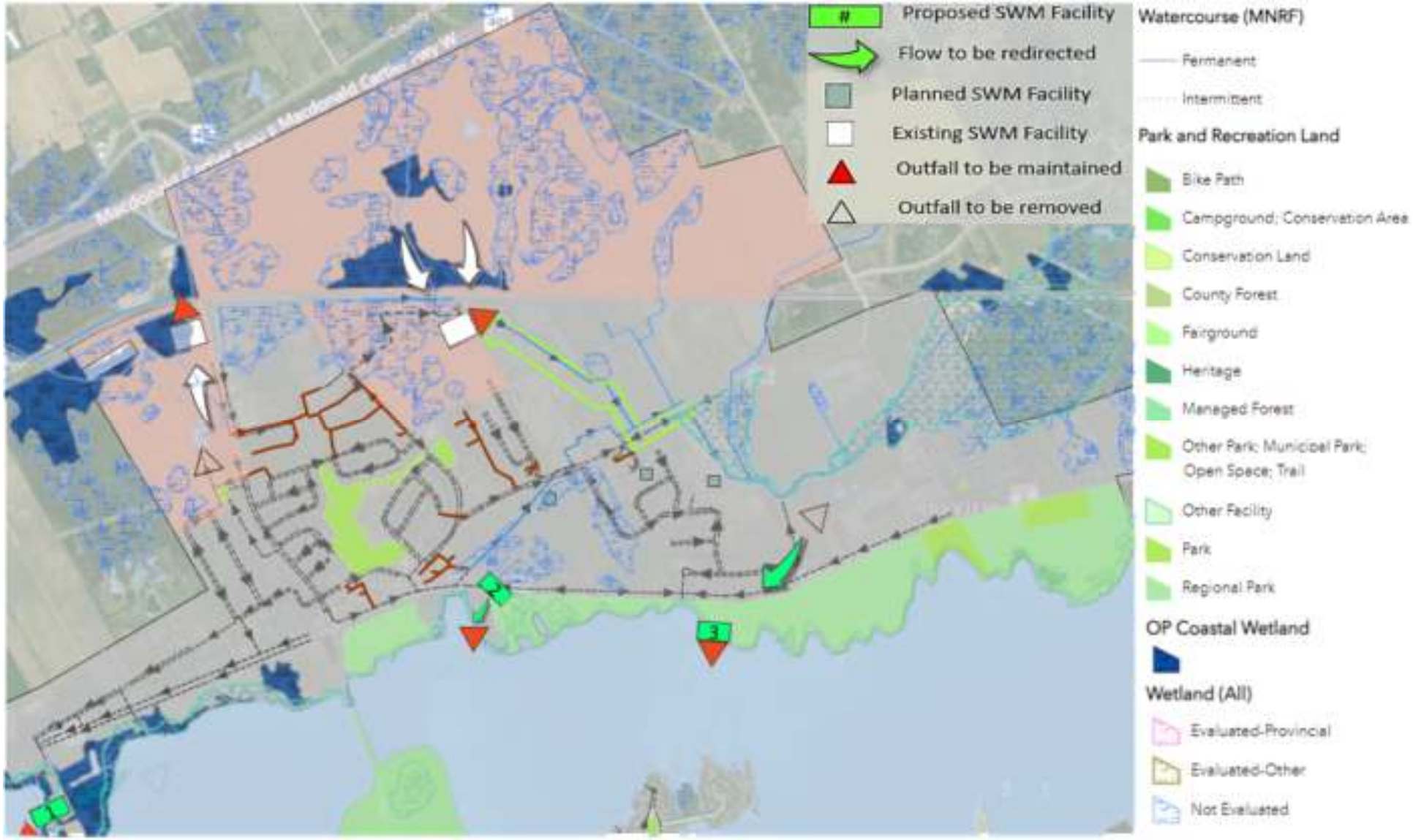


Figure 7-4 Long Sault Stormwater Projects within the Natural Environment

Social Environment Assessment

Table 7-45 illustrates the comparison and scoring of the social/cultural heritage environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-45 Social Environment Assessment - Long Sault Stormwater System

LONG SAULT		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Does not address Township requirements.	5
B – Outfall End-of-Pipe Treatment	▪ Construction impacts in localized areas (mainly near currently undeveloped areas).	9
C – Localized Treatment	▪ Potential impacts during construction. ▪ Impacts will be lower if coordinate with road reconstruction.	8
D – Individual Lot-Level Control and Storage	▪ Construction impacts in localized areas.	7
E – Implement LID Controls	▪ Construction impacts in residential areas as Bio-Swale implementation will occur where existing ditches currently are.	7

From a social impact perspective, the highest ranked alternative is Alternative B – Outfall End-of-pipe treatment, as it has the least inherent social negative impacts due to the possibility of constructing SWM facilities system which will reduce the number of required facilities while allowing for planned community growth.

Economic Environment Assessment

Table 7-46 illustrates the comparison and scoring of the economic environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-46 Economic Environment Assessment - Long Sault Stormwater System

LONG SAULT		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Capital Cost: $0. ▪ Operating Cost Impact: No change from current operational cost.	10
B – Outfall End-of-Pipe Treatment	▪ Capital Cost covered by the Township: $4.5M. ▪ Operating Cost Impact: Highest relative operating cost due to the construction of SWM facilities to be maintained by the Township. ▪ SMW facilities require land, thus reducing lands available for development.	9
C – Localized Treatment	▪ Capital Cost covered by the Township: $6.0M. ▪ Operating Cost Impact: Increased cost relative to the installation of stormwater interceptors to be maintained.	7

D – Individual Lot-Level Control and Storage	▪ Capital Cost: $0.00 (privately owned by landowners). ▪ Operating Cost Impact: (privately operated by landowners).	10
E – Implement LID Controls	▪ Capital Cost covered by the Township: $7.0M. ▪ Operating Cost Impact: Increased cost relative to vegetation maintenance.	8

From an economic environment perspective, the highest ranked alternatives are Alternative A and Alternative D due to having the lowest cost of the various solutions. However, it must be noted that both alternatives will not fully solve the identified problems and community growth objectives described in Section 7. In particular, Alternative A will not address Township requirements for future growth as the stormwater system will continue to operate as per current conditions, while Alternative D does not address community growth impacts within the original Town site area.

Alternative Evaluation Summary

Based on the evaluation from the previous sections, the alternative assessment can be summarized in Table 7-47.

Table 7-47: Alternative Evaluation Ranking Summary - Long Sault Stormwater System

	Alternative A – Do Nothing	Alternative B – Outfall End-of-pipe treatment	Alternative C – Localized Treatment	Alternative D – Individual lot-level control and storage	Alternative E – Implement LID Controls
Technical	SCORE: 4 RANK: 5th	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd	SCORE: 8 RANK: 3rd	SCORE: 7 RANK: 4th
Natural	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 3rd	SCORE: 9 RANK: 2nd	SCORE: 8 RANK: 3rd	SCORE: 7 RANK: 4th
Social	SCORE: 5 RANK: 4th	SCORE: 9 RANK: 1st	SCORE: 7 RANK: 3rd	SCORE: 7 RANK: 3rd	SCORE: 8 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd	SCORE: 7 RANK: 2nd	SCORE:10 RANK: 1st	SCORE: 8 RANK: 3rd
Final Score & Ranking	SCORE: 29 (72.5%) RANK: 5th	**SCORE: 36 (90%) RANK: 1st**	SCORE: 32 (80%) RANK: 3rd	SCORE: 33 (82.5%) RANK: 2nd	SCORE: 30 (75%) RANK: 4th

Therefore, the preferred alternative is Alternative B – Outfall End-of-pipe treatment**.**

7.4.6 Ingleside Stormwater System

The same approach used for the Long Sault Stormwater System was used for the development of alternatives within the Ingleside Stormwater System. All planned and potential development areas were input into the model and system conditions were analyzed under 5-year and 100-year design storm.

As discussed previously, a result of population growth is directly related to the potential need to expanded road transportation networks and/or increase impervious areas, which, in turn, requires upsized or enhanced stormwater drainage. As such any growth-related road/impervious area needs should translate into stormwater needs. As per Long Sault, in the review of stormwater servicing options for Ingleside, 2-key factors were considered in the development of a preferred strategy:

- **Water Quality and Quantity Control:** Stormwater management is required to mitigate the effects of urbanization on the hydrologic cycle including increased runoff, and decreased infiltration of rain and snowmelt. A combination of lot level, conveyance, and end-of-pipe stormwater management practices are usually required to meet the multiple objectives of stormwater management such as maintaining the hydrologic cycle, protection of water quality, and preventing increased erosion and flooding. Maintaining the current accepted approaches for stormwater management will adequately mitigate the impacts of future development on flooding, erosion and water quality in the existing watercourses flowing through the study area. There are no challenges for implementation of this approach, as it is considered standard practice for new development and will adhere to all current Township, provincial and federal requirements for stormwater management and environmental protection.
- **Impacts within the original Town site area:** As a result of this MSS, it is anticipated that the Township will continue to incorporate sidewalk construction into its capital works program. This will increase the amount of impervious area within the original Town site, thus resulting in decreasing the number of pervious areas, ditches and change in drainage. Consideration for the installation of technologies to promote infiltration and pollutant removal on a local site-by-site basis or the construction of centralized stormwater facilities will be recommended. Recommended solutions will be implemented and phased concurrently with road reconstruction projects.

In the review and development of alternatives to support future growth, it was found that the aforementioned approach should be used consistently. A description and assessment of the impacts of the proposed solutions is presented in the next section.

Technical Assessment

Table 7-48 illustrates the comparison and scoring of the natural environment evaluation according to the criteria listed in Section 7-1 in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-48 Technical Assessment for Ingleside Stormwater System

INGLESIDE		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Does not address Township requirements.	4
B – Outfall End-of-Pipe Treatment	▪ High level of treatment achieved. ▪ Higher amount of flow to be treated/stored. Thus, it requires lands and property acquisition reducing land available for development. ▪ Address impacts within original Town site. ▪ Dependent upon upstream and downstream drainage facilities.	10
C – Localized Treatment	▪ Feasible. ▪ Promote infiltration and pollutant removal on a local site-by-site basis. ▪ Phased approach to implementing stormwater quality controls where implementation occurs during road reconstruction projects.	9

	▪ Not dependent upon upstream and downstream drainage facilities.	
D – Individual Lot-Level Control and Storage	▪ Suitable for new development and vacant properties. ▪ Not dependent upon upstream and downstream drainage facilities.	8
E – Implement LID Controls	▪ Feasible. ▪ Promote infiltration and pollutant removal on a local site-by-site basis. ▪ Focused on more frequent storm events of lower volumes as opposed to less frequent storm events with higher volume. ▪ Dependent on type of soil conditions.	7

From a technical perspective, the highest ranked alternative for Ingleside Stormwater System is Alternative B - Outfall End-of-pipe treatment.

Natural Environment Assessment

Figure 7-5 illustrates the water projects with reference to the identified natural environmental areas. Table 7-49 illustrates the comparison and scoring of the natural environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-49 Natural Environment Assessment - Ingleside Stormwater System

INGLESIDE		
Alternative	**Natural Environment Assessment**	**Score**
A – Do Nothing	▪ No Impacts.	10
B – Outfall End-of-Pipe Treatment	▪ Limited clearing of treed areas. ▪ New sewers that route to a communal SWM facility may be required resulting in potential impacts during construction.	8
C – Localized Treatment	▪ Potential impacts during construction. ▪ Impacts will be lower if coordinate with road reconstruction.	9
D – Individual Lot-Level Control and Storage	▪ Tree removal may be required depending on development areas. ▪ Potential impacts during construction.	8
E – Implement LID Controls	▪ Leaching from swale vegetation may increase the presence of trace metals and nutrients in the runoff. ▪ Infiltration through the swale may carry pollutants into local groundwater.	7

From a natural environmental impact perspective, the highest ranked alternative is Alternative A as there are no natural environment impacts associated with doing nothing.

Figure 7-5 Ingleside Stormwater Projects within the Natural Environment

Social Environment Assessment

Table 7-50 illustrates the comparison and scoring of the social/cultural heritage environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-50 Social Environment Assessment - Ingleside Stormwater System

INGLESIDE		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Does not address Township requirements.	5
B – Outfall End-of-Pipe Treatment	▪ Construction impacts in localized areas (mainly near currently undeveloped areas).	9
C – Localized Treatment	▪ Potential impacts during construction. ▪ Impacts will be lower if coordinate with road reconstruction.	8
D – Individual Lot-Level Control and Storage	▪ Construction impacts in localized areas.	7
E – Implement LID Controls	▪ Construction impacts in residential areas as Bio-Swale implementation will occur where existing ditches currently are.	7

From a social impact perspective, the highest ranked alternative is Alternative B – Outfall End-of-Pipe treatment as it has the least inherent social negative impacts due to the possibility of constructing SWM facilities system which will reduce the number of required facilities while allowing for planned community growth.

Economic Environment Assessment

Table 7-51 illustrates the comparison and scoring of the economic environment evaluation criteria in order to rank the alternatives relative to each other as part of the identification of the preferred alternative.

Table 7-51 Economic Environment Assessment - Ingleside Stormwater System

INGLESIDE		
Alternative	**Technical Assessment**	**Score**
A – Do Nothing	▪ Capital Cost: $0. ▪ Operating Cost Impact: No change from current operational cost.	10
B – Outfall End-of-Pipe Treatment	▪ Capital Cost covered by the Township: $8.0M. ▪ Operating Cost Impact: Highest relative operating cost due to the construction of SWM facilities to be maintained by the Township. ▪ SMW facilities require land, thus reducing lands available for development.	4
C – Localized Treatment	▪ Capital Cost covered by the Township: $3.0M. ▪ Operating Cost Impact: Increased cost relative to the installation of stormwater interceptors to be maintained.	9

D – Individual Lot-Level Control and Storage	▪ Capital Cost: $0.00 (privately owned by landowners). ▪ Operating Cost Impact: (privately operated by landowners).	10
E – Implement LID Controls	▪ Capital Cost covered by the Township: $7.0M. ▪ Operating Cost Impact: Increased cost relative to vegetation maintenance.	6

From an economic environment perspective, the highest ranked alternatives are Alternative A and Alternative D due to having the lowest cost of the solutions. However, it must be noted that both alternatives will not fully solve the identified problems and community growth objectives described in Section 7. In particular, Alternative A will not address Township requirements for future growth as the stormwater system will continue to operate as per current conditions, while Alternative D does not address community growth impacts within the original Town site area.

Alternative Evaluation Summary

Based on the evaluation from the previous sections, the alternative assessment can be summarized in Table 7-52.

Table 7-52: Alternative Evaluation Ranking Summary - Ingleside Stormwater System

	Alternative A – Do Nothing	Alternative B – Outfall End-of-pipe treatment	Alternative C – Localized Treatment	Alternative D – Individual lot-level control and storage	Alternative E – Implement LID Controls
Technical	SCORE: 4 RANK: 5th	SCORE: 10 RANK: 1st	SCORE: 9 RANK: 2nd	SCORE: 8 RANK: 3rd	SCORE: 7 RANK: 4th
Natural	SCORE: 10 RANK: 1st	SCORE: 8 RANK: 3rd	SCORE: 9 RANK: 2nd	SCORE: 8 RANK: 3rd	SCORE: 7 RANK: 4th
Social	SCORE: 5 RANK: 4th	SCORE: 9 RANK: 1st	SCORE: 7 RANK: 3rd	SCORE: 7 RANK: 3rd	SCORE: 8 RANK: 2nd
Economic	SCORE: 10 RANK: 1st	SCORE: 4 RANK: 4th	SCORE: 9 RANK: 2nd	SCORE:10 RANK: 1st	SCORE: 6 RANK: 3rd
Final Score & Ranking	SCORE: 29 (72.5%) RANK: 4th	SCORE: 31 (77.5%) RANK: 3rd	**SCORE: 34 (85%) RANK: 1st**	SCORE: 33 (82.5%) RANK: 2nd	SCORE: 28 (70%) RANK: 5th

Therefore, the preferred alternative is Alternative C – Localized Treatment.

7.4.7 Transportation System

As indicated in the previous sections, there are no identified transportation bottlenecks in either the current or future conditions. This is due in combination to the anticipated growth in the community and the proximity of County Rd collectors to the local road network. As such, there are no identified projects tied to the future growth of the community. However, there are design components that should be considered in the Township guidelines to ensure that the impacts of growth do not result in the deterioration of the transportation experience in the community. This is addressed in the preferred alternatives section related to traffic operations, road safety and the integration of active transportation into new development projects.

It is important to note that, as the community grows, the key roadways in the community may begin to reach capacity resulting in some back-ups at peak times. These will typically be the intersections with County Rd No. 2 and other County Roads along the waterfront. As this is not within the

Township's jurisdiction, coordination with the Counties will be required to ensure that capacity upgrades are advanced to avoid any congestion backing up into Township streets.

8 PREFERRED ALTERNATIVES

The evaluation process for the alternative solutions includes the assessment of the alternative solutions in comparison to criteria established by the Project Team. The evaluation process includes an overall review of the alternative solutions, including technical performance of each alternative solution as well as positive and negative impacts on the natural environment, social environment, economic environment, and technical parameters identified by the Project Team.

The following sections provide a more detailed description of the proposed alternatives for the development of the preliminary and detailed design.

8.1 Water System Alternatives

8.1.1 Long Sault Pressure Zone

As detailed in the previous sections, the preferred alternatives for Growth within the Long Sault Settlement Area are a combination of projects intended to reinforce the existing system, ensure that water servicing for growth addresses both immediate and future needs, and provides redundancy and reliability through increasing storage and capacity in the system. This alternative includes solutions to overcome current and future bottlenecks as identified in Table 8-1.

Key information regarding the development of this alternative is summarized in Figure 8-1. At the preferred alternative stage, the estimates are refined to a Class "D" (+/-25%) stage due to the opportunity to optimize and understand the design further.

A review of the Municipal Class EA Schedules confirms that the project components would fit within the requirements of Exempt projects and Schedule B Class EA for the new elevated storage system. The consultation and review process that has been undertaken complies with, or exceeds, the requirements of Exempt projects and Schedule B Class EA and, therefore, the preferred alternatives meeting the Exempt projects and or Schedule B can be advanced directly to implementation.

8.1.2 Ingleside Pressure Zone

As detailed in the previous sections, the preferred alternatives for Growth within the Ingleside Settlement Area are a combination of projects intended to reinforce the existing system and ensure that water servicing for growth addresses both immediate and future need as identified in Table 8-2.

Key information regarding the development of this alternative is summarized in Figure 8-2. At the preferred alternative stage, the estimates are refined to a Class "D" (+/-25%) stage due to the opportunity to optimize and understand the design further.

A review of the Municipal Class EA Schedules confirms that the project components would fit within the requirements of Exempt projects. The consultation and review process that has been undertaken complies with, or exceeds, the requirements of Exempt projects and, therefore, the preferred alternatives meeting the Exempt projects can be advanced directly to implementation.

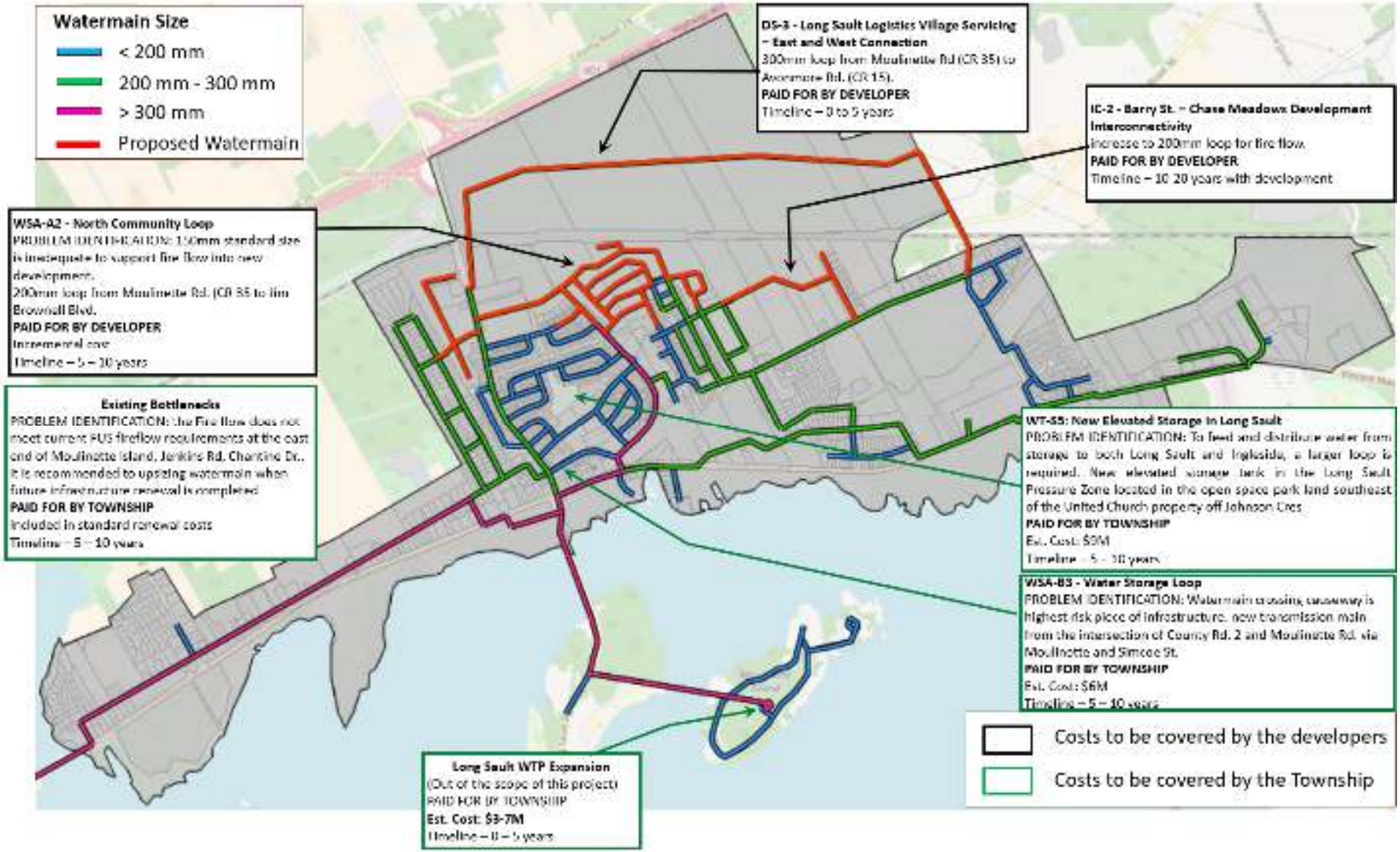


Figure 8-1 Preferred Alternative - Long Sault Pressure Zone

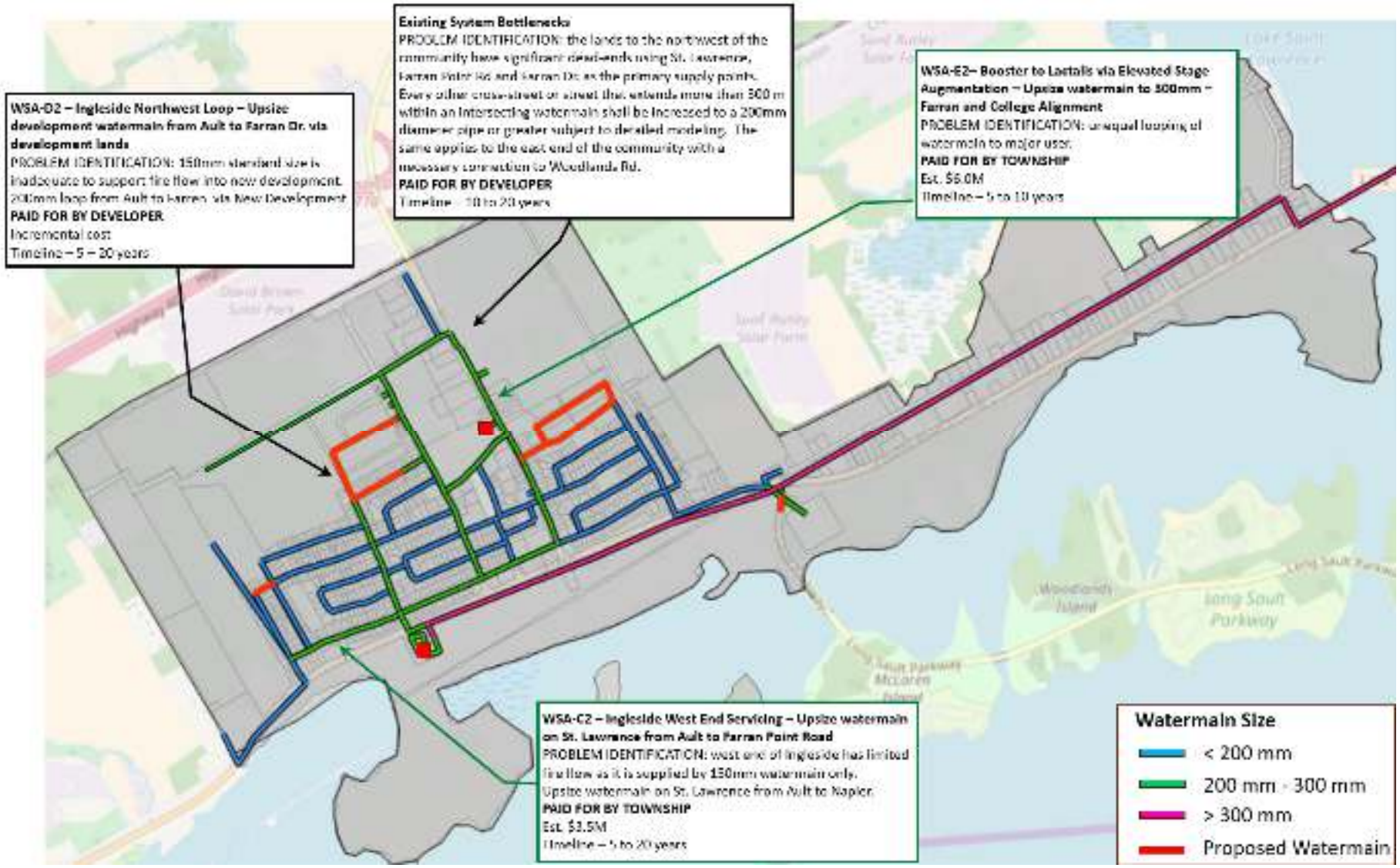


Figure 8-2 Preferred Alternative - Ingleside Pressure Zone

Table 8-1 Preferred Alternative Description – Long Sault Pressure Zone

	Description	Prerequisite Conditions	EA Schedule	Cost Estimate (2024 $)
0-5 YEARS TIMELINE				
DS-3 - Long Sault Logistics Village Servicing – East and West Connection	This project will consist of two connections to the distribution system to the development in order to form a watermain loop to the east and west ends of the development. The exact size will be determined based on the ultimate water and fire demand as the proponent has not confirmed final occupancies or requirements at this time. It is anticipated that the water demand may be up to 3,500 m^3/day plus fire demand to be determined on a building-by-building basis. This project will be completed and paid for by the Developer under the approval of Township. ▪ East Connection: ○ From existing watermain dead-end on Moulinette Rd north along Station Lane, crossing CNR via dedicated utility corridor to connect to Street "A" in LSLV. ○ Size: 300mm (est.) ○ Length: 730 m ▪ West Connection: ○ From intersection of County Rd 36 and County Rd 15 north along County Rd 15 crossing CNR to the intersection with Street "A" in LSLV. ○ Size: 300mm (est.) ○ Length: 1,000-1,200 m depending on final location of intersection		**Schedule B**	**PAID FOR BY DEVELOPER**
Long Sault Regional Water Treatment Plant Expansion	▪ The Township is proceeding with a Class Environmental Assessment to expand the water treatment capacity to the build-out of the existing system footprint.		**Schedule C**	**TOWNSHIP COSTS: $3-7M (out of scope for this project)**
5-10 YEARS TIMELINE				
Existing System Bottlenecks	▪ In Section 6.3, there were several bottlenecks identified including the east end of Moulinette Island, Jenkins Rd, Chantine Dr., where the fire flow does not meet current FUS fireflow requirements. The recommendation is to do nothing immediately in most cases; however, they should be flagged for upsizing when future infrastructure renewal is completed.		**Exempt**	**TOWNSHIP COSTS: Included in standard renewal costs**
WSA-A2 - North Community Loop	▪ Upsize developer watermain on McNiff Ave. from Moulinette to connection with Jim Brownell Blvd. to 200 mm – 1.3 km length – Project will be phased with development.	Development of McNiff Corridor and Chase Meadows Development	**Exempt**	**PAID FOR BY DEVELOPER**
WSA-B3 - Water Storage Loop	▪ Install new transmission main from the intersection of County Rd. 2 and Moulinette Rd. via Moulinette and Simcoe St. to the open space park by the splash pad/baseball diamond to the new storage site located off Johnson Cres. Southeast of the United Church property and continuing north through the municipally owned lands crossing Saunders and French to McNiff to connect to the North Community Loop. ○ Size: 400mm dia. ○ Length: 1.4 km		**Exempt**	**TOWNSHIP COSTS: $3.5M (+/- 25%)**
10-20 YEARS TIMELINE				
WT-S5: New Elevated Storage in Long Sault	▪ New elevated storage tank in the Long Sault Pressure Zone located in the open space park land southeast of the United Church property off Johnson Cres. Timing to be coordinated with need and budgetary requirements. ○ Size: 3,500 – 4,500 m^3 – Size to be selected based on growth projections at the time of implementation ○ Hydraulic Gradeline – Top water elevation – 130 m (maximum zone static pressure – 610 kPa, minimum zone static pressure – 425 kPa)		**Schedule B**	**TOWNSHIP COSTS: $9M (+/- 25%)**
IC-2 - Barry St. – Chase Meadows Development Interconnectivity	▪ Upsize developer watermain on Barry St. from Chase Meadows to Fenton Farm via future developments to 200mm – 725 m length – Project will be phased with development.	Development of parcel between Chase Meadows and Fenton Farm	**Exempt**	**PAID FOR BY DEVELOPER**

Table 8-2 Preferred Alternative Description – Ingleside Pressure Zone

	Description	Prerequisite Conditions	EA Schedule	Cost Estimate (2024 $)
0-5 YEARS TIMELINE				
WSA-C2 – Ingleside West End Servicing – Upsize watermain on St. Lawrence from Ault to Farran Point Road	▪ Provide new 250mm tee connection on the outlet from the booster station on the north side of County Rd. No. 2 and reroute 250mm along the north side of County Rd No. 2 extending north on Killarney and extending a 250mm watermain east to connect with Ault Drive and a 200mm watermain west along St. Lawrence Drive to the easement back to County Rd No. 2 and continue east to the intersection of County Rd No. 2 and Farran Point Rd. The watermain that currently crosses private property (via easement) can be abandoned once the project is complete. Project can be implemented over two to three construction years for budgetary purposes and should proceed in advance of any northwest residential development as it provides the capacity to meet fire flow requirements. Project costs include full reconstruction to Township Standard. o Size: 250mm dia., length: 680 m o Size: 200mm dia., length: 850 m		**Exempt**	**TOWNSHIP COSTS: $3.5M (+/- 25%)**
5-10 YEARS TIMELINE				
WSA-E2– Booster to Lactalis via Elevated Stage Augmentation – Upsize watermain to 300mm – St. Lawrence, Farran, College and Dickinson Alignment	▪ Replace watermain from existing 250 mm watermain at Farran Dr. and St. Lawrence Dr. along Farran Dr. to College St.to Dickinson and along Dickinson to connect with 45th Parallel Dr. and the existing Water Tower It is preferable to maintain a separate distribution main along this alignment up to the elevated storage to provide a dedicated supply. Project can be implemented over two to three construction years for budgetary purposes. Project costs include full reconstruction to Township Standard. o Size: 300mm dia. o Length: 1.4 km		**Exempt**	**TOWNSHIP COSTS: $6M (+/- 25%)**
10-20 YEARS TIMELINE				
WSA-D2 – Ingleside Northwest Loop – Upsize development watermain from Ault to Farran Dr. via development lands	▪ Upsize developer watermain on Ault Dr. (future) and Balsam St. (future) from Ault Dr. and Beech St. to Balsam St. and Farran Dr. – 575 m length – Project will be phased with development.	Development of subject lands	**Exempt**	**PAID FOR BY DEVELOPER**
Existing System Bottlenecks	▪ As identified in 6.3.2, the lands to the northwest of the community have significant dead-ends, as development occurs, using St. Lawrence, Farran Point Rd and Farran Dr. as the primary supply points, every other cross-street or street that extends more than 300 m within an intersecting watermain shall be increased to a 200mm diameter pipe or greater subject to detailed modeling. The same applies to the east end of the community with a necessary connection to Woodlands Rd.	Development of subject lands.	**Exempt**	**PAID FOR BY DEVELOPER**

8.2 Wastewater System Alternatives

8.2.1 Long Sault Sanitary System

As detailed in the previous section, the preferred alternative for Growth within the Long Sault Settlement Area is **Alternative C – Centralized Sanitary System Servicing the North Central Area**. This alternative includes solutions to overcome current and future bottlenecks as identified in Table 8-3.

Key information regarding the development of this alternative is summarized in Figure 8-3. At the preferred alternative stage, the estimates are refined to a Class "D" (+/-25%) stage due to the opportunity to optimize and understand the design further.

A review of the Municipal Class EA Schedules confirms that the project components would fit within the requirements of Exempt projects and Schedule B Class EA. The consultation and review process that has been undertaken complies with, or exceeds, the requirements of Exempt projects and Schedule B Class EA and, therefore, the preferred alternatives meeting the Exempt projects and or Schedule B can be advanced directly to implementation.

Table 8-3 Preferred Alternative Description - Long Sault Sanitary System

	Description	Prerequisite Conditions	EA Schedule	Cost Estimate
0-5 YEARS TIMELINE				
SPS-L1 - County Rd 36 SPS and Forcemain Upgrades	The proposed pumping station configuration will be optimized as part of the preliminary design development; however, in general, the following components will be included: ▪ Wet-well design for ultimate build-out, but only initially instrumented for the short-term (10 year) capacity of the system to best correspond with the lifespan of the pump components. ▪ Pumping systems will be sized for short-term with modular design capacity to allow for the addition of new pumps to raise the firm capacity of the system. ▪ The wet-well and pumping will be designed to minimize the risk of dead zones and the associated sediment/rags build-up in the wet-well causing additional operation and maintenance costs. ▪ Electrical, instrumentation and controls and mechanical equipment will be located in a building adjacent to the wet-well configured to minimize the amount of National Fire Protection Association (NFPA) rated spaces to reduce risk and cost. ▪ Back-up power to ensure that facility operation can be maintained through both short- and long-term outages. ▪ The forcemain from the pumping station to the inlet works for the WWTP will be twinned and sized for both initial and ultimate capacity of the system. ○ Length of the Forcemain – Approximately 0.7 km ○ Size – 350 mm		**Schedule B**	**TOWNSHIP COSTS: $2.8M (+/- 25%)**
SA-L1 - 300 mm Sanitary Sewer North of County Road 36	▪ Upsizing sewer on County Rd 36 from 300 mm to 450 mm ○ Length of the Gravity Sewer – Approximately 0.6 km. ○ Size – 450 mm at 0.2% slope (to be confirmed in preliminary design). ○ Depth – Varies, but the sanitary sewers will be approximately 3 m below grade.		**Exempt Project**	**TOWNSHIP COSTS: $1.5M (+/- 25%)**
SA-L2 - 250 mm Sanitary Sewer South of County Road 36	▪ Upsizing sewer south of County Rd 36 from 250 mm to 350 mm ○ Length of the Gravity Sewer – Approximately 0.5 km. ○ Size – 350 mm at 0.2% slope (to be confirmed in preliminary design). ○ Depth – Varies, but the sanitary sewers will be approximately 3 m below grade.		**Exempt Project**	**TOWNSHIP COSTS: $1.2M (+/- 25%)**
Long Sault Wastewater Treatment Plant	▪ The Township is reviewing optimization opportunities, but plant expansion is the anticipated outcome.		**Schedule C**	**TOWNSHIP COSTS: $15-25M (out of scope for this project)**
SPS-LD1 - Chase Meadows Development Integrated Pumping Station	▪ New Sanitary Pumping Station (SPS) sized for Chase Meadows, McNiff Area, West of Moulinette, LSLV. ▪ New 250mm – 1.5 m long Forcemain from the new SPS to existing gravity sanitary sewer to Long Sault WWTP. ▪ New 200 mm – 1.0 km long gravity sewer from LSLV to the new SPS.	▪ Flow from existing Mille Roches SPS to be directed to the new Chase Meadows SPS ▪ Needs to be coordinated with all developments to ensure that gravity inflow is achieved.	**Schedule B**	▪ Primary Developer covers cost of internal sewers and base SPS. ▪ Township to finance incremental cost increase for exterior connections, depth, size for other developments and recover that cost from future developments. **Estimated costs to be covered by the Township: $2.7M (+/- 25%)**
SA-LD1 - LSLV Phase 1	▪ New 200 mm – 1.5 km long gravity sewer from LSLV to Chase Meadows SPS.	Chase Meadows SPS in place	**Schedule B**	**PAID FOR BY DEVELOPER**
5-10 YEARS TIMELINE				
SPS-LD2 - LSLV Phase 2	▪ New Sanitary Pumping Station (SPS) sized to 7.5 L/s. ▪ New 200 mm – 2.0 km long gravity sewer from LSLV to the new SPS. ▪ New 200mm – 0.5 km long Forcemain from the new SPS to be connected on the existing sewer on County Rd 36.		**Schedule B**	**PAID FOR BY DEVELOPER**
10-20 YEARS TIMELINE				
SA-LD2 - Moulinette Road Subdivision Development	▪ New 200 mm – 750 m long gravity sewer from the Moulinette Rd Subdivision development to be connected to the existing trunk sanitary sewer directed to the Long Sault WWTP.	Needs to be coordinated with McNiff and Chase Meadows SPS	**Exempt Project**	**PAID FOR BY DEVELOPER**

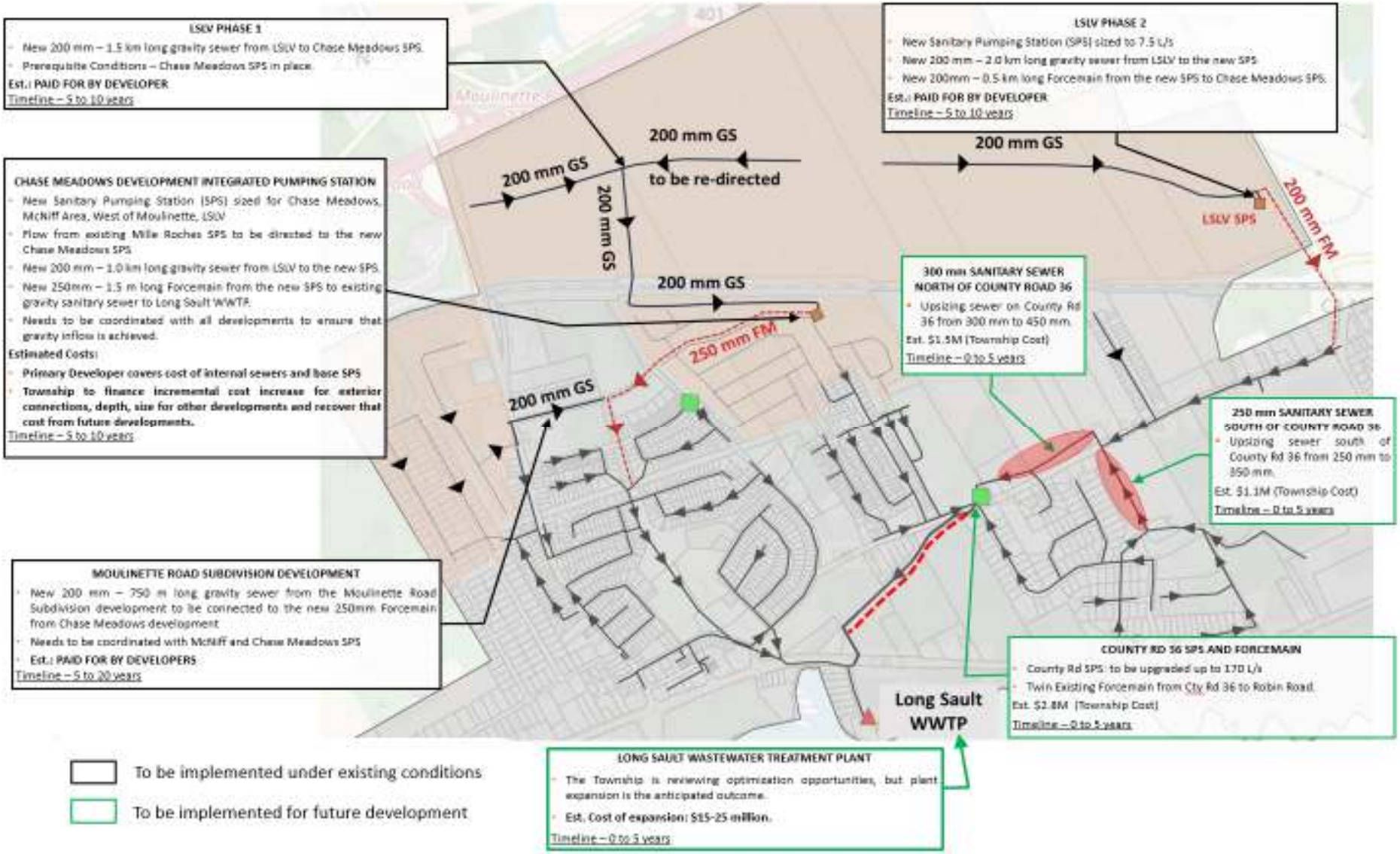


Figure 8-3 Preferred Alternative - Long Sault Sanitary System

8.2.2 Ingleside Sanitary System

As indicated in Section 9.4, the existing sanitary sewer should be able to receive additional flow from future development without negative impacts on the existing sewer network with the exception of the existing Ingleside SPS. Therefore, no future configuration has been planned for future development within the municipal sanitary servicing area of Ingleside. However, connection points for future development areas together with recommendations to overcome existing bottlenecks in order to optimize future system operations have been identified and localized in Figure 8-4. At the preferred alternative stage, the estimates are refined to a Class “D” (+/-25%) stage due to the opportunity to optimize and understand the design further.

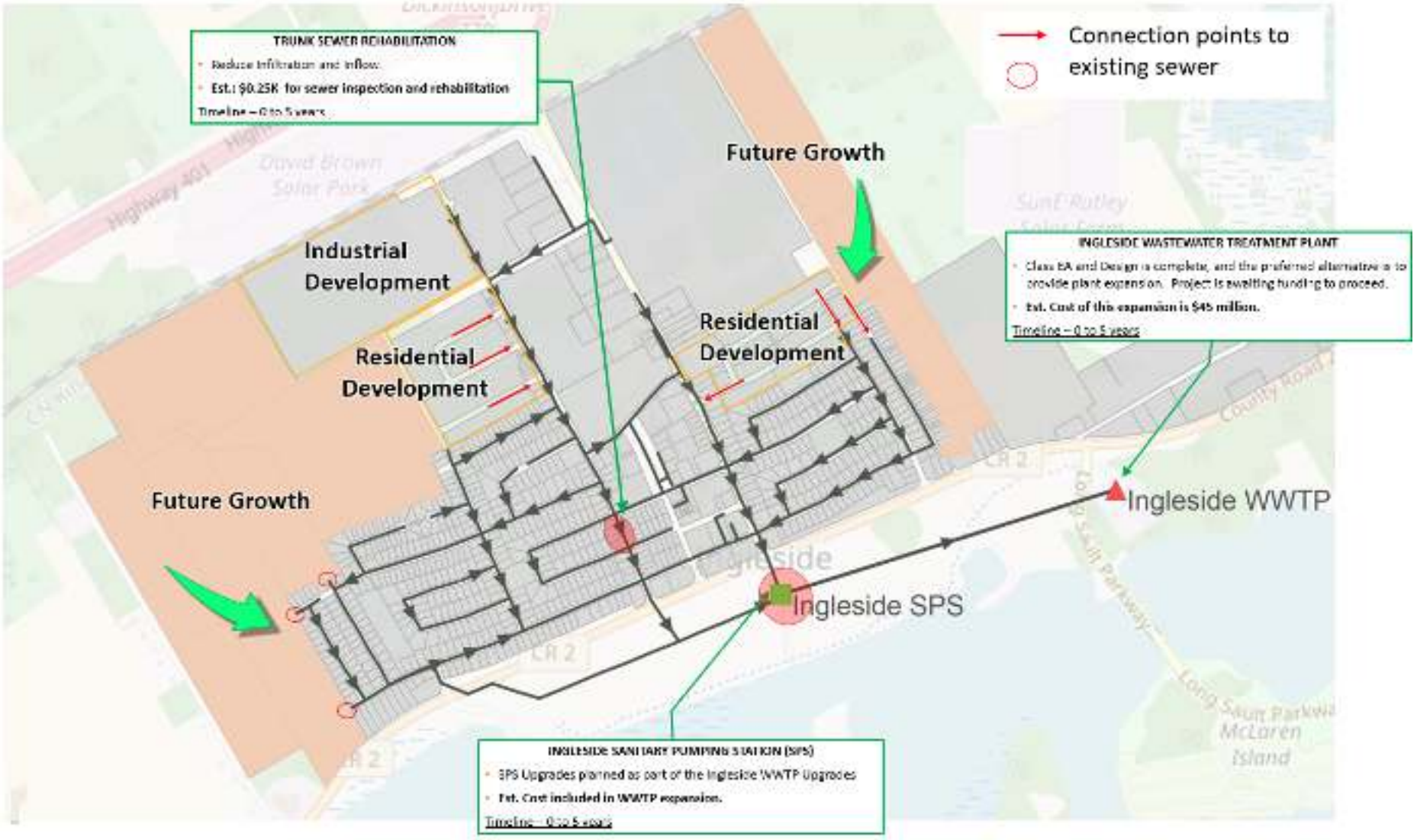


Figure 8-4 Preferred Alternative - Ingleside Sanitary System

8.3 Stormwater Management Alternatives

8.3.1 Long Sault Stormwater System

The preferred Stormwater Management alternative for Long Sault is **Alternative B – Outfall End-of-pipe treatment**. Although no bottlenecks were identified under current conditions, a condition assessment of the 600 mm storm sewer along Mille Roches and directed to County Rd 36 has been recommended to confirm sewer conditions.

Key information regarding the development of this alternative is summarized in Figure 8-5. At the preferred alternative stage, the estimates are refined to a Class "D" (+/-25%) stage due to the opportunity to optimize and understand the design further. Table 8-4 illustrates the cost estimate for the preferred alternative.

A review of the Municipal Class EA Schedules confirms that the project components would fit within the requirements of a Schedule B Class EA. The consultation and review process that has been undertaken complies with, or exceeds, the requirements of a Schedule B Class EA and therefore, the preferred alternatives meeting the Class B can be advanced directly to implementation.

Table 8-4 Preferred Alternative Description - Long Sault Stormwater System

	Description	Prerequisite Conditions	EA Schedule	Cost Estimate
0-5 YEARS TIMELINE				
ST-LR1 - Storm Sewer Rehabilitation	▪ Condition assessment of the 600mm diameter storm sewer along Mille Roches and directed to County Rd 36.		**N/A**	**TOWNSHIP COSTS: $0.15K (+/- 25%)**
5-10 YEARS TIMELINE				
ST-MD1 - New Municipal Drain Definition	▪ New Municipal Drain for North Outlet to St. Lawrence River to be defined to provide outlet certainty to all impacted landowners		**Under the Drainage Act**	**TOWNSHIP COSTS: $0.10M**
SWM-L1 - New Stormwater Facility No. 2	▪ New 15,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly. It will include crossing the County Rd 2 to discharge into the St. Lawrence River. ▪ Required to meet quality control requirements. ▪ Design Considerations: ○ Ponds would be volume-based sizing, designed to treat first flush rain (~25 mm rainfall depth). ○ The max depth of the SWM ponds should not exceed 3.3m, including a max freeboard of 0.3m. ○ The depth of permanent pool must be 1.0-1.5m ○ The 25mm storm event extended detention should discharge over a 24-to-48-hour period.	Land Acquisition Required	**Schedule B**	**TOWNSHIP COSTS: $2.5M (+/- 25%)**
SWM-LD-1 - Moulinette Road Subdivision Development	▪ New 9,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly.		**Schedule B**	**PAID FOR BY DEVELOPER**
10-20 YEARS TIMELINE				
SWM-L2 - New Stormwater Facility No. 1	▪ New 9,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly. ▪ Required to meet quality control requirements. ▪ Design Considerations:		**Schedule B**	**TOWNSHIP COSTS: $1.2M (+/- 25%)**

	○ Ponds would be volume-based sizing, designed to treat first flush rain (~25 mm rainfall depth). ○ The max depth of the SWM ponds should not exceed 3.3m, including a max freeboard of 0.3m. ○ The depth of permanent pool must be 1.0-1.5m ○ The 25mm storm event extended detention should discharge over a 24-to-48-hour period.			
SWM-L3 - New Stormwater Facility No. 3	▪ New 9,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly. ▪ Required to meet quality control requirements. ▪ Design Considerations: ○ Ponds would be volume-based sizing, designed to treat first flush rain (~25 mm rainfall depth). ○ The max depth of the SWM ponds should not exceed 3.3m, including a max freeboard of 0.3m. ○ The depth of permanent pool must be 1.0-1.5m ○ The 25mm storm event extended detention should discharge over a 24-to-48-hour period.		**Schedule B**	**TOWNSHIP COSTS: $1.2M (+/- 25%)**

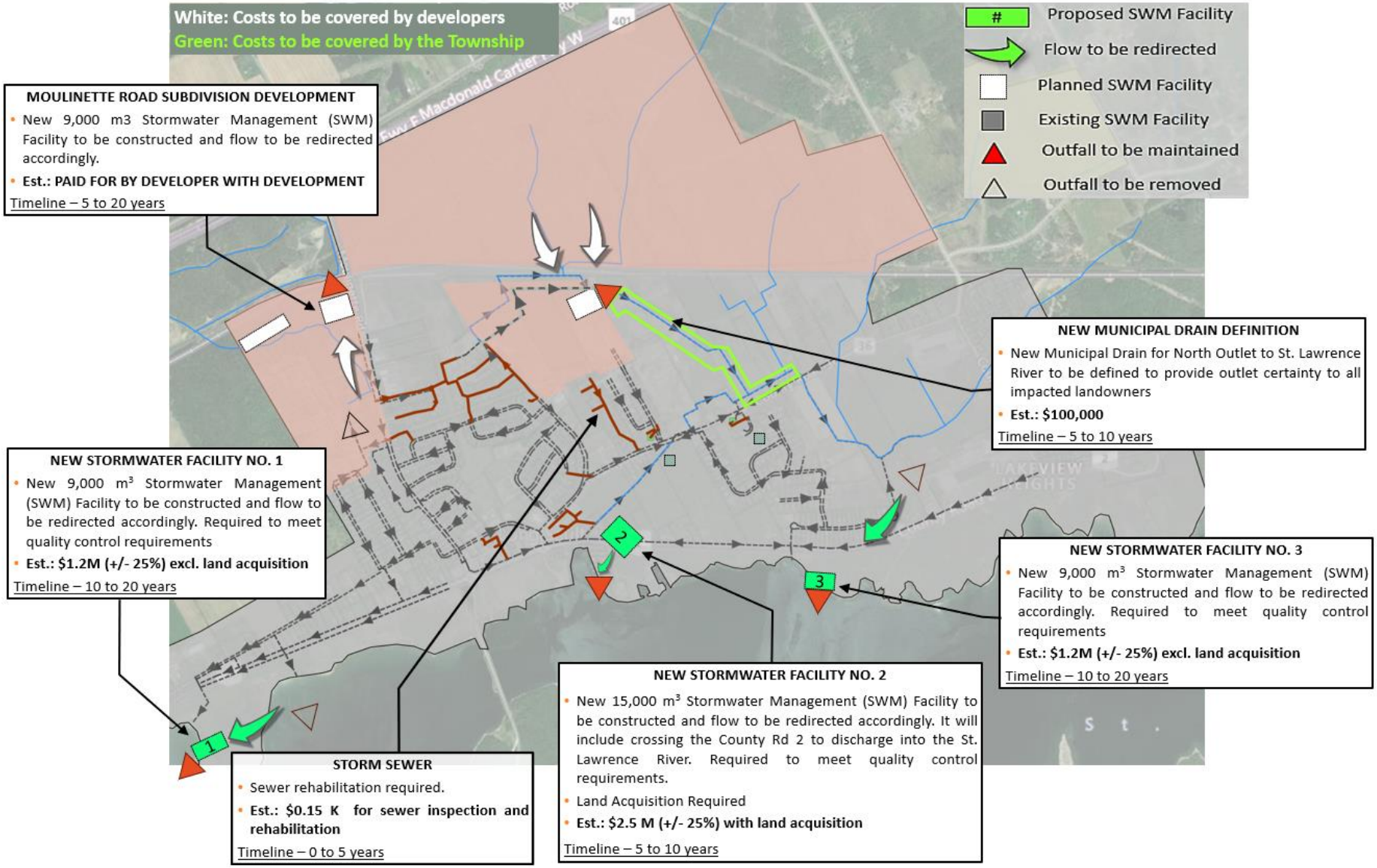


Figure 8-5 Preferred Alternative - Long Sault Stormwater System

8.3.2 Ingleside Stormwater System

The preferred Stormwater Management alternative for Ingleside is **Alternative C – Localized Treatment**. Additionally, to overcome the bottlenecks identified under current conditions, flow re-routing from Hoople Street to Dickinson Drive and upsizing the sewer along College Street would be required.

Key information regarding the development of this alternative is summarized in Figure 8-6**.** At the preferred alternative stage, the estimates are refined to a Class "D" (+/-25%) stage due to the opportunity to optimize and understand the design further. Table 8-5 illustrates the cost estimate for the preferred alternative.

A review of the Municipal Class EA Schedules confirms that the project components would fit within the requirements of a Schedule B Class EA. The consultation and review process that has been undertaken complies with, or exceeds, the requirements of a Schedule B Class EA and therefore, the preferred alternatives meeting the Class B can be advanced directly to implementation.

Table 8-5 Preferred Alternative Description - Ingleside Stormwater System

	Description	Prerequisite Conditions	EA Schedule	Cost Estimate
0-5 YEARS TIMELINE				
ST-I1 -Upsizing Storm Sewer along College Street	▪ Upsizing Storm Sewer along College Street from 400mm to 525mm ○ Length of the Sewer – Approximately 300m ○ Size – 525 mm at 0.2% slope (to be confirmed in preliminary design) ○ Depth – Varies, but the sanitary sewers will be approximately 2 m below grade.		**Exempt Project**	**TOWNSHIP COSTS: $1.1M (+/- 25%)**
ST-I2 - Storm Sewer From Hoople Street to Maxwell Avenue	▪ Upsizing Storm Sewer along Hoople Street from 200mm to 350mm ○ Length of the Sewer – Approximately 200m ○ Size – 350 mm at 0.4% slope (to be confirmed in preliminary design) ○ Depth – Varies, but the sanitary sewers will be approximately 2 m below grade. ▪ New 350 mm from Hoople Street to Dickinson Drive (CR14). ○ Length of the Sewer – Approximately 120m ○ Size – 350 mm at 0.3% slope (to be confirmed in preliminary design) ○ Depth – Varies, but the sanitary sewers will be approximately 2 m below grade.		**Exempt Project**	**TOWNSHIP COSTS: $1.3M (+/- 25%)**
SWM-ING - Oil-Grit Separator [(a)] (OGS) Within the Existing Township Area	▪ Installation of approximately 20 oil-grit separators (OGS) on a street-by-street level, designed to remove oil and grit from stormwater runoff.	To be coordinate with Road Reconstruction projects.	**Based on road reconstruction**	**TOWNSHIP COSTS: $3.0M (+/- 25%)**
5-10 YEARS TIMELINE				
N/A	**N/A**	**N/A**	**N/A**	**N/A**
10-20 YEARS TIMELINE				
SWM-ID1 - Northeast Combined SWM Facility	▪ New 9,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly. Required to meet quality control requirements.	Land Acquisition Required	**Schedule B**	**PAID FOR BY DEVELOPERS**
SWM-ID2 - Northwest Combined SWM Facility	▪ Planned Stormwater Management (SWM) Facility to be sized to service development area and northwest long-term development lands. Flow to be redirected accordingly. Required to meet quality control requirements.		**Schedule B**	**PAID FOR BY DEVELOPERS/DEVELOPMENT CHARGES**
SWM-ID3 - Future Growth Development Areas	▪ New 9,000 m^3 Stormwater Management (SWM) Facility to be constructed and flow to be redirected accordingly.		**Schedule B**	**PAID FOR BY DEVELOPERS**

(a) Timeline is 0-20 years based on road reconstruction projects

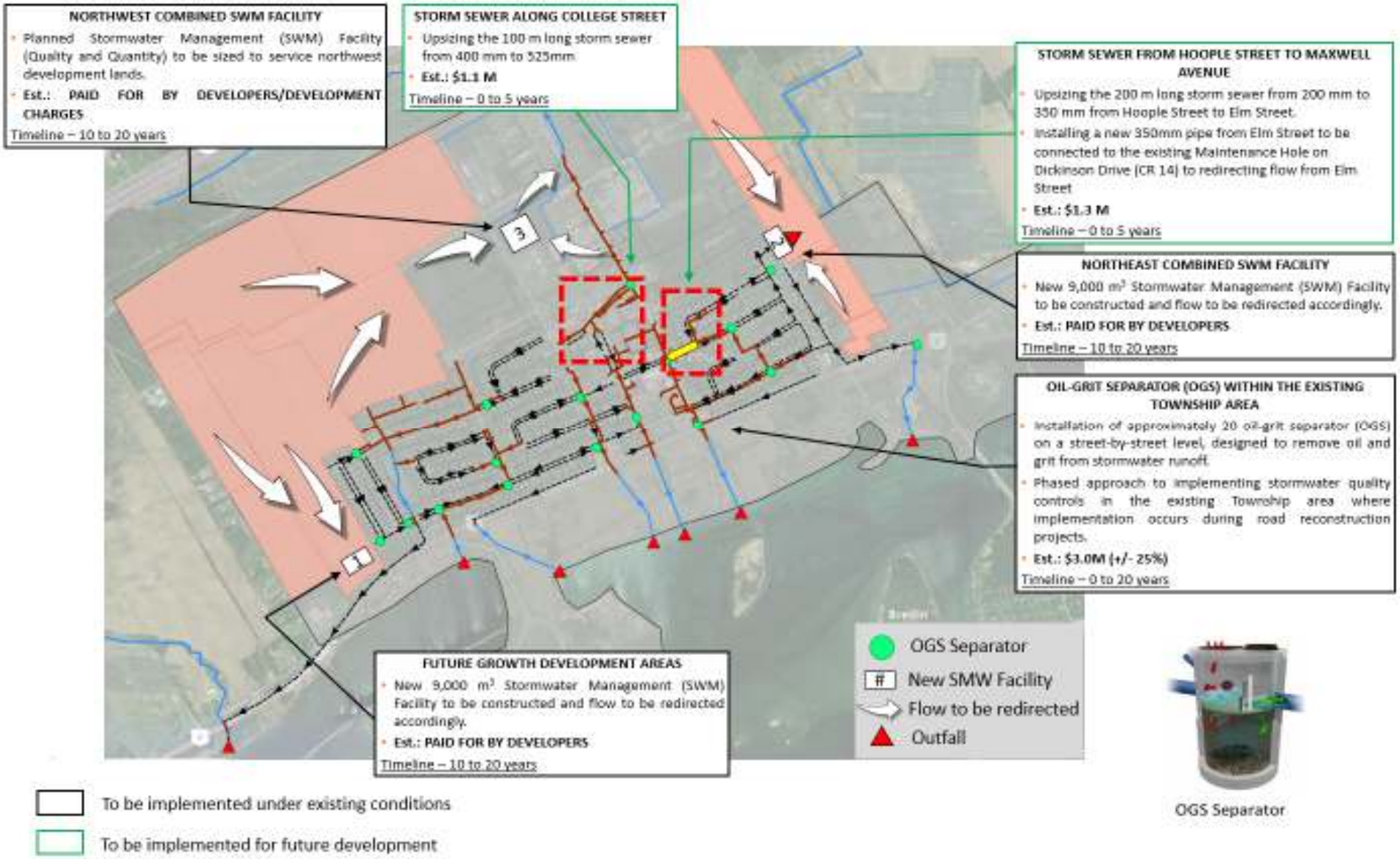


Figure 8-6 Preferred Alternative - Ingleside Stormwater System

8.4 Transportation Servicing

8.4.1 Traffic Operations

The Township is experiencing substantial residential and ICI growth with several large-scale projects planned in the area, including the following:

- **Long Sault Logistics Village is a major development planned in the Township.** The proposed development consists of 15 industrial buildings with a combined GFA of approximately 450,000 m^2, and an intermodal rail yard. The planned development is expected to generate 734 and 877 two-way vehicle trips in the AM peak hour and PM peak hour, respectively.
- **Chase Meadows Subdivision Development** is a major residential development planned in Long Sault. This project is planned to be located east of Mille Roches Rd and consists of 459 residential dwellings. It is projected to generate about 285 new trips in the AM peak hour and approximately 385 new trips in the PM peak hour. The development is planned to be constructed in phases and includes single-family homes and townhouses.

TISs for both developments indicate that their surrounding road networks can accommodate increased traffic volumes with some recommended road improvements. The TIS prepared for Long Sault Logistics Village recommends installing three traffic signals, all at County intersections. The TIS prepared for Chase Meadows Subdivision Development identifies the extension of McNiff Avenue east of Moulinette Rd (County Rd 35) to connect with Mille Roaches Rd. This planned extension of McNiff Ave will help provide an alternate route to Highway 401, in addition to Simcoe St., at the east end of the Long Sault community.

8.4.2 Road Safety

As previously discussed, the Township is expecting an increase in residential and commercial development in the near future. Long Sault Logistics Village and Chase Meadows Subdivision Development are among the major developments planned in the Township that are expected to increase traffic volumes. Safety of all transportation users remains a paramount concern as the traffic generated by these sites increases vehicle volumes throughout the Township's transportation network.

As evidenced through the reduction of serious injury collisions between 2015 and 2019, safety continues to improve on the Township's Road network. It is anticipated that the Township will continue its efforts at key intersections and roads. The aforementioned aspects of signage, pavement markings, paved shoulders, and access management techniques, including dedicated turn lanes and raised medians, are simple yet effective measures that can continued to be considered for the Township going forward. Guidance from the Ontario Traffic Manual (OTM) and Transportation Association of Canada (TAC) guidance, including the TAC Canadian Guide to Traffic Calming, can help the Township achieve their road safety goals.

8.4.3 Pedestrian Safety

The most significant component of the preferred alternative with respect to transportation is the development of consistency for the inclusion of sidewalks on existing residential streets with a focus on streets that are higher traffic compared to strictly local streets with limited through traffic. As identified in Section 7, the preferred alternatives are:

- TSW-L1 - Long Sault – French Ave., Long Sault Drive., and County Rd No. 36 – Total Estimated Cost: $1M
- TSW-I1 - Ingleside – Ault Dr. and Bank St. - $100,000

8.4.4 Active Transportation

It is anticipated that the Township will continue to incorporate sidewalk construction into its capital works program. While some roads already have sidewalk construction planned, a review of current plans do not include routes near the main commercial plazas in Long Sault and Ingleside, including Plaza Street, Long Sault Drive, Mille Roches Rd, and St Lawrence Dr.

The Township desires to boost tourism cycling as well as local cycling by developing a well-connected trail network. The Township conducted the *Bicycle Friendly Communities Workshop* in June 2019 that identified the need for an interactive mapping tool of the facilities, parks, and trails available in the Township. The Workshop also recognized the importance of an annual signature cycling event, which is a car-free event that in support of active transportation. The Township strives to become a Bicycle Friendly Community through the implementation of such infrastructure projects and initiatives.

The *2020 South Stormont Parks and Recreation Master Plan* identifies some of the routes planned for active transportation within the Township that include:

- AT-1 - A dedicated multi-use pathway along the south side of County Rd 2, between Ingleside and Long Sault. **Included in this study as a preferred alternative for a capital cost of $4.4M.**
- A trail along the New York Central (NYC) Rail Line providing regional linkage into northern areas of the Township through Newington and connecting with the Russell Township (outside of project scope); and
- Potential development of a mountain bike park within the Township (outside of project scope).

The Township recognizes the waterfront, extending along its southern boundary, as an important asset. The *2021 Township of South Stormont Waterfront Master Plan* identified plans for future trails with consideration of the Township's 10-year capital works plans and *Recreation Master Plan*. The County Rd 2 Multi-Use Trail project has been envisioned as an important east-west active transportation corridor, with an objective to improve linkage to existing and new waterfront facilities. The Township will need to consider how their active transportation network connects to this route. The implementation of sidewalks, crossings and cycling facilities can help to improve mobility, reduce congestion, enhance safety, promote sustainability, and support economic development in the Township.

8.4.5 Road Illumination

As previously identified, while the existing illumination does not meet RP-8 standards fully, it does meet the required lighting levels, but not the uniformity. In order to meet the uniformity requirements, it would be necessary to either add additional streetlights to fill in uniformity gaps or remove and install new streetlights at intervals that would meet the RP-8 requirements. The current system is not perfect but does not warrant this level of independent investment. The preferred alternative is to integrate roadway illumination with each road reconstruction and require a lighting assessment and replacement of lights at the time of construction. For new construction, compliance with RP-8 should be the standard of acceptance.

8.5 Capital Cost Summary

Table 8-6 illustrates the total estimated cost ($2024) for the preferred alternatives identified in both communities broken down by service type. The prioritization and anticipated annual expenditures necessary to support the implementation of the Master Servicing Study is included in the Conclusions and Recommendations section of this report.

Table 8-6: Preferred Alternative Capital Cost Summary (Municipal Funded) - $2024

System Components	Long Sault	Ingleside
Water Distribution	$12.5M	$9.5M
Sanitary Collection	$8.2M	$0.25M
Stormwater Management	$5.15M	$5.4M
Transportation	$3.2M	$2.3M
Infrastructure Renewal	$30M	$30M
Total ($2024)	$59.05M	$47.45M
Equivalent Annual Capital Cost ($2024)	$2.95M	$2.38M

9 PUBLIC CONSULTATION

9.1 Notice of Commencement

At the onset of the project a list of entities was developed and is provided in **Appendix B**. On July 17th, 2023, a Notice of Study Commencement was issued to the agency contacts and advertised on the Town's website. The Notice of Commencement has been included in **Appendix C**.

Feedback from the issuance of the Notice of Study Commencement were collected and appended to this report.

9.2 Public Information Centres

9.2.1 Public Information Centre No. 1

The Public Information Centre was held in person on October 17th, 2023, from 5:00pm to 7:00pm. A formal presentation was provided.

Boards presenting the project information were presented and representatives from the project team and Township staff were available to answer questions during the PIC. A total of 10 individuals attended the meeting. The PIC including the Q&A was recorded and is available on the Township's project website.

The attendance list, presentation materials, and comments sheets are included in **Appendix D.**

9.2.2 Public Information Centre No. 2

The Public Information Centre was held in person on November 7th, 2023, from 5:00pm to 7:00pm. A formal presentation was provided.

Boards presenting the project information were presented and representatives from the project team and Town staff were available to answer questions during the PIC. No individuals attended the meeting. The PIC was recorded and is available on the Town's project website.

The presentation materials are included in **Appendix E.**

9.3 Stakeholder Consultation

Table 9-1 below provides a summary of public consultation questions, comments and answers received to date. Refer to **Appendix F** for written correspondence received from the public.

Table 9-1 Public Stakeholder Comments and Consultation

Stakeholder	Comment	Action
Public Commenter No. 1	Noticeable water flow/pressure drop when watering lawn during breakfast and supper periods.	A review of the location of the residence on Manning Rd and setback from the road would indicate that pressure drop from the watermain to the residence could be up to 140 kPa (20 psi), which would be significant when combined with the pressure drop through a hose. During high demand periods when combined with the filling of the Ingleside reservoir via the Manning Rd Transmission, the pressure drop at the residences may be noticeable. Recommend that Township install pressure transducer to track water pressure along the transmission main.

9.4 Public Agency Comments

Table 9-2 below provides a summary of public consultation questions, comments and answers received to date by Public Agency. Refer to **Appendix F** for written correspondence received from the public.

Table 9-2 Public Stakeholder Comments and Consultation

Stakeholder	Comment	Action
Ministry of the Environment, Conservation and Parks	The MECP provided guidance regarding the Class EA process for this project. In particular, direction have been provided regarding the ministry's interests with respect to the Class EA process and listed as follows: ▪ Planning and policies for projects located to the eastern region. ▪ Environmental protection documents about the natural, and social environment. ▪ Mitigation and monitoring actions for potential environmental impacts. ▪ Class EA and Consultation process.	WT reviewed the documents received by the MECP and proceeded with following all the steps for this Class EA project and communications requirements. In particular, provincial policies and regulations have been consulted together with the Township official plan, previous studies, and secondary plans. Sources of potential environmental impacts have been considered during the development and assessment of alternatives and, if any, mitigation measures have been applied.
Hydro One	Hydro One indicated that there are existing high voltage Transmission facilities and Distribution facilities within the study area. They requested to stay informed on the status of this project and requested to consider the possibility that Hydro One may have provision for future lines or already contain secondary land uses within the project area.	WT will continue to inform Hydro One about the project status.

9.5 Indigenous Community Comments

Table 9-3 below provides a summary of public consultation questions, comments and answers received to date by the Indigenous Community. Refer to **Appendix F** for written correspondence received from the public.

Table 9-3 Public Stakeholder Comments and Consultation

Stakeholder	Comment	Action
Indigenous Communities and Organizations	No comments received to date.	Follow-up with identified indigenous communities and organizations upon notice of completion.

9.6 Notice of Completion

The project is not yet complete. Upon approval of the draft report a notice of completion will be issues.

The Notice of Study Commencement will be issued to the agency contacts and advertised on the Town's website. The Notice of Completion will be included in **Appendix G**.

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

In general terms, the infrastructure in Long Sault and Ingleside is in good condition and there are no critical bottlenecks in the existing system.

10.1.1 General

The infrastructure in both Long Sault and Ingleside is servicing the community well, but the original Seaway town site area in both communities does have infrastructure that is reaching the end of its useful life. As evident by the significant percentage of non-revenue water and I/I in the system, there are opportunities to be achieved through reducing water leakage and I/I. Achieving this reduction has the potential of servicing an additional 300 properties or more with no additional operating cost, since the lost water is already produced, and the infiltrated wastewater is already treated. As indicated in previous sections, it appears that the lost water and I/I is distributed across both communities with a definite focus on the original town site areas. Therefore, rather than a localized correction approach, a more long-term goal of infrastructure renewal should be considered as the preferred approach to addressing this issue.

10.1.2 Water Servicing

The existing water system servicing Long Sault and Ingleside is operating well within accepted standards but is reaching the 20-year mark following the implementation of the Regional Water Supply regime. This, combined with the age of the original infrastructure, which is over 65 years old, means that the Township is entering a phase where over the next 20 years it may be necessary to renew the majority of the existing infrastructure.

The Master Servicing Study analysis has identified a number of projects to be completed based on need in both Long Sault and Ingleside. Some of the projects address future requirements by integrating Township water supply priorities into new developments to ensure that the completed works not only meet the needs of the development, but of the community as a whole. Furthermore, major projects have been identified to reinforce the water supply system in terms of capacity, resilience, and operational efficiency. These include new elevated storage in Long Sault as well as the replacement or twinning of existing watermains to improve the transmission of water between the source and storage as well as providing effective distribution of fire flow to flow restricted areas in the communities.

The implementation of the recommendations below will be the next critical step that the Township will need to undertake. As indicated above, the major infrastructure components (water treatment system and storage) are reaching capacity or are over 65 years old. This applies to a large percentage of the distribution system as well. Generally, the expected life of passive infrastructure (watermains, tanks, etc.) is 75-100 years. The Township has approximately 62 km of watermains of which an estimated 75% is original to the Seaway era and/or a minimum of 50 years old. Therefore, there are approximately 47 km of watermain that may need to be replaced within the next 25-50 years. This equates to approximately 1 km of replacement per year or $1M per year for watermain replacement alone.

10.1.3 Wastewater Servicing

The existing wastewater system servicing Long Sault and Ingleside is operating well within accepted standard. However, as per the water system, the original infrastructure is near to the end of its lifespan.

The Master Servicing Study analysis has identified a number of projects to be completed based on need in both Long Sault and Ingleside. Some of the projects address existing bottlenecks which will require sewer upgrades to better service current and future population. Moreover, alternatives to accommodate future growth have also been provided which will include sanitary pumping station upgrades and sewer interconnectivity between developers with the intent to develop a centralized system which will promote the planned growth while maximizing gravity conveyance to both Long Sault and Ingleside Wastewater Treatment Plants.

Both Long Sault and Ingleside WWTPs are near to full capacity, and it is our understanding that the Township is already providing solutions to increase system capacity for future growth. The estimated costs for Long Sault and Ingleside WWTPs are in the range of $15-25M and $45M, respectively.

The implementation of the recommendations below will be the next critical step that the Township will need to undertake. Rather than advancing sewer inspections to optimize the operation of the trunk sewer within the Ingleside wastewater system, no additional projects have been identified to improve wastewater servicing within Ingleside. On the other hand, the total estimated costs to be covered by the Township for improving/implementing wastewater servicing within Long Sault are expected to be approximately $8.5M.

10.1.4 Stormwater Servicing

As per the water and wastewater system, the existing wastewater system servicing Long Sault and Ingleside is operating well within accepted standards; no bottlenecks of any significance were identified in the Long Sault distribution system under current conditions. On the other hand, sections of the Ingleside stormwater network were identified as undersized and solutions to increase capacity have been proposed.

With regard to future growth, although population growth does not directly impact stormwater, this will translate into needs to expand the road transportation networks and/or increase of impervious areas, which, in turn, requires upsized or enhanced stormwater drainage. Therefore, solution to mitigate the effects of urbanization on the hydrologic cycle including increased runoff, and decreased infiltration of rain and snowmelt, as well as protection of water quality have been developed.

The construction of combined stormwater facilities has been proposed within the Long Sault stormwater system to address both existing and new development areas. The estimated costs to be covered by the Township to improve stormwater servicing in Long Sault are approximately $5.2M.

In Ingleside, a combination of localized treatment using oil-grit-separation technologies and end-of-pipe stormwater management practices have been considered to meet the multiple objectives of stormwater management. The estimated costs to be covered by the Township to improve stormwater servicing in Ingleside are approximately $5.2M.

10.1.5 Transportation Servicing

The existing and proposed populations in Long Sault and Ingleside combined with the existing and proposed road networks will not result in any significant traffic congestion within the 20-year study period. The County Roads that intersect with County Rd. No. 2 will, and do, encounter congestion primarily due to the impact of Emergency Detours from Highway 401. This is outside of the scope of this project; however, because the collector and arterial routes in both communities are County Roads, it is important for collaboration with the Counties in order to minimize the impacts on Township streets.

The key action items associated with the transportation servicing component of the MSS are associated with the pedestrian and active transportation components with a focus on mobility and access. Additionally, ensuring that there is consistency within both communities for the provision of sidewalks will be important in ensuring pedestrian safety.

In Ingleside specifically, creating safe access from the community to the waterfront should be a priority that will require collaboration with the Counties to allow for safe crossings at each of the key desire lines along the south perimeter of the community.

Furthermore, the most significant individual project associated with the transportation scope is the multi-use trail from Long Sault to Ingleside to be located on the south side of the County Rd. No. 2 corridor. This project will provide a more functional system to allow for both recreational and functional transportation between communities and into the urban centre of Cornwall. The prioritization of the projects should be linked to both integration with the water, wastewater, and stormwater scopes and, in the case of the multi-use trail, funding partnerships to facilitate the implementation of the preferred alternatives.

As was identified in the Roads needs study, there are a number of streets within both communities that are considered to have a critically deficient condition. This does not impact the transportation servicing of the community; however, it is relevant in terms of prioritizing infrastructure renewal to maximize the value for money achieved. Focusing on areas that capture both deficiencies for water, sanitary, storm and transportation will increase the immediacy of seeing results from infrastructure renewal.

Independent from the servicing aspect of the project relative to transportation is traffic safety within the two communities. A review of street lighting indicated that the Township does not meet the strict requirements of the RP-8 standard for roadway illumination; however, additional streetlights may meet compliance, but may not benefit the community and actually may have adverse impacts including

light pollution and complaints from residents. Focusing street lighting efforts in areas where there is a risk of pedestrian/vehicle interactions at night such as around the Plaza areas in both communities and pedestrian desire lines that intersect with through streets is recommended when those streets are budgeted for reconstruction.

Several traffic calming tools have been reviewed in the MSS and it is important that the community determine the preferred approach that meets both safety and operational effectiveness. This may be best achieved through a pilot program to test the most effective tool within the community combined with the addition of additional signage to improve speed compliance within the communities.

Overall, the future transportation servicing for both Long Sault and Ingleside will require that the considerations for pedestrian/active transportation linkages are provided, and the road networks are configured to promote efficient progression of traffic from residential areas to the collector and arterial County Roads.

10.1.6 Integrated Solutions

One of the important benefits of the Master Servicing process is to develop holistic solutions for the community rather than piecemeal additions to the system that are focused solely on individual street level benefits. The implementation phase of this project covers a 20-year period and is intended to provide adequate time to budget to achieve the objective of an integrated approach to infrastructure by prioritizing capital projects based on maximizing benefit to the community.

It is equally important that the projects begin to be implemented at the earliest opportunity and that stable funding be established to ensure that the integrated solutions which are essentially road reconstruction projects are completed annually in order to begin the effort of closing the infrastructure gap in the community in a manner that maximizes ratepayer value.

10.2 Recommendations

10.2.1 General

Independent from identified bottlenecks and growth-related servicing requirements, addressing the non-revenue water and I/I issues in both communities is an opportunity to increase system efficiency, increase the uncommitted reserve capacity and, ultimately, reduce the operational cost per connection.

The approach to achieving these reductions consists of renewing and upgrade the original town site infrastructure and cross-section as well as implementing a private side service replacement program to address identified I/I issues. The recommended implementation would be as follows:

- Develop a public consultation process to promote the private side service replacement program including a subsidy program to maximize capture rate.
- Reconstruct one block length in each community annually including all servicing and utilities per year.
- Integrate the prioritization of projects with the existing road condition assessments in order to maximize the overall value by addressing areas that have complementary deficiencies (poor pavement condition, missing sidewalks ,etc.) to generate complete street solutions.

The implementation of this approach should be in addition to the annual expenditures proposed in the sections below with the exception of projects that are directly related to either developer or municipally driven projects identified in this report. Prioritization of projects that do address identified water, sanitary, storm and/or transportation issues identified herein is important to maximize the value for money; however, it is recommended that, independent from the identified infrastructure

investments required for meeting current and future infrastructure requirements, approximately $3 million per year (adjusted annually for inflation) be invested in infrastructure renewal to begin to capture the I/I and water loss issues as well as reducing the current infrastructure deficit. This investment would result in one street reconstruction per year per community.

10.2.2 Water Servicing

Long Sault

The preferred alternative layout and cost estimate for each proposed solution is outlined in Figure 7-1. The Township can consider the following measures to improve current water servicing deficiencies and provide future water servicing within the Long Sault Servicing area:

Timeline: 0-5 Years:

- Create a watermain loop to serve both the east and west ends of the Long Sault Logistics Village development by installing a 300mm watermain on both ends. Costs will be covered by the developer.

Timeline: 5-10 Years

- Upsizing existing watermains along the east end of Moulinette Island, Jenkins Road, and Chantine Drive to meet current FUS fireflow requirements. Those should be planned together with future infrastructure renewal projects. Costs to be covered by the Township.
- Upsizing the existing watermains along McNiff Avenue from Moulinette to connection with Jim Brownell Blvd up to 200mm. Costs will be covered by the developer.
- Install new transmission main from the intersection of County Rd. 2 and Moulinette Rd. via Moulinette and Simcoe St. to the open space park by the splash pad/baseball diamond to the new storage site located off Johnson Cres. Southeast of the United Church property and continuing north through the municipally owned lands crossing Saunders and French to McNiff to connect to the North Community Loop. Costs to be covered by the Township.

Timeline: 10-20 Years

- Install a new elevated storage tank in the Long Sault Pressure Zone located in the open space park land southeast of the United Church property off Johnson Cres. Costs to be covered by the Township.
- Upsize developer watermain on Barry Street from Chase Meadows to Fenton Farm via future developments to 200mm. Costs will be covered by the developer.

Ingleside

The preferred alternative layout and cost estimate for each proposed solution is outlined in Figure 7-2. The Township can consider the following measures to improve current water servicing deficiencies and provide future water servicing within the Ingleside Servicing area:

Timeline: 0-5 Years

- Provide a new 250mm tee connection on the outlet from the booster station on the north side of County Rd. No. 2 and reroute 250mm along the north side of County Road No. 2. extending north on Killarney and extending a 250mm watermain east to connect with Ault Drive and a 200mm watermain west along St. Lawrence Drive to the easement back to County Rd No. 2 and continue east to the intersection of County Rd No. 2 and Farran Point Rd. Costs to be covered by the Township.

- Replace watermain from existing 250 mm watermain at Farran Dr. and St. Lawrence Dr. along Farran Dr. to College St.to Dickinson and along Dickinson to connect with 45th Parallel Dr. and the existing Water Tower. Project can be implemented over two to three construction years for budgetary purposes. Project costs include full reconstruction to Township Standard.

Timeline: 10-20 Years

- Upsize developer watermain on Ault Drive (future) and Balsam Street (future) from Ault Drive and Beech Street to Balsam Street and Farran Drive. Costs will be covered by the developer.
- Every other cross-street or street that extends more than 300m within an intersecting watermain shall be increased to a 200mm diameter pipe or greater.

10.2.3 Wastewater Servicing

Long Sault

The Township can consider the following measures to improve current wastewater servicing deficiencies and provide future wastewater servicing within the Long Sault Servicing area:

Timeline: 0-5 Years

- Upsize the 300 mm Sanitary Sewer North of County Road 36 to 450mm. Costs will be covered by the Township.
- Upsize the 250 mm Sanitary Sewer South of County Road 36 to 350mm. Costs will be covered by the Township.
- County Rd 36 SPS and Forcemain Upgrades: Increase SPS Capacity from 47 L/s to 170 L/s to convey ultimate capacity of the upstream area. Increase Inlet SPS to 450 mm to convey build-out flow of 170 L/s. Costs will be covered by the Township.
- Chase Meadows Development area:
  - Install a new 200 mm – 1.0 km long gravity sewer from LSLV to the new SPS. Costs will be covered by the developer.
  - Install a new 250mm – 1.5 m long Forcemain from the new SPS to existing trunk sanitary sewer directed to the Long Sault WWTP. Costs will be covered by the developer.
  - Install a new Sanitary Pumping Station (SPS) sized for Chase Meadows, McNiff Area, West of Moulinette, and Long Sault Logistic Village Development. Primary Developer covers base costs of the SPS.
- Long Sault Logistic Village Development (Phase 1) area
  - Install a new 200 mm – 1.5 km long gravity sewer from LSLV to Chase Meadows SPS. Costs will be covered by the developer.

Timeline: 5-10 Years

- Long Sault Logistic Village Development (Phase 2) area
  - Install a new Sanitary Pumping Station (SPS) sized to 7.5 L/s to be located within the LSLV development area. Costs will be covered by the developer.
  - Install a new 200 mm – 2.0 km long gravity sewer upstream to the new SPS within the LSLV development area. Costs will be covered by the developer.
  - Install a new 200mm – 0.5 km long Forcemain from the new SPS within LSLV development to be connected on the existing sewer on County Rd 36. Costs will be covered by the developers.

Timeline: 10-20 Years

- Moulinette Road Subdivision development area:
  - Install a new 200 mm – 750 m long gravity sewer from development to be connected to existing trunk sanitary sewer directed to the Long Sault WWTP. Costs will be covered by the developer.

Ingleside

The Township can consider the following measures to improve current wastewater servicing deficiencies and provide future wastewater servicing within the Ingleside Servicing area:

Timeline: 0-5 Years

- Trunk Sewer Rehabilitation. It is recommended to investigate the impact of infiltration and inflow by performing a CCTV investigation. This would allow for an assessment of the need for rehabilitating leaky pipes or broken lateral connections in order to improve operation efficiency. Costs will be covered by the Township.

10.2.4 Stormwater Servicing

Long Sault

The Township can consider the following measures to improve current wastewater servicing deficiencies and provide future wastewater servicing within the Long Sault Servicing area:

Timeline: 0-5 Years

- Provide Condition Assessment of the 600mm diameter storm sewer along Mille Roches and directed to County Rd 36. Costs will be covered by the Township.

Timeline: 5-10 Years

- Define the new Municipal Drain for North Outlet to St. Lawrence River to provide outlet certainty to all impacted landowners. Costs will be covered by the Township.
- Install a new 15,000 m^3 Stormwater Management (SWM) Facility to be located to the south side of the intersection between County Rd 2 and Robin Rd. Flow to be redirected accordingly. It will include crossing the County Rd 2 to discharge into the St. Lawrence River. Costs will be covered by the Township.
- Moulinette Road Subdivision Development Area
  - Install a new 9,000 m^3 Stormwater Management (SWM) Facility. Flow to be redirected accordingly. Costs will be covered by the developer.

Timeline: 10-20 Years

- Install a new 9,000 m^3 Stormwater Management (SWM) Facility to be located on the west side of Long Sault and south of County Rd 2. Flow to be redirected accordingly. Costs will be covered by the Township.
- Install a new 9,000 m^3 Stormwater Management (SWM) Facility to be located on the east side of Long Sault and south of County Rd 2. Flow to be redirected accordingly. Costs will be covered by the Township.

Ingleside

The Township can consider the following measures to improve current wastewater servicing deficiencies and provide future wastewater servicing within the Ingleside Servicing area:

Timeline: 0-5 Years

- Upsizing Storm Sewer along College Street from 400mm to 525mm. Costs will be covered by the Township.
- Upsizing Storm Sewer along Hoople Street from 200mm to 350mm. Costs will be covered by the Township.
- Install a new 350 mm from Hoople Street to Dickinson Drive (CR14). Costs will be covered by the Township.
- Installation of approximately 20 oil-grit separators (OGS) on a street-by-street level, designed to remove oil and grit from stormwater runoff. This will need to be coordinated with Road Reconstruction projects. Costs will be covered by the Township.

Timeline: 5-10 Years

- No alternatives identified within this timeframe.

Timeline: 10-20 Years

- Northeast Combined SWM Facility: Install a new 9,000 m^3 Stormwater Management (SWM) Facility. Flow to be redirected accordingly. Land Acquisition will be required. Costs will be covered by the developer.
- Northwest Combined SWM Facility: to be sized to service development area and northwest long-term development lands. Costs will be covered by the developer/development of charges.
- Future Development: Install a new 9,000 m^3 Stormwater Management (SWM) Facility within the residential area allocated for future development. Flow will require to be redirected accordingly. Costs will be covered by the developer.

10.2.5 Transportation Servicing

The Township can consider the following measures to enhance traffic, road safety and active transportation operations on their public right-of-way:

- Address the roads in Long Sault and Ingleside identified as critically deficient in the *2021 Township of South Stormont Road Needs Study*.
- Confirm the recommendations contained in relevant development TISs, including:
  - Extending McNiff Avenue east of Moulinette Road (County Road 35), connecting to Mille Roches Road. This provides an alternate route to Highway 401. This will be coordinated and paid for by development.
  - Installing three traffic signals identified in the Long Sault Logistics Village TIS. These signals are all located at County intersections. This will be coordinated with the County and paid for by County and/or Developer.
- Continue to improve traffic operations and road geometry at critical intersections and roads, especially along the roads next to schools, hospitals, and commercial plazas.
- Ensure all posted speed limits are in increments of 10 kilometres per hour and signed in accordance with OTM guidance. Notably, the Township may wish to consider replacing any speed limit signs posted at “55”.
- Identify missing sidewalk links and provide a network of continuous sidewalks and crossings. Specific locations may include:

- Sidewalk on Plaza Street, between Long Sault Plaza and Simcoe Street.
- Sidewalk on Long Sault Drive, between Long Sault Plaza and Moulinette Road.
- Sidewalk on County Rd. No. 36. This road is expected to provide a vital link to the future developments planned in the Township and is planned to be downloaded to the Township.
- A crosswalk at the north approach of the Bank Street and Maple Street intersection, west of Ingleside Plaza.
- Sidewalk on Bank Street, between Maple Street and St Lawrence Drive
- Sidewalk on St Lawrence Drive, between Bank Street and Dickinson Drive.

- Continue to install dedicated cycling facilities, notably where they connect to the more frequently used recreational trails, such as the South Stormont Recreation Trail.
- Move forward with all recommendations from noted transportation-related plans including the following Township studies:
  - 2020 Parks and Recreation Master Plan
  - 2021 Waterfront Master Plan
  - 2021 Community Strategic Plan
  - 2021 Road Needs Study
  - 2022 Development Charges Background Study

10.3 Project Integration and Prioritization

One of the most critical aspects of the Master Servicing Study is how the Township will achieve the recommendations of the study. Funding will be a challenge as the capital requirements to implement the recommendations proposed are significantly greater than the annual capital expenditures by the Township.

10.3.1 Municipal Funded Projects

Table 10-1 summarizes the estimated projected capital costs by service type, community and time horizon. **Appendix H** provides a list of prioritized projects and the prerequisite conditions for the implementation of the project including considerations for advancing or delaying projects based on Township priorities. A list of Developer or Development Charges Funded Projects was also included.

Table 10-1: Projected Municipally Funded MSS Expenditures by Time Horizon ($2024)

Service	Long Sault	Ingleside	Annual Budget Impact per year
0 – 5 years (2025 – 2030)			
Water	-	$3.5M	$0.7M
Sanitary	$8.2M	$0.25M	$1.69M
Storm[a]	$0.15M	$3.15M	$0.66M
Transportation	$1.0M	$0.1M	$0.22M
Infrastructure Renewal (I/I/water loss reduction)	$7.5M	$7.5M	$3.0M
Total (2025-2030)	**$16.85M**	**$14.5M**	**$6.27M**
5 – 10 years (2031 – 2035)			
Water	$3.5M	$6.0M	$1.9M
Sanitary	-	-	$0.0M
Storm[a]	$2.6M	$0.75M	$0.67M
Transportation	$2.2M	$2.2M	$0.22M
Infrastructure Renewal (I/I/water loss reduction)	$7.5M	$7.5M	$3M
Total (2031-2035)	**$15.8M**	**$16.45M**	**$6.45M**
10 - 20 years (2036 – 2045)			
Water	$9.0M	-	$0.9M

Sanitary	-	-	
Storm[(a)]	$2.4M	$1.5M	$0.39M
Transportation	-	-	$0.0M
Infrastructure Renewal (I/I/water loss reduction)	$15M	$15M	$3.0M
Total (2036-2045)	**$26.4M**	**$16.5M**	**$4.29M**

(a) Oil Grit Separator costs within the existing Ingleside Area have been spread over the 20-year period.

10.4 Next Steps

As the Master Servicing Plan is following the Municipal Class EA process, the next step for the project is to proceed to the notice of completion stage upon Council approval of the document. Upon clearance of the final consultation opportunities, the project may proceed to impleme7ntation. With the exception of the elevated storage tank project, the remainder of the projects are exempt from the Class EA process and Environmental Compliance Approval requirements as they will fall under the Township's Drinking Water License or Consolidated Linear Infrastructure Environmental Compliance Approval (CLI-ECA).

The implementation of the recommended projects from the MSS should be integrated into capital budgeting and coordinated with the development community to ensure that enabling projects for development are both integrated into the Township's Development Charges by-law and scheduled to be in place in order to coincide with occupancy of new housing or industry within the community.