CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update – 2051 Amendment

November 2021

Volume IV – Wastewater Master Plan

GM BluePlan ENGINEERING

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APPENDICES

Key Acronyms and Definitions

ADWF (Average Dry Weather Flow)

Average Dry Weather Flow is the typical daily wastewater generation, experienced by the City's wastewater system, during a period without any precipitation.

Boundary Adjustment Lands

The Boundary Adjustment Lands are the lands brought into the City of Brantford Municipal Boundary from the County of Brant as part of the need to secure additional lands for the City's future growth. These adjustment lands were effective as of January 1, 2017.

CAS (Conventional Activated Sludge)

Conventional Activated Sludge is a type of treatment plant that includes primary and secondary treatment processes for the oxidation of carbonaceous biological matter and the reduction of organic pollutants.

CT (Contact Time)

Contact Time is the time needed to disinfect wastewater from viruses or bacteria achieved through a specific chemical dose of chlorine

d/D (depth/Diameter)

d/D is a dimensionless constant that describes the relationship between depth of flow (d) and the pipe height (d). d/D can be an effective indicator of pipe performance; d/D less than 1 means a pipe is not flowing full. d/D equal to 1 means a pipe is flowing full, and d/D exceeding 1 means a pipe is experiencing surcharging conditions.

EA (Environmental Assessment)

An Environmental Assessment, or in the context of this document the MEA Municipal Class EA, is an approved planning process for municipal infrastructure that can be used to meet the requirements of the EAA. The Municipal Class EA process was revised and updated in 1993, 2000, 2007, 2011, 2015, and 2020.

Expansion Lands

The Expansion Lands are the lands which were determined through the MCR to be included in the City's new Settlement Area Boundary.

GIS (Geographic Information Systems)

Geographic Information System is captures, stores, analyzes, and displays spatially referenced information to the surface of the earth.

HGL (Hydraulic Grade Line)

A Hydraulic Grade Line, within a partially full pipe, is the surface level of water in the pipe. Within a completely full pipe, it is the level of a column of water would raise to in a piezometer which is the sum of the pressure head and elevation head.

HP (Horsepower)

Horsepower is a unit of measure for power.

HRT (Hydraulic Retention Time)

Hydraulic Retention Time refers to average length of time a soluble compound remains in a reactor or tank.

I&I (Inflow and Infiltration)

Inflow and Infiltration is the water entering a wastewater system by the environment. Inflow is caused by unsuitable connections to the wastewater system, typically including sump pumps and downspouts. Infiltration is caused when groundwater enters the wastewater system through leaks/defects in the pipes, typically through holes or cracks.

LOS (Level of Service)

Level(s) of Service is the delivering of a service to customers such that risk, performance, and cost are balanced.

MCR (Municipal Comprehensive Review)

The Municipal Comprehensive Review is a process undergone by municipalities within Ontario to ensure that their official plans conform to policies within A Place to Grow: Growth plan for the Greater Golden Horseshoe. The MCR will complete background review, public consultation, and development of policies necessary for input into a new or amended official plan.

MECP (Ministry of the Environment, Conservation, and Parks)

The Ministry of the Environment, Conservation, and Parks is a department of the Ontario government responsible for protecting and improving the quality of the environment.

MLD (Million Litres per Day)

Million Litres per Day is a unit of measure for flow rate.

MSP (Master Servicing Plan)

The Master Servicing Plan is a comprehensive document that provides a review, evaluation, and development of water, wastewater, and stormwater servicing strategies to support existing needs and projected growth forecasts to 2051.

PIC (Public Information Centre)

Public Information Centres are public events which are used to educate and inform the public as well as to elicit feedback from the study. This is a necessary step in the Class EA process and are typically done at study milestones.

Process Module (PM)

A Process Module is a treatment train in the WWTP.

WWPS (Wastewater Pumping Station)

A Wastewater Pumping Station will lift wastewater, collected by gravity sewers, via a forcemain to an area of higher elevation so that it can continue its journey by gravity to either another WWPS or the WWTP

Peak Wet Weather Flow (PWWF)

Peak Wet Weather Flow is the highest hourly flow that occurs within the wastewater system as caused by a rainfall event. Peak Wet Weather Flow occurs due to an increase in wet weather caused I&I when it is combined with ADWF.

RDII (Rainfall Derived Inflow and Infiltration)

Rainfall Derived Inflow and Infiltration is the peak inflow and infiltration response observed when flows enter the wastewater system during a rainfall event.

SCADA (Supervisory Control and Data Acquisition)

Supervisory Control and Data Acquisition is a computer system which gathers, stores, and displays real time data used to monitor and control facilities within the water and wastewater systems.

Siphon

A Siphon is a tube which conveys wastewater upwards from a reservoir and then down to a lower level of its own accord. Once the wastewater has been forced into the tube, by suction, flow continues unaided.

WAS (Waste Activated Sludge)

Waste Activated Sludge is the surplus activated sludge that is removed from the treatment process to maintain an appropriate ratio of biomass.

Wastewater Treatment Plant (WWTP)

Wastewater Treatment Plant is a facility which contains a treatment process to clean wastewater, passing through many steps to meet treatment requirements, before it is discharged into the Grand River.

1. Introduction and Background

1.1 City of Brantford Context

The City of Brantford is located in southwest Ontario along the banks of the Grand River and is within proximity of the City of Hamilton and the County of Brant. The City of Brantford is a single tier municipality, which owns and is responsible for the planning, construction, and management of the municipal water, wastewater, and stormwater infrastructure.

The City owns and operates its water system, which includes water treatment, storage facilities, pumping stations, and trunk and distribution watermains. The City's water is supplied by a single surface water treatment plant (WTP) that draws water from the Grand River and distributes treated water to its residents.

The City owns and operates its wastewater system, which includes wastewater treatment, pumping stations, and collection and trunk sewers. The City's wastewater is collected and conveyed to a single wastewater treatment plant (WWTP) that treats the City's wastewater before discharging into the Grand River.

The City owns, maintains, and operates the majority of the stormwater collection and management infrastructure, which includes catch basins, storm sewers, ditches, culverts, stormwater management facilities, and other stormwater facilities and structures. The entirety of the City is located within the Grand River watershed. The majority of the City's existing stormwater sewers and managed ditches drain directly to the Grand River or the following Grand River tributaries: Phelps Creek, Mohawk Lake and D'Aubigny Creek; however, a significant portion of the City's northeast discharges to local creeks along the City's north and east before discharging into Fairchild Creek.

Readily available and accessible public infrastructure is essential to the viability of existing and growing communities. Infrastructure planning, land use planning, and infrastructure investment require close integration to ensure efficient, safe, and economically achievable solutions to provide the required water, wastewater, and stormwater infrastructure.

To balance the needs of growth with the protection and preservation of natural, environmental, and heritage resources, the City of Brantford initiated the preparation of the 2020 Master Servicing Plan Update – 2051 Amendment (2020 MSP Update) for water, wastewater, and stormwater services under the Municipal Engineers Association (MEA) Master Plan Class Environmental Assessment process.

1.2 Municipal Comprehensive Review

The City of Brantford started its Official Plan Review in 2013. Between 2013 and 2016, completed work included the hosting of visioning sessions, the preparation of technical background papers and the creation of a new Draft Official Plan (Version 1, issued in July 2016). The Official Plan Review was put on hold while the Municipal Boundary Adjustment Agreement, between the City of Brantford and the County of Brant, was finalized and approved by the Province, and pending updates to the Growth Plan for the Greater Golden Horseshoe to which the new Official Plan must conform.

In 2016, the municipal boundary, between the City of Brantford and the County of Brant, was adjusted to secure additional lands for the City's future growth, effective January 1, 2017. These lands are referred to as the Boundary Adjustment Lands.

The municipal boundary adjustment brought new lands into Brantford's municipal boundary; however, this did not automatically include the lands in the City's urban area boundary, also referred to as a Settlement Area boundary. To expand the City's Settlement Area boundary, the Province requires municipalities to conduct a Municipal Comprehensive Review (MCR) as input into their new or amended Official Plan. The MCR is necessary as it determines the extent to which the Settlement Area boundary is to be expanded. Following the completion of the MCR, the new or amended Official Plan can designate urban land uses within the expanded Settlement Area boundary.

The City ventured to complete the MCR and revisions to the 2016 Draft Official Plan to include the Boundary Adjustment Lands. The City of Brantford established an eight-stage study process to complete the Municipal Comprehensive Review and finalize the new Official Plan – entitled **Envisioning Our City**, and a new draft Official Plan was released to the public for review and comment in June 2020. To assist the City in completing a new Official Plan, the City retained a team of consultants led by SGL Planning & Design Inc., and includes The Planning Partnership, Cushman Wakefield, Hemson Consulting, AgPlan Limited, ASI (Archaeological Services Inc.), Ecosystem Recovery Inc., GM BluePlan Engineering, Plan B Natural Heritage, and Dillon Consulting. The new Official Plan was adopted by City Council in March 2021 and has been submitted to the Province for approval.

GM BluePlan Engineering was retained to support the MCR Study with respect to the determination of the appropriate water, wastewater, and stormwater servicing plan for the lands to be included within the Settlement Area boundary in the North Brantford and Tutela Heights Boundary Adjustment Lands.

1.3 Master Servicing Plan

In support of the Official Plan Review, and to ensure that infrastructure servicing recommendations to support the new urban land uses are made in a cohesive and integrated manner with the City's long-term servicing needs of the existing system, the City has undertaken an update to its MSP.

The 2020 MSP Update – 2051 Amendment provides a review, evaluation, and development of water, wastewater, and stormwater servicing strategies to support existing needs and projected growth forecasts based to 2051; including the servicing of new urban land uses within the City's new Official Plan, adopted by Council in March 2021.

The 2020 MSP Update was completed concurrently with the City's new Official Plan and the Transportation Master Plan Update to enable, where advantageous, alignment of recommended work or capital projects, minimizing potential impacts and disruptions to the public. Following the completion of the 2020 MSP Update to the 2041 growth horizon, updated growth numbers were provided by the Province's Growth Plan to the 2051 growth horizon.

The 2020 MSP Update – 2051 Amendment is a critical component of the City's planning for growth and will provide the framework and vision for the management, expansion and funding of the water, wastewater, and stormwater systems for the entire City to 2051 and beyond.

1.4 Master Servicing Plan Objectives

The MSP Update for water, wastewater and stormwater services comprehensively documents the development, evaluation, and selection of the preferred water, wastewater, and stormwater servicing strategies to meet the servicing needs of existing and future development to 2051 and beyond.

The 2020 MSP Update evaluates the ability of existing and planned water, wastewater, and stormwater infrastructure in the City of Brantford to efficiently and effectively service the City's existing and anticipated growth, including servicing of the new urban land uses within the City's new Settlement Area boundary in accordance with the draft Official Plan, and to evaluate and develop recommended servicing strategies.

The key objectives of the 2020 MSP Update are as follows:

- Review and integrate the servicing needs to support buildout of the new urban land within the 2017 Boundary Adjustment Lands;
- Review planning forecasts to 2051 and determine the impacts on servicing needs for the City's water, wastewater, and stormwater infrastructure;
- Consider and incorporate proposed water, wastewater, and stormwater infrastructure needs to support the full buildout lands within the new municipal boundary beyond 2051;
- Undertake a comprehensive review and analysis for the water, wastewater, and stormwater servicing requirements;
- Complete the MSP in accordance with the MEA Class EA process (further described in **Volume II**);

- Address key servicing considerations as part of the development and evaluation of servicing strategies including:
    - Level of service to existing users and approved growth
    - Operational flexibility and security of supply
    - Mitigation of impacts to natural, social, and economic environments
    - Opportunity to meet policy, policy statements, regulations and technical criteria
    - Opportunity to optimize existing infrastructure and servicing strategies
    - Ensuring the strategies are cost effective
- Consider and develop sustainable servicing solutions;
- Utilize updated industry trends and more detailed information from relevant City studies and projects to provide better capital cost estimates;
- Utilize recently completed and on-going projects to update infrastructure status, capacity and cost estimates;
- Utilize the updated water, wastewater, and stormwater hydraulic models for the analysis of servicing alternatives;
- Establish a complete and implementable water, wastewater, and stormwater capital program; and
- Extensive consultation with the public and stakeholders.

1.5 Master Servicing Plan Documentation Layout

The 2020 MSP Update Report, including all supporting volumes, is the documentation placed on public record for the prescribed review period. This documentation, in its entirety, describes all required phases of the planning process and incorporates the procedure considered essential for compliance with the **Environmental Assessment Act**.

The MSP Update Report is organized into six volumes as described below.

Volume I – Executive Summary

Volume I provides a brief overview of the 2020 MSP Update. It summarizes the information contained in **Volume II**, **III**, **IV**, **V** and **VI**, including problem statement, purpose of the study, significant planning, environmental and technical considerations, description of the analysis performed and final solution and recommendations.

Volume II – Plan & Policy

Volume II details the master planning process; including the Master Plan Class EA process, related studies, legislative, and policy planning context, water, wastewater, and stormwater servicing principles and policies, population and employment growth forecasts, existing environmental and servicing conditions, evaluation methodology, and future considerations.

The appendices in this volume contain relevant baseline and planning information including:

- Appendix A – Traffic Zone Population and Employment Projections
- Appendix B – Principles, Policies, and Level of Service
- Appendix C – Unit Rates

Volume III – Water Master Plan

Volume III consists of the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation and selection of the preferred water servicing strategy. This volume outlines the water policies, design criteria and level of service needed to be achieved by the water network. In addition, **Volume III** identifies the existing water network and describes the hydraulic modelling tool used for the analysis. Further **Volume III** outlines the detailed evaluation and decision-making process as well as the preferred servicing strategy and associated capital program and implementation plan.

A significant amount of technical background information has been compiled, which is critical to the development of the Water Master Servicing Plan. This information is included as appendices in **Volume III**. The technical appendices contain relevant project, implementation, and technical analysis information including:

- Appendix A – Water System Schematic
- Appendix B – Traffic Zone Demand
- Appendix C – Expansion Lands Concepts
- Appendix D – Water Treatment Plant Concepts
- Appendix E – Evaluation Tables
- Appendix F – Capital Program Project Sheets

Volume IV – Wastewater Master Plan

Volume IV consists of the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation and selection of the preferred wastewater servicing strategy. This volume outlines the wastewater policies, design criteria and level of service needed to be achieved by the wastewater network. In addition, **Volume IV** identifies the existing wastewater network and describes the hydraulic modelling tool used for the analysis. Further in **Volume IV** is the detailed evaluation and decision-making as well as the preferred servicing strategy and associated capital program and implementation plan.

A significant amount of technical background information has been compiled, which is critical to the development of the Wastewater Master Servicing Plan. This information is included as appendices in **Volume IV**.

The technical appendices contain relevant project, implementation, and technical analysis information including:

- Appendix A – Wastewater System Schematic
- Appendix B – Traffic Zone Flows
- Appendix C – Expansion Lands Concepts
- Appendix D – Wastewater Treatment Plant Concepts
- Appendix E – Evaluation Tables
- Appendix F – Capital Program Project Sheets

Volume V – Stormwater Master Plan

Volume V consists of the principal document summarizing the study objectives, approach, methodologies, technical analyses, evaluation and selection of the preferred stormwater servicing strategy. This volume outlines the stormwater policies, design criteria and level of service needed to be achieved by the stormwater network. In addition, **Volume V** identifies the existing stormwater network and describes the hydraulic modelling tool used for the analysis. Further, **Volume V** outlines the detailed evaluation and decision-making as well as the preferred servicing strategy and associated capital program and implementation plan.

A significant amount of technical background information has been compiled, which is critical to the development of the Stormwater Master Servicing Plan. This information is included as appendices in **Volume V**. The technical appendices contain relevant project, implementation, and technical analysis information including:

- Appendix A – Key Existing Stormwater Infrastructure Facility Details
- Appendix B – Expansion Lands Subwatershed Study
- Appendix C – Evaluation Tables
- Appendix D – Implementation Plan Detailed Study Overview Sheets
- Appendix E – Capital Program Project Sheets

Volume VI – Public and Agency Consultation

Volume VI contains all relevant documentation of the public consultation process including notices, comments and responses, and distribution information. Presentation material from all Public Information Centres (PICs) held during this process is included. Other presentation material and discussion information from workshops held with relevant agencies, approval bodies and other stakeholders are also included within the appendices:

- Appendix A – Study Stakeholder List
- Appendix B – Study Commencement
- Appendix C – Public Information Centres
- Appendix D – Comments Received
- Appendix E – Study Completion

2. Wastewater System Policy and Criteria

Execution of reasonable Policies and Level of Service (LOS) objectives are essential in ensuring that the proper planning and design principles are followed in the development of detailed servicing strategies, implementation of system capital program, and operations and maintenance practices.

In the context of the MSP, these Policies and LOS objectives provide guidelines and direction to the master planning process, in addition to ensuring that wastewater flows are adequately representative to support the decision making for sizing and timing of future infrastructure.

Through the MSP Update, draft Policies and LOS objectives were established and used to guide future investment in the water, wastewater, and stormwater systems. This section summarizes the key Policy and LOS objectives as they relate to the wastewater system. A fulsome summary of the MSP Policies and Level of Service (LOS) objectives review and recommendations is included in **Appendix A** of **Volume II**.

2.1 Wastewater Servicing Principles and Policies

Specific servicing principles and policies have been developed to guide the development of wastewater servicing strategies. In general:

"**The City of Brantford is looking to provide an efficient, sustainable, and reliable wastewater system that minimizes environmental impacts and is capable of accommodating growth.**"

The servicing policies which impact the wastewater servicing are summarized in **Appendix A** of **Volume II**.

2.2 Wastewater Design Criteria and Hydraulic Performance Criteria

A guiding principle of design criteria is to ensure that the flow projections are adequately predicted with an appropriate factor of safety and risk management. This overall principle also ensures that infrastructure has sufficient capacity to meet the growing needs of the City and does not impede the approved/planned growth.

The design criteria were reviewed as part of this MSP Update to ensure wastewater flows are accurate and will support sizing and timing of future infrastructure such as pipes and facilities.

2.2.1 Wastewater Design Criteria and Level of Service Summary

The development of design criteria utilized historical flow data in combination with Ontario Ministry of Environment, Conservation, and Parks (MECP) Design Standards and Guidelines. Level of Service and wastewater policies were discussed and established at the outset of the project.

The wastewater design criteria updated as part of the MSP Update are summarized in **Table 1**.

Table 1: Wastewater Design Criteria and Level of Service

Criteria		Draft Targets
Wastewater Flows	Per Capita Rate	245 Liters/capita/day (residential) 270 Liters/capita/day (employment)
	Peaking Factor	Harmon's Peaking Factor (min 2.0, max 4.0)
	Inflow/Infiltration Allowance	0.3 Liters/second/hectare
Facility Capacity	Facility Triggers	80% Planning and Design 90% Construction
	Pumping	Firm capacity = • Largest pump out of service (pump capacity); and, • Largest forcemain out of service (when multiple forcemains are present) Wastewater Pumping Station (WWPS) to convey peak 100-year flows New WWPS or upgraded WWPS, which support growth, to also provide storage to detain 10-year flows for 1 hour
System Performance	Peak Wet Weather Design Flows	10 Year Design Storm
	Existing Infrastructure	Hydraulic Grade Line Target 2.1 meters below ground level or depth/Diameter (d/D) <= 1.0
	New/Upgraded Infrastructure	depth/Diameter of pipe (d/D) ≤ 0.7
Extraneous Flow Program		Requirement of the flow monitoring of new developments to ensure development is achieving design flows

Development of the wastewater flow criteria for the 2020 MSP Update is detailed further in **Appendix B** in **Volume II**.

2.2.2 Wastewater Flow Criteria

2.2.3 Wastewater Use Design Criteria

Wastewater flows are assessed by means of dry weather flows and peak wet weather flow with growth design flows calculated using the following formula:

Peak Design Flow = Dry Weather Flow × Peaking Factor + Infiltration Allowance

To estimate the growth flow per capita rates, extraneous flow allowance, and peaking factors must be defined.

2.2.3.1 Per Capita Flow Rate

Per capita average dry weather flows, as detailed in **Table 2**, were assessed on a system scale with further analysis using 2017 flow monitoring data. The per capita rates indicate that typical residential and employment per capita rates are generally lower than the existing design criteria on a catchment scale and a system wide scale.

Table 2: Historic Wastewater Per Capita Rates

Year	Residential Per Capita Rate (L/c/d)	Employment Per Capita Rate (L/c/d)	Combined Per Capita Rate (L/c/d)
2012	219	259	232
2013[(1)]	-	-	238
2014	239	268	244
2015	197	227	201
2016	214	250	218
2017	243	243	263
2018	224	244	244
2019	222	236	234
Average	**223**	**247**	**234**
Current Design Criteria	**270**	**300**	**-**

[(1)] Water billing data unavailable

The recommended design criteria utilized for per capita dry weather flows is as follows:

- Growth related residential per capita rate of 245 L/c/d and employment per capita rate of 270 L/c/d
    - This represents a decrease in the existing design criteria per capita rates of 10% and is in line with the recommended water per capita rate decrease.
    - The recommended per capita rate remains above the observed historic per capita rate; providing reasonable flexibility in the criteria to accommodate potential changes in future usage rates.
    - While there is an observed decreasing trend in per capita rates, a stepped approach to lowering per capita rates is recommended with the next MSP to ensure water conservation measures are maintained as wastewater flows are directly correlated with water consumption.

2.2.3.2 Peaking Factor

The City presently utilizes the Harmon's peaking factor approach in their current design criteria, and it is recommended that this approach be maintained. Using 2017 flow monitoring data, observed and design guideline peaking factors were compared, the resulting comparison indicated that the observed peaking factors were lower than the peaking factors calculated using design guideline methodology, as detailed in **Table 3**. Harmon's peaking factor was used to estimate growth related peak dry weather flows as this method provides an additional safety factor in the evaluation of the local system as the observed peaking factors were lower.

Table 3: Observed and Harmon's Peaking Factors

Flow Monitor	Observed Peaking Factor	Design Guidelines Peaking Factor (Residential)	Design Guidelines Peaking Factor (Employment)
SA03	1.95	2.86	2.97
SA04	1.85	2.63	2.82
SA10	1.67	3.72	3.43
SA11	2.19	3.65	3.59
SA12	1.83	2.83	3.24
SA13	1.63	2.82	2.71
SA14	1.83	2.85	3.15
SA15	1.81	3.03	3.16
SA16	1.93	3.80	3.58

2.2.3.3 Extraneous Flow Allowance

Observed wet weather flows, by means of extraneous flows entering the wastewater system, were evaluated based on the 2017 flow monitoring data. This process extrapolated observed extraneous flows to design storms, as detailed in **Table 4**, such that the performance of the existing wastewater system could be assessed.

Table 4: Observed Extraneous Flows

Design Storm	Average I/I (L/s/ha)	Min I/I (L/s/ha)	Max I/I (L/s/ha)
2-Year	0.22	0.08	0.41
5-Year	0.31	0.10	0.55
10-Year	0.38	0.11	0.67
25-Year	0.46	0.13	0.81
50-Year	0.52	0.15	0.93
100-Year	0.59	0.17	1.05
Current Design Criteria	**0.26**		

The recommended design criteria utilized for extraneous flow allowance are as follows:

- Recommend extraneous flow allowance for new greenfield and infill development be increased to 0.3 L/s/ha.
- Capacity assessment for existing infrastructure to utilize actual existing peak wet weather flow based on the hydraulic model results.

2.2.3.4 Starting Point Methodology

The five-year rolling average of average day flows will be used to establish baseline system average daily flows.

2.2.3.5 Growth Flow Projections

Future system flows were developed using a starting point methodology, the standard approach within Southern Ontario for projecting future growth flows. Expected flows due to growth were added to the starting point flow to establish future flows. For example:

2051 Average Dry Weather Flow = Baseline Average Dry Weather Flow + (2051 total equivalent population[1] – 2016 total equivalent population) * 245 L/c/d

[1] Equivalent Population – Total of the combined people and employment population.

2.2.4 Wastewater Facilities

Evaluation of facility capacities and future needs were assessed first utilizing peak wet weather flows under historic conditions and further growth flows utilizing the per capita rate, peaking factor, and extraneous flow allowance outlined in **Section 2.2.1**.

2.2.4.1 Facility Upgrade Triggers

Industry best practice, and recommended methodology, for treatment and wastewater pumping stations facility upgrade triggers are as follows:

- At 80% utilization of a facility's capacity the planning and design process will begin to assess upgrade capacity needs.
- At 90% utilization of a facility's capacity the construction process begins through either an upgrade to an existing facility or construction of a new facility.

2.2.4.2 Wastewater Pumping Station Capacity

The evaluation of pumping needs considered the inflow to each pumping station for each design storm using the hydraulic wastewater model. The recommended approach in determination of pumping capacities is as follows:

- Firm capacity is defined as the largest pump out of service, utilizing pump performance data, where available and largest forcemain out of service where there are dual forcemains.
- 100-year level of service for existing and new wastewater pumping facilities – capable of conveying peak 100-year design storm flows.
- 10-year level of service for new facilities and upgraded facilities – capable of providing 1 hour of onsite storage for the 10-year design storm flows.

2.2.5 Hydraulic Performance Criteria

An updated and calibrated hydraulic wastewater model (2017) was utilized in the analysis of existing wastewater system performance. This process detailed existing system performance without the application of growth flows and could be used as a guideline for potential system upgrades.

2.2.5.1 Gravity Sewer System Capacity

Sewer surcharging conditions was defined and assessed when peak system hydraulic grade line (HGL) within a pipe satisfies the following conditions under the 10-year design storm:

- Existing Infrastructure
  - The Hydraulic Grade Line (HGL) in the pipe if the pipe obvert is higher than 2.1 meters below grade; or
  - The depth of flow in pipe is equal to or less than the obvert elevation ($d/D \leq 1$) [2];
- New/Upgraded Infrastructure
  - Gravity sewers will achieve a d/D target of 0.7

Table 5 presents a summary of the level of service targets that were used to evaluate the performance of the existing system.

Table 5: Wastewater Level of Service Targets

Wastewater Criteria	
Design Rainfall Derived Inflow and Infiltration (RDII)	Existing – 10 Year Design Storm Growth - 0.30 (L/s/ha)
Peaking Factor	Harmon's Peaking Factor
Hydraulic Grade Line (HGL) Target	2.1 m below ground under 10-year storm
depth/Diameter (d/D) Target	Existing 1.0 under design RDII
d/D Target	New 0.7 under design RDII

2.3 Capital Cost Projections

A capital cost is provided for all projects proposed as part of this MSP Update. For the majority of the wastewater system projects, a base construction cost was obtained using either a unit rate construction cost, based on pipe diameter, or unique project analysis. The base construction cost considers several factors specific to each project such as creek crossings, railway and highway crossings, tunneling requirements, and location of construction (Greenfield, urban, suburban). Design, administration, contingency, and non-recoverable HST costs were added to arrive at a final project cost. Detailed costing sheets were developed to support the financial evaluation for each capital project.

[2] Depth of flow in pipe (d) is equal to or less than the obvert elevation (D)

3. Planning & Growth Projections

A Place to Grow: Growth plan for the Greater Golden Horseshoe is a 25-year plan, released in 2006, that has the following aims:

- Promote economic growth;
- Prioritize intensification in strategic growth areas;
- Increase housing supply;
- Improve integration of land use planning with planning and investment in infrastructure and public service facilities;
- Protect and enhance natural heritage, hydrologic and landform systems, features and functions;
- Create jobs; and,
- Build communities that make life easier, healthier and more affordable for people of all ages

Amendment 2 to the Province's Growth Plan came into effect on June 17, 2013. This amendment updated Schedule 3 population and employment forecasts to 2031 and extended forecasts to a 2041 horizon and subsequently a 2051 horizon. The basis of the Master Servicing Plan is to identify the long-term servicing requirements to support the City's growth needs in line with the Amendment 1 to the Province's A Place to Grow: Growth Plan for the Greater Golden Horseshoe to 2051, with appropriate strategic servicing decisions to support post 2051 growth.

3.1 Growth Lands

In 2016, the municipal boundary between the City of Brantford and the County of Brant was adjusted in order to secure additional lands in the City for future growth, effective January 1, 2017. These lands are referred to as the Boundary Adjustment Lands.

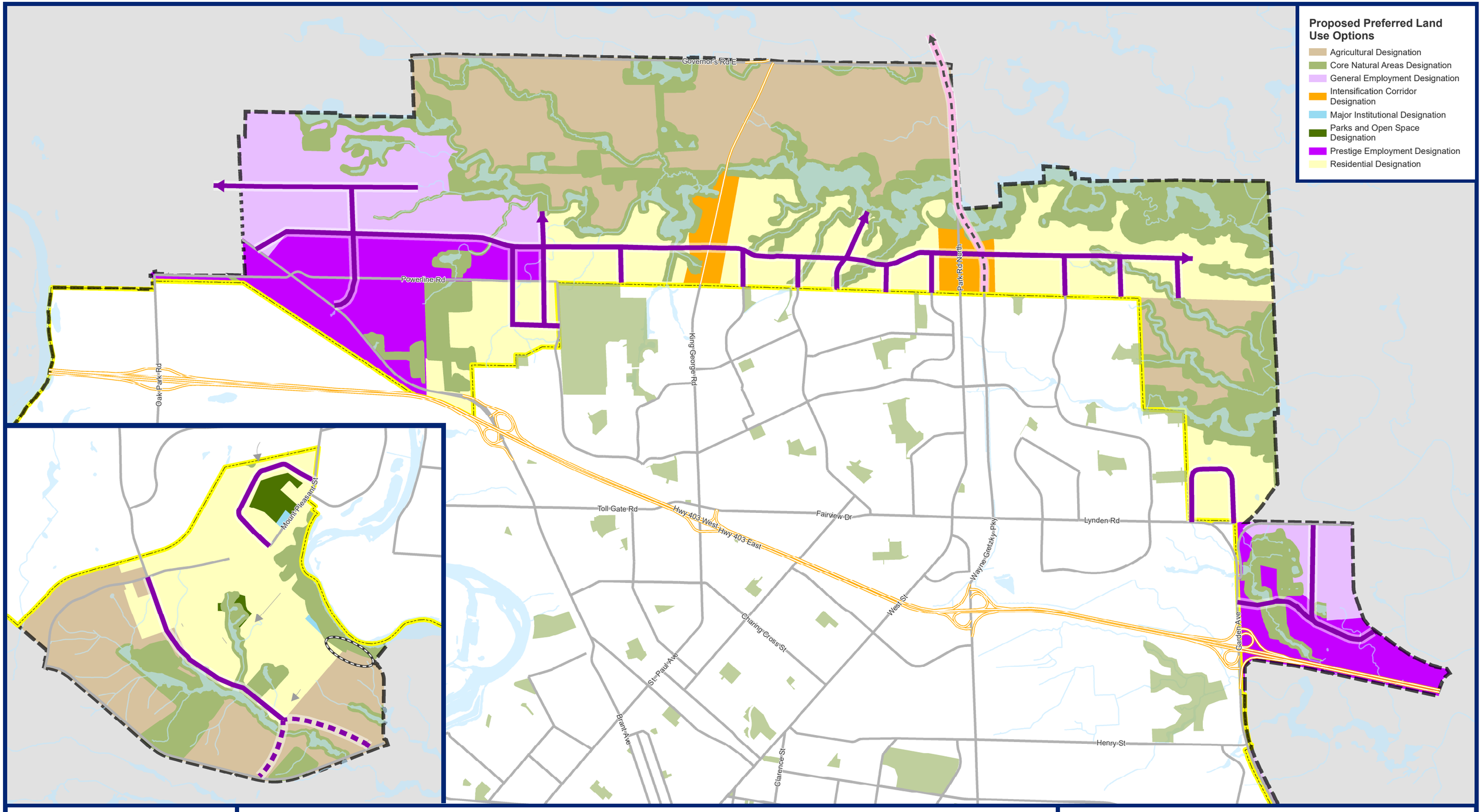
The municipal boundary adjustment brought new lands into Brantford's municipal boundary; however, this did not automatically include the lands in the City's urban area boundary, also referred to as the Settlement Area boundary. To expand the City's Settlement Area boundary, the Province requires municipalities to conduct an MCR as input into their new or amended Official Plan. The MCR is necessary as it determines the extent to which the Settlement Area boundary is to be expanded. Following the completion of the MCR the new or amended Official Plan can designate urban land uses within the expanded Settlement Area boundary.

The MCR identified both growth and intensification targets as well as Settlement Area boundary expansion needs. **Figure 1** presents the Settlement Area Boundary Expansion Lands which are further subdivided into the following sub-areas:

- North Expansion Lands;
- East Expansion Lands; and,
- Tutela Heights.

Both the East Expansion Lands and Tutela Heights include lands previously within the Settlement Area boundary of the County of Brant and through the boundary adjustment became part of the City's Settlement Area. However, as these areas require municipal servicing infrastructure, they are included as part of the three expansion sub-areas listed above.

The proposed land use designations for the Settlement Area boundary expansion areas are presented in Schedule 3 of the Official Plan and include a variation of residential, intensification, and employment areas. Portions of the Settlement Area Boundary Expansion are within the GRCA floodplain and Natural Heritage System; as such, urban development is not permitted in these areas of the new urban land uses due to their environmental sensitivity and the importance of maintaining the existing land uses. Additionally, beyond the Settlement Area Boundary Expansion are Trigger Lands, which are lands held for future Settlement Area expansion following substantial development of the current proposed Settlement Area Boundary Expansion areas.



Proposed Preferred Land Use Options

- Agricultural Designation
- Core Natural Areas Designation
- General Employment Designation
- Intensification Corridor Designation
- Major Institutional Designation
- Parks and Open Space Designation
- Prestige Employment Designation
- Residential Designation

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Proposed Preferred Road Options

- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

General Features

- Expressway / Highway
- Arterial and Collectors
- 2016 Municipal Boundary
- Existing Municipal Boundary
- Six Nations of the Grand River Territory
- Outside Municipalities
- Parks
- Waterbody
- Future Road Closure and Implementation of Alternative Access in Accordance with the Tutela Heights Road and Slope Stability Municipal Class EA

Figure 1

Preferred Land Uses

N

0 0.5 1 Kilometers

April 2021
717036-SP-002
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BluePlan Engineering

The population projections for the Expansion Lands within the Settlement Area Boundary are provided in **Table 6.**

Table 6: Expansion Lands Population Projections

Settlement Area Boundary Expansion Lands	Area (ha)	Population		
		Residential[(1)]	Employment[(2)]	Total
North Expansion Lands	1,883	21,789	12,383	34,172
East Expansion Lands	240	2,772	2,666	5,438
Tutela Heights	581	7,386	278	7,664

(1) Inclusion of 3% undercount and secondary suite residential population growth distributed within the expansion lands

(2) Inclusion of employment no fixed place of work and work from home employment growth distributed within the expansion lands

3.1.1 Settlement Area Boundary Expansion Wastewater Servicing

The wastewater servicing concepts and strategies presented in the following sections consider upgrades within the City's existing infrastructure system, as well as new infrastructure and upgrades needed to service the expansion areas.

3.1.2 Tutela Heights Wastewater System

Existing residents within the Tutela Heights area are serviced by private on lot septic systems. New growth in Tutela Heights will need to be serviced by the municipal wastewater system via an extension of the City's existing wastewater system. The existing septic areas can continue to remain as such; however, the sizing of any existing wastewater infrastructure should consider the future servicing of these septic areas by the City's wastewater system.

3.2 Population and Employment Growth Analysis

Growth projections for the City of Brantford were provided by SGL based on the City's Official Plan. SGL has refined the population and employment forecasts set out in the Official Plan and allocated the projections based on Traffic Survey Zone distribution, factoring projected detailed planning information within Greenfield growth areas, intensification corridors and the Settlement Area Boundary Expansion Lands. **Table 7** and **Table 8** present the population and employment breakdowns. **Appendix A** of **Volume II** provides a detailed breakdown of existing and 2051 population and employment projections by Traffic Survey Zone. The City's total growth estimate by Traffic Zone Data is 113,833 people and jobs.

Table 7: Growth Population Estimates

Land Use Type	2051 Population
In existing 2016 units	84,598
In new units in built up and intensification areas	26,151
In new greenfield units in existing urban area	16,503
In new greenfield units in expansion area(1)	30,541
In secondary suites	2,000
Total population	159,794
Existing 2016 population	**97,110**
Total population +3% undercount	**164,736**
Growth population	**67,626**

(1) Exclusion of secondary suite residential population distributed within the expansion lands

Table 8: Growth Employment Estimates

Land Use Type	2051 Employment
Existing 2016 employment(1)	37,158
Vacant employment lands in existing urban area	8,738
Additional employment in intensification areas	10,534
Vacant employment lands in existing greenfield areas	603
Employment in expansion area(1)	12,311
No fixed place of work	10,067
Work from home	3,954
Existing 2016 employment(2)	**37,158**
Total employment	**83,365**
Growth employment	**46,207**

(1) Exclusion of no fixed place of work and work from home employment growth distributed within the expansion lands

(2) Existing employment undercounted due to StatCan employment suppression

3.3 Projected System Populations

Table 9 details growth by major Wastewater Pumping Station (WWPS) and WWTP catchments from Traffic Zone data.

Table 9: Wastewater Catchment Population and Employment Growth

Wastewater Catchment[1]	Population		Employment	
	2016	2051	2016	2051
Brantford WWTP	48,355	78,372	13,000	42,500
Johnson Road WWPS	1,585	2,238	0	386
Empey Street WWPS	23,230	47,459	18,392	30,251
Somerset Road WWPS	5,325	5,403	670	1,279
Woodlawn Road WWPS	1,675	4,987	0	281
St. Andrews Drive WWPS	315	279	0	82
Lawren S. Harris Drive WWPS	1,425	849	0	62
Greenwich Street WWPS	9,710	18,245	4,341	7,512
Alexander Drive WWPS	370	333	245	338
Fifth Avenue WWPS	5,120	6,570	510	675
Total	**97,110**	**164,736**	**37,158**	**83,365**

[1] Catchment totals do not include populations and employment of their upstream catchments

3.3.1 County Agreements

As part of the 2016 Boundary Adjustment Agreement, the City committed to allowing the County to connect to the City's servicing infrastructure for areas referred to as the Airport Lands and the Cainsville Lands. The services to be connected were wastewater for the Airport Lands and water and wastewater for the Cainsville Lands. This was subject to a number of terms and conditions including that the City would provide adequate capacity to service the areas based on the City's design criteria and subject to both parties entering into a Servicing Agreement.

The County of Brant undertook a review to evaluate the infrastructure required to service the Airport and Cainsville Lands inline with the 2016 Boundary Adjustment Agreement. The results of the study were presented at the August 14, 2018 County of Brant Public Works Committee meeting (PW-18-69 – Airport and Cainsville Servicing Strategy). The study recommendations for wastewater were as follows:

- Connecting the Airport Lands to the City's wastewater system will be costly and is not recommended over the next 5-10 years.
- To connect the Cainsville wastewater system to the City's existing 675mm trunk sewer on Colborne Street.

As per the County report Phase 1 of the Cainsville Service Area was identified as the first priority for the County. This involves connecting Cainsville wastewater to the City's collection and treatment system and ensuring that the existing water connection to the City's distribution system is adequate. The Airport connection phases were identified as a lower priority.

The existing, 2041 and 2051 populations are provided in **Table 10** to provide context; if the County and City enter into an agreement in the future.

Table 10: Cainsville and Airport Population Growth

County of Brant Servicing	Population	
	2016	2051
Airport	903	9,269
Cainsville	7,265[(1)]	10,738
Total	**8,168**	**20,007**

[(1)] Cainsville existing population includes the total population from both serviced and not serviced properties

3.3.2 Post Period Considerations

The servicing analysis focuses on servicing the buildout of the internal growth and Settlement Area Boundary Expansion Areas to 2051; however, in the development of the recommended servicing strategy and infrastructure sizing, consideration for the full buildout of the City's municipal boundary, including the Trigger Lands was considered, assuming similar population and employment densities. Where applicable, identification of future facility expansion needs and/or strategic upsizing of linear infrastructure was identified and incorporated into the final servicing plan.

The growth projection, detailed in **Table 11**, for the remainder of the municipal boundary area was estimated by applying a density to these remaining areas, excluding Natural Heritage Areas. These densities include:

- 25 jobs per hectare for North and East Expansion Employment Lands;
- 60 residents and jobs combined per hectare for North and East Expansion Residential Lands; and,
- 55 residents and jobs combined per hectare for Tutela Heights.

This approach typically aligns with the residential densities for proposed growth to 2051.

Table 11: Municipal Boundary Full Buildout Population & Employment

Trigger Lands	Area (ha)	Population & Employment
North Expansion Lands	319	19,162
Tutela Heights	170	9,361
Total Trigger Lands	**490**	**28,522**

4. Existing Wastewater System

4.1 Existing Wastewater Infrastructure

The City employs a gravity-based wastewater collection and treatment system that collects wastewater from the east and west sides of the Grand River, highlighted in **Figure 2** with detailed wastewater system schematics provided in **Appendix A**. The collection system generally drains from the north to the south and from west of the Grand River to the east. The existing network also includes siphons which convey flow under the Grand River in four locations. Wastewater flows are sent to the Brantford Wastewater Treatment Plant (WWTP), located in southeast Brantford near the Grand River.

4.1.1 Wastewater Treatment Plant

The Brantford WWTP is located at 385 Mohawk Street adjacent to the Grand River in southeast Brantford. The WWTP is a Class IV conventional activated sludge (CAS) facility. The WWTP consists of a single influent pump station and preliminary treatment, including screening and grit removal. Wastewater is distributed to two Process Modules (PMs) for primary and secondary (aeration and secondary clarification) treatment and is then combined again for common chlorination and de-chlorination. Treated effluent is discharged to the Grand River. Sludge is digested anaerobically on site with sludge loading facilities and biosolids storage tanks. **Table 12** includes the WWTP processes and corresponding capacities and an overview of the processes is provided in **Figure 3**.

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

N

CITY OF HAMILTON
COUNTY OF BRANT

Lawren S. Harris Dr WWPS
Woodlawn Rd WWPS
Somerset Rd WWPS
St. Andrews WWPS
Alexander Dr WWPS
Henry Street Flow Split
Johnson Rd WWPS
Empey St WWPS
Wastewater Treatment Plant
Greenwich St WWPS
Fifth Ave WWPS

Governors Rd E
Powerline Rd
Oak Park Rd
Hardy Rd
Grand River
Toll Gate Rd
Hwy 403 West
Hwy 403 East
Fairview Dr
King George Rd
Park Rd North
Lynden Rd
Garden Ave
Wayne Gretzky Pkwy
West Brant Trail
Charing Cross St
St Paul Ave
Brantdale
Clarence St
Dalhousie St
Colborne St W
Colborne St
Temmi Dr
Veterans Memorial Pkwy
Mount Pleasant St
Fifth Ave
Glenwood Dr
Henry St
Brant County Rd #18

0 1 2 Kilometers

Wastewater Network

- Wastewater Pumping Station
- Wastewater Treatment Plant
- Flow Split
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)
- Forcemains

WWPS Catchment

- Empey St WWPS
- Woodlawn Rd WWPS
- Somerset Rd WWPS
- Greenwich St WWPS
- Fifth Ave WWPS
- St.Andrew's Ave WWPS
- Lawren S. Harris Dr WWPS
- Johnson Rd WWPS
- Alexander Dr WWPS
- Upstream of Henry Street Flow Split
- WWTP

General Features

- Expressway / Highway
- Arterial and Collectors
- Outside Municipalities
- Waterbody
- 2016 Municipal Boundary
- New Municipal Boundary
- Six Nations of the Grand River Territory

Figure 2
Existing Wastewater System

BluePlan ENGINEERING

November 2020
717036-WW-001
NAD 1983 CSRS UTM Zone 17N

Water, Wastewater and Stormwater
Master Servicing Plan Update

Wastewater Treatment Plant Infrastructure

Pump

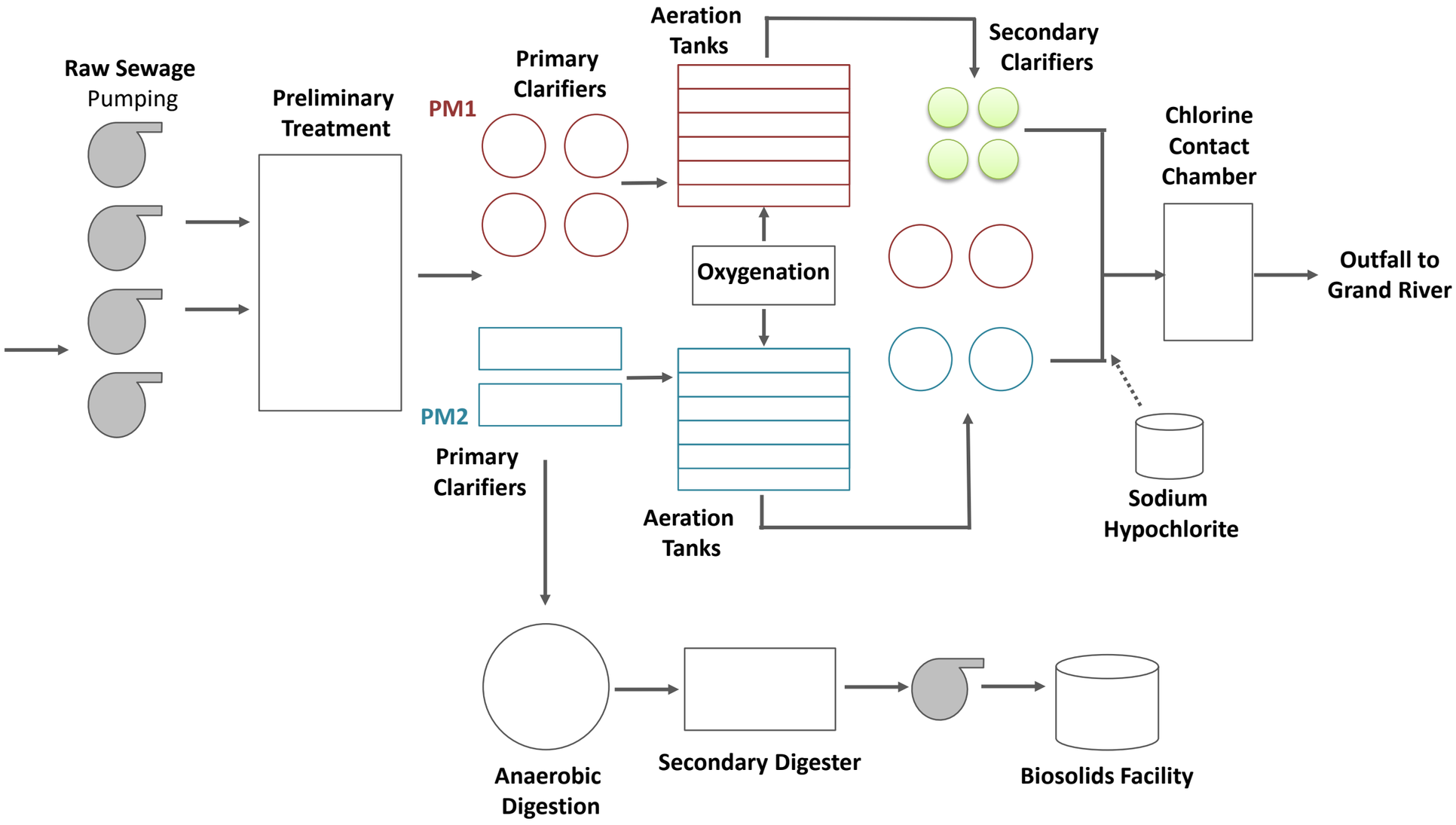


Figure 3
Wastewater Treatment Plant Process Diagram

August 2020
717036-WW-001
NAD 1983 CSRS UTM Zone 17N

Table 12: Wastewater Treatment Plant Capacity Process Overview

Process	Elements	Installed Capacity (1)		Operating/Rated Capacity (2) (MLD)
		PM1 Capacity (MLD)	PM2 Capacity (MLD)	
Raw Sewage Pumping	(4) pumps rated @ 60 MLD	240		180
Forcemain	(2) 900 mm forcemains	220		220
Preliminary Treatment – Screening	(2) trains at 116 MLD	232		232
Preliminary Treatment – Grit Chambers	(2) trains at 116 MLD	232		232
Primary Clarifiers	(4) clarifiers for PM1, (2) clarifiers for PM2	35.6	28.15	63.75
Aeration Tanks	(2) tanks for PM1, (2) tanks for PM2	61.508	19.808	55.408 (81.316)(3)
BOD_5 Loading	0.5 kg BOD_5/m^3/day	61.508	19.808	55.408 (81.316)(3)
O_2 Availability	(2) new 300 HP and (1) 200 HP turbo blowers and (1) 300 HP centrifugal blower	49.158		49.158
Secondary Clarifiers	(2) clarifiers in service and (4) clarifiers out of service at PM1 and (2) clarifiers at PM2	72.7	38.5	55.408 (77 – 111.2)(3)
Chlorine Contact Chamber	(1) Tank and pipe based on 30 min CT	35.28		35.28
Sludge Digesters	(2) primary digesters and (1) secondary digester with (2) pumps at 15 day HRT	74.464		74.464
Biosolids Storage	(3) tanks at 150 days HRT	50.785		50.785

(1) The installed capacity is the total installed capacity of all units in the process based on facility specifications

(2) The observed/rated capacity is the actual operating capacity of the process based on current facility operations

(3) Actual rated capacity which is limited by upstream process capacity (total rated capacity)

4.1.2 Wastewater Pumping Stations

There are currently nine (9) WWPS of varying capacity that are owned by the City. **Table 13** summarizes the wastewater pumping facilities flow capacities. Performance testing was completed in 2018 to confirm the observed capacity of the City's WWPS. For the purposes of the MSP Update's analysis, the WWPS's observed firm capacity was used.

Table 13: Wastewater Pumping Station Capacities

Facility	Pumps	Installed Capacity (1) (MLD)	Design Firm Capacity (2) (MLD)	Observed Firm Capacity (3) (MLD)
Johnson Road WWPS	3	6.0	5.5	4.7
Empey Street WWPS	4	145.2	138.2	96.8
Somerset Road WWPS	4	26.8	23.3	22.5
Woodlawn Road WWPS	3	5.5	4.9	4.1
St. Andrews Drive WWPS	2	2.8	2.4	2.1
Lawren S. Harris Drive WWPS	3	7.8	6.7	6.3
Greenwich Street WWPS	4	37.6	32.0	29.5
Alexander Drive WWPS	2	2.8	1.8	0.9
Fifth Avenue WWPS	3	8.5	7.2	6.1

(1) The installed capacity is the total installed capacity of all pumps at the facility based on pump specifications

(2) The design firm capacity is the capacity with the largest pump out of service based on pump specifications

(3) Observed firm capacity is the actual operating capacity of the station based on pump station performance testing completed in 2018

4.2 Wastewater Trunk Sewers

A larger trunk sewer network and catchment area collects most areas northeast of the Grand River. A 975 mm to 1200 mm trunk sewer extends along the east side of Brantford, generally along Mohawk Street, Empey Street, Roy Boulevard, and Wayne Gretzky Parkway, a 675 mm to 750 mm sewer extends north through the center of Brantford generally along Stanley Street, and a 900 mm sewer services the majority of the downtown core following Greenwich Street.

A small collection system drains the area southwest of the Grand River towards Colborne Street. The trunk sewer network crosses the Grand River via siphons from southwest to northeast at two locations; south of Colborne Street and south of Baldwin Street along the Dike Trail. Flow from smaller catchments crosses the Grand River northeast to southwest from Grand River Avenue to Spalding Drive and along the Oak Hill Trail south of Hardy Road.

4.3 Existing System Flows

4.3.1 Existing System Flows

The existing system observed average daily flows were reviewed from 2015 to 2019 and are included in **Table 14**.

Table 14: Existing, Observed System Flows

Year	Observed Average Daily Flow (MLD)
2015	29.3
2016	32.0
2017	36.4
2018	34.8
2019	34.5
5 Year Average	**33.4**

4.3.1.1 Starting Point Methodology

The five year rolling average of average day flows was used to establish baseline system average daily flows.

4.3.2 Projected System Flows

The population and employment projections presented in **Table 9** and Level of Service criteria presented in **Table 1** were utilized to calculate the average dry weather flow (ADWF) presented in **Table 15** and further detailed in **Appendix B**. Future system flows were developed using a starting point methodology, the standard approach within Southern Ontario for projecting future growth flows. Expected flows due to growth were added to the starting point flow to establish future flows. It should be noted that population growth experiences a net decrease within the Lawren S. Harris Drive WWPS catchment due to a reduction in unit occupancy (or population per unit) in existing residential homes, without any additional greenfield growth or intensification; as such, flows to the catchment experience a decrease from 2016 to 2051.

Table 15: Wastewater System Flows

Wastewater Catchment	Average Dry Weather Flow (MLD)[1]	
	2016	2051
Brantford WWTP	41.8	70.8
Johnson Road WWPS	0.3	0.5
Empey Street WWPS	8.7	17.9
Somerset Road WWPS	2.2	3.3
Woodlawn Road WWPS	0.4	1.3
St. Andrew's Drive WWPS	0.1	0.1
Lawren S. Harris Drive WWPS	0.3	0.2
Greenwich Street WWPS	6.3	9.3
Alexander Drive WWPS	0.1	0.1
Fifth Avenue WWPS	2.4	2.9

[1] ADWF includes the WWPS catchment, and all upstream catchments established from the City's Wastewater model

4.3.2.1 County Wastewater Agreements

In the 2016 Boundary Adjustment Agreement, signed by the City and the County, the City committed to entering into a Servicing Agreement based on various principles including that the wastewater system capacity will be provided based on the City's design criteria.

As per County Council report PW-18-69 (August 2018) future flows from Cainsville are likely to be conveyed to the City of Brantford; however, the Airport connection is not anticipated within the next 5 to 10 years and feasibility will be revisited at a later date.

The flows for Cainsville and Airport in the County of Brant are provided in **Table 16** to provide context for the possible flows; if the County and City enter into a wastewater agreement in the future.

Table 16: Cainsville and Airport Flows

County of Brant Servicing	Average Dry Weather Flow (MLD)	
	2016	2051
Airport	0.2	1.6
Cainsville	0.7	1.8
Total	**0.9**	**3.4**

4.3.2.2 Post Period Considerations

The servicing analysis focuses on servicing the buildout of the internal growth and Settlement Area Boundary Expansion Areas to 2051; however, in the development of the recommended servicing strategy and infrastructure sizing, consideration for the full buildout of the City's municipal boundary including the Trigger Lands was considered, assuming similar population and employment densities. Where applicable, identification of future facility expansion needs and/or strategic upsizing of linear infrastructure was identified and incorporated into the final servicing plan.

The growth projection for the remainder of the municipal boundary area was estimated by applying a density to these remaining areas, excluding Natural Heritage Areas. These densities include:

- 25 jobs per hectare for North and East Expansion Employment Lands
- 60 residents and jobs combined per hectare for North and East Expansion Residential Lands
- 55 residents and jobs combined per hectare for Tutela Heights

This approach typically aligns with the residential densities for proposed growth to 2051. The projected ADWF for the municipal boundary full buildout and their corresponding downstream trunk sewers are shown in **Table 17**. The Oak Park trunk sewer and Mount Pleasant trunk sewer are in the WWTP catchment and the Coulbeck trunk sewer is in the Empey St. WWPS catchment.

Table 17: Municipal Boundary Full Buildout Population and Flows

Trunk Sewer	Area (ha)	Population & Employment	ADWF (MLD)
Oak Park Trunk Sewer	151	9,063	2.4
Coulbeck Trunk Sewer	168	10,098	2.7
Mount Pleasant Trunk Sewer	170	9,361	2.5
Total	**490**	**28,522**	**7.7**

4.4 Hydraulic Wastewater Model

The City's existing hydraulic model was updated using InfoWorks ICM, a wastewater system modelling and management software package by Innovyze.

The model was updated through the following procedure:

- System review through facilities drawings, SCADA and GIS data.
- Direct GIS to model link for pipes, manholes and facilities.
- Dry Weather Flow (DWF) and allocation estimated based on billing data versus treated wastewater flow at the WWTP
- Two – Wet Weather Flow (WWF) scenarios comprising of:
    - Dynamic RTK unit hydrograph approach, calibrated against historic flow monitoring records.
    - Static Rainfall Derived Inflow and Infiltration (RDII) flow rated scenario based on the City's design standard of 0.30 L/s/ha.

4.4.1 Network Development

Updates to the system and sewers were imported directly into the City's existing GIS wastewater system infrastructure data. Before importing the network information into the model, GIS and existing model pipes were analyzed for any discrepancies with respect to diameter, slope, and upstream and downstream manholes. A small number of discrepancies were found, and the correct source of information was identified for each case (GIS or existing model). The system network elevation for each model junction was based on the City's ground surface contours.

4.4.2 Facility Development

Each system facility was manually reviewed and updated in the model based on available facility site plan drawings, and process flow diagrams, pump curves, and other available information. The scope of the facility development included:

- Reviewing and updating the network configuration around each facility
- Updating the system pumps and pump curves
- Reviewing system storage elements and defining the storage geometry

4.4.3 System Dry Weather Flow

The system's DWFs were evaluated based on SCADA information and flow monitoring data provided. This process supports determination of:

- Average dry weather flows (ADWF), including determination of base sanitary flows and groundwater inflows.
- Spatial allocation of system flows.
- Temporal variation of system flows and peaking factors.

4.4.4 System Wet Weather Flow

The system's wet weather flows were evaluated based on SCADA information and flow monitoring data provided. This process supports determination of:

- System response to a wet weather event (rainfall/snowmelt).
- RDII based on catchment area.

4.4.5 Model Validation

The model was validated for accuracy using the flow monitoring data and average daily flows at the WWTP and WWPS's supplied by the City. DWF in the model was measured against the average daily flows to ensure that flow was realistic.

5. Assessment of Existing Wastewater Infrastructure

A critical step in the master planning process is the assessment of the existing infrastructure to establish the wastewater system baseline conditions. These baseline conditions will become the basis of the future recommendations of the MSP Update, therefore it was important to ensure that they were determined through a comprehensive detailed analysis of the system. Once the existing system conditions were established, the potential impacts of the future growth flows on the wastewater system were analyzed to develop and recommend future servicing strategies.

The following sections describe the current infrastructure constraints, as well as opportunities for developing and expanding the wastewater system to meet growing flows to the 2051 planning horizon and beyond. The capacities and performance outlined in this section are based on the preferred expansion lands servicing concepts outlined in **Section 6**.

5.1 Opportunities and Constraints

Existing and future wastewater opportunities and constraints were identified through discussions with City staff, as well as through hydraulic analyses and review of infrastructure data (e.g. GIS, design reports, as-built information, etc.). The InfoWorks ICM hydraulic model was used to analyze the performance of the existing and future system under dry weather and wet weather flow conditions.

In general, the wastewater collection system has sufficient capacity to convey existing peak wet weather flows with upgrades throughout the system required to convey future peak wet weather flows. **Figure 4** highlights some of the key opportunities and constraints within the City's existing wastewater system.

Partial future servicing of northwest employment lands through Woodlawn pumping station

Optimization of local sewer system to maximize available sewer and pumping capacity to support growth areas

Potential to optimize flow split

Short and long term strategies to manage pump station capacity (Fifth, Empey, and Greenwich)

Provide capacity to Airport employment land (may be subject to potential servicing agreements)

Capacity, maintenance, and security of existing river crossings

Extend City's wastewater system to service new development in the Tutela Heights area

Future servicing of expansion lands including multiple new pumping stations and trunk sewers

Management of wet weather flow and system resiliency to climate change

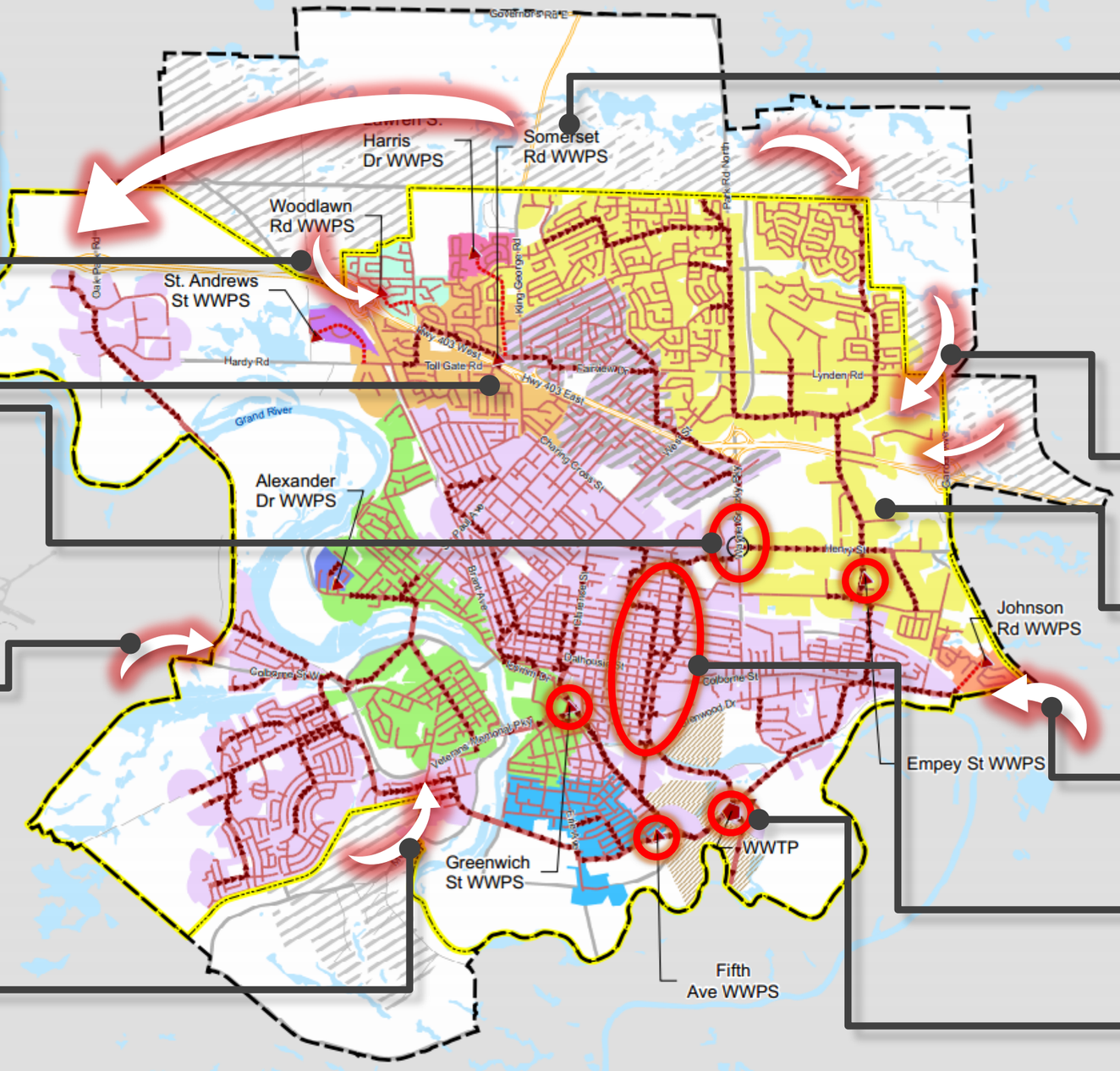
Trunk capacity to support growth areas along eastern boundary

Trunk capacity needs to support intensification corridors and northern growth areas

Provide capacity to Cainsville (may be subject to potential servicing agreements)

Existing trunk sewers at capacity

Treatment capacity to support existing and future users



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Wastewater Network
- Sewage Treatment Plant
- Wastewater Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

Catchment
- Empey St WWPS
- Woodlawn Rd WWPS
- Somerset Rd WWPS
- Greenwich St WWPS
- Fifth Ave WWPS
- St.Andrew's Ave WWPS
- Lawren S. Harris Dr WWPS
- Johnson Rd WWPS
- Alexander Dr WWPS
- Upstream of Henry Street Flow Split
- WWTP

General Features
- New Municipal Boundary
- 2016 Municipal Boundary
- Six Nations of the Grand River Territory
- Expansion Lands

Figure 4

Opportunities and Constraints

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April 2021
717036-G-006
NAD 1983 CSRS UTM Zone 17N
BluePlan

Treatment

- Existing WWTP upgrades are needed to support existing and future users
- Opportunity for short term optimization and upgrades

Pumping

- Short- and long-term strategies are needed to manage pumping station capacity (Fifth Avenue WWPS, Empey Street WWPS, Greenwich Street WWPS, Woodlawn Road WWPS, and Johnson Road WWPS)

Sanitary Sewer

- Trunk capacity needs to support intensification corridors and northern/eastern growth areas
- A number of existing sewers are at capacity or will be at capacity with 2051 growth flow and upgrades necessary
- Optimization of local wastewater system and flow splits is required to maximize available sewer and pumping capacities to support 2051 growth

Inflow and Infiltration

- Wet weather management is needed throughout the entire wastewater system

5.2 Facility Capacity

Future facility capacity utilization for treatment, pumping and conveyance are presented in the following section.

5.2.1 Wastewater Treatment Plant

The 2020 MSP analyzed the projected growth flows at the Brantford WWTP to ensure that the facility has adequate capacity to service the 2051 growth horizon.

The starting point methodology identified in **Appendix B** of **Volume II** was used to calculate the projected flows for the Brantford WWTP. **Figure 5** presents the Brantford WWTP's existing treatment capacity versus the long-term treatment need. With the full buildout to 2051, the WWTP will reach over 90% capacity.

Although the WWTP has a rated capacity of 81.8 MLD, based on discussions with City staff, not all processes within the treatment plant can accommodate this capacity and thus the WWTP processes were further reviewed to determine limiting capacities and potential opportunities at the existing facility.

Table 18 presents the limitations and opportunities of the processes at the WWTP. These opportunities were further evaluated to determine alternative solutions for system upgrades.

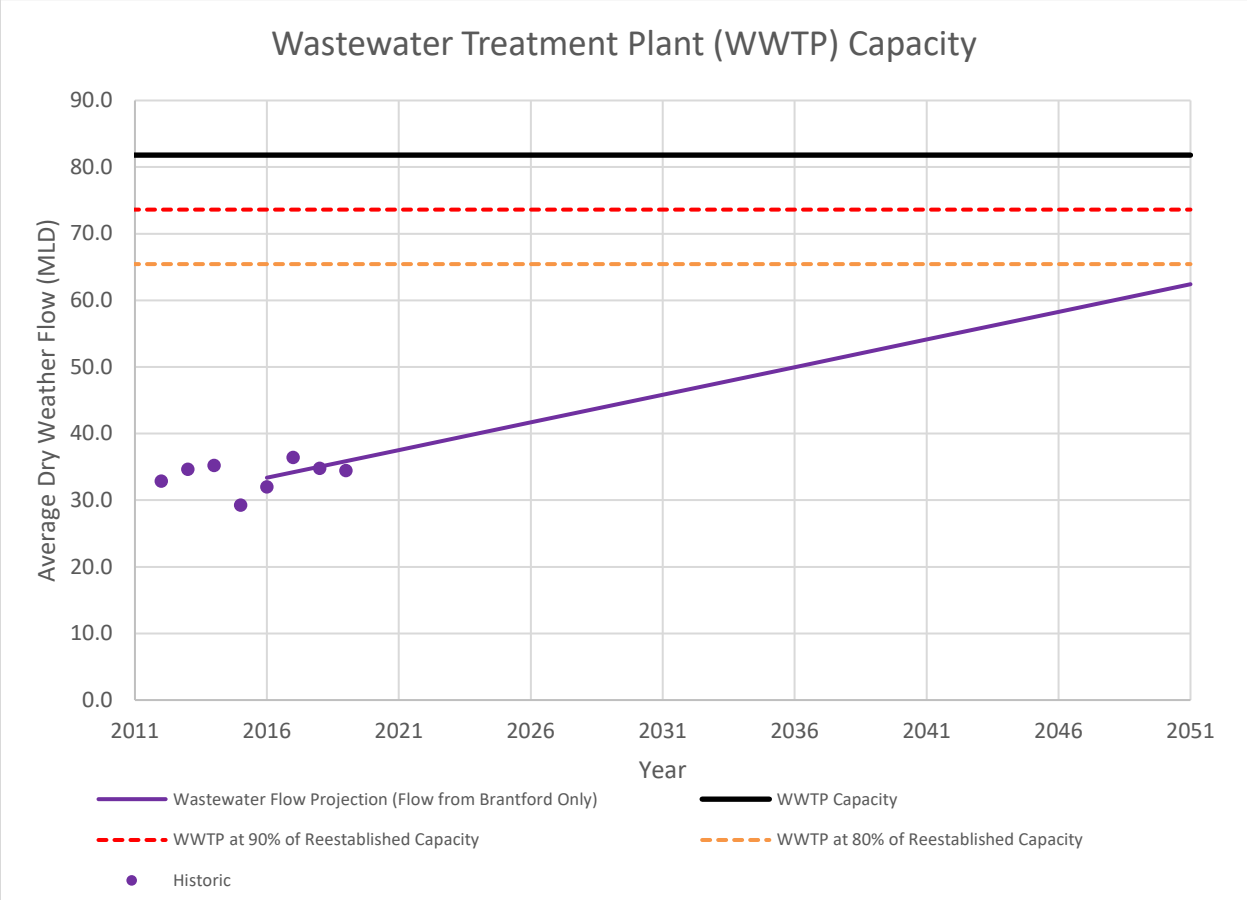


Figure 5: Brantford WWTP Capacity

Table 18: Brantford WWTP Process Limitations & Opportunities

Process	Operating Capacity (MLD)	Limitations	Opportunities
Raw Sewage Pumping	180	• Raw sewage pumping station already has a concern at the current flow rates due to limited storage within the wet well • There is limited space on site to physically expand the footprint of the raw sewage pumping station • There have been no overflow events to date; however, high river levels cause water to enter the pumping station through the overflow pipe which can cause an increase of flows into the wastewater treatment plant. This occurs regularly every spring and fall and is not caused by a significant flow.	• There is no room for an additional pump; however, there is an opportunity to expand the wet well to increase the wet well capacity • Capacity and redundancy of two 900 mm forcemains is sufficient
Preliminary Treatment	232	• Combined downstream channel for screens adds a flow restriction despite the hydraulic capacity of the screens. • No redundancy in the screening process; the entire preliminary treatment building needs to be taken offline to bypass the building to complete maintenance	• Upgrade system to allow for isolation of one of the channels while bypassing the Preliminary Treatment Building • Project has been initiated to automate valves

Primary Clarifiers	63.75	• Flow is maintained manually between the Process Modules; however, flow split can be limiting factor
		• Based on previous assessments, the clarifier mechanisms (sludge and scum collection) including gearboxes and motors, effluent weirs, flow distribution gate valves and other associated items must be replaced for primary clarifiers #1, #2 and #4.
			• To increase clarifier capacity,
			  ○ Construct a separate waste activated sludge (WAS) thickening facility which would increase capacity to range of 76.5 – 102 MLD
			  ○ There is existing space on site to add additional clarifiers

Aeration Tanks	55.408 (81.316)	• Process Module split is current limitation as PM2 aeration tanks limit flow through other PM2 processes
		• Every 8-10 years, tank needs to be taken offline, to be cleaned (replacement of membrane diffusers) which takes two months to complete
		• Current process in PM#2 cannot handle peak flows. These flows will bypass aeration tanks to secondary clarifiers.
			• Redistribute flows after primary clarifiers
			  ○ Modifications to cross connection pipe being investigated through PM1 primary clarifier upgrade project
			• Treat higher influent flows
			  ○ Add/upgrade existing step-feed system – PM1 has an existing system that would need to be rehabbed and a system could be added to PM2
			• Increase capacity of PM2 from 19.808 MLD to 28.15 MLD to be in line with primary clarifiers

Oxygenation	49.158	• The WWTP completed the replacement of two (2) of the existing four (4) 300 HP blowers with energy efficient turbo blowers in 2019 • There are three (3) energy efficient turbo blowers and one (1) centrifugal blower. • The fourth blower configuration that provides redundancy in the event of failure	• Existing fourth blower that provides redundancy in event of failure • There is room in existing building for additional blower or upsizing of existing blowers • Consider smaller blowers as opposed to one large blower to reduce overall lifecycle costs • Combined process does not influence PM flow split
Secondary Clarifiers	55.408 (77 – 111.2)	• Some of the original secondary clarifiers are still in service today and at the end of their useful life; upgrades are required for secondary clarifiers #3, #4, #5, #6 and #8	• There are four (4) secondary clarifiers in PM1 that are old and not currently in service; however, can be placed back into service with minor maintenance • There is one (1) secondary clarifier in PM2 that is in a state of disrepair and not currently in service; however, can be placed back into service with minor maintenance

Process	Operating Capacity (MLD)	Limitations	Opportunities
Disinfection & De-chlorination	35.28	• Chlorine contact tank volume is limiting factor; the piping before and after the contact chamber prior to the addition of sodium bisulfite is used in the calculation to determine contact time. • Issues when river level is high as water can almost back up into contact chamber and can back up the overflow channel in the raw sewage pumping station • Currently super-chlorinating of the effluent is completed when flows exceed 37 MLD because the contact time is not being achieved	• Upsize or build additional 1.468 ML contact chamber to increase to existing ECA plant rated capacity • Install an alternate technology that could replace or supplement chlorination to meet the disinfection criteria
Anaerobic Sludge Digesters	Sludge Digesters: 74.464 Biosolids Storage: 50.785	• The current system used to remove the supernatant from the biosolids storage tanks is ineffective unless the tank is near full.	• Decant system in storage tanks is being replaced with a floating decanting system that allows the removal of supernatant at various levels regardless of the volume of biosolids in the storage tanks; increasing storage capacity • Construct WAS thickening facility to lower capacity needed by concentrating the solids and reducing the volume • Secondary digester could be converted to primary clarifier with the addition of mixers, new roof and piping modifications

5.2.2 Wastewater Pumping Station Capacity

Assessment of pumping capacity was based on the ability of the WWPS to provide firm capacity to meet the projected PWWF for the corresponding WWPS catchments. **Table 19** highlights the WWPS projected capacity utilization and the 10-year storm 1-hour wet well storage requirements under 2016 and 2051 flows. The 2016 and 2051 capacity surplus and deficits were based on the operational firm capacity of the WWPS.

Table 19: WWPS Capacity and Peak Wet Weather Flow

Station	Facility Capacity			2016					2051			
	ECA Firm Capacity (MLD)	2018 Observed Firm Capacity (MLD)	Available Storage (ML)	PWWF – RDII 0.3 (MLD)	100-Year PWWF (MLD)	Surplus / Deficit (MLD)	10-year PWWF 1-hour Storage Requirement (ML)	Storage Surplus / Deficit (ML)	Growth PWWF (MLD)	Surplus / Deficit (MLD)	10-year PWWF 1-hour Storage Requirement (ML)	Storage Surplus / Deficit (ML)
Johnson Road WWPS	5.5	4.7	0.069	1.2	6.6	-1.9	0.189	-0.120	6.7	-2.0	0.208	-0.139
Empey Street WWPS	138.2	96.8	2.262	40.3	73.7	23.1	3.650	-1.388	123.6	-26.8	5.352	-3.090
Somerset Road WWPS	23.3	22.5	0.497	10.6	17.0	5.4	0.479	0.018	17.5	5.0	0.495	0.002
Woodlawn Road WWPS	4.9	4.1	0.107	2.1	3.5	0.5[(1)]	0.101	0.006	3.6	0.5	0.102	0.005
St. Andrews Drive WWPS	2.4	2.1	0.032	0.7	1.5	0.5	0.043	-0.011	1.6	0.5	0.045	-0.013
Lawren S. Harris Drive WWPS	6.7	6.3	0.069	1.2	2.3	4.1	0.067	0.002	2.2	4.1	0.067	0.002
Greenwich Street WWPS	32.0	29.5	1.007	18.3	31.8	-2.3	1.044	-0.037	41.8	-12.3	1.260	-0.253
Alexander Drive WWPS	1.8	0.9	0.165	0.3	0.4	0.5	0.011	0.154	0.4	0.5	0.013	0.152
Fifth Avenue WWPS	7.2	6.1	0.192	5.8	8.2	-2.1	0.320	-0.128	10.9	-4.8	0.433	-0.241

[(1)] Wastewater Pumping Station capacity utilization colour based on observed firm capacity (<80% capacity, 80-100% capacity, >100% capacity)

- **Johnson Road WWPS:** Due to existing high wet weather flows within the Johnson Road WWPS catchment, the station's operating capacity is exceeded during the design 100-year storm. Limited growth is anticipated within the catchment. Further, the station's available storage capacity, under the design 10-year storm, is insufficient to meeting the desired emergency storage capacity.
- **Empey Street WWPS:** A substantial portion of the North Expansion Lands, east of King George Road, as well as the East Expansion Lands will flow to the Empey WWPS, as further detailed in **Section 6**. As a result of the projected growth within the Empey Street WWPS catchment, capacity upgrades to the station are needed to support projected 2051 growth. Further, the station's available storage capacity, under the design 10-year storm, is insufficient to meeting the desired emergency storage capacity.
- **Somerset Road WWPS:** The Somerset Road WWPS currently has sufficient storage capacity to meet the City's existing storage requirements; however, it has insufficient storage to meet the desired 2051 emergency storage capacity.
- **Woodlawn Road WWPS:** The Woodlawn Road WWPS currently has sufficient pumping and storage capacity to meet the City's performance criteria. However, the station's existing operational capacity is only 82% of the station's original design capacity. Provisional development servicing plans for the Expansion Lands south of Powerline Road and east of Balmoral Drive propose, through regrading of existing lands, to maximize the lands that can drain to the Woodlawn WWPS, up to the station's original design capacity.
- **St. Andrews Drive WWPS:** The St. Andrews Drive WWPS's available storage capacity, under the design 10-year storm, is insufficient to meet the desired emergency storage capacity.
- **Greenwich Street WWPS:** Due to existing high wet weather flows within the Greenwich Street WWPS catchment, the station's operating capacity is exceeded during the design 100-year storm. Growth pressures within the catchment are anticipated to further increase this capacity deficit. Further, the station's available storage capacity, under the design 10-year storm, is insufficient to meet the desired emergency storage capacity.
- **Alexander Drive WWPS:** The Alexander Drive WWPS has sufficient pumping and storage capacity to accommodate 2016 and 2051 growth flows.
- **Fifth Avenue WWPS:** Due to existing high wet weather flows within the Fifth Avenue WWPS catchment, the station's operating capacity is exceeded during the design 100-year storm. Growth pressures within the catchment are anticipated to further increase this capacity deficit. Further, the station's available storage capacity, under the design 10-year storm, is insufficient to meet the desired emergency storage capacity.

Servicing strategies and concepts related to pumping needs are further described in **Section 7** and **8**.

5.3 Collection System

The City's hydraulic wastewater model was used to support the assessment of the wastewater system's sewer capacity. **Table 20** details the existing gravity sewer performance in terms of depth/Diameter (d/D) which indicates the fullness of a pipe as the proportional depth of the pipe. A d/D less than 0.5 indicates that the pipe is half full; however, a d/D greater than 1 indicates that the pipe is surcharging.

Table 20: Gravity Sewer Performance

Design Storm	depth/Diameter (d/D)				
	<0.5	0.5-0.8	0.8-1	>1	Surcharging <2.1 m
Dry Weather Flow	99%	0.8%	0.1%	0.3%	0%
2-Year	90%	8.2%	0.6%	1%	0%
5-Year	84%	12.0%	1.5%	2%	0%
10-Year	81%	13.0%	2.2%	4%	0%
25-Year	78%	12.4%	2.9%	7%	1%
50-Year	74%	12.5%	3.1%	10%	2%
100-Year	72%	12.1%	3.3%	13%	3%

Based on the hydraulic modelling results as shown in **Table 21** and **Figure 6**, the system generally has sufficient capacity under the existing 10-year design storm; however, there are existing areas of concern. Similarly, the system was assessed under the 2051 10-year design storm, as showcased in **Figure 7** and the same concerns were presented including:

North Brantford

- Trunk sewer constraints from King George Road to Park Road North due to existing and growth flows

Empey Street Pumping Station Catchment

- Constraints in the Coulbeck Trunk sewer in the section 270 m east of Bodine Road from Roy Boulevard to Henry Street as it crosses Highway 403
- Opportunity to optimize Henry Street flow split

Fifth Avenue Pumping Station Catchment

- High rates of inflow and infiltration which limits existing pumping station and sewer capacity
- Opportunity to divert some flows to limit pumping station upgrade costs

Greenwich Pumping Station Catchment

- Local sewer and trunk sewer capacity constraints as a result of current and growth flows
- Opportunity to re-configure flows at the Grand River Siphon and focus sewer upgrade needs along a single alignment

Oak Park Trunk Sewer

- Existing 675/750 mm trunk sewer on Oakhill Drive represents an existing restriction, with 1050 mm upstream sewer and 1200 mm downstream sewer. Existing sewer presents an existing operational issues and is at capacity under 2051 growth flows

Brantford Wastewater Treatment Plant Catchment

- Constraints in the Mohawk Street trunk sewer from the Mohawk Street siphon to the entrance of the WWTP under 2051 growth flows

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

CITY OF HAMILTON
COUNTY OF BRANT

N

Lawren S. Harris Dr WWPS
Somerset Rd WWPS
Woodlawn Rd WWPS
St. Andrews WWPS
Grand River
Alexander Dr WWPS
Henry Street Flow Split
Johnson Rd WWPS
Empey St WWPS
Wastewater Treatment Plant
Greenwich St WWPS
Fifth Ave WWPS

0 1 2 Kilometers

Wastewater Network

- Wastewater Pumping Station
- Sanitary Treatment Plant
- Flow Split
- Forcemains

Sewer Capacity

- d/D <0.5
- 0.5 >=d/D <0.8
- 0.8 >=d/D <1.0
- d/D >=1.0

WWPS Catchment

- Empey St WWPS
- Lawren S. Harris Dr WWPS
- Woodlawn Rd WWPS
- Johnson Rd WWPS
- Somerset Rd WWPS
- Alexander Dr WWPS
- Greenwich St WWPS
- Upstream of Henry Street Flow Split
- Fifth Ave WWPS
- WWTP
- St.Andrew's Ave WWPS

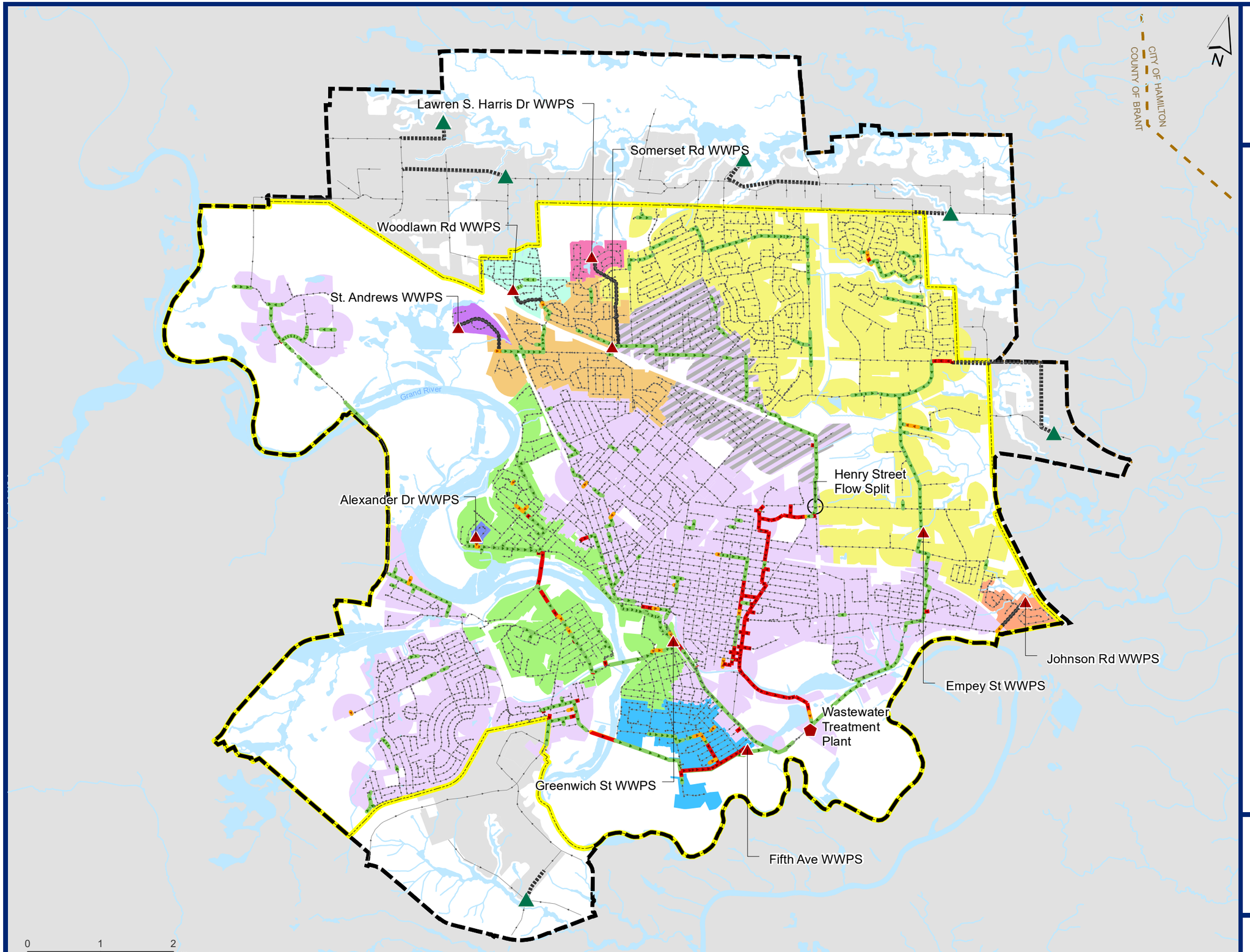
General Features

- New Municipal Boundary
- Outside Municipalities
- 2016 Municipal Boundary
- Waterbody

Figure 6
Existing - 10 Year Storm

BluePlan ENGINEERING

November 2020
717036-WW-013
NAD 1983 CSRS UTM Zone 17N



THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network

- Wastewater Pumping Station
- Sanitary Treatment Plant
- Flow Split
- Forcemains

Sewer Capacity

- d/D <0.5
- 0.5 >=d/D <0.8
- 0.8 >=d/D <1.0
- d/D >=1.0

WWPS Catchment

- Empey St WWPS
- Lawren S. Harris Dr WWPS
- Woodlawn Rd WWPS
- Johnson Rd WWPS
- Somerset Rd WWPS
- Alexander Dr WWPS
- Greenwich St WWPS
- Upstream of Henry Street Flow Split
- Fifth Ave WWPS
- WWTP
- St.Andrew's Ave WWPS

General Features

- New Municipal Boundary
- Outside Municipalities
- 2016 Municipal Boundary
- Waterbody
- Expansion Lands

Figure 7

2051 - 10 Year Storm

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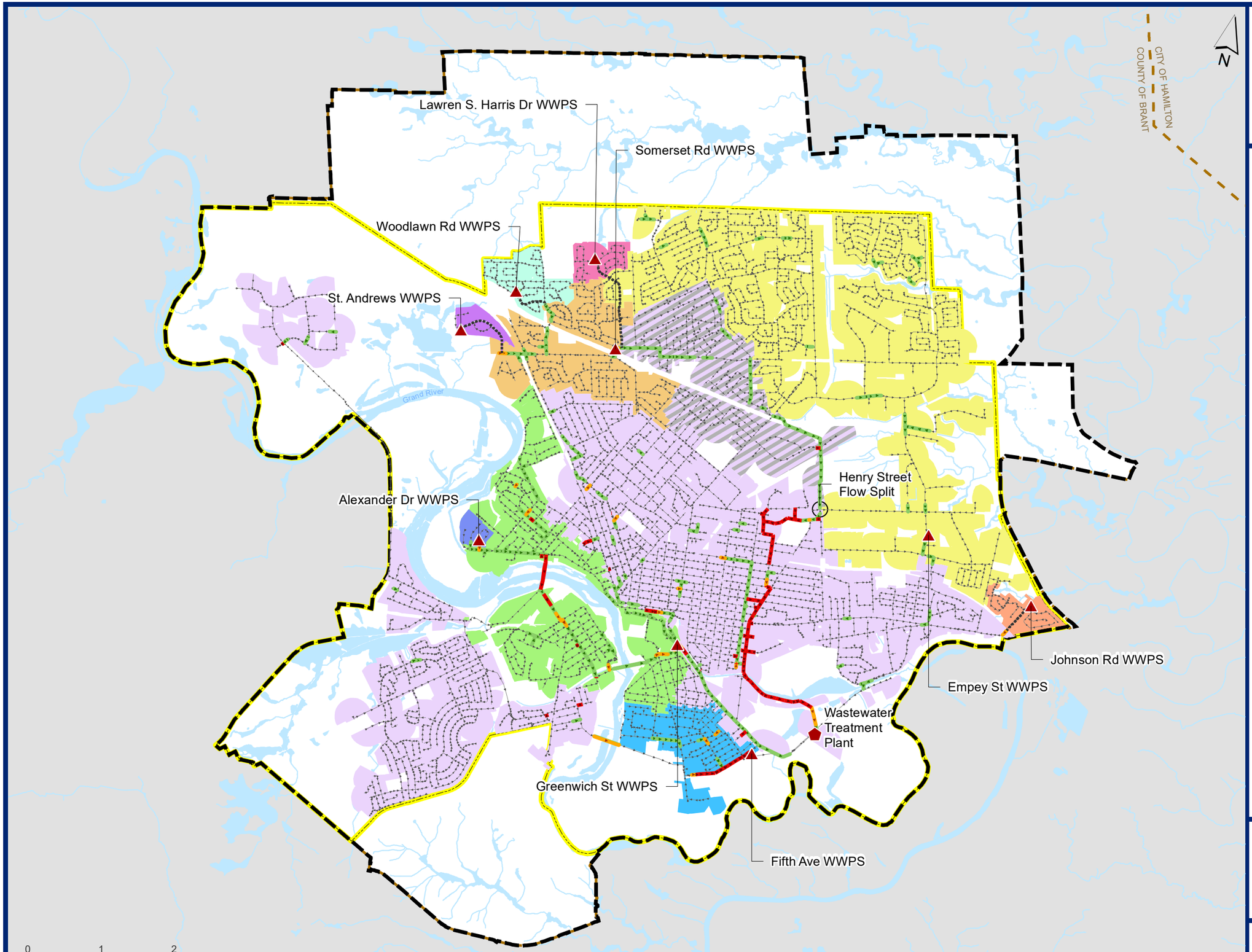
April 2021
717036-WW-013
NAD 1983 CSRS UTM Zone 17N

5.3.1 Downtown Sewers

The growth projection identifies substantial potential for intensification and redevelopment with the City's downtown area. The existing downtown sewer network has sufficient capacity to meet existing flows with some surplus capacity to accommodate growth. The scope of sewer capacity needs will be highly dependent on the ultimate location and density of growth; which are unknown at this time.

5.4 Wet Weather Flows

Many of the areas within the City's wastewater system are subject to extraneous wet weather flow rates exceeding the City's design allowance, as shown in **Figure 8** and **Figure 9** for existing conditions and 2051 conditions respectively. These higher than designed wet weather flows are resulting in reduced sewer and pumping station capacity, and increased pumping station storage and wastewater treatment needs. City wide and targeted wet weather flow strategies will be key to minimizing the scope of future system upgrades.



THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network

- Wastewater Pumping Station
- Sanitary Treatment Plant
- Flow Split
- Forcemains

Sewer Capacity

- d/D <0.5
- 0.5 >=d/D <0.8
- 0.8 >=d/D <1.0
- d/D >=1.0

WWPS Catchment

- Empey St WWPS
- Lawren S. Harris Dr WWPS
- Woodlawn Rd WWPS
- Johnson Rd WWPS
- Somerset Rd WWPS
- Alexander Dr WWPS
- Greenwich St WWPS
- Upstream of Henry Street Flow Split
- Fifth Ave WWPS
- WWTP
- St.Andrew's Ave WWPS

General Features

- New Municipal Boundary
- Outside Municipalities
- 2016 Municipal Boundary
- Waterbody

Figure 8
Existing - WWF

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November 2020
717036-WW-013
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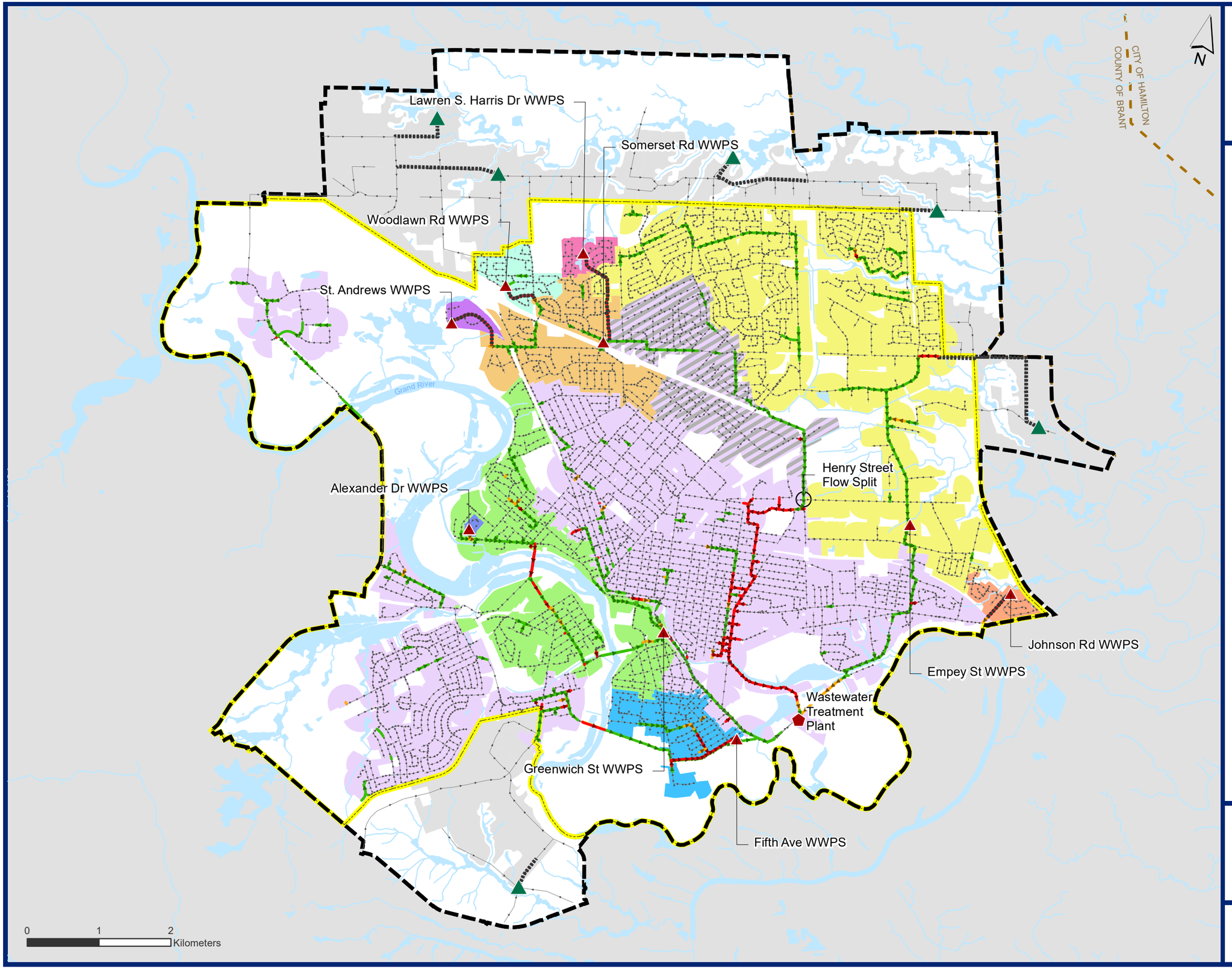

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network

- Wastewater Pumping Station
- Sanitary Treatment Plant
- Flow Split
- Forcemains

Sewer Capacity

- d/D <0.5
- 0.5 >=d/D <0.8
- 0.8 >=d/D <1.0
- d/D >=1.0

WWPS Catchment

- Empey St WWPS
- Woodlawn Rd WWPS
- Somerset Rd WWPS
- Greenwich St WWPS
- Fifth Ave WWPS
- St.Andrew's Ave WWPS
- Lawren S. Harris Dr WWPS
- Johnson Rd WWPS
- Alexander Dr WWPS
- Upstream of Henry Street Flow Split
- WWTP

General Features

- New Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Waterbody
- Expansion Lands

Figure 9

2051 - WWF

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April 2021
717036-WW-013
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6. Servicing of Expansion Lands

The Settlement Area Boundary Expansion Lands will require municipal wastewater servicing via an extension of the City's existing wastewater system. A broad range of wastewater servicing concepts were established and evaluated based on a high-level feasibility assessment to meet the servicing requirements for the North and East Expansion Lands and Tutela Heights.

Concepts are based on the City's existing wastewater system configuration and capacity, existing ground elevations within the expansion lands, and the identified natural heritage system. Figures for the servicing concepts for the expansion lands are included in **Appendix C**.

6.1 Assessment of Expansion Lands Servicing

The expansion lands servicing concepts were evaluated as part of the Secondary Plan in support of the MCR using the following criteria:

1. Configure wastewater service to integrate with existing trunk network
    i. Ability to integrate with existing wastewater trunk network
    ii. Upgrades to existing wastewater network needed to support growth areas
2. To limit impacts on infrastructure implementation, phasing, and servicing flexibility
    i. Impacts on the trunk infrastructure requirements, including infrastructure sizing, configuration, and requirements for new facilities
    ii. Impacts on infrastructure phasing
    iii. Impacts on servicing flexibility
3. Cost to provide additional infrastructure
    i. Capital Cost
    ii. Lifecycle Cost

6.2 North Expansion Lands

Wastewater servicing for the expansion lands along the northern boundary is characterized by challenging topography with a general downward slope west to east and south to north (away from the existing wastewater network). Further, the expansion lands are bisected by several south to north watercourses.

Generally, the existing northern limit of the wastewater network was not designed with consideration for future expansion beyond the pre-existing municipal boundary. As such, there are only two trunk sewers along the northern boundary which have sufficient depth and capacity to support servicing off the expansion lands without triggering substantial downstream capacity upgrades. These consist of the existing Colbeck trunk sewer at the far east of the City and the Oak Park trunk sewer at the far west of the City. The North Expansion Lands will be serviced by connecting to these two sewers.

Three general servicing concepts were considered and are outlined below including:

- All Flows to Coulbeck Road
- Flow Split with all Residential Lands to Coulbeck Road
- Flow Split at King George Road

6.2.1 Concept 1: All Flows to Coulbeck Road

The residential and employment lands will be serviced by an extension of the Coulbeck Road trunk sewer on the east side of the City's existing system. Due to a shallow invert in the existing Coulbeck Road trunk sewer and several south to north watercourse crossings, multiple WWPS are required to convey flows from west to east. Wastewater servicing within the Residential Expansion Lands will require three (3) new WWPS; including one WWPS east of Coulbeck Road, one west of Park Road North and south of Jones creek, and one west of King George Road. The employment lands will require an additional two (2) new WWPS; one west of Balmoral Drive and one east of Golf road, north of the collector road. A small section of residential lands, southeast of Golf Road and Powerline Road, can convey flows via gravity to the existing Woodlawn Road WWPS and connect to the existing system at Allensgate Road or Myrtleville Drive. New trunk sewers will generally follow the east-west collector road system in the North Expansion Lands. Forcemains from each WWPS will outlet to the new east-west trunk sewers.

Under this concept, the North Expansion Lands wastewater collection will be consolidated to the City's existing infrastructure on the east side of the City. This includes the trunk sewer on Coulbeck Road and Empey WWPS. The Empey WWPS and downstream sewers will require upgrades to accommodate the North Expansion Lands.

6.2.2 Concept 2: Flow Split with all Residential Lands to Coulbeck Road

The residential lands and employment lands east of Golf Road will be serviced by an extension of the Coulbeck Road trunk sewer on the east side of the City's existing system. Due to a shallow invert in the existing Coulbeck Road trunk sewer and several south to north watercourse crossings, three (3) new WWPS will be required to convey flows east of Golf Road. One WWPS will be located east of Coulbeck Road, one WWPS will be located along the collector road, south of Jones Creek and the third WWPS will be located along the collector road, along King George Road. New trunk sewers will generally follow the east-west collector road system in the North Expansion Lands. The forcemain from the WWPS east of Coulbeck Road will outlet to the Coulbeck Road trunk sewer and the other two WWPSs will outlet to the collector road trunk sewer, which will convey flows via gravity to the Coulbeck Road trunk sewer.

The employment lands west of Golf Road will be serviced by an extension of the Oak Park Road trunk sewer on the west side of the City's existing system. The extension of the Oak Park Road sewer will require a Highway 403 and railway crossing. One WWPS will be required to convey flows from east to west, located in the most northern employment lands, east of Golf Road. A small section of residential lands southeast of Golf Road and Powerline Road can convey flows via gravity to the existing Woodlawn Road WWPS and connect to the existing system at Allensgate Road or Myrtleville Drive. A new deep trunk sewer will generally follow east-west along the Powerline Road right of way and north-south along the collector road. The new WWPS will outlet to the trunk sewer which will travel by gravity to Oak Park Road.

Under this concept, the North Expansion Lands will be split between the City's east and west existing infrastructure, including Coulbeck Road and Oak Park Road trunk sewers.

6.2.3 Concept 3: Flow Split at King George Road

The residential lands east of King George Road will be serviced by an extension of the Coulbeck Road trunk sewer on the east side of the City's existing system. Due to a shallow invert in the existing Coulbeck Road trunk sewer and several south to north watercourse crossings, two (2) new WWPS will be required to convey flows east of King George Road. One WWPS will be located east of Coulbeck Road and the other WWPS will be located along the collector road, south of Jones Creek. New trunk sewers will generally follow the east-west collector road system in the North Expansion Lands. The forcemain from the WWPS east of Coulbeck Road will outlet to the Coulbeck Road trunk sewer and the other WWPS will outlet to the collector road trunk sewer, which will convey flows via gravity to the Coulbeck Road trunk sewer.

The employment lands and residential lands west of King George will be serviced by an extension of the Oak Park Road trunk sewer on the west side of the City's existing system. The extension of the Oak Park Road sewer will require a Highway 403 and railway crossing. Two (2) new WWPS will be required to convey flows from east to west. One WWPS will be located west of Balmoral Drive and the other WWPS will be located in the most northern employment lands, east of Golf Road. A small section of residential lands southeast of Golf Road and Powerline Road can convey flows via gravity to the existing Woodlawn Road WWPS and connect to the existing system at Allensgate Road or Myrtleville Drive. New trunk sewers will generally follow east-west along the new east-west collector road and north-south along the new collector road. Both WWPSs will outlet to the north-south collector road trunk sewer which will convey flows via gravity to Oak Park Road.

Under this concept, the North Expansion Lands will be split between the City's east and west existing infrastructure, including the Coulbeck Road and Oak Park Road trunk sewers. This strategy allows for higher flexibility for northwest employment and residential phasing as infrastructure can be built out from the east or west depending on development needs.

6.2.4 North Expansion Lands Preferred Servicing Concept

Through the Secondary Plan Review process the Flow Split at King George Road servicing concept was identified as the preferred servicing approach, as it provided the greatest amount of servicing flexibility allowing for the simultaneous development of the west employment lands and east residential lands. Further, this servicing concept presented the lowest overall cost as it minimized the sizing of trunk infrastructure requirements within the North Expansion Lands and minimized the scope of upgrades to the existing Colbeck and Oak Park trunk sewers.

The Flow Split at King George Road servicing concept for the North Lands was carried forward when completing the assessment of overall wastewater system servicing needs.

6.3 East Expansion Lands Servicing

Wastewater servicing for the expansion lands along the eastern boundary is characterized by challenging topography with a general downward slope southwest to the northeast, away from the existing wastewater network.

All opportunities are dependent on the overall servicing concept and ultimate strategy as outlined in **Sections 7** and **8**. Two servicing concepts were considered and are outlined below including:

- Sinclair Boulevard Tie In
- Lynden Road Tie In

6.3.1 Concept 1: Sinclair Boulevard Tie In

The residential lands north of Lynden Road will be serviced by an extension of the Lynden Road sewer. Wastewater servicing within the residential lands will consist of new sewers following the new collector road system that outlet to the Lynden Road sewer.

The employment lands south of Lynden Road will be serviced by a connection to the Sinclair Boulevard sewer. New sewers, following the collector road system, will convey flow via gravity to a consolidated WWPS in the southeast. Wastewater flows will be pumped by a WWPS to the Sinclair Boulevard sewer.

For this concept, upgrades will be required in the Sinclair Boulevard trunk sewer within the downstream system including Empey Street WWPS. This strategy allows for higher flexibility for residential and employment phasing as the residential lands can connect to the existing infrastructure and do not require any additional facilities.

6.3.2 Concept 2: Lynden Road Tie In

Wastewater servicing within the residential lands north of Lynden Road will consist of new sewers following the new collector road system, draining to the east employment lands. The employment lands will consist of new sewers, following the collector road system, that flow by gravity to a consolidated WWPS in the southeast. A WWPS and forcemain will pump all residential and employment flows to the Lynden Road sewer.

For this option, flows will be consolidated to the Lynden Road trunk sewer, which will require upsizing to accommodate the East Expansion Lands.

6.3.3 East Expansion Lands Preferred Servicing Concept

Through the Secondary Plan Review process the Lynden Road Tie-in servicing concept was identified as the preferred servicing approach, as it presented the lowest overall cost as it limited the scope of sewer upgrades to the Lynden Road sewer.

The Lynden Road Tie-in servicing concept for the East Lands was carried forward when completing the assessment of overall wastewater system servicing needs.

6.4 Tutela Heights

The wastewater servicing for Tutela Heights can be separated into two service areas: lands north of Mount Pleasant Road and lands south of Mount Pleasant Road. The lands north of Mount Pleasant Road slope to the northeast, toward the City's existing wastewater network; allowing for a direct gravity connection to the system. The lands south of Mount Pleasant Road generally slope to the southwest, away from the City and its existing wastewater network. Flows from these lands will be collected via a centralized WWPS and conveyed to the new trunk sewer on Mount Pleasant Road.

Servicing concepts were considered and are outlined below including:

- Tie into Mount Pleasant Road
- Tie into Gilkison Street

6.4.1 Concept 1: Tie into Mount Pleasant Road

The existing and expansion lands north of Mount Pleasant Road slope to the north and east, toward the City's existing wastewater network. These lands can be serviced by extending the City's Mount Pleasant Road trunk sewer to Conklin Road. These lands can be serviced via gravity once a new trunk sewer along Mount Pleasant Road is constructed.

The existing and expansion lands south of Mount Pleasant Road slope to the south and west, away from the City and its' existing wastewater network. Flows from these lands will be collected via a centralized WWPS in the south. A new trunk sewer will extend southeast along the collector road to the WWPS. Flows will be conveyed from the new WWPS to a new trunk

sewer extending north along Tutela Heights Road, outletting to the new trunk sewer on Mount Pleasant Road.

This concept will require upgrades to the City's existing Mount Pleasant Road trunk sewer.

6.4.2 Concept 2: Tie into Gilkison Street

The existing and expansion lands north of Mount Pleasant Road slope to the north and east, toward the City's existing wastewater network. These lands can be serviced by a new trunk sewer along Gilkison Street connecting to the City's network. These lands can be serviced via gravity once the trunk sewer along Gilkison Street is constructed.

The existing and expansion lands south of Mount Pleasant Road slope to the south and west, away from the City and its' existing wastewater network. Flows from these lands will be collected via a centralized WWPS in the south. A new trunk sewer will extend southeast along the collector road to the WWPS. Flows will be conveyed from the new WWPS to a new trunk sewer extending north along Tutela Heights Road, outletting to the new trunk sewer on Mount Pleasant Road.

This concept presents risk due to presence of flood plain along Gilkison Street.

6.4.3 Tutela Height Preferred Servicing Concept

Through the Secondary Plan Review process the Tie into Mount Pleasant Road servicing concept was identified as the preferred servicing approach due to the seasonal flooding issues along Gilkison Street. However, both concepts should be reviewed at the time of block planning process to confirm the preferred sewer alignment.

The Tie into Mount Pleasant Road servicing concept for the Tutela Heights area was carried forward when completing the assessment of overall wastewater system servicing needs.

7. Wastewater Servicing Concepts

Wastewater servicing concepts were developed under the context of identifying high level servicing solutions or concepts to address both system wide and local opportunities and constraints. This long list of servicing concepts was developed based on existing elevations, system conveyance, and pumping capacity, to evaluate the feasibility to either be carried forward for further analysis and consideration or being screened out completely.

The following sections summarize the wastewater servicing concepts, based on specific wastewater catchment areas, with their advantages and disadvantages, such that only desired concepts are carried forward as servicing strategies for further evaluation and costing. These concepts focus on the existing wastewater system while accommodating growth within the North Expansion Lands, East Expansion Lands and Tutela Heights.

The wastewater servicing concepts for the Settlement Area Boundary Expansion Lands, previously discussed in **Section 6**, were carried forward and incorporated into the downstream concept areas where relevant, including the following strategies:

- The North Expansion Lands will be serviced via connections to the existing wastewater system's trunk sewers along the northern boundary including the Coulbeck Road trunk sewer at the east of the City and Oak Park Road trunk sewer at the west of the City.
- The East Expansion Lands will be serviced by connections to the existing wastewater system at either Lynden Road or Sinclair Boulevard.
- Tutela Heights will be serviced by extending the City's Mount Pleasant Road trunk sewer to Conklin Road with a new WWPS outletting to the new sewer on Mount Pleasant Road

7.1 Servicing Concept Development

As part of the 2020 MSP Update, wastewater concepts were reviewed for existing and future growth areas in order to select the servicing strategies that:

- Make best use of existing infrastructure to avoid new infrastructure where possible;
- Minimize cost of new infrastructure;
- Consider operation and maintenance costs to ensure financial sustainability;
- Ensure a long term reliability and security of the wastewater system;
- Increase system resilience to climate change;
- Avoid/minimize environmental crossings and other disruptions to the environment where possible;
- Avoid disruptions to cultural heritage resources;
- Plan for future infrastructure within the existing road right-of-way where possible;
- Avoid/reduce production of Green House Gas Emissions; and,
- Avoid/minimize impact to areas that could represent a significant drinking water threat.

Wastewater servicing concepts were identified and reviewed for existing and future growth areas within the City of Brantford in order to select the best servicing strategies for the system.

7.2 Brantford Wastewater Treatment Plant

The capacity of all processes within the existing WWTP is not sufficient to accommodate all projected growth. As such, upgrades are required to facilitate development. **Table 21** outlines the concepts which were presented to address the additional growth flows. These concepts are further detailed in **Appendix D**.

Table 21: Brantford WWTP Concepts

Brantford WWTP Upgrades	
The following concepts to upgrade the capacity at the Brantford WWTP were reviewed.	
Concept 1: No Upgrades	
Under this concept, the WWTP capacity will be re-rated from 81.8 MLD to the actual capacity of 35.28 MLD, based on the existing limiting process of the Chlorine Contact Chamber. This alternative requires no upgrades to the existing processes. Based on the existing ADWF of 32.79 MLD, this alternative would not be able to accommodate growth as existing flows are over 90% of existing plant capacity.	
Advantages	**Disadvantages**
• No upgrades required • No construction impacts	• Only services existing system and does not accommodate any growth flows • Existing flows are over 90% of plant capacity • No capacity redundancy to allow for regular maintenance
Carried Forward	
Concept 2: Minimal Upgrades – 50 MLD	
Under this concept, the WWTP capacity will be re-rated from 81.8 MLD to 50 MLD. For all processes in the WWTP to provide 50 MLD, minimal upgrades will be required including building a new contact chamber.	
Advantages	**Disadvantages**
• Minimal upgrades required • Interim solution to service growth and can support phased expansion of the plant • Minimal construction impacts	• Only accommodates growth flows for the City up to 2031. • No capacity redundancy to allow for regular maintenance
Carried Forward	
Concept 3: Moderate Upgrades – 62 MLD	
Under this concept, the WWTP will be re-rated from 81.8 MLD to 62 MLD. For all processes in the WWTP to provide 62 MLD, moderate upgrades will be required including increasing the aeration tank volume or re-distributing flows between the aeration tank process modules, upsizing existing or adding an additional oxygenation blower, building a new contact chamber and installing a decant system in the biosolids storage tank.	
Advantages	**Disadvantages**
• Moderate process upgrades required. • Supports phased expansion of the plant	• No capacity redundancy to allow for regular maintenance. • Does not allow for growth flexibility to service Cainsville or Airport lands. • Moderate construction impacts
Carried Forward	
Concept 4: Moderate upgrades – 81.8 MLD	
To upgrade the WWTP processes to the existing rated capacity of 81.8 MLD, more extensive upgrades will be required including constructing a WAS thickening facility to allow the primary clarifiers to provide the rated capacity without expansion and increase the capacity within the anaerobic digesters, increasing the aeration tank volume, upsizing existing or adding an additional oxygenation blower, building a new contact chamber and installing a decant system in the biosolids storage tank.	
Advantages	**Disadvantages**
• Supports phased expansion of the plant • Streamlines upgrades with WAS thickening facility supporting primary clarifiers, anaerobic digesters and biosolids storage • Allows growth flexibility to service all City growth and opportunity to service Cainsville and Airport lands	• More extensive upgrades will be required due to the WAS thickening facility at primary clarifiers. • Maintenance remains an issue as processes are approaching maximum capacity • Moderate construction impacts
Carried Forward	

Concept 5: Moderate upgrades for maintenance redundancy – 92 MLD	
To upgrade the WWTP processes to a rated capacity of 92 MLD, more extensive upgrades will be required including constructing a WAS thickening facility to allow the primary clarifiers to provide the rated capacity without expansion and increase the capacity within the anaerobic digesters, increasing the aeration tank volume, upsizing existing or adding an additional oxygenation blower, building a new contact chamber and installing a decant system and additional storage tank in the biosolids storage tank.	
Advantages	**Disadvantages**
• Provides more flexibility for processes to be taken offline for maintenance • Streamlines upgrades with WAS thickening facility supporting primary clarifiers, anaerobic digester and biosolids storage • Allows growth flexibility to service all City growth and Airport and Cainsville lands to 2051	• More extensive upgrades will be required due to the primary clarifier upsizing and WAS thickening facility • Additional future O&M costs • Moderate construction impacts
Carried Forward	
Concept 6: Major upgrades – 110 MLD	
To upgrade the WWTP processes to a rated capacity of 110 MLD, major upgrades will be required including an additional Process Module to provide redundancy. Many system processes require upgrades including an additional process module and upgrading hydraulic cross connection piping for the primary clarifiers, aeration tanks and secondary clarifiers, upsizing existing or adding additional oxygenation blowers, building a new contact chamber, constructing a WAS thickening facility and adding an additional anaerobic digester and installing a decant system and additional storage tank in the biosolids storage tank.	
Advantages	**Disadvantages**
• Provides redundancy for all major processes • Streamlines upgrades • Allows growth flexibility • Allows processes to be taken offline for maintenance • Allows growth flexibility to service all City growth and Airport and Cainsville lands	• Requires major process upgrades. • System would be oversized for existing flows. • Additional future O&M costs • Major construction impacts
Carried Forward	

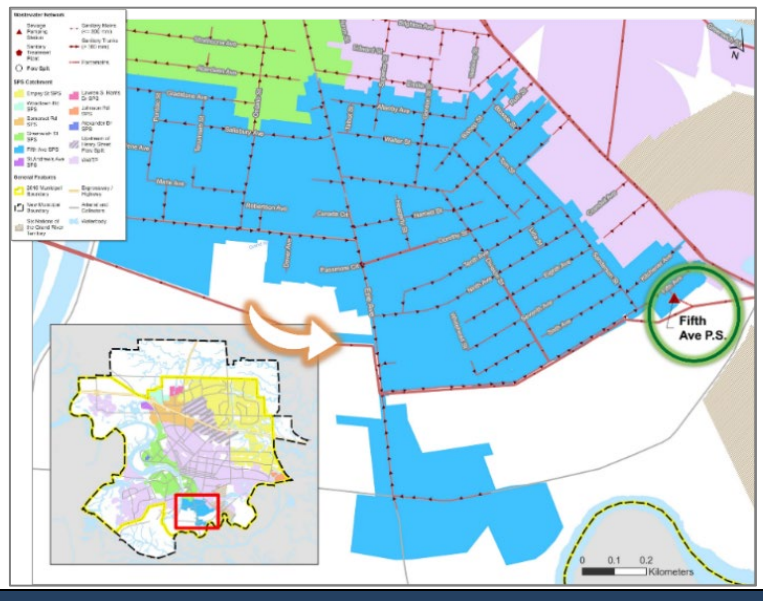
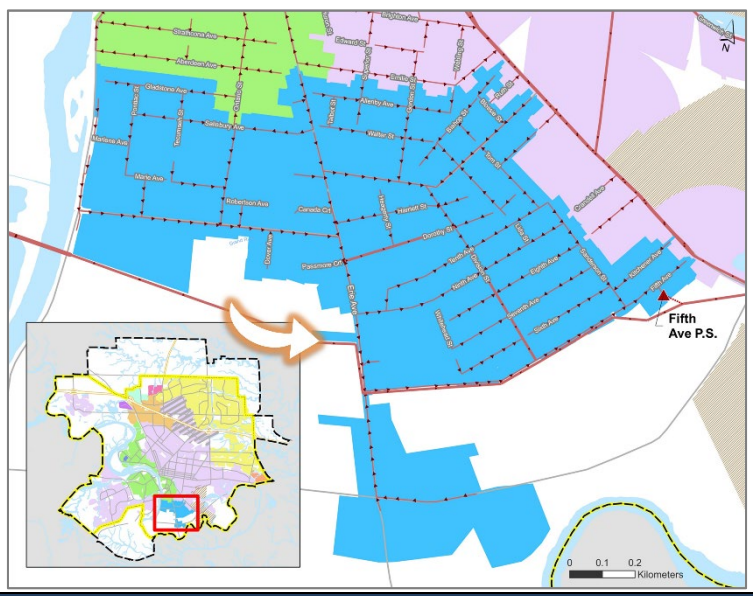
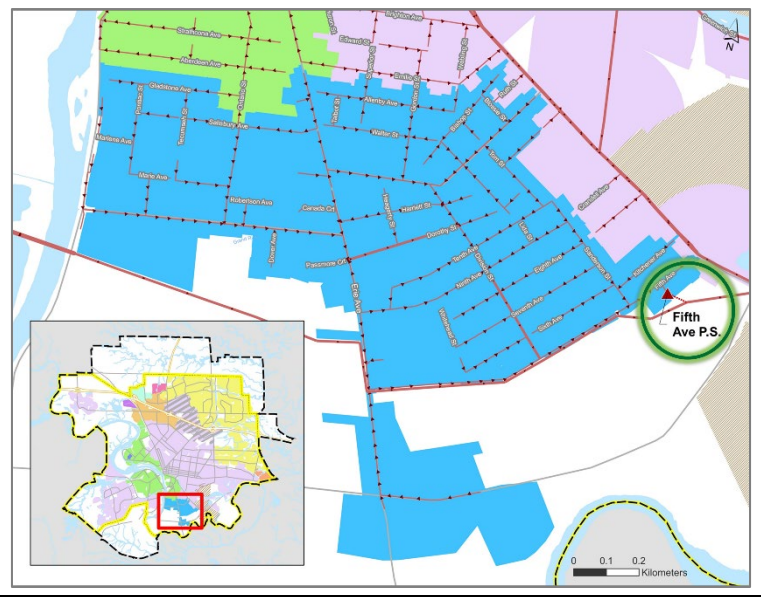
7.3 Fifth Avenue WWPS Catchment

Within the Fifth Avenue WWPS Catchment, two concepts were developed to address the existing capacity constraints at the WWPS due to high inflow and infiltration rates as well as future growth within the catchment area**.** The two concepts, detailed in **Table 22**, are outlined as follows:

- **Fifth Avenue WWPS Catchment Concept 1: Diversion**
  - Flows to the Fifth Avenue WWPS will be diverted to the WWTP trunk sewer; however, upgrades to the Fifth Avenue WWPS are still required
- **Fifth Avenue WWPS Catchment Concept 2: Pumping**
  - Fifth Avenue WWPS will be upgraded to accommodate future peak flows to 2051

Further, inflow and infiltration reduction strategies are needed in addition to the concepts presented to optimize the Fifth Avenue WWPS and local sewer capacity.

Table 22: Fifth Avenue Pumping Station Catchment Concepts

<table>
<tr><th colspan="3">Fifth Avenue Pumping Station Catchment - Concepts</th></tr>
<tr><td colspan="2">Overview</td><td rowspan="2"> 
</td></tr>
<tr><td colspan="2">• Fifth Avenue WWPS catchment has high rates of inflow and infiltration limiting existing pumping station and sewer capacity
• Intensification occurring along Erie Avenue will contribute additional flows to the pumping station and sewers</td></tr>
<tr><td colspan="3">Concept 1: Diversion</td></tr>
<tr><td colspan="3">Wastewater flows, which would normally be conveyed to the Fifth Avenue WWPS, would be diverted to the 1,200 mm trunk sewer to the WWTP. Diverted flows will primarily be conveyed via gravity, primarily from greenfield growth areas adjacent to the trunk sewer.</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td><td rowspan="2"> 
</td></tr>
<tr><td>• Opportunity to divert flow away from Fifth Avenue WWPS to reduce upgrades at Fifth Avenue WWPS</td><td>• Diversion opportunities are limited and unlikely to eliminate the need for pumping station upgrades</td></tr>
<tr><td colspan="2">Screened Out</td></tr>
<tr><td colspan="3">Concept 2: Pumping</td></tr>
<tr><td colspan="3">Pump upgrades to the existing Fifth Street WWPS to meet the 10-year design storm and growth flows to 2051.</td></tr>
<tr><td>Advantages</td><td>Disadvantages</td><td rowspan="2"> 
</td></tr>
<tr><td>• Services existing users and growth</td><td>• Upgrades required at the Fifth Avenue WWPS including pump upgrades and new forcemain; further noting that they are currently underway</td></tr>
<tr><td colspan="2">Carried Forward</td></tr>
</table>

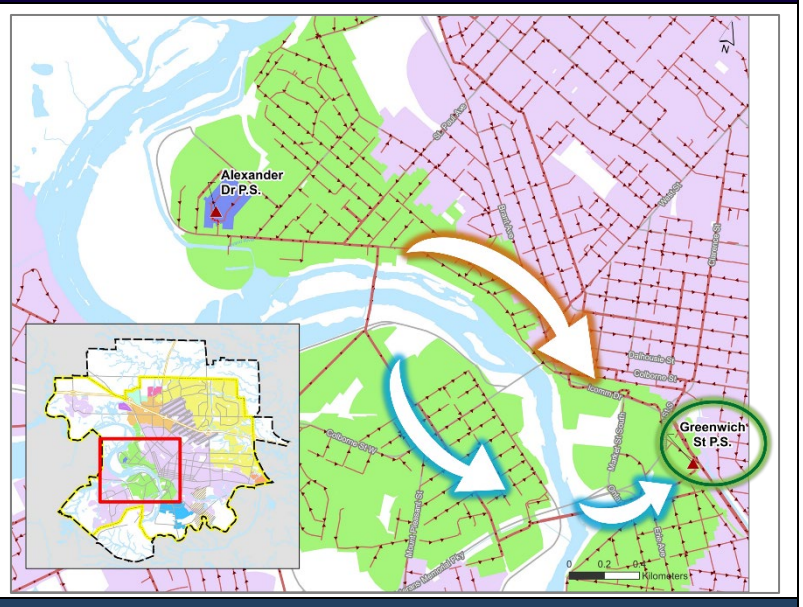
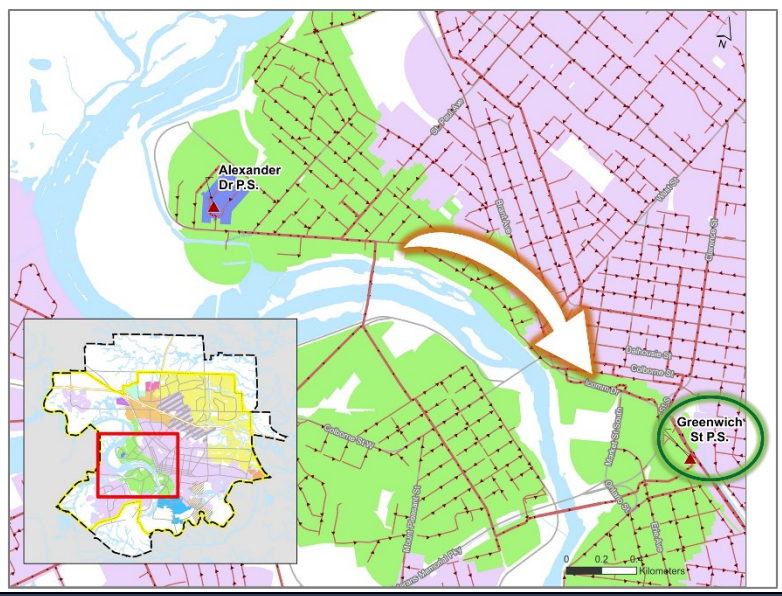
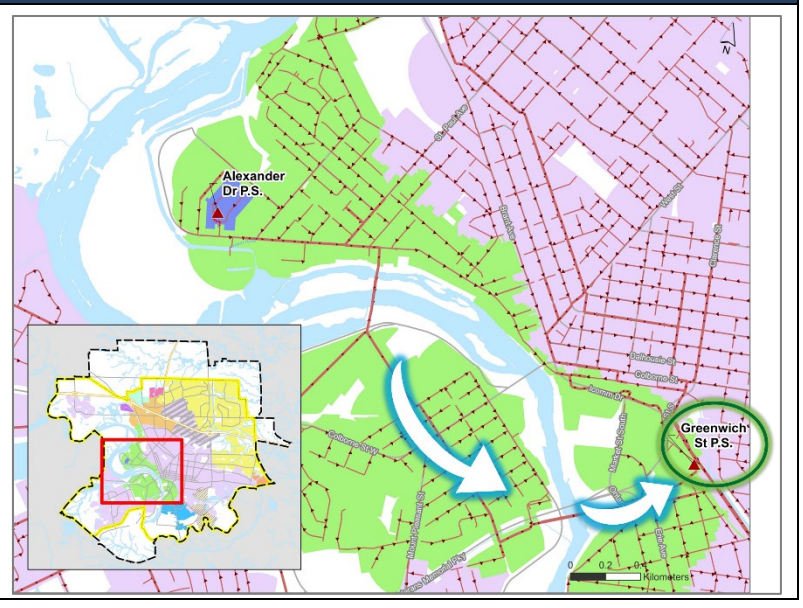
7.4 Greenwich Street WWPS Catchment

Within the Greenwich Street WWPS Catchment, two concepts were developed to address the existing and future capacity constraints within the local sewers within the catchment area. The two concepts, detailed in **Table 23**, are outlined as follows:

- **Concept 1: Divert More Flows to Grand River Avenue**
  - Flows will be conveyed to the flow split at Grand River Avenue and Jubilee Avenue will be primarily diverted along the upsized Grand River Avenue trunk sewer to the Greenwich Street WWPS
- **Concept 2: Maintain Existing Flow Split**
  - Flows will be conveyed normally at the Grand River Avenue and Jubilee Avenue flow split with upgrades to the existing trunk sewers

Further, upgrades to the Greenwich Street WWPS and inflow and infiltration reduction strategies are needed in addition to the concepts presented to address existing deficiencies and support growth.

Table 23: Greenwich Pumping Station Catchment - Concepts

Greenwich Pumping Station Catchment - Concepts	
Overview	
• Greenwich WWPS Catchment has high rates of inflow and infiltration, limiting existing pumping station and sewer capacity • Intensification occurring in downtown, along Icomm Drive	
Concept 1: Divert More Flows to Grand River Avenue and Upgrade Greenwich WWPS	
Advantages	**Disadvantages**
• Diverted flows do not cross Grand River • Eliminates surcharging along Catherine Avenue • Reduces sewer impacts West of Greenwich WWPS • Utilizes new trunk sewer on Icomm Drive	• Sewer upgrades along Grand River Avenue (minor collector road)
Carried Forward	
Concept 2: Maintain Existing Flow Split by Upsizing Trunk Sewer and Upgrade Greenwich WWPS	
Advantages	**Disadvantages**
• Existing split optimizes Grand River Avenue and Catherine Avenue sewer • Potential to reduce local surcharging and sewer upgrades with I&I reduction	• Grand River Avenue and Catherine Avenue sewer remains surcharged • Increased siphon flows • Sewer upgrades west of Greenwich WWPS >10m deep
Carried Forward	

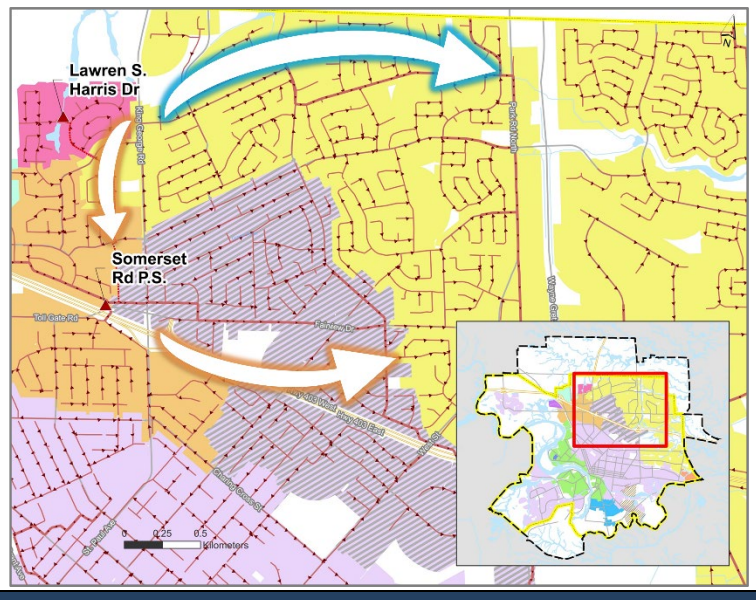
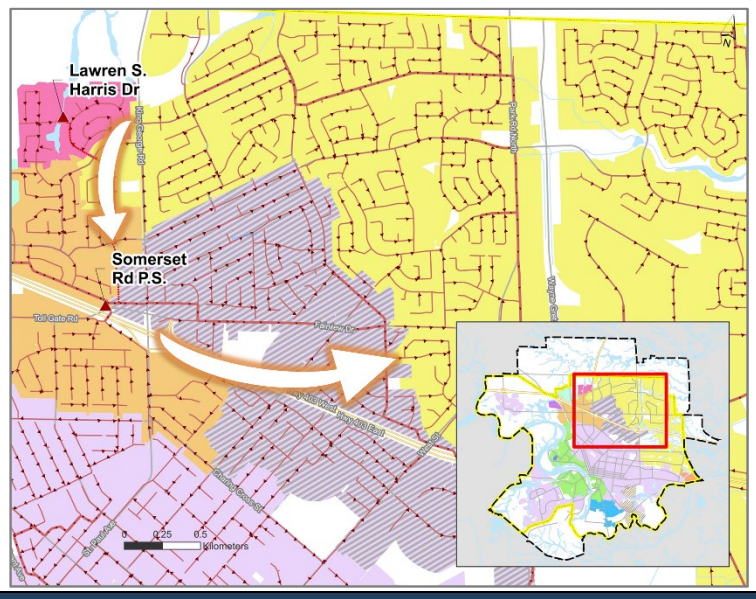
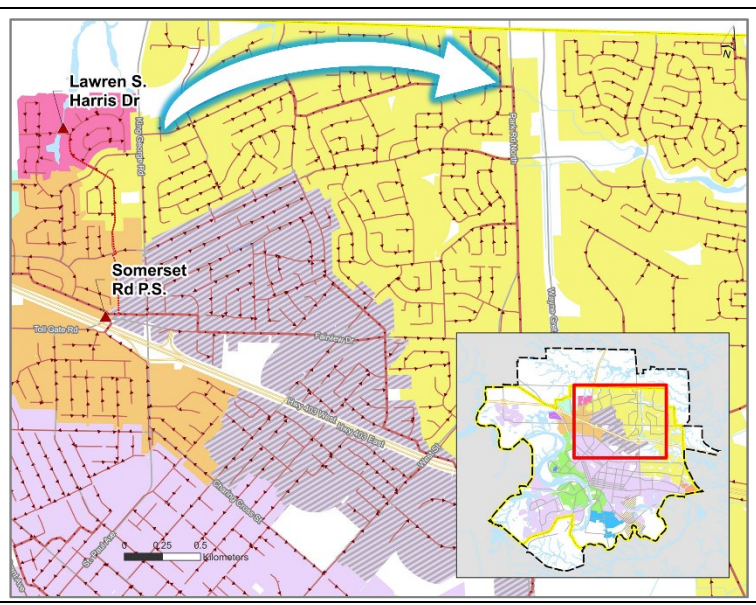
7.5 North Brantford Catchment Concepts

Within the North Brantford Catchment, two concepts were developed to address the existing capacity constraints due to high inflow and infiltration rates as well as future growth within the catchment area**.** The two concepts, detailed in **Table 24**, are outlined as follows:

- **Concept 1: New sewer to Baxter Street trunk sewer**
  - New sewer interceptor to be constructed south along King George Road and upsizing the trunk sewer west along Fairview Drive to the WWTP catchment to accommodate both existing and growth flows along the intensification corridor
  - Redirecting Somerset WWPS flows was reviewed to reduce the flows going to Henry Street flow split but was screened out prior to further review due to the additional costs related to new infrastructure required
- **Concept 2: Upgrade sewers going to Park Road North**
  - Upgrades existing trunk sewer east from King George Road to Park Road North to accommodate existing and growth flows

Further, inflow and infiltration reduction strategies are needed in addition to the concepts presented to optimize the local sewer capacity.

Table 24: North Brantford Catchment Concepts

North Brantford Catchment Concepts	
Overview	
• Limited sewer capacity along King George Road and Powerline Road • Limited capacity restricts sewer servicing options for North Expansion Lands • Sewer upgrades are needed to support intensification corridors	
Concept 1: New sewer to Baxter Street trunk sewer	
New sewer interceptor south along King George Road to Somerset WWPS and upsizing existing trunk sewer west along Fairview Drive.	
Advantages • Optimizes downstream trunk sewer capacities • Capacity to accommodate north lands King George Road septic systems (neighbourhood of Summerhayes Crescent and Lakeside Drive)	**Disadvantages** • Major construction disruptions • Complex implementation • Does not address existing constraints
Carried Forward	
Concept 2: Upgrade sewers going to Park Road North	
Upgrade existing trunk sewers east from King George Road to Park Road North.	
Advantages • Minimizes sewer upgrades and construction • Lower capital cost	**Disadvantages** • Minimal opportunity to service north lands or King George Road septic systems
Carried Forward	

7.6 Empey Street WWPS Catchment

Within the Empey Street WWPS Catchment, four concepts were developed to address the existing capacity constraints due to high inflow and infiltration rates as well as future growth within the catchment area**.** The four concepts, detailed in **Table 25**, are outlined as follows:

- **Concept 1: Existing flow split with sewer upgrades downtown and at Empey WWPS**
  - Existing Henry Street flow split is maintained with trunk sewer upgrades downtown, in the WWTP catchment, and pump capacity upgrades at the Empey Street WWPS
- **Concept 2: Existing flow split with new downtown trunk sewer to WWTP**
  - Optimization of Henry Street flow split to convey majority of the flows south along a new downtown trunk sewer, in the WWTP catchment, to the WWTP
- **Concept 3: Redirect flows to Empey WWPS and new deep tunnel to replace Empey WWPS**
  - Optimization of Henry Street flow split to convey majority of the flows east to the Empey Street WWPS catchment, with a new deep trunk sewer to bypass the Empey Street WWPS
- **Concept 4: Redirect flows to Empey WWPS and upgrade Empey WWPS**
  - Optimization of Henry Street flow split to convey majority of the flows east to the Empey Street WWPS catchment, with pump capacity upgrades at Empey WWPS

Further, inflow and infiltration reduction strategies are needed in addition to the concepts presented to optimize the local sewer capacity.

Table 25: Empey Street Pumping Station Catchment - Concepts

Empey Street Pumping Station Catchment Concepts

Overview

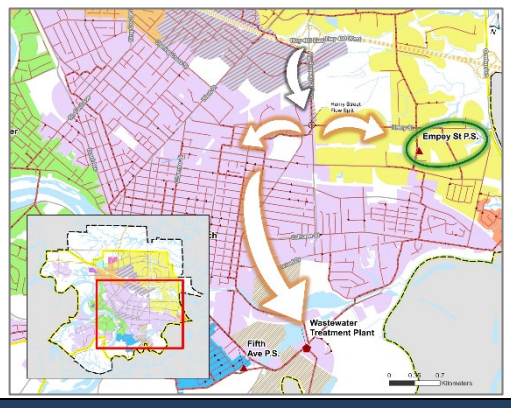
- Significant growth and intensification expected upstream of the Empey Street WWPS, which has existing capacity restrictions
- Existing trunk sewer downstream of the Henry Street flow split is constrained

Concept 1: Existing flow split with sewer upgrades downtown and at Empey pumping station

Existing Henry Street flow split is maintained with trunk sewer upgrades downtown, in the WWTP catchment, and pump capacity upgrades at the Empey Street WWPS.

Advantages	Disadvantages
• Minimizes upgrades and pump needs at Empey Street WWPS • Short term capacity is available at Empey Street WWPS	• High costs and construction to upgrade downtown sewers

Carried Forward

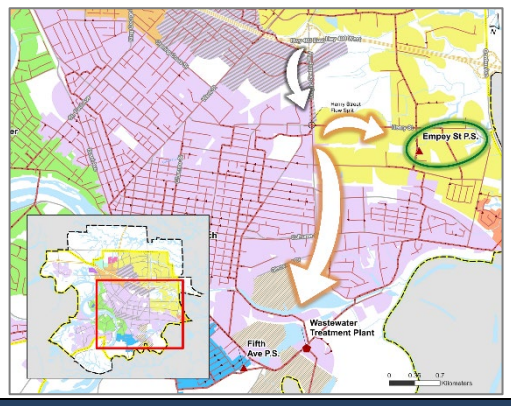


Concept 2: Existing flow split with new downtown trunk sewer to WWTP

Optimization of Henry Street flow split to convey majority of the flows south along a new downtown trunk sewer, in the WWTP catchment, to the WWTP.

Advantages	Disadvantages
• Minimizes upgrades and pump needs at Empey Street WWPS • Short term capacity is available at Empey Street WWPS • Provides additional system capacity	• High costs and construction to new downtown sewers

Carried Forward

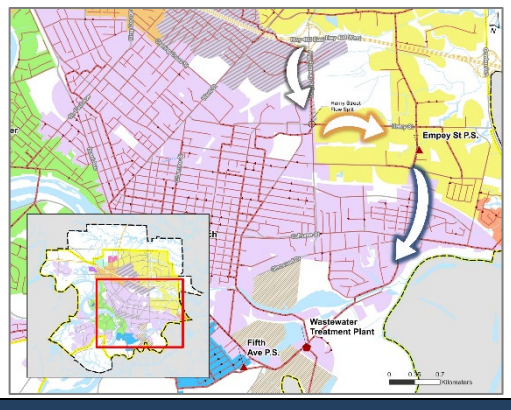


Concept 3: Redirect flows to Empey pumping station and new deep tunnel to replace Empey pumping station

Optimization of Henry Street flow split to convey majority of the flows east to the Empey Street WWPS catchment, with a new deep trunk sewer to bypass the Empey Street WWPS.

Advantages	Disadvantages
• Optimizes flow split to relieve sewer constraints in downtown • Minimizes upgrades and pump needs at Empey Street WWPS	• High costs and complex construction • Higher peak flows to the wastewater treatment plant

Carried Forward

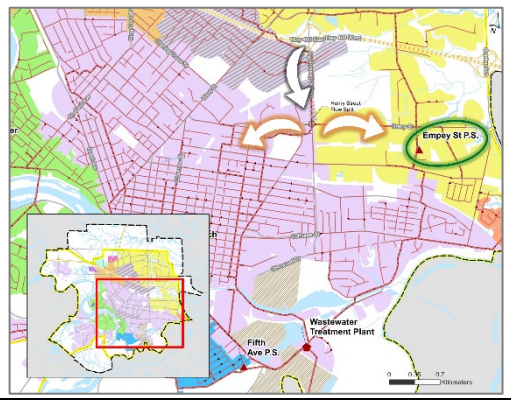


Concept 4: Redirect flows to Empey WWPS and upgrade Empey WWPS

Optimization of Henry Street flow split to convey majority of the flows east to the Empey Street WWPS catchment, with pump capacity upgrades at Empey WWPS.

Advantages	Disadvantages
• Optimizes flow split to relieve sewer constraints in downtown • Short term capacity is available at Empey Street WWPS	• Upgrades are necessary at Empey Street WWPS

Carried Forward



8. Wastewater Servicing Evaluation and Strategies

8.1 Objectives

Wastewater servicing strategies were carried forward based on the servicing concepts presented in **Section 7** and reviewed for existing and future growth in the City in order to select the best servicing solutions. The following sections summarize the alternative servicing strategies and evaluation of the strategies. The evaluation process is outlined in **Appendix C** of **Volume II**. The detailed evaluation of the wastewater alternatives is outlined in **Appendix E** of this Volume.

8.2 Brantford Wastewater Treatment Plant

An overview of the wastewater treatment plant concepts is provided in **Section 7.2**. All concepts, reviewed in **Section 7.2**, were carried forward as follows:

- **Alternative 1**: No Upgrades
- **Alternative 2:** Minimal Upgrades – Rated Capacity to 50 MLD
- **Alternative 3:** Moderate Upgrades – Rated Capacity to 62 MLD
- **Alternative 4:** Moderate upgrades – Rated Capacity to 81 MLD
- **Alternative 5:** Moderate upgrades for maintenance redundancy – Rated Capacity to 92 MLD
- **Alternative 6:** Major upgrades – Rated Capacity to 110 MLD

The evaluation process is summarized in **Table 26**. Alternative 4 provides a greater WWTP benefit as compared to Alternatives 1, 2 and 3; while maintaining a lower capital cost as compared to Alternatives 5 and 6. On an assessment of system benefit vs. cost, Alternative 4 was selected as the preferred servicing alternative.

Table 26: Brantford WWTP Alternatives & Evaluation

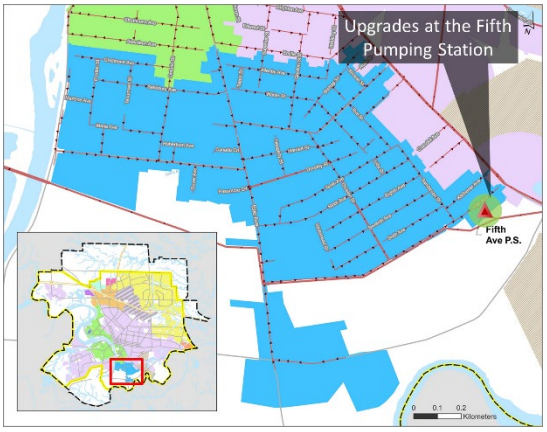
WWTP Upgrade Alternatives						
	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**	**Alternative 6**
Overview	• No upgrades.	• Minimal upgrades – 50 MLD	• Moderate upgrades – 62 MLD	• Moderate upgrades – 81.8 MLD	• Moderate upgrades for maintenance redundancy – 92 MLD	• Major upgrades – 110 MLD
Advantages	• No upgrades required	• Minimal upgrades required • Interim solution to service growth and can support phased expansion of the plant	• Moderate process upgrades required. • Supports phased expansion of the plant	• Supports phased expansion of the plant • Streamlines upgrades with WAS thickening facility supporting primary clarifiers, anaerobic digesters and biosolids storage	• Provides more flexibility for processes to be taken offline for maintenance • Streamlines upgrades with WAS thickening facility supporting primary clarifiers, anaerobic	• Provides redundancy for all major processes • Streamlines upgrades • Allows growth flexibility • Allows processes to be taken offline for maintenance
Disadvantages	• Only services existing system and does not accommodate any growth flows. • Existing flows are over 90% of plant capacity • No capacity redundancy to allow for regular maintenance	• Only accommodates growth flows for the City up to 2031. • No capacity redundancy to allow for regular maintenance	• No capacity redundancy to allow for regular maintenance. • Does not allow for growth flexibility to service Cainsville or Airport lands.	• More extensive upgrades will be required due to the WAS facility at primary clarifiers. • Maintenance remains an issue as processes are approaching maximum capacity	• More extensive upgrades will be required due to the primary clarifier upsizing and WAS facility • Additional future O&M costs	• Requires major process upgrades. • System would be oversized for existing flows. • Additional future O&M costs
Upgrades, Costs and Timing	0 years	0 – 2 years $5 M	5 – 10 years $10 M	10 – 15 years $17.5 M	10 – 15 years $28.5 M	15+ years $120 M
Four-Point Criteria Evaluation	Tech: Low Enviro: High Social & Cult: High Finan: High	Tech: Medium Enviro: High Social & Cult: Medium Finan: High	Tech: Medium Enviro: High Social & Cult: Medium Finan: Medium	Tech: High Enviro: High Social & Cult: Medium Finan: Medium	Tech: High Enviro: Low Social & Cult: Low Finan: Low	Tech: High Enviro: Low Social & Cult: Low Finan: Low
Recommended Alternative	• **Not Recommended**: It cannot effectively service growth in Brantford.	• **Not Recommended**: It only services growth in short-term.	• **Not Recommended**: It does not streamline construction upgrades and does not provide excess capacity for growth projections.	• **Recommended**: It services all growth including flexibility to service Cainsville and Airport Lands by providing sufficient capacity within all processes.	• **Not Recommended**: Due to capital and operations and maintenance costs.	• **Not Recommended**: Due to major costs and oversized infrastructure for existing and growth flows

Evaluation Scoring Legend: **High** **Medium** **Low**

8.3 Fifth Avenue Pumping Station Alternatives

For the Fifth Avenue WWPS, only Concept 2: Pumping was carried forward as a viable alternative. The overview and planned upgrades for the Fifth Avenue WWPS are presented in **Table 27**.

Table 27: Fifth Avenue WWPS Planned Upgrades

Fifth Avenue Pumping Station	
Overview • Fifth Avenue Pumping Station catchment has high rates of inflow and infiltration limiting existing pumping station and sewer capacity • Intensification occurring along Erie	
Planned Upgrades • Pumping station capacity upgrades are needed to meet 2051 flow targets further noting that construction is currently underway • Construct emergency 1-hour peak flow storage • New forcemain (twinned) further noting that this is currently under construction	

8.4 Greenwich Street WWPS Catchment Alternatives

Within the Greenwich Street WWPS catchment, existing and future capacity constraints exist within the local sewers in the catchment area. Both concepts, reviewed in **Section 7.4**, were carried forward as follows:

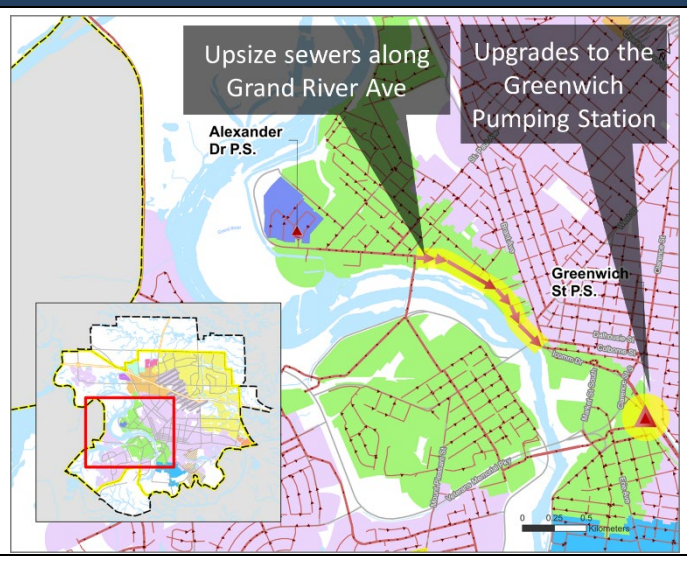
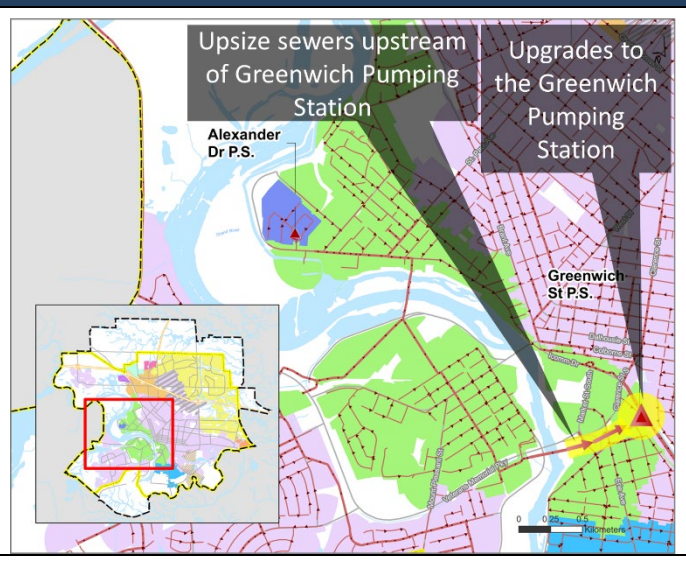
- **Alternative 1:** Divert More Flows to Grand River Avenue
- **Alternative 2:** Maintain Existing Flow Split

Under Alternative 1, the trunk sewer will be upsized to 525 mm along Grand River Avenue from Jubilee Avenue to Icomm Drive as well as upgrading the existing pumping capacity at the Greenwich Street WWPS. This is achieved through the optimization of flows at the Grand River Avenue and Jubilee Avenue flow split to convey the majority of flows along Grand River Avenue.

Under Alternative 2, the trunk sewer to Greenwich Street WWPS from Market Street South would be upsized to 750 mm as well as upgrading the existing pumping capacity at the Greenwich Street WWPS.

The overview, advantages, disadvantages and evaluation are summarized in **Table 28**.

Table 28: Greenwich Pumping Station Alternatives

Greenwich Pumping Station Alternatives		
	Alternative 1: Divert More Flows to Grand River Avenue	**Alternative 3:** Maintain Existing Flow Split
		
Overview	• Optimize flow split and divert flows to Grand River Avenue • Upgrades to Grand River Avenue Sewer	• Maintain existing flow split • Upgrades to Trunk sewer west of Greenwich WWPS
Sewers	• 1370 m of new 525 mm sewer along Grand River Avenue from Jubilee siphon to Icomm Drive	• 540 m of new 750 mm sewer upstream of Greenwich WWPS
Pumping	• Capacity upgrades required at Greenwich WWPS within existing facility footprint	• Capacity upgrades required at Greenwich WWPS within existing facility footprint
Inflow and Infiltration	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment
Costing	• Sewers: $3 M • Greenwich WWPS: $2 M	• Sewers: $5M • Greenwich WWPS: $2 M
Advantages	• Flows are not diverted across the Grand River • Reduces existing local and trunk sewer constraints • Upgrades to Grand River Avenue sewer upstream of recently upgraded sewers will utilize existing sewer capacity in the new Grand River Avenue sewers	• Optimizes current flow split along Grand River Avenue and Catherine Avenue trunk sewers • Potential to reduce local surcharging and sewer upgrades with I&I reduction
Disadvantages	• Sewer upgrades along Grand River Avenue (minor collector road)	• Increases flow across Grand River • Grand River Avenue and Catherine Avenue sewer remains surcharged • Increased flows through two siphons • Sewer upgrades west of Greenwich WWPS >10m deep
Four-Point Criteria Evaluation	Technical: 🟢 | Environ-mental: 🟢 | Social & Cultural: 🟡 | Financial: 🟢	Technical: 🟡 | Environ-mental: 🟢 | Social & Cultural: 🟡 | Financial: 🟡
Recommended Alternative	• **Recommended**: Sewer upgrades resolve constraints while minimizing flows crossing the Grand River	• **Not Recommended**: Sewer constraints remain and has complex construction

Evaluation Scoring Legend: 🟢 **High** 🟡 **Medium** 🔴 **Low**

The full evaluation is included in **Appendix E**. Alternative 1 (Divert More Flows to Grand River Avenue) is the preferred alternative as it resolves local capacity constraints as well as minimizes the flow across the Grand River at two locations.

8.5 North Brantford Catchment Alternatives

Within the North Branford Catchment, existing capacity constraints due to high inflow and infiltration rates as well as future growth within the catchment area are present. Both concepts, reviewed in **Section 7.5**, were carried forward as follows:

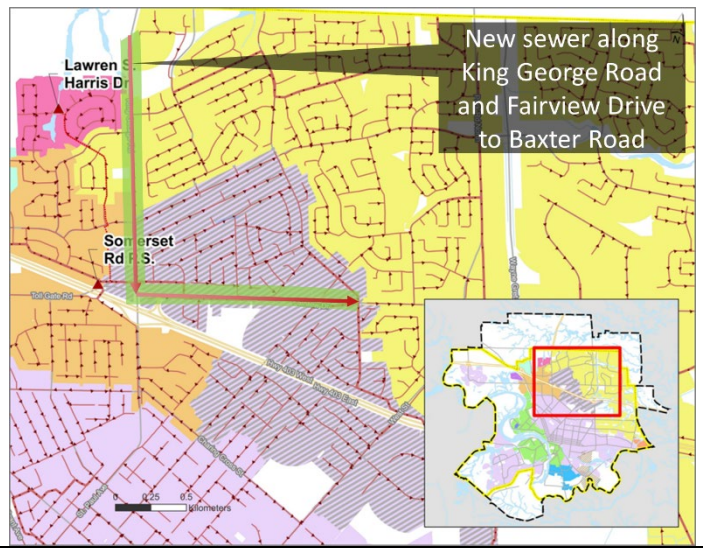
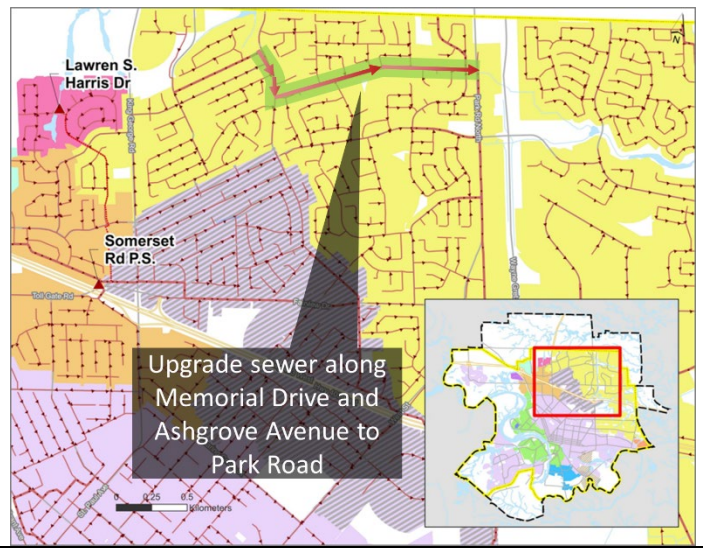
- **Alternative 1:** New sewer to Baxter Street trunk sewer
- **Alternative 2:** Upgrade sewers going to Park Road North

Under Alternative 1, a new 300 mm sewer interceptor would be constructed south along King George Road to Fairview Drive and east along Fairview Drive to Baxter Street. Flow would be conveyed to the WWTP catchment, bypassing the Henry Street flow split.

Under Alternative 2, local sewers would be upsized to 300 mm south along Memorial Drive and east along Ashgrove Avenue to Park Road North.

The overview, advantages, disadvantages and evaluation are summarized in **Table 29**.

Table 29: North Brantford Catchment Alternatives

North Brantford Catchment Alternatives								
	Alternative 1: New Trunk Sewer to Baxter Road				**Alternative 2:** Upgrade Existing Sewers to Park Road N			
								
Overview	• New gravity sewer along King George Road and Fairview Drive to existing Baxter Street trunk sewer • Potential oversizing to support north expansion lands • Local Sewer deficiencies addressed through I&I reduction – No new growth flows				• King George growth flows directed to Existing Park Road North and Fairview Drive Sewers • Upgrade North Ashgrove Ave sewers • Additional local sewer upgrades may be needed dependent on Intensification areas • Local sewer (Dunsdon Street) deficiencies addressed through I&I reduction – No new growth flows			
Sewers	• 3,400 m of new 300 mm sewer (upsize to 600 mm to incorporate expansion lands)				• 1,560 m of sewer upsized to 600 mm			
Inflow and Infiltration	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment				• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment			
Costing	• Sewers: $19M				• Sewers: $3.5 M			
Advantages	• Optimizes downstream trunk sewer capacities • Opportunity to service North Expansion Lands • Aligns with water strengthening/construction along King George Road • Capacity to incorporate septic systems area along King George Road (neighbourhood of Summerhayes Crescent and Lakeside Drive)				• Minimizes sewer upgrades • Minimizes construction impacts along King George Road • Lower capital costs			
Disadvantages	• Major disruptions to King George Road traffic & businesses • Complex construction required with >10 m deep sewers • Complex implementation • Does not address existing constraints in sewers upstream of Park Road				• No opportunity to service North Expansion Lands • Servicing of septic areas (neighbourhood of Summerhayes Crescent and Lakeside Drive) not feasible with WWPS and additional sewer upgrades required			
Four-Point Criteria Evaluation	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial
Recommended Alternative	• **Not Recommended**: High construction disruptions and high costs				• **Recommended**: Lower construction complexity, construction disruptions, and costs			

Evaluation Scoring Legend: **High** **Medium** **Low**

The full evaluation is included in **Appendix E**. Alternative 2 (Upgrade Existing Sewers to Park Road) is the preferred alternative as it has lower impacts due to construction as well as lower cost to construct.

8.6 Empey Street WWPS Catchment

Within the Empey Street WWPS Catchment, existing capacity constraints due to high inflow and infiltration rates as well as future growth within the catchment area are present. All four concepts, reviewed in **Section 7.5**, were carried forward as follows:

- **Alternative 1A:** Existing flow split with sewer upgrades downtown and at Empey WWPS
- **Alternative 1B:** Existing flow split with new downtown trunk sewer to WWTP
- **Alternative 2A:** Redirect flows to Empey WWPS and new deep tunnel to replace Empey WWPS
- **Alternative 2B:** Redirect flows to Empey WWPS and upgrade Empey WWPS

Under Alternative 1A, the existing Henry Street flow split will be maintained, conveying similar flows to Empey Street WWPS and to the downtown trunk sewer. The existing downtown trunk sewer will be upsized to 675 mm and 750 mm from the Henry Street flow split to Greenwich Street.

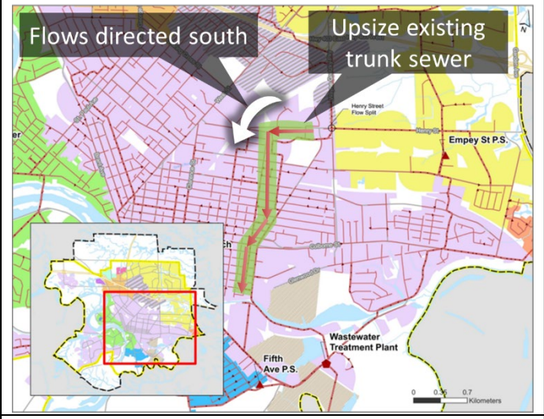
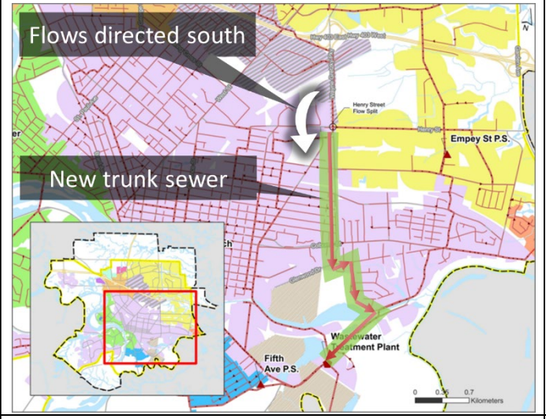
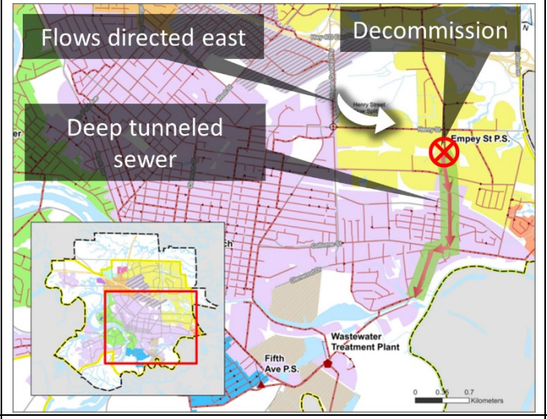
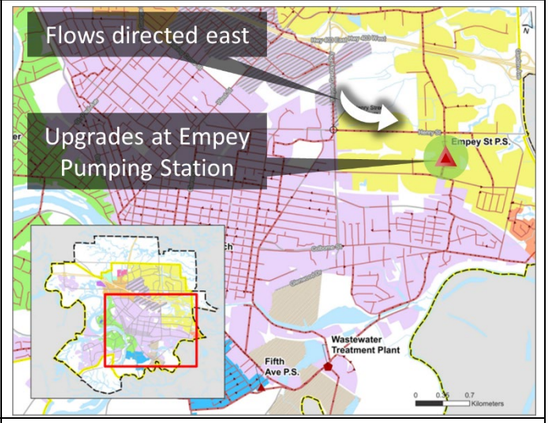
Under Alternative 1B, the Henry Street flow split will be optimized to convey the majority of flows south through a new 750 mm downtown trunk sewer, generally south along Wayne Gretzky Parkway to the Mohawk Street trunk sewer.

Under Alternative 2A, the Henry street flow split will be optimized to convey the majority of flow east to a new deep tunneled trunk sewer. The purpose of this tunneled trunk sewer is to bypass the Empey Street WWPS to eliminate the need for upgrades.

Under Alternative 2B, the Henry street flow split will be optimized to convey the majority of flow east to Empey Street WWPS which requires upgrades to Empey Street WWPS pump capacity to accommodate increased flows.

The overview, advantages, disadvantages and evaluation are summarized in **Table 30**.

Table 30: Empey Street WWPS Catchment Alternatives

Empey Street WWPS Catchment Alternatives				
	Alternative 1A: Existing Flow Split with Sewer Upgrades Downtown and at Empey WWPS	**Alternative 1B:** Existing Flow Split with New Downtown Trunk Sewer to WWTP	**Alternative 2A:** Redirect Flows to Empey WWPS and New Deep Tunnel to Replace Empey WWPS	**Alternative 2B:** Redirect Flows to Empey WWPS and Upgrade Empey WWPS
				
Overview	• Maintain existing flow split upgrade downstream deficiencies • Upgrade trunk sewer downstream of flow split • Upgrade to Empey WWPS	• New trunk alignment to WWTP	• Redirect flows to Empey WWPS to relieved downstream constraints and replacement of Empey WWPS with Deep Tunnel • Flow Split Reconfiguration • New Deep Tunnel	• Redirect flows to Empey WWPS to relieve downstream constraints & WWPS upgrades • Flow Split Reconfiguration • Upgrade Empey WWPS
Sewers	• 2,625 m of 675 mm to 750 mm sewer	• +3,000 m of 750 mm sewer	• 2000 m of 1,050 mm sewer	• Reconfigure existing Henry Street flow split
Inflow and Infiltration	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment	• Initiate Inflow and Infiltration program to reduce wet weather flows in catchment
Costing	• Sewer: $7 M • Empey WWPS: $2 - $6 M	• Sewer: $13 M • Empey WWPS: $2 - $6M	• Sewer: $33 M • Flow Split Reconfiguration: $0.5 M • Empey WWPS Decommissioning: $1M	• Empey WWPS: $10 M • Flow Split Reconfiguration: $0.5 M
Advantages	• Minimizes upgrades and pump needs at Empey WWPS • Existing short term capacity available at Empey WWPS • Potential to eliminate WWPS upgrades through I&I Reduction	• Minimize upgrades and pump needs at Empey WWPS • Existing short term capacity at Empey WWPS • Provides additional system capacity • Potential to eliminate WWPS upgrades through I&I Reduction	• Optimization of the flow split to direct flows to Empey WWPS to relieve flows through downtown trunk • Elimination of WWPS – Improves system efficiency and long-term O&M • Potential to minimize WWPS upgrades through I&I Reduction	• Optimization of the flow split to direct flows to Empey WWPS to relieve flows through downtown trunk • Existing short term capacity at Empey WWPS • Potential to minimize WWPS upgrades through I&I Reduction

Disadvantages	• Limited ability to redirect flows away from Empey WWPS • High costs and construction to upgrade downtown trunk sewers				• Limited ability to redirect flows away from Empey WWPS • High costs and construction for new downtown sewers				• High capital cost • Sewers upstream of WWTP are at capacity with minor surcharging during PWWF • Higher peak flows may be realized at WWTP as Empey WWPS acts as storage • Implementation and Cost risk associated with tunnel construction				• Upgrades required at Empey WWPS • Sewers upstream of WWTP are at capacity with minor surcharging during PWWF			
Four-Point Criteria Evaluation	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial
Recommended Alternative	• **Not Recommended**: Substantial sewer upgrades and high construction needs.				• **Not Recommended**: High construction needs and costs associated with new sewer.				• **Not Recommended**: High costs and complex construction associated with tunneled sewer				• **Recommended**: Easiest to implement with the lowest upgrade costs.			

Evaluation Scoring Legend: High Medium Low

The full evaluation is included in **Appendix E**. Alternative 2B (Redirect Flows to Empey WWPS and Upgrade Empey WWPS) is the preferred alternative as it has the easiest implementation process and the lowest upgrade costs.

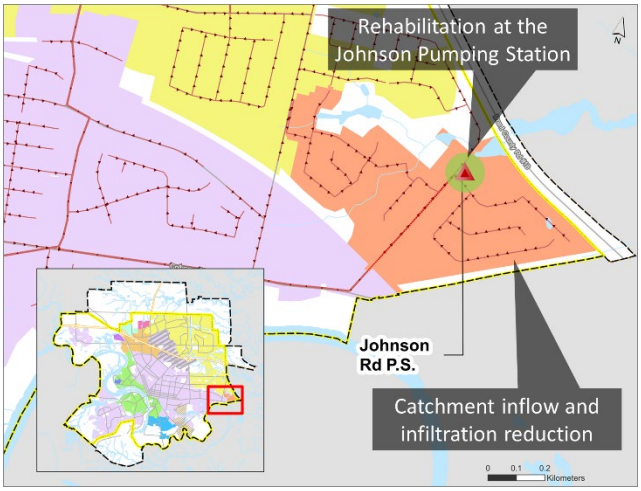
8.7 Local System Servicing Concepts

In addition to the larger catchment concepts that were reviewed, the following planned and proposed local system servicing concepts were presented.

8.7.1 Johnson Road WWPS Catchment

The existing Johnson Road WWPS catchment experiences high rates of inflow and infiltration resulting in capacity constraints at the WWPS; as such, upgrades are proposed to both reduce inflow and infiltration as well as rehabilitate the existing pumps. **Table 31** details the planned upgrades.

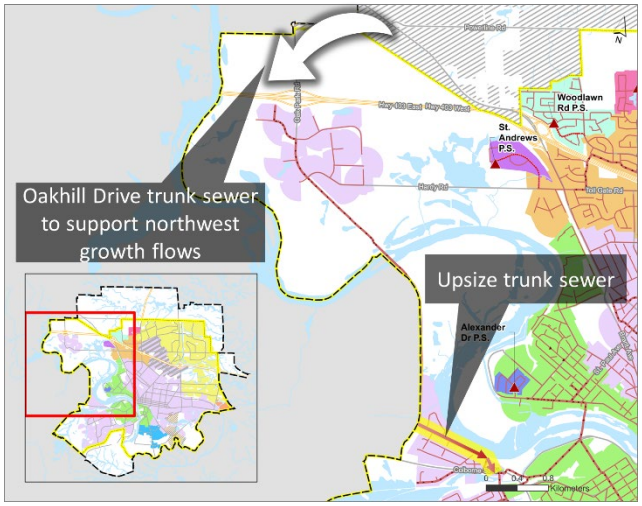
Table 31: Johnson Road WWPS Catchment

Johnson Road Pumping Station Catchment	
Overview • Johnson Road Pumping Station catchment has high rates of inflow and infiltration and existing Pumping Station is operating below firm capacity • Growth occurring in northwest area of catchment	
Planned Upgrades • Implement inflow and infiltration reduction in catchment to reduce flows to Pumping Station • Pump rehabilitation at Pumping Station to re-establish installed capacity to meet 2051 flow targets	

8.7.2 Oakhill Drive

The Oakhill Drive trunk sewer will support the north expansion lands; however, an existing bottleneck exists between Jennings Road and Colborne Street West. As such, the trunk sewer will be upsized to accommodate increased growth flows. **Table 32** details the planned upgrades.

Table 32: Oakhill Drive

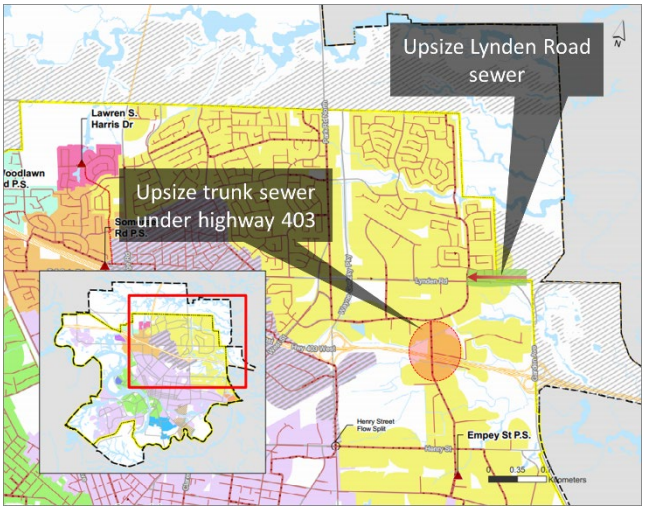
Oakhill Drive	
Overview • Oakhill Drive trunk sewer will support northwest growth flows from Oak Park Road • Existing Oakhill Drive sewer between Jennings Road and Colborne Street West downsizes from 1,050 mm to 675/750 mm **Planned Upgrades** • Upsize sewer between Jennings Road and Colborne Street West to accommodate 2051 growth flows and mitigate potential operational issues	

8.7.3 Coulbeck Road Trunk Sewer

The Coulbeck Road trunk sewer will support the north and east expansion lands; however, a capacity constraint exists south of Roy Boulevard crossing Highway 403 to Adams Boulevard. The trunk sewer will be upsized to accommodate increased growth flows and will include ongoing inflow and infiltration such that the project is not triggered at an earlier date than anticipated with an upgrade timeline of 20+ years.

Further, to service the east expansion lands, the existing sewer on Lynden Road will be upsized from the east expansion lands to Roy Boulevard to accommodate increased flows from the new east lands WWPS and forcemain. **Table 33** details the proposed upgrades.

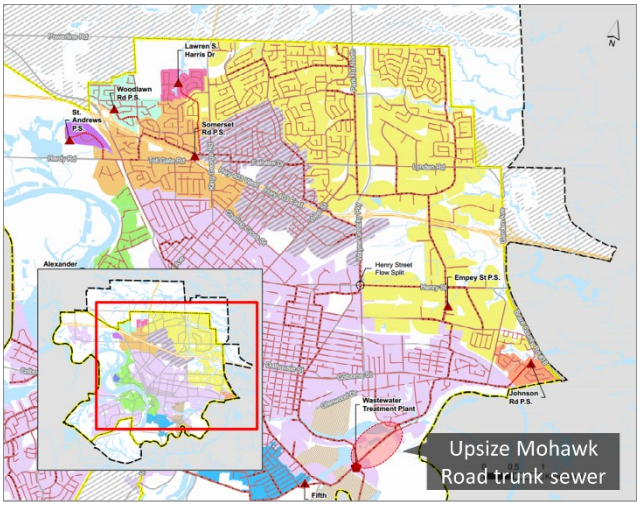
Table 33: Coulbeck Road Trunk Sewer

Coulbeck Trunk Sewer	
Overview	
• North Expansion Lands east of King George Road directed to Coulbeck Road Trunk Sewer • East Expansion Lands along eastern boundary directed to Lynden Road and Coulbeck Road Trunk Sewer	
Proposed Upgrades	
• Coulbeck Road trunk sewer under Highway 403 crossing to be upsized to support growth • Ongoing flow monitoring in sewer to ensure inflow and infiltration doesn't trigger project earlier • Lynden Road sewer upgrade from proposed East Expansion Lands forcemain to Coulbeck Road	

8.7.4 Mohawk Road Trunk Sewer

The Mohawk Road trunk sewer will support the north and east expansion lands; however, a capacity constraint exists upstream of the WWTP. The trunk sewer will be upsized to accommodate increased growth flows and will include ongoing inflow and infiltration monitoring such that the project is not triggered at an earlier date than anticipated with an upgrade timeline of 20+ years. **Table 34** details the proposed upgrades.

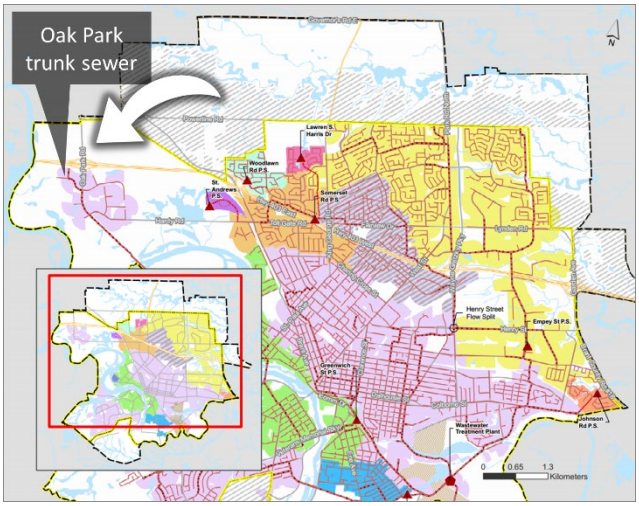
Table 34: Mohawk Road Trunk Sewer

Mohawk Road Trunk Sewer	
Overview	
• North Expansion Lands east of King George Road and East Expansion Lands along eastern boundary flow through Mohawk Road trunk sewer	
Proposed Upgrades	
• Mohawk Sewer from Mohawk Street siphon (south of Forest Road) to WWTP entrance to be upsized to support growth • Ongoing flow monitoring in sewer to ensure inflow and infiltration doesn't trigger project earlier	

8.7.5 Northwest Area Trunk Alignment

The new trunk sewer, within the north expansion lands, west of King George Road will connect to the existing wastewater system at Oak Park Road. Due to existing environmental and construction constraints within the corridor, a separate Schedule 'B' EA will be needed to determine the full extents of the impacts. **Table 35** details the proposed upgrades.

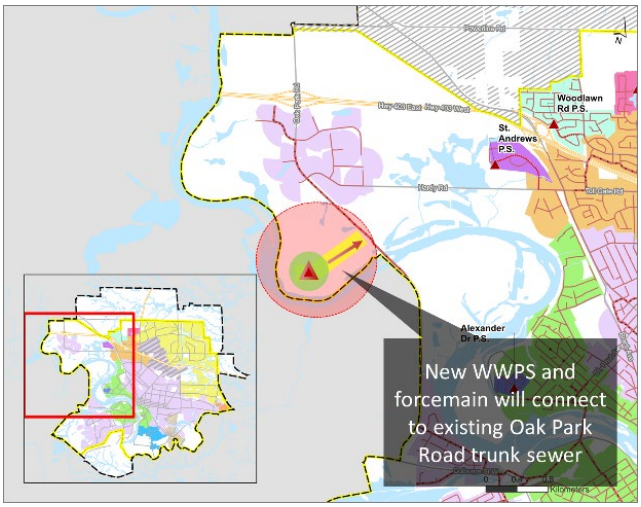
Table 35: Northwest Area Trunk Alignment

Northwest Area Trunk Alignment	
Overview	
• North Expansion Lands west of King George directed to Oak Park Road Trunk sewer • Oak Park Road and Powerline Road alignment constrained due to overhead powerlines and railway crossing • Potential alignment through future employment lands	
Proposed Upgrades	
• Oak Park Road and Powerline Road sewer alignment will be determined through subsequent Schedule 'B' EA • Opportunity to optimize alignment with development draft plans	

8.7.6 TCA Lands

Within the TCA Lands, located south of the NW employment area along the proposed Oak Park Road, a development is proposed. To accommodate wastewater flows within the area located southwest of the proposed Oak Park Road and south of Hardy Road, a new WWPS and forcemain are needed. To accommodate wastewater flows within the area, northeast of the proposed Oak Park Road and south of Hardy Road, local gravity sewers will need to drain to the existing Oak Park Road trunk sewer. Further, it should be noted that wastewater flows from the TCA lands, east of the proposed Oak Park Road will drain, via gravity to the adjacent, Oak Park Road trunk sewer. **Table 36** details the planned upgrades to the southwest.

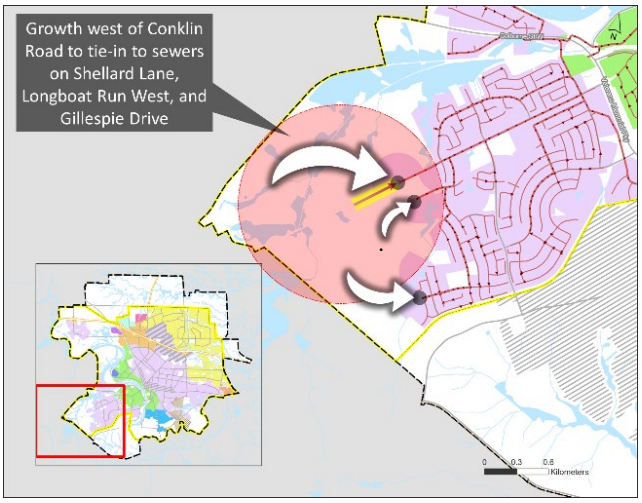
Table 36: TCA Lands

TCA Lands	
Overview	
• Development proposed southwest of the proposed Oak Park Road and south of Hardy Road • Low elevations within the development due to proximity to lower lying Grand River	
Planned Upgrades	
• Due to decreasing elevations within the development, a new 30 L/s WWPS and forcemain is needed to accommodate flows • Proposed forcemain will connect to the existing 750 mm gravity sewer located on Oak Park Road	

8.7.7 West of Conklin Road

Greenfield development within West Conklin, generally north and south of Shellard Lane and west of Conklin Road, will be serviced through various connections conveying flows to the WWTP including the existing 675 mm trunk sewer on Shellard Lane which has sufficient capacity. **Table 37** details the planned upgrades.

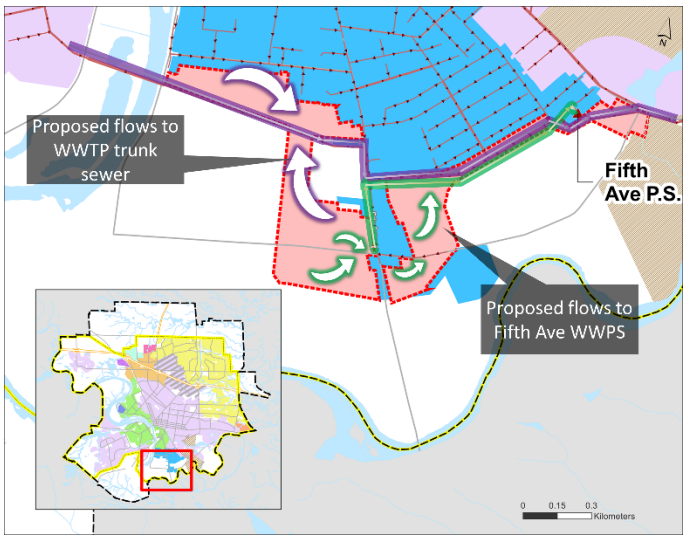
Table 37: West of Conklin Road

West of Conklin Road	
Overview	
• Greenfield development will occur west of Conklin Road, north and south of Shellard Lane	
Planned Upgrades	
• Flows will be conveyed to the existing sewers on Shellard Lane, Longboat Run West, and Gillespie Drive and conveyed by gravity to the WTTP • Existing Shellard Lane trunk sewer has sufficient capacity to accommodate all greenfield development flows	

8.7.8 Fifth Avenue Development

Greenfield development occurring within the Fifth Avenue WWPS catchment will occur generally south of Baldwin Avenue and east of Erie Avenue. Due to its location, the majority of the greenfield growth flows can be diverted to the WWTP trunk gravity sewer which traverses the development area. **Table 38** details the planned upgrades.

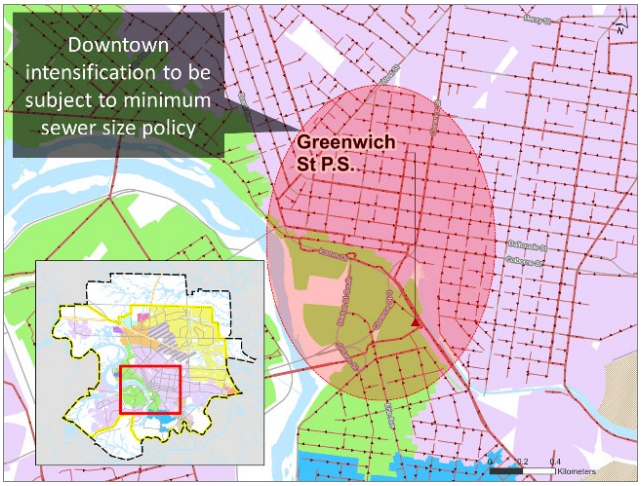
Table 38: Fifth Avenue Development

Fifth Avenue Development	
Overview	
• Greenfield development will occur south of Baldwin Avenue and east of Erie Avenue	
Planned Upgrades	
• Due to the proximity of the development to the existing WWTP trunk sewer, a connection to the existing WWTP trunk sewer can be made to accommodate a majority of the flows by gravity	

8.7.9 Downtown Growth

The growth projection identifies substantial potential for intensification and redevelopment within the City's downtown area. Sewer capacity upgrades may be required to support the increased density. Sewer upgrades will be coordinated with other planned rehabilitation works and/or as required to support individual developments. **Table 39** details the planned upgrades.

Table 39: Downtown Growth

Downtown Growth	
Overview	
• Substantial growth identified in downtown core • Impacts to existing sewers are dependent on location and density of growth	
Planned Upgrades	
• Establish a policy for minimum sewer capacity requirement to accommodate future intensifications based on L/s/ha of upstream catchment • Upgrade costs to be divided between City and growth	

8.8 Wastewater Pumping Station Capacity and Storage Upgrades

Based on the pumping review, there is an existing and long-term pumping deficit and storage needs at some of the existing pumping stations. In addition, based on reviews with City staff, a number of the pumping stations are operating at a lower capacity than the ECA rated firm capacity and require upgrades.

Table 40 presents the facility capacities including design firm capacity, observed firm capacity, available storage and the existing and 2051 flow and storage requirements.

Table 40: WWPS Capacity and Storage Requirements

WWPS	Facility Capacity			Existing		2051	
	Design Firm Capacity (MLD)	Observed Firm Capacity (MLD)	Available Storage (ML)	100-Year PWWF (MLD)	10-year PWWF 1-hour Storage Requirement (ML)	Growth PWWF (MLD)	10-year PWWF 1-hour Storage Requirement (ML)
Johnson Rd. WWPS	5.5	4.7	0.069	6.7	0.189	6.7	0.208
Empey St. WWPS	138.2	96.8	2.262	73.7	3.650	123.6	5.352
Somerset Rd. WWPS	23.3	22.5	0.497	17.0	0.479	17.5	0.495
Woodlawn Rd. WWPS	4.9	4.1	0.107	3.5	0.101	3.5	0.102
St. Andrews WWPS	2.4	2.1	0.032	1.6	0.043	1.6	0.045
Lawren S. Harris Dr. WWPS	6.7	6.3	0.069	2.2	0.067	2.2	0.067
Greenwich St. WWPS	32.0	29.5	1.007	31.8	1.044	41.8	1.260
Alexander Dr. WWPS	1.8	0.9	0.165	0.3	0.011	0.3	0.013
Fifth Ave. WWPS	7.2	6.1	0.192	8.2	0.320	10.9	0.433

(1) Flow and storage requirements colour based on observed firm capacity (<80% capacity, 80-100% capacity, >100% capacity)

The following WWPS require pump upgrades, storage upgrades or both:

- **Johnson Road WWPS**: Rehabilitation to re-establish station firm capacity, and additional storage to address existing and future peak wet weather flow storage deficit. Additionally, implement wet weather flow reduction in the catchment to address peak flows in excess of the rehabilitated firm capacity.
- **Empey Street WWPS**: Pump station upgrades in line with **Section 8.6**. Further installation of additional storage to address existing and future peak wet weather flow storage deficit. Additionally, implement wet weather flow reduction in the catchment to manage long-term storage requirements.
- **Somerset Road WWPS:** Wet weather flow reduction to address future peak wet weather flow storage deficit.
- **Woodlawn Road WWPS**: Rehabilitation to re-establish station firm capacity.
- **St. Andrews WWPS**: Additional storage to address existing and future peak wet weather flow storage deficit.
- **Greenwich Street WWPS**: Renewal and improvements to increase station capacity as per **Section 8.4**.
- **Alexander Drive WWPS**: No upgrades are necessary at the WWPS.
- **Fifth Avenue WWPS**: Upgrades to increase station capacity including a new forcemain as per **Section 8.3**, which is currently under construction.

8.9 Wet Weather Management

The wet weather management program has been recommended to address existing areas with high inflow and infiltration that result in system capacity restrictions or basement flooding risk. The program is intended to deal with existing capacity constraints, and to provide growth-related capacity without expanding/upgrading existing infrastructure, or by minimizing the required expansion/upgrade. This program provides for a proactive and targeted approach to addressing wet weather impacts.

The wet weather management program should focus on the following priority areas:

- Johnson Road WWPS catchment
- Fifth Avenue WWPS catchment
- Greenwich WWPS catchment
- North Brantford catchment

8.9.1 Johnson Road WWPS

The Johnson Road WWPS catchment is subject to very high RDII (1.28 L/s/ha) that is resulting in peak flows exceeding the capacity of the Johnson Road WWPS. I&I reduction is needed to avoid upgrades to the station beyond the planned rehabilitation. If I&I reduction efforts are unsuccessful, additional upgrades and potential forcemain twinning may be required.

8.9.2 Fifth Avenue WWPS

The Fifth Avenue WWPS catchment area is subject to seasonal high groundwater infiltration, resulting in spring base flow being 5 times the typical baseflows. These seasonally high baseflows combined by the moderately high RDII, results in peak flows exceeding the capacity of the Fifth Avenue WWPS and upstream sewer surcharging. The planned upgrades to the Fifth Avenue WWPS will be sufficient to accommodate the existing and projected peak flows without I&I reduction; however, I&I reduction is still recommended to provide additional resilience to the local system and to reduce total system baseflows helping to manage available growth capacity at the WWTP.

8.9.3 Greenwich Street WWPS

The Greenwich Street WWPS catchment area is subject to moderately high RDII that is resulting in peak flows exceeding the capacity of the Greenwich WWPS. The area is also suspected to be subject to seasonally high groundwater infiltration. The planned upgrades to the Greenwich WWPS will be sufficient to accommodate the existing and projected peak flows without I&I reduction; however, I&I reduction is still recommended to provide additional resilience to the local system and to reduce total system baseflows helping to manage available growth capacity at the WWTP. I&I reduction is needed to avoid additional upgrades to the station beyond the planned rehabilitation.

8.9.4 North Brantford

The North Brantford catchment area is subject to moderately high RDII that is resulting in higher-than-expected flows to the Empey Street WWPS and increased risk of basement flooding in the local sewer network. Upgrades to the Empey Street WWPS are triggered by growth, and I&I reduction alone would not eliminate the need for pump station upgrades; however, I&I reduction is required to minimize the required storage upgrades to support the 10-year design storm flows. I&I reduction will also provide additional resilience to the local system.

8.9.5 Flow Monitoring

To support the wet weather management program, it is recommended that the City maintain and expand the existing flow monitoring program.

8.10 Post Period Servicing

The servicing analysis presented focuses on servicing the buildout of the internal growth and Settlement Area Boundary Expansion Areas to 2051; however, consideration of the City's municipal boundary including the Trigger Lands was considered and will be serviced by the following extensions:

North Expansion Lands

- Full Buildout of the municipal boundary in the North Expansion Lands will be serviced by gravity sewers draining to one of the proposed new WWPS including the Northwest-1 WWPS, Northwest-2 WWPS, and Northeast WWPS
- Lands north of the North-South Collector Road will go to the Northwest-1 WWPS with capacity upgrades at the WWPS and a twinned forcemain needed to accommodate additional flows
- Lands north of the Northwest-2 WWPS and west of King George will go to Northwest-2 WWPS with capacity upgrades at the WWPS required. The forcemain will be sized to accommodate growth to 2051 and the additional buildout flows.
- Lands between King George Road and Park Road North, north of Jones Creek will require three new WWPS that will pump to either the North WWPS or the east-west collector road trunk sewer at Park Road. Capacity upgrades at the new North WWPS will be required and the forcemain will be sized to accommodate growth to 2051 and the additional full buildout flows.
- Lands east of Coulbeck Road will go to Northeast WWPS with capacity upgrades at the WWPS required. The forcemain will be sized to accommodate growth to 2051 and the additional full buildout flows.

Tutela Heights Lands

- Full buildout of Tutela Heights will either be serviced by a direct connection to the gravity sewer along Mount Pleasant Road or by a gravity connection going to the Tutela Heights WWPS with all flows ultimately out letting to the Mount Pleasant Road trunk sewer.
- Full buildout of lands south of Mount Pleasant Road will be serviced by gravity sewers to the Tutela Heights WWPS and outlet to Mount Pleasant Road
- Full buildout of lands north of Mount Pleasant Road will tie in directly to the gravity sewer along Mount Pleasant Road

9. Preferred Wastewater Servicing Strategy

The recommended wastewater servicing strategy can be broken down into various components that have different aims but each contributing to the overall improvement of the existing system and service of the projected buildout due to growth.

The preferred servicing strategy was developed to ensure that extension of the wastewater collection system to the expansion lands is supportive of the existing servicing strategy and follows an integrated approach with the City's development plans.

9.1 Preferred Wastewater Servicing Strategy Overview

The preferred wastewater strategy consists of directing growth flows to existing trunk sewers and upgrading downstream WWPSs where needed with the objective of maximizing the total area serviced by gravity.

The North Expansion lands flows will be split between two trunk sewers, Coulbeck Road and Oak Park Road with four (4) new WWPS required to service the expansion lands. The East Expansion lands will be serviced by a connection to the existing system along Lynden Road with a new WWPS in the east employment lands outletting to the Lynden Road sewer.

Tutela Heights will be serviced by a trunk sewer along Mount Pleasant Road connecting to the City's existing system. The lands south of Mount Pleasant Road will be collected via a centralized WWPS and conveyed to the trunk sewer on Mount Pleasant Road and the lands north of Mount Pleasant Road can be serviced by a direct gravity connection along Mount Pleasant Road.

Each wastewater project is further depicted in **Sections 9.1.1** to **9.1.7**.

9.1.1 Brantford Wastewater Treatment Plant

Upgrades at the Brantford Wastewater Treatment Plan allow for a rated capacity to be re-established to 81.8 MLD and maintained when completed within the next 5-15 years. Process maintenance and optimization at the WWTP is needed to accommodate 2051 growth flows. All proposed upgrades will be completed within the next 5-15 years and include the following upgrades:

- **Chlorine Contact Chamber:** New chlorine contact chamber
- **Oxygenation:** Upsize existing blowers
- **Aeration Tanks:** Optimize process flow rates to Process Module 1 (PM1) and PM2
- **Waste Activated Sludge (WAS) Thickening:** New WAS thickening facility to support primary clarifiers and anaerobic digester
- **Biosolids Storage Tank:** New decant system which is currently under construction

9.1.2 Pumping Stations

9.1.2.1 Upgrades to existing Wastewater Pumping Stations

The following details the recommended upgrades at existing pumping stations

- **Empey Street WWPS Storage Upgrades**: Twinned Wet Well (Duplicate of existing ~0.5 ML of storage), and 2.0 ML Storage Chamber, includes 4 new pumps and a new control building.
- **Empey Street Wastewater Pumping Station Rehabilitation and Improvements**: Renewal to meet current flow needs including maintenance and repair and rehabilitation.
- **Fifth Avenue Wastewater Pumping Station Upgrades**: Upgrades at existing WWPS including upgrading capacity to 11.2 MLD, and a new forcemain (twinned) which is currently under construction.
- **Fifth Avenue Wastewater Pumping Station Storage Upgrades:** Upgrades at the existing WWPS to accommodate 1 hour of storage, 0.468 ML, at peak flows of 11.2 MLD.
- **Greenwich Wastewater Pumping Station Rehabilitation and Improvements**: Renewal to meet current flow needs including maintenance and repair, rehabilitation, and replacing existing pumps with new pumps and non-clog impellers to reduce plugging. Pumps selected are to match current firm capacity to preservice the existing station capacity.
- **St. Andrews Wastewater Pumping Station Storage Upgrades**: An additional 0.02 ML of storage to address existing and future peak weather flow storage deficit.
- **Johnson Wastewater Pumping Station Storage Upgrades**: An additional 0.12 ML of storage to address existing and future peak weather flow storage deficit.
- **Johnson Wastewater Pumping Station Rehabilitation**: Rehabilitation, maintenance, and repair to address operational concerns related to WWPS.
- **Woodlawn Wastewater Pumping Station Rehabilitation**: Rehabilitation, maintenance, and repair to address operational concerns related to WWPS.

9.1.2.2 New Wastewater Pumping Stations

The following details the recommended new pumping stations to service the Expansion Lands:

- **Northwest-1 Wastewater Pumping Station**: New 2.3 MLD WWPS located northeast of Golf Road. Flows will be pumped to the trunk sewer along the north-south collector road, draining to Oak Park Road. WWPS to be sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.

- **Northwest-2 Wastewater Pumping Station**: New 10.7 MLD WWPS located east of Golf Road on east-west collector road. Flows will be pumped to the trunk sewer along the north-south collector road, draining to Oak Park Road. WWPS to be sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.
- **North Wastewater Pumping Station:** New 8.7 MLD WWPS located along the east-west collector road between King George Road and Park Road North, south of Jones Creek. WWPS to be sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.
- **Northeast Wastewater Pumping Station**: New 3.2 MLD WWPS located along Powerline Road, east of Coulbeck Road. Flows will be pumped to Coulbeck Road trunk sewer.
- **East Wastewater Pumping Station**: New 8.0 MLD WWPS located in southeast East Expansion Lands along collector road. Flows will be pumped to trunk sewer on Lynden Road.
- **Tutela Heights Wastewater Pumping Station**: New 3.8 MLD WWPS located in south Tutela Heights along collector road. Flows to be pumped to trunk sewer on Tutela Heights Road, extending to Mount Pleasant Road trunk sewer.

9.1.2.3 New Forcemains

The following details the recommended new forcemains to service the Expansion Lands:

- **Northwest-1 Wastewater Pumping Station Forcemain**: New 150 mm forcemain extending from Northwest-1 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate North Expansion Lands with allowance for potential twinning for full buildout flows.
- **Northwest-2 Wastewater Pumping Station Forcemain**: New 400 mm forcemain extending from Northwest-2 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate existing flows and full buildout flows.
- **North Wastewater Pumping Station Forcemain**: New 350 mm forcemain from North WWPS to east-west collector road trunk sewer. Forcemain sized to accommodate existing flows and full buildout flows.
- **Northeast Wastewater Pumping Station Forcemain**: New 200 mm forcemain from Northeast WWPS to Coulbeck Road trunk sewer. Forcemain sized to accommodate existing flows and full buildout.
- **East Wastewater Pumping Station Forcemain**: New 350 mm forcemain extending from East WWPS to Lynden Road trunk sewer.
- **Tutela Heights Wastewater Pumping Station Forcemain**: New 350 mm forcemain extending from Tutela Heights WWPS to Tutela Heights Road trunk sewer.

9.1.3 Existing System Upgrades

Projects to service the existing system include the following:

- **Bodine Road Easement Sewer Upgrades**: Upsize existing 975 mm sewer to 1,350 mm on alignment 270 m east of Bodine Road from Roy Boulevard to Henry Street crossing under Highway 403 to address future capacity issues; sewer sized to accommodate full buildout. Project costs include ongoing flow monitoring in existing trunk sewer to ensure Inflow and Infiltration (I&I) does not trigger project earlier than anticipated.
- **North Ashgrove Avenue Sewer Upgrades**: Upgrade existing 375-500 mm sewers to 600 mm on Memorial Drive from Kensington Drive to Ashgrove Avenue and on Ashgrove Avenue from Memorial Drive to the Homestead Place to address capacity issues in North Brantford.
- **Summerhayes Crescent Servicing Study**: Feasibility study to assess the connection of the existing septic service lands to the existing King George Road sewer or pumping the services to east-west collector road trunk sewer (east of King George Road) and North WWPS. The feasibility study will determine sewer upsizing needs.
- **Henry Street Flow Split Reconfiguration**: Reconfigure sewer flow split to redirect flows to Empey Street WWPS to relieve downstream sewer capacity constraints.
- **Grand River Avenue Sewer Upgrades**: Optimize Grand River Avenue and Jubilee Avenue flow split by diverting more flows to Grand River Avenue. Upsize existing 300 mm sanitary sewers to 525 mm along Grand River Avenue to accommodate increased flows.
- **Oakhill Sewer Upgrades**: Upsize Oakhill Drive sewer between Jennings Road and Colborne Street West from 675 and 750 mm to 1,050 mm to accommodate growth flows from the North Expansion Lands as well as address any potential operational issues due to the smaller sewer diameter.
- **Downtown Sewers**: The growth projection identifies substantial potential for intensification and redevelopment, as per the Downtown Brantford Revitalization EA, within the City's downtown area. Sewer capacity upgrades may be required to support the increased density. Sewer upgrades will be coordinated with other planned rehabilitation works and/or as required to support individual developments.
- **Mohawk Trunk Sewer Upgrades**: Upgrade existing 1,200 mm sewer on Mohawk Street from Mohawk Street siphon (south of Forest Road) to WWTP entrance to address future capacity issues; sewer sized to accommodate full buildout. Project costs includes ongoing flow monitoring in existing trunk sewer to ensure I&I does not trigger project earlier than anticipated.

9.1.4 North Expansion Lands

Projects to service the North Expansion Lands include the following:

- **Oak Park Road Trunk Sewer:** New 825 mm trunk sewer extending from north-south collector road to Oak Park Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.
- **North-South Collector's Road Trunk Sewer**: New 825 mm trunk sewer extending along north-south collector road from east-west collector road to Powerline Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.
- **North-South Collector's Road Trunk Sewer**: New 525 mm trunk sewer extending along north-south collector's road from northern east-west collector road to north-south collector road to service lands north of east-west collector road. Sewer sized to accommodate full buildout.
- **East-West Collector's Road Trunk Sewer (West of King George)**: New 600 mm trunk sewer extending along east-west collector road east of Northwest-2 WWPS and west of King George Road. Sewer sized to accommodate full buildout.
- **East-West Collector's Road Trunk Sewer (East of King George Road)**: New 525 mm to 675 mm trunk sewer extending along east-west collector road east of King George Road to North WWPS. Sewer sized to accommodate full buildout.
- **East-West Collector's Road Trunk Sewer (East of North WWPS)**: New 675 mm trunk sewer extending from North WWPS forcemain to west of Park Road North. Sewer sized to accommodate full buildout.
- **East-West Collector's Road Trunk Sewer (East of North WWPS)**: New 825 mm trunk sewer extending from west of Park Road North to east of Wayne Gretzky Parkway. Sewer sized to accommodate full buildout.
- **East-West Collector's Road Trunk Sewer (East of North WWPS)**: New 975 mm trunk sewer extending from east of Wayne Gretzky Parkway to Coulbeck Road trunk sewer. Sewer sized to accommodate full buildout.

9.1.5 East Expansion Lands

Projects required to service the East Expansion Lands include the following:

- **East Expansion Lands Trunk Sewer**: New 525 mm trunk sewer from Lynden Road to East WWPS along the east collector road.
- **Lynden Road Trunk Sewer Upgrades**: Upsize existing 250 mm sewer to 525 mm along Lynden Road from East WWPS forcemain to Brantwood Park Road.

9.1.6 Tutela Heights

Watermain upgrades that will be required to accommodate growth include the following:

- **Mount Pleasant Road Trunk Sewer Upgrades**: Upgrade existing sewer to 825 mm along Mount Pleasant Road from Gilkison Street to the trunk sewer connection at Delamere Street.
- **Mount Pleasant Road Trunk Sewer**: New 825 mm trunk sewers along Mount Pleasant Road from Tutela Heights Road to existing trunk sewer on Mount Pleasant Road.
- **Tutela Heights Road Trunk Sewer**: New 750 mm trunk sewers along Tutela Heights Road from Tutela Heights WWPS forcemain to Mount Pleasant Road.

9.1.7 Additional Studies

- **Flow Monitoring**: City wide flow monitoring program to address existing issues and provide guidance for wet weather flow management practices.
- **City Wide Inflow and Infiltration Program**: City wide I&I reduction program based on flow monitoring results to address existing areas of high I&I.
- **Greenwich Street WWPS Inflow and Infiltration Reduction**: Greenwich WWPS catchment is subject to high I&I which will be addressed through the initiation of an I&I program to manage peak flows allowing for additional capacity to be realized at the existing Greenwich Street WWPS.
- **Johnson Road WWPS Inflow and Infiltration Reduction**: Johnson Road WWPS catchment subject to very high I&I which will be addressed through the initiation of an I&I program to manage peak flows allowing for additional capacity to be realized at the existing Johnson Road WWPS.

9.2 Capital Program

The preferred wastewater servicing strategy has been developed to support the servicing needs of the existing and future growth areas within the City of Brantford to 2051 and beyond. The capital costs for each project of the Preferred Strategy were estimated according to the costing methodology within **Section 10** of **Volume II**. These projects are listed according to their project number and are shown in **Table 44**. The capital program table contains project descriptions, dimensions, proposed timing, and estimate total project cost. Detailed project sheets are included in **Appendix F**.

9.2.1 Project Costing

The wastewater Capital Program project costs were developed using a unit cost approach. A breakdown of the unit cost methodology is included in **Volume II**.

9.2.2 Development Charge Contributions

For each identified wastewater project, the project's estimated growth/benefit to existing related contributions was identified. **Table 41** summarizes the Development Charges benefit to existing classifications

Table 41: Development Charges Benefit to Existing Classifications

Development Charges Benefit to Existing Class	Description
A	Solely supporting new development area
B	Triggered by growth but also services existing users
C	Triggered by growth but also provides some operational improvement
D	Supports both growth and existing users equally
E	Primarily to address existing operational issues but also supports growth
F	Sole benefit to existing users

9.2.3 Project Timing and Triggers

To support the City's long-term budgeting and wastewater rates, a preliminary project timeline for each wastewater Capital Program project has been identified. Project timing has been identified in the following increments.

- 0-5 Years
- 5-10 Years
- 10-20 Years

The estimated project timeline was based on individual triggers for each project. These triggers are based on either the growth within the system which can be accommodated before the identified project is required or requirements to service the expansion lands. The triggers that correlate to the project timing are included in **Table 42**.

Table 42: Project Triggers

Project Timeline	Triggers
0 – 5 Years	• Operational improvements (Station rehab and storage) • Primary Trunks to Growth Areas • System Wide Growth Areas
5 – 10 Years	• System Wide Growth • System Trunks & WWPS Upgrades – Depends on Capacity Trigger • Primary Trunk within Growth Areas
10 – 20 Years	• Remaining Growth Projects • System Trunks & WWPS Upgrades – Depends on Capacity Trigger
Unknown/Ongoing	• Downtown Sewers • I&I Reduction • Flow Monitoring

9.3 Operational and Maintenance Impacts

The proposed wastewater system upgrades represents a 110% increase in value of the City sewer trunk network and includes a 20% increase in pump stations. No increase is anticipated for the treatment plant as upgrades are re-establishing the existing capacity.

It is anticipated that the above system expansions will increase the network operational and maintenance costs by an equivalent amount. As such, these additional operational costs, and supporting staff increase, will need to be factored into the City's long-term wastewater system financial planning and operational needs

9.4 Summary – Capital Program Projects

Summary maps and tables of the recommended upgrades for the capital program are included in **Table 43** and **Figure 10**.

Table 43: Wastewater Capital Program Summary

Capital Program ID	Name	Required Studies	Class EA Schedule	Project Type	Size/ Capacity	Total Estimated Cost (2020$)	Timeline	DC Benefit to Existing Class
WW-SS-001	Oak Park Road Trunk Sewer	Municipal Class EA	B	Sewer 5m	825 mm	$ 25,985,000	0-5 Years	A
WW-SS-002	North-South Collector's Road Trunk Sewer	-	A	Sewer 5m	825 mm	$ 1,050,000	0-5 Years	A
WW-SS-003	North-South Collector's Road Trunk Sewer	-	A	Sewer 5m	525 mm	$ 577,000	10-20 Years	A
WW-SS-004	East-West Collector's Road Trunk Sewer (West of King George Road)	-	A	Sewer 5m	525 mm	$ 1,382,000	10-20 Years	A
WW-SS-005	East-West Collector's Road Trunk Sewer (West of King George Road)	-	A	Sewer 5m	600 mm	$ 703,000	5-10 Years	A
WW-SS-006	East-West Collector's Road Trunk Sewer (East of King George Road)	-	A	Sewer 5m	525 mm	$ 660,000	10-20 Years	A
WW-SS-007	East-West Collector's Road Trunk Sewer (East of King George Road)	-	A	Sewer 5m	675 mm	$ 1,758,000	10-20 Years	A
WW-SS-008	East-West Collector's Road Trunk Sewer (East of King George Road)	-	A	Sewer 5m	675 mm	$ 859,000	10-20 Years	A
WW-SS-009	East-West Collector's Road Trunk Sewer (East of North WWPS)	-	A	Sewer 5m	675 mm	$ 1,841,000	5-10 Years	A
WW-SS-010	East-West Collector's Road Trunk Sewer (East of North WWPS)	-	A+	Sewer 5m	825 mm	$ 1,611,000	5-10 Years	A
WW-SS-011	East-West Collector's Road Trunk Sewer (East of North WWPS)	-	A	Sewer 5m	975 mm	$ 6,104,000	0-5 Years	A
WW-SS-012	East Expansion Lands Trunk Sewer	-	A	Sewer 5m	525 mm	$ 4,231,000	5-10 Years	A
WW-SS-013	Lynden Road Trunk Sewer Upgrades	-	A+	Sewer 5m	525 mm	$ 588,000	0-5 Years	A
WW-SS-014	Mount Pleasant Road Trunk Sewer Upgrades	-	A+	Sewer 5m	825 mm	$ 2,302,000	0-5 Years	B
WW-SS-015	Mount Pleasant Road Trunk Sewer	-	A+	Sewer 5m	825 mm	$ 2,114,000	0-5 Years	A
WW-SS-016	Tutela Heights Road Trunk Sewer	-	A+	Sewer 5m	750 mm	$ 2,087,000	5-10 Years	A
WW-SS-017	Bodine Road Easement Sewer Upgrades	-	A+	Sewer 5m	1350 mm	$ 22,997,000	20+ Years	B
WW-SS-018	North Ashgrove Avenue Sewer Upgrades	-	A+	Sewer 5m	600 mm	$ 3,083,000	0-5 Years	C
WW-SS-019	Summerhayes Crescent Servicing Study	Feasibility Study.	B	Sewer 5m	-	$ 150,000	0-5 Years	E
WW-SS-020	Henry Street Flow Split Reconfiguration	-	A+	Sewer 10m	825 mm	$ 493,000	0-5 Years	D
WW-SS-021	Grand River Avenue Sewer Upgrades	-	A+	Sewer 5m	525 mm	$ 3,653,000	5-10 Years	E
WW-SS-022	Oakhill Sewer Upgrades	-	A+	Sewer 5m	1050 mm	$ 4,963,000	10-20 Years	B
WW-SS-023	Downtown Sewers	-	A+	Sewer 5m	525 mm	$ 6,103,000	10-20 Years	C
WW-SS-024	Mohawk Street Sewer Upgrades	-	A+	Sewer 5m	1350 mm	$ 5,902,000	20+ Years	B
WW-FM-001	Northwest-1 Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	250 mm	$ 982,000	10-20 Years	A
WW-FM-002	Northwest-2 Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	400 mm	$ 2,948,000	5-10 Years	A
WW-FM-003	North Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	350 mm	$ 882,000	10-20 Years	A
WW-FM-004	Northeast Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	200 mm	$ 582,000	0-5 Years	A
WW-FM-005	East Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	350 mm	$ 3,974,000	5-10 Years	A

Capital Program ID	Name	Required Studies	Class EA Schedule	Project Type	Size/ Capacity	Total Estimated Cost (2020$)	Timeline	DC Benefit to Existing Class
WW-FM-006	Tutela Heights Wastewater Pumping Station Forcemain	Municipal Class EA	B	Forcemain	350 mm	$ 1,826,000	10-20 Years	A
WW-PS-001	Northwest-1 Wastewater Pumping Station	Municipal Class EA	B	Pumping	2.3 MLD	$ 2,405,000	10-20 Years	A
WW-PS-002	Northwest-2 Wastewater Pumping Station	Municipal Class EA	B	Pumping	10.7 MLD	$ 5,444,000	5-10 Years	A
WW-PS-003	North Wastewater Pumping Station	Municipal Class EA	B	Pumping	8.7 MLD	$ 4,462,000	10-20 Years	A
WW-PS-004	Northeast Wastewater Pumping Station	Municipal Class EA	B	Pumping	3.2 MLD	$ 3,240,000	0-5 Years	A
WW-PS-005	East Wastewater Pumping Station	Municipal Class EA	B	Pumping	8.0 MLD	$ 4,078,000	5-10 Years	A
WW-PS-006	Tutela Heights Wastewater Pumping Station	Municipal Class EA	B	Pumping	3.8 MLD	$ 2,406,000	10-20 Years	A
WW-PS-007	Empey Street Wastewater Pumping Station Storage Upgrades	Municipal Class EA	B	Pumping	-	$ 15,100,000	0-5 Years	C
WW-PS-008	Empey Street Wastewater Pumping Station Rehabilitation and Improvements	Feasibility Study.	A	Pumping	-	$ 2,100,000	0-5 Years	E
WW-PS-009	Fifth Avenue Wastewater Pumping Station Upgrades	-	A	Pumping	-	$ 3,512,000	Completion 2021	D
WW-PW-010	Fifth Avenue Wastewater Pumping Station Storage Upgrades	-	A	Pumping	-	$ 2,134,000	0-5 Years	E
WW-PS-011	Greenwich Wastewater Pumping Station Rehabilitation and Improvements	-	A	Pumping	-	$ 900,000	0-5 Years	E
WW-PS-012	St. Andrews Wastewater Pumping Station Storage Upgrades	Municipal Class EA	B	Pumping	1.7 MLD	$ 243,000	0-5 Years	E
WW-PS-013	Johnson Wastewater Pumping Station Storage Upgrades	Municipal Class EA	B	Pumping	9.9 MLD	$ 559,000	0-5 Years	E
WW-PS-014	Johnson Wastewater Pumping Station Rehabilitation	Feasibility Study.	A	Pumping	-	$ 400,000	0-5 Years	E
WW-PS-015	Woodlawn Wastewater Pumping Station Rehabilitation	Feasibility Study.	A	Pumping	-	$ 400,000	0-5 Years	C
WW-II-001	Flow Monitoring	-	-	Wet Weather Reduction	-	$ 8,423,000	0-5 Years	C
WW-II-002	City Wide Inflow and Infiltration Program	-	-	Wet Weather Reduction	-	$ 26,738,000	0-5 Years	D
WW-II-003	Greenwich Wastewater Pumping Station Inflow and Infiltration Reduction	-	-	Wet Weather Reduction	-	$ 5,568,000	0-5 Years	D
WW-II-004	Johnson Wastewater Pumping Station Inflow and Infiltration Reduction	-	-	Wet Weather Reduction	-	$ 5,568,000	0-5 Years	D
WW-TP-001	Wastewater Treatment Plant Upgrades - 0-5 Years	-	A+	Treatment	-	$ 7,575,000	0-5 Years	C
WW-TP-002	Wastewater Treatment Plant Upgrades - 5-10 Years	-	A+	Treatment		$ 5,568,000	5-10 Years	B
WW-TP-003	Wastewater Treatment Plant Upgrades - 10-15 Years	-	A+	Treatment		$ 10,303,000	10-20 Years	B
					TOTAL	**$ 229,516,000**		

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Capital Program Projects

- Sewer Mains
- Forcemains
- New Wastewater Pumping Station
- Existing Wastewater Pumping Station Upgrade
- Wastewater Treatment Plant Upgrades

Wastewater Network

- Wastewater Pumping Station
- Wastewater Treatment Plant
- Flow Split
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)
- Forcemains

Wastewater Pumping Station (WWPS) Catchment

- Empey St WWPS
- Woodlawn Rd WWPS
- Somerset Rd WWPS
- Greenwich St WWPS
- Fifth Ave WWPS
- St.Andrew's Ave WWPS
- Lawren S. Harris Dr WWPS
- Johnson Rd WWPS
- Alexander Dr WWPS
- Upstream of Henry Street Flow Split
- WWTP

General Features

- 2016 Municipal Boundary
- New Municipal Boundary
- Six Nations of the Grand River Territory
- Waterbody

Proposed Preferred Land Use Options

- Agricultural Designation
- Core Natural Areas Designation
- General Employment Designation
- Intensification Corridor Designation
- Major Institutional Designation
- Parks and Open Space Designation
- Prestige Employment Designation
- Residential Designation

Not shown in figure: WW-II-001, WW-II-002, WW-II-003, and WW-II-004

0 1 2 Kilometers

Figure 10

Wastewater - Capital Program

BluePlan Engineering

April 2021
717036-WW-001
NAD 1983 CSRS UTM Zone 17N

10. Implementation Plan

As outlined in **Section 2** of **Volume II**, the 2020 MSP sets out to satisfy the Class EA Master Plan Approach 1 requirements according to the MEA Class EA document. The Preferred Wastewater Servicing Strategy will support the servicing needs of the City of Brantford's future growth to 2051 and beyond. This strategy will be implemented in accordance with each project Class EA schedule.

The Preferred Wastewater Servicing Strategy will support the servicing needs of the City of Brantford's future growth to 2051 and beyond.

The Class EA requirements for each project have been identified in the Capital Program. Schedule A and A+ projects may move forward to design and construction, with A+ projects requiring public notification prior to implementation. Schedule B or equivalent projects that have been identified within the Preferred Wastewater Servicing Strategy will be part of a developer-led local servicing plan and approved through the Planning Act Municipal development review process or will be satisfied through separate Class EA study prior to design and construction. The Preferred Wastewater Strategy did not identify any Schedule C projects.

All necessary studies (environmental impact, cultural heritage resource, and archeological resource, etc.) should be undertaken by an appropriate professional as early as possible during the planning process for all Schedule B projects identified within the Preferred Servicing Strategy.

As part of the detailed design of the projects, the following requirements should be considered:

- Finalization of property requirements;
- Refinement of infrastructure alignment;
- Identification of preferred construction methodologies;
- Completion of additional supporting investigations as required (e.g. geotechnical, hydrogeological, fluvial geomorphology, etc.);
- Review and mitigation of potential construction related impacts; and,
- Satisfy all federal, provincial, municipal, and conservation authority approval requirements.

With respect to the City's planning and budgeting, this program will be utilized as a high-level baseline estimate for the City's capital budget. These costs will be further developed and refined during the implementation phases as detailed information becomes available.

The anticipated timing of each project within the Preferred Strategy has been established based on the projected population and employment growth within the City. The wastewater program's project scheduling has also been cross-referenced with the water and stormwater programs to ensure project coordination along common alignments.

Given the growth-related nature of the servicing strategies, the wastewater capital program forms the foundation for the wastewater component of the City of Brantford's Development Charges (DC) By-Law.

The following subsections outline the proposed implementation for wastewater infrastructure.

10.1 Brantford Wastewater Treatment Plant

Upgrade requirement triggers at the Brantford WWTP are outlined in **Table 44** and shown in **Figure 11**. Based on the existing ADWF firm capacity of 81.8 MLD and existing ADWF of 33.4 MLD, there is approximately 48.4 MLD of available treatment capacity to support growth; corresponding to an equivalent population of approximately 180,000 people and jobs. Although the WWTP has a rated capacity of 81.8 MLD, based on discussions with City staff, not all processes within the treatment plant can accommodate this capacity and upgrades are required to re-establish the rated capacity of 81.8 MLD. The timeline for the necessary upgrades is on an expediated schedule which was discussed and preferred by the City.

Table 44: Brantford WWTP Upgrade Triggers

	ADWF Rated Capacity (MLD)	Existing ADWF (MLD)	Upgrade Trigger	
			Additional Capacity before Trigger (MLD)	People & Jobs
80% Capacity	65.4	33.4	32.1	120,000
90% Capacity	73.6		40.2	150,000
100% Capacity	81.8		48.4	180,000

Upgrades are classified into three sets of upgrades, based on an expediated timeline and are as follows:

- 0-5 Year Upgrades
  - New chlorine contact chamber
- 5-10 Year Upgrades
  - Upsize existing oxygenation blowers
  - PM1 & PM2 cross connection piping upgrades
  - Install a new decant system for biosolids storage
- 10-15 Year Upgrades
  - New WAS facility

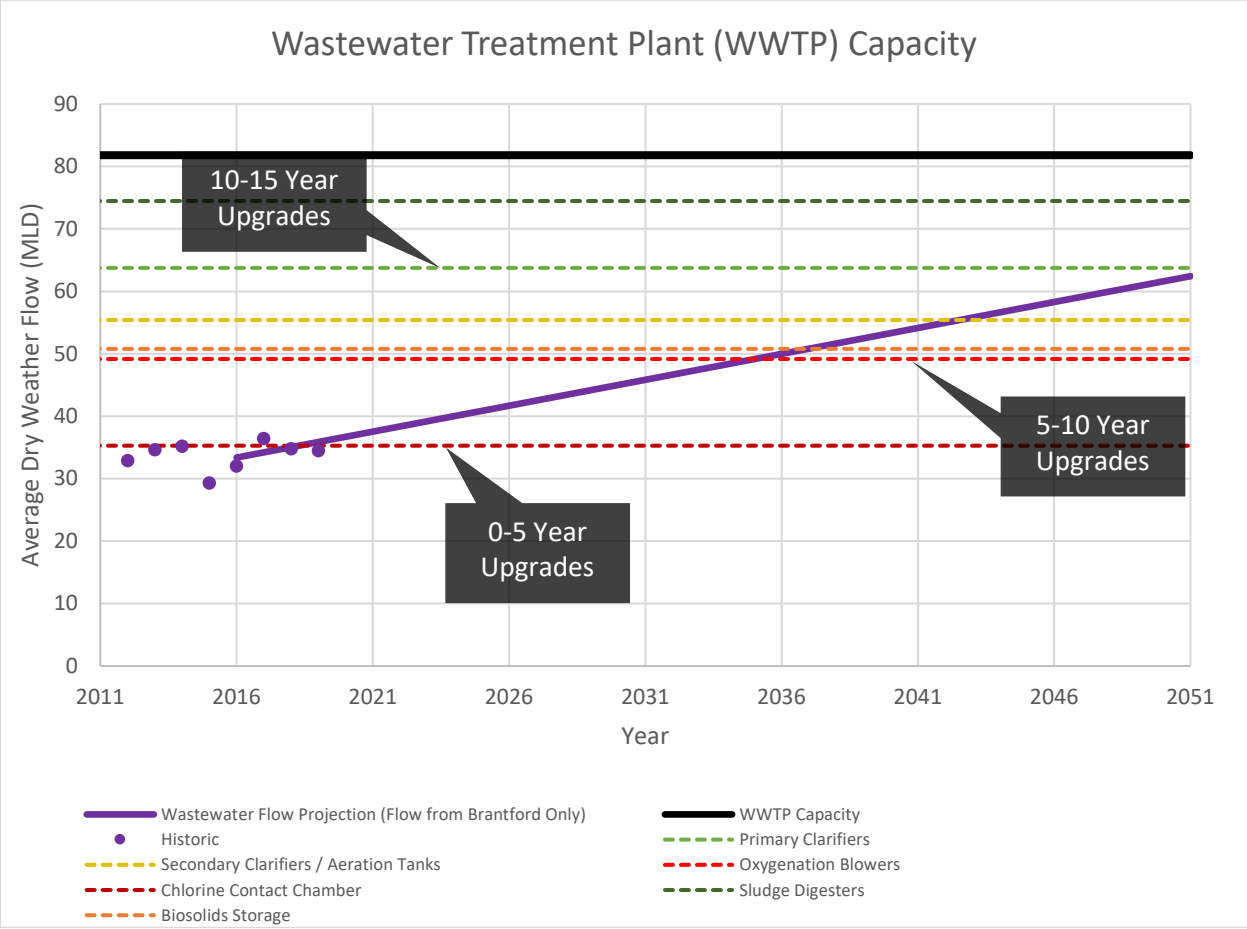


Figure 11: Brantford Wastewater Treatment Plant Capacity Triggers

10.2 Area Servicing Plans

The following sections outline the trunk servicing needs, triggers, and overall servicing requirements for each "development area" with the objective of providing direction on the project timing and triggers in terms of municipal servicing. The following subsections also summarize the magnitude of growth that can be accommodated before any upgrades are triggered.

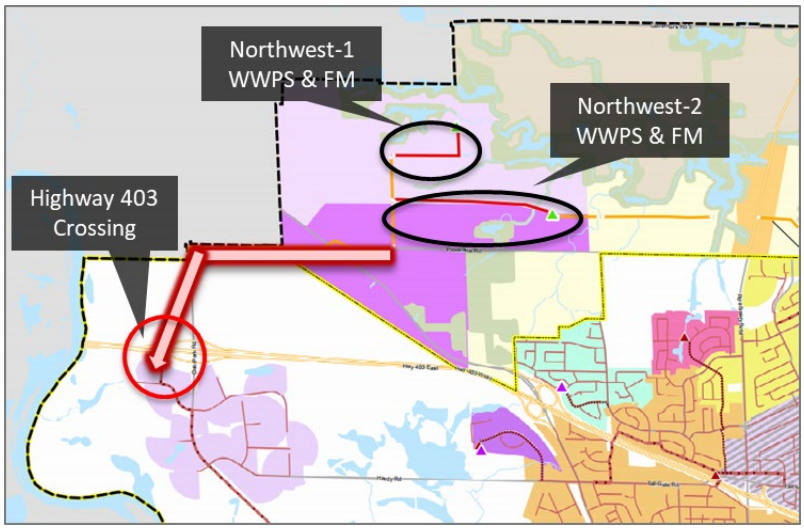
10.2.1 North Expansion Lands (West of King George)

Within the North Expansion Lands, the project timing was broken into two categories: West of King George and East of King George. For the lands West of King George Road, the Oak Park Road trunk sewer will need to be extended north to Powerline Road, crossing Highway 403 before any growth can be serviced, with the trigger being any growth north of Highway 403.

Unlike the Oak Park Road trunk sewer, the trigger for new Wastewater Pumping Stations and forcemains to service the North Expansion Lands will be by local development growth and dependent on the timing of this growth.

The Oakhill Drive sewer will also require upsizing to support growth in the North Expansion Lands, which will be triggered by an additional PWWF of 34.6 MLD or approximately 20,000 people and jobs, based on a density of 25 jobs per hectare for the North Expansion Employment Lands. An overview of the projects required to service the North Expansion Lands West of King George, including timing and triggers are presented in **Table 45**.

Table 45: North Expansion Lands (West of King George) Implementation

North Expansion Lands (West of King George)		
Overview • Triggered by growth north of Highway 403 **Key Projects** • Highway 403 sanitary sewer crossing: **Immediate** (to service any growth) • New WWPS and FM, and wastewater trunk sewers: **Later**; triggered by local development • Oakhill Drive Sewer: **Later**; triggered by growth		
	WW-SS-001: Oak Park Trunk Sewer	**WW-SS-022:** Oakhill Drive Sewer
Why	• Trunk wastewater sewer crossing Highway 403 • Railway crossing and overhead powerlines • Optimize through local development • Coordinate with watermain	• Upsize wastewater sewer to accommodate growth • Existing bottleneck
Study	Schedule 'B' EA	No further study required
Trigger	Any growth north of Highway 403	Additional PWWF of 34.6 MLD (~20,000 people & jobs)
Timing	0-5 Years **Initiate EA within next year**	10 – 20 Years

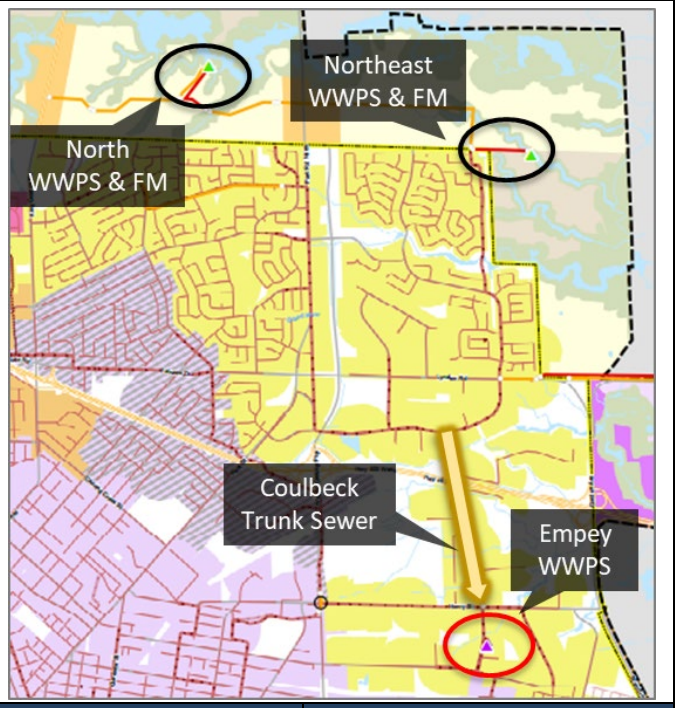
10.2.2 North Expansion Lands (East of King George)

For the North Expansion Lands east of King George, the Coulbeck Road trunk sewer extension, new Wastewater Pumping Stations and forcemains will all be triggered by local development growth and dependent on the timing of this growth.

To support growth in the North Expansion Lands, the Empey WWPS, Coulbeck Road trunk sewer and Mohawk Street trunk sewer require upgrades. The Empey WWPS requires additional wet well storage and pump upgrades, with upgrades required immediately, before any growth can occur. The Coulbeck Road trunk sewer will require upsizing, which will be triggered by an additional PWWF of 25.9 L/s or approximately 22,000 people and jobs, based on a density of 60 residents and jobs per hectare for the North and East Residential Lands. Similarly, the Mohawk Street trunk sewer will require upsizing, which will be triggered by an additional PWWF of 34.6 L/s or approximately 30,000 people and jobs, based on a density of 60 residents and jobs per hectare for the North and East Residential Lands. Flow monitoring should be initiated now for both trunk sewers to ensure I&I does not trigger upgrades sooner than anticipated.

An overview of the projects required to service the North Expansion Lands West of King George, including timing and triggers are presented in **Table 46**.

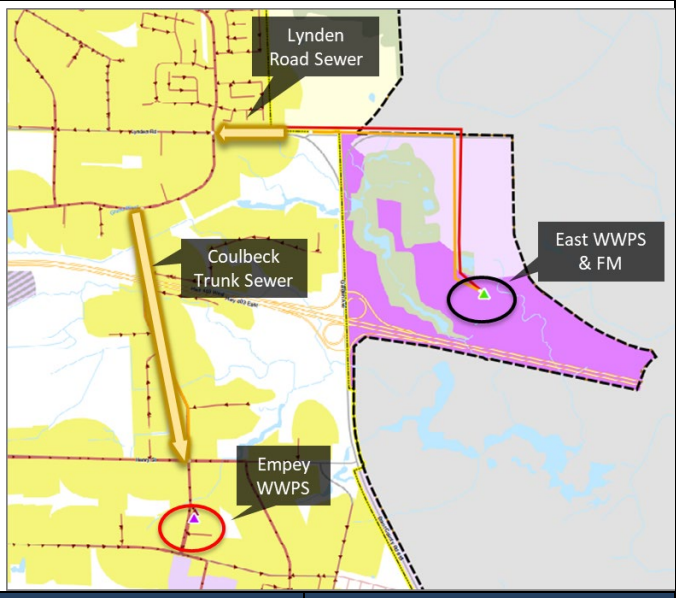
Table 46: North Expansion Lands (East of King George) Implementation

North Expansion Lands (East of King George)			
Overview • No studies required for initial trunk sewer connection • Studies required for downstream catchments • Triggered by growth north of Highway 403 **Key Projects** • Empey WWPS: **Initiate EA now** • Coulbeck Road Trunk Sewer: **Later**; Initiate flow monitoring now • Mohawk Street Sewer: **Later**; Initiate flow monitoring now • New WWPS & FM, and wastewater sewers: **Later**; triggered by development			
	WW-PS-008: Empey Street WWPS	**WW-SS-017:** Coulbeck Road Trunk Sewer Upgrades	**WW-SS-024:** Mohawk Street Sewer Upgrades
Why	• More wet well storage • Pump upgrades needed for increased flows	• Future capacity issues • I&I may trigger project earlier than anticipated	• Future capacity issues • I&I may trigger project earlier than anticipated
Study	Schedule 'B' EA	Ongoing flow monitoring	Ongoing flow monitoring
Trigger	Immediately; Storage at capacity now	Additional PWWF of 25.9 MLD (~22,000 people & jobs)	Additional PWWF of 34.6 MLD (~30,000 people & jobs)
Timing	0-5 Years **Initiate EA now**	20+ Years **Initiate Flow Monitoring Now**	20+ Years **Initiate Flow Monitoring Now**

10.2.3 East Expansion Lands

Servicing for the East Expansion Lands is triggered by growth east of Garden Avenue. To support growth in the East Expansion Lands, the Empey WWPS, Coulbeck Road trunk sewer and Lynden Road trunk sewer require upgrades. The Empey WWPS requires additional wet well storage and pump upgrades, with upgrades required immediately, before any growth can occur. The Lynden Road trunk sewer will require upsizing, which will be triggered by an additional PWWF of 1.7 MLD or approximately 1,000 people and jobs, based on a density of 25 jobs per hectare for the East Expansion Employment Lands. The Coulbeck Road trunk sewer will require upsizing, which will be triggered by an additional PWWF of 25.9 L/s or approximately 22,000 people and jobs, based on a density of 60 residents and jobs per hectare for the North and East Residential Lands. New Wastewater Pumping Stations and forcemains to service the east expansion lands will be triggered by local development growth and dependent on the timing of this growth. An overview of the projects required to service the North Expansion Lands West of King George, including timing and triggers are presented in **Table 47**.

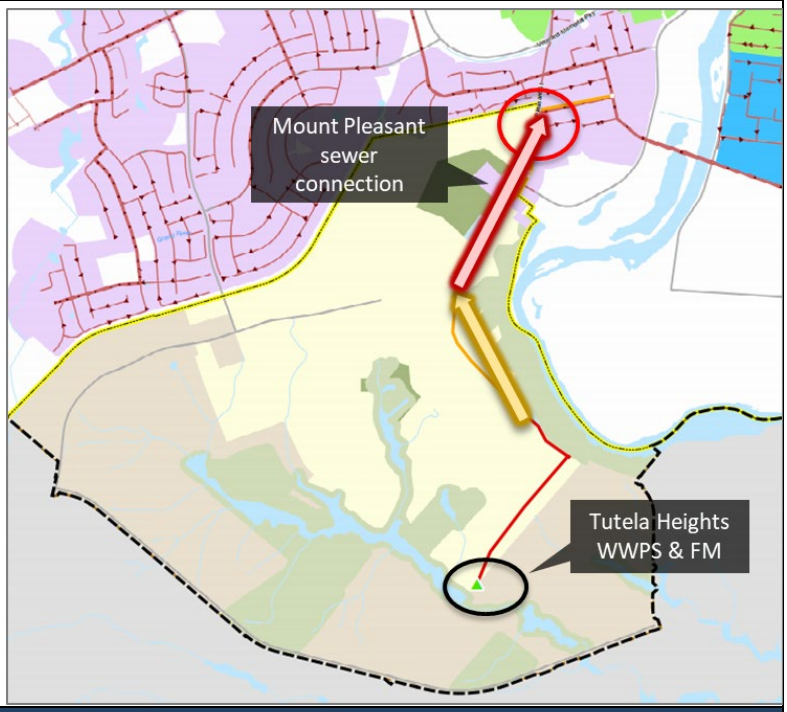
Table 47: East Expansion Lands Implementation

East Expansion Lands			
Overview • No initial studies required • Triggered by growth east of Garden Avenue **Key Projects** • Empey WWPS: **Initiate EA now** • Coulbeck Road Trunk Sewer: **Later;** Initiate flow monitoring now • Lynden Road Trunk Sewer Upgrades: **Later;** triggered by growth • New WWPS & FM, and Sanitary Sewers: **Later;** triggered by development			
	WW-PS-008: Empey Street WWPS	**WW-SS-017:** Coulbeck Road Trunk Sewer Upgrades	**WW-SS-013:** Lynden Road Sewer Upgrades
Why	• More wet well storage • Pump upgrades needed for increased flows	• Future capacity issues • I&I may trigger project earlier than anticipated	• Future capacity issues
Study	Schedule 'B' EA	Ongoing flow monitoring	No further study required
Trigger	Immediately; Storage at capacity now	Additional PWWF of 25.9 MLD (~22,000 people & jobs)	Additional PWWF of 1.7 MLD (~1,000 people & jobs)
Timing	0-5 Years **Initiate EA now**	20+ Years **Initiate Flow Monitoring Now**	0-5 Years

10.2.4 Tutela Heights

To integrate Tutela Heights into the City's existing wastewater system, a Mount Pleasant gravity sewer connection is required. The lands that can be serviced by gravity can be developed as soon as the trunk sewer connection to the existing wastewater system is constructed. The new Wastewater Pumping Station and forcemain to service south Tutela Heights will be triggered by local development growth and dependent on the timing of this growth. An overview of the projects required to service Tutela Heights, including timing and triggers are presented in **Table 48**.

Table 48: Tutela Heights Implementation

Tutela Heights	
Overview • No initial studies required • Triggered by growth • Gravity sewer connection to existing City system **Key Projects** • Mount Pleasant connection: to integrate into City's system • New WWPS & FM, and wastewater sewers: **Later;** triggered by development and will require studies to determine best location	

	WW-SS-014 & **WW-SS-015:** Mount Pleasant Road Trunk Sewer
Why	• Extend sewer to Tutela Heights • Upgrade portion of existing sewer for future capacity issues
Study	No further study required
Trigger	Needed to support growth
Timing	0 – 5 Years

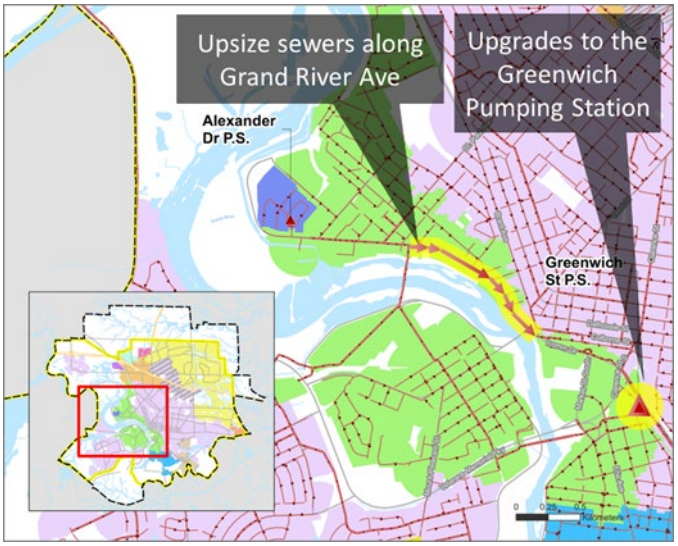
10.3 Local Servicing Needs

The following sections outline the local servicing needs, triggers and overall servicing requirements for each "local development area" with the objective of providing direction on the project timing and triggers in terms of municipal servicing.

10.3.1 Grand River Avenue Sewer Upgrades

Sewer upgrades are required along Grand River Avenue from Jubilee Siphon to Icomm Drive, upstream of the recently upgraded sewers along Grand River Avenue. Sewer upgrades are required to address existing capacity issues as there are existing local and trunk sewer constraints that will limit growth capacity in the catchment. The timing is dependent on additional growth within the catchment. An overview of the sewer upgrade project is identified in **Table 49**.

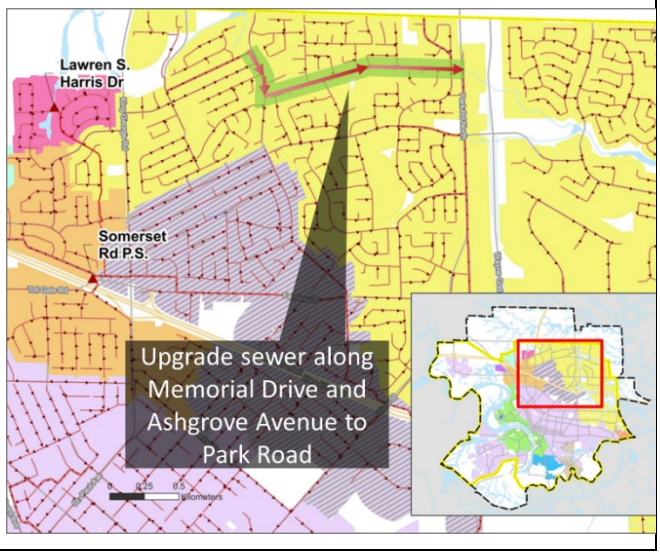
Table 49: Grand River Avenue Sewer Upgrades Implementation

WW-SS-021: Grand River Avenue Sewer Upgrades		
Why	• Address existing capacity issues • I&I reduction strategies needed to address existing deficiencies and support growth	
Study	No further study required	
Trigger	Existing capacity (limited growth in catchment)	
Timing	5-10 Years	

10.3.2 North Ashgrove Sewer Upgrades

Sewer upgrades are required along north Ashgrove Avenue to address existing capacity issues prior to accommodating growth flows. The timing is dependent on growth in the catchment, upstream of the existing sewer. An overview of the sewer upgrade project is identified in **Table 50.**

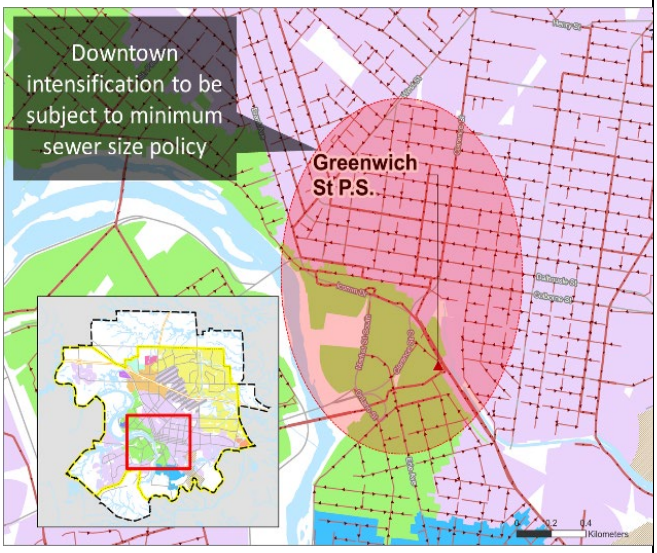
Table 50: North Ashgrove Sewer Upgrades Implementation

WW-SS-018: North Ashgrove Sewer Upgrades		
Why	• Address existing capacity issues in North Brantford • Potential to accommodate Summerhayes Crescent dependent on study outcome	
Study	No further study required	
Trigger	Intensification	
Timing	5-10 Years (Dependent on Growth Pressures)	

10.3.3 Downtown Sewers

Sewer upgrades may be required in the downtown to accommodate future intensification. The sewer upgrades timing will be triggered by local development or planned rehabilitation works based on a minimum sewer capacity requirement of the upstream catchment. An overview of the sewer upgrade project is identified in **Table 51.**

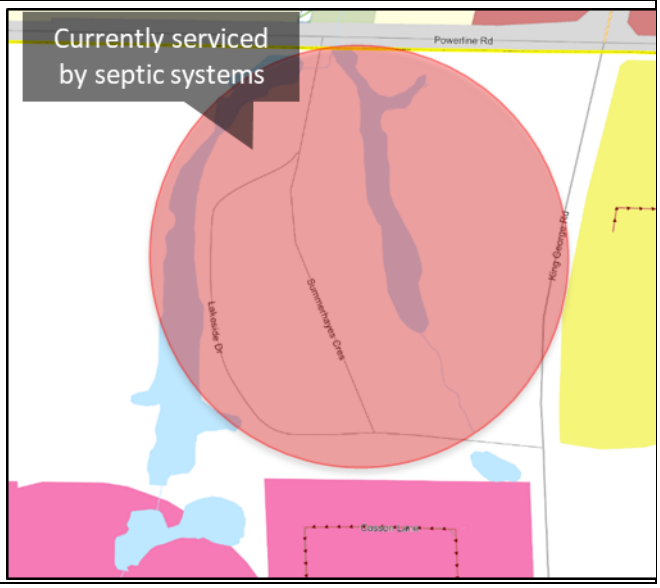
Table 51: Downtown Sewers Implementation

WW-SS-023: Downtown Sewers		
Why	• Substantial potential for intensification and redevelopment in downtown • Address existing capacity issues	
Study	Policy for minimum sewer capacity requirement (L/s/ha of upstream catchment)	
Trigger	• Planned rehabilitation works, and/or • Local development	
Timing	Ongoing	

10.3.4 Summerhayes Crescent Servicing Study

A feasibility study is required to assess the connection of the Summerhayes neighbourhood into the City's system, which is currently serviced by on lot septic. The study is triggered by local growth and will be required prior to servicing this area. An overview of the project is presented in **Table 52**.

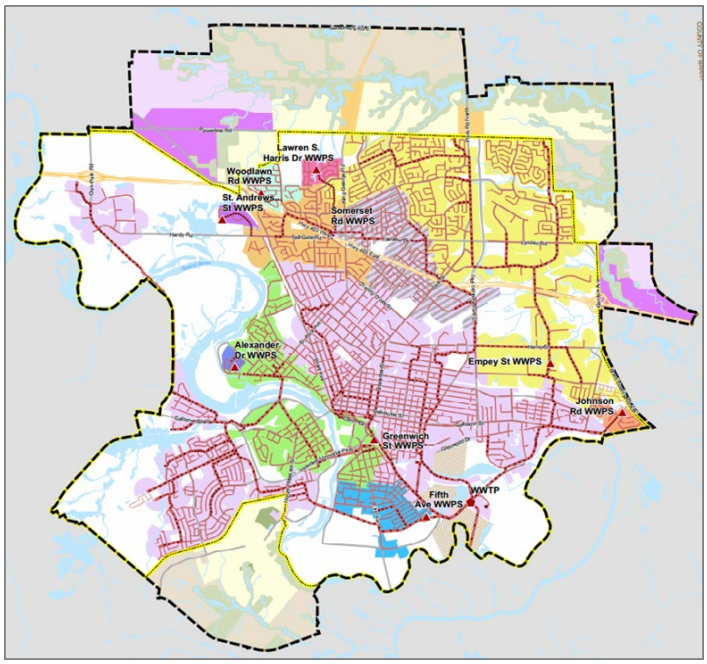
Table 52: Summerhayes Crescent Servicing Study Implementation

WW-SS-018: Summerhayes Crescent Servicing Study		
Why	• Servicing of septic area	
Study	Feasibility Study	
Trigger	No existing City servicing – Local growth pressures	
Timing	0 – 5 Years	

10.4 Flow Monitoring

The City's flow monitoring program is ongoing and proposed to continue for the next 20 years. As the City moves forward with the program, the goal is to be more operational by using flow monitors to track capacity within existing sewers. Flow monitoring should be completed in newly installed systems, development areas prior to the City's acquisition of the sewer assets, to ensure growth lands are not contributing to wet weather flows. An overview of the flow monitoring program is outlined in **Table 53**.

Table 53: Flow Monitoring Implementation

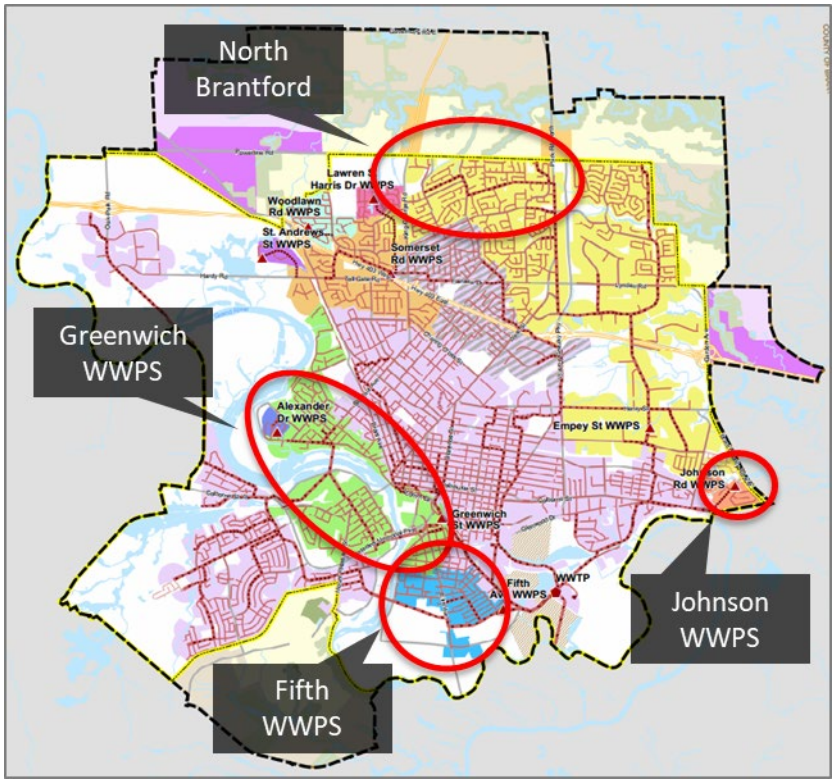
WW-II-001: Flow Monitoring	
Overview • **Ongoing**; proposed for next 20 years • Transition from data collection to active management	
Why • System understanding • Capacity tracking and performance • Provide guidance for wet weather flow management practices • Development capacity management	
Proposed Monitoring Strategies	

• Anchor monitors
  ○ Track capacity at key locations
  ○ Measure impacts of I&I program
  ○ Support system understanding and model calibration
• Development monitors
  ○ Track capacity and allocation
  ○ Measure impacts of I&I program
  ○ Support system understanding and model calibration
• Tactual I&I Program
  ○ Find I&I sources to support remediation plan	

10.5 Inflow & Infiltration Reduction

Inflow and infiltration (I&I) reduction is required in multiple catchments to address existing areas with high I&I. This I&I reduction is required immediately to provide growth capacity and reduce upgrades at existing WWPS. An overview of the I&I target areas is provided in **Table 54**.

Table 54: Inflow and Infiltration Implementation

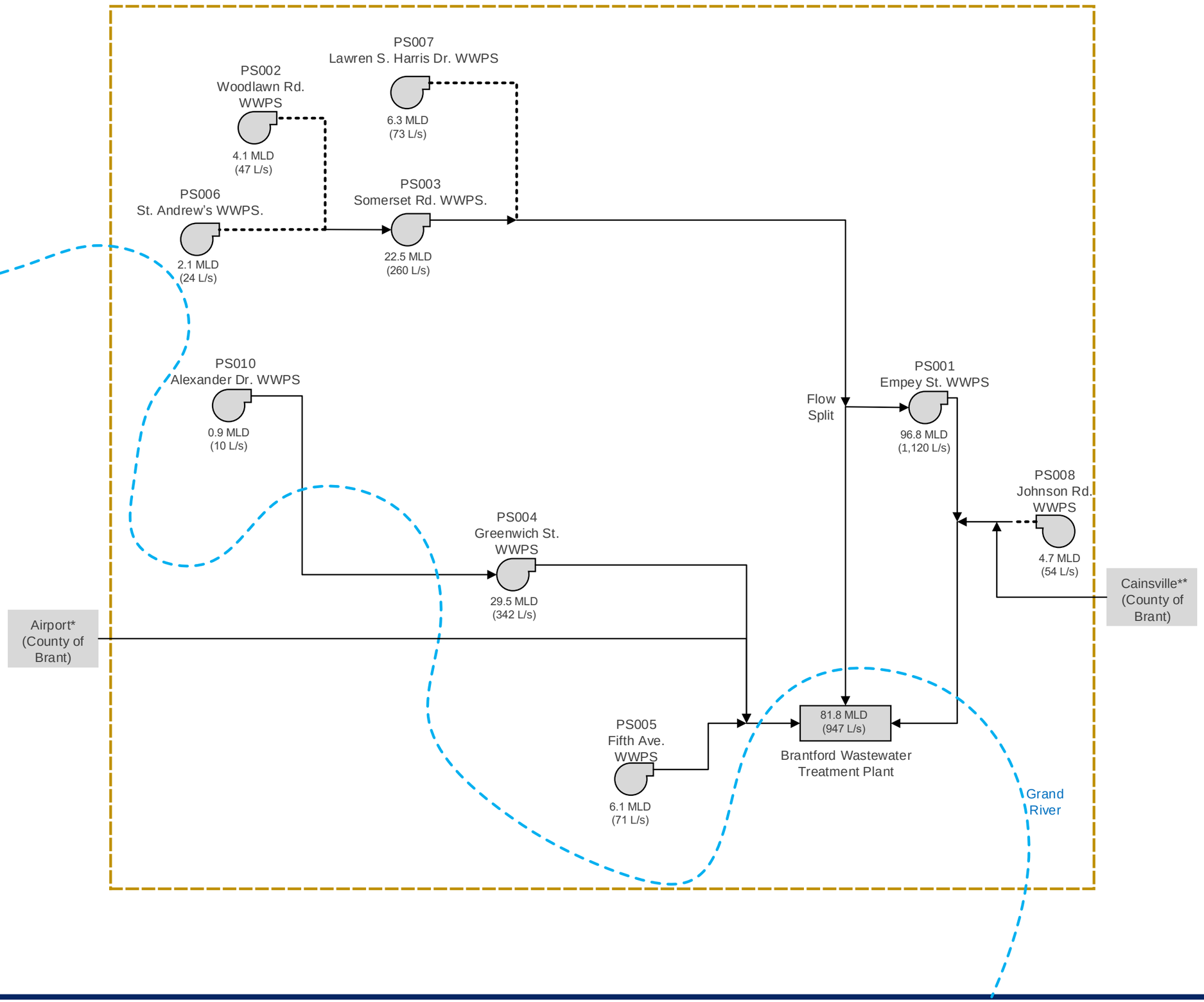
Inflow and Infiltration				
Trigger • High wet weather flows • Existing and long-term capacity restrictions **Why** • Remove or reduce I&I to avoid upgrades **Where** • Johnson Road WWPS catchment • Fifth Avenue WWPS catchment • Greenwich WWPS catchment • North Brantford catchment **Timing** • Start now • Focus on one area at a time				
	WW-II-004: Johnson Road WWPS	**WW-II-002:** Fifth Avenue WWPS	**WW-II-003:** Greenwich Street WWPS	**WW-II-002:** North Brantford
Why	• Very high RDII (1.28 L/s/ha) • Peak flows exceeding WWPS capacity • I&I reduction needed to avoid WWPS upgrades	• High seasonal groundwater infiltration • Peak flows exceeding Fifth WWPS capacity causing upstream surcharging • I&I reduction needed to provide growth capacity	• Moderately high RDII • Seasonally high groundwater infiltration • I&I reduction needed to avoid additional WWPS upgrades • Will provide growth capacity	• Moderately high RDII • Increased flows to Empey WWPS • Required to minimize upgrades required at Empey WWPS

A

City of Brantford

APPENDIX A

WASTEWATER SYSTEM SCHEMATIC



THE CORPORATION OF THE CITY OF BRANTFORD

City of Brantford
Master Servicing Plan Update

WWTP
RATED CAPACITY
Wastewater Treatment Plant

Trunk Gravity Mains

FIRM CAPACITY
Wastewater Pumping Station (WWPS)

Water Feature

Force Mains

City Boundary

Firm Capacity refers to operational Firm Capacity

* Future service
** Possible future service subject to Servicing Agreement

Existing Wastewater Collection System Schematic

BluePlan ENGINEERING

August 2020
717036 - WW - 001
Not to Scale

B

City of Brantford

APPENDIX B

TRAFFIC ZONE FLOWS

Appendix B
Traffic Zone Details - Wastewater Flows

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
1001	Empey St. S.P.S.	819	184	1,003	2.3	0.6	2.9
1002	Empey St. S.P.S.	406	79	485	1.2	0.2	1.4
1003	Empey St. S.P.S.	-15	152	137	0.0	0.5	0.4
1004	Empey St. S.P.S.	0	78	78	0.0	0.2	0.2
1005	Empey St. S.P.S.	-5	112	107	0.0	0.4	0.3
1006	Brantford W.W.T.P.	0	13	13	0.0	0.0	0.0
1007	Empey St. S.P.S.	0	141	141	0.0	0.4	0.4
1008	Empey St. S.P.S.	0	296	296	0.0	0.9	0.9
101	Woodlawn Rd. S.P.S.	-105	144	39	-0.3	0.4	0.2
102	Lawren S. Harris Dr. S.P.S.	-455	0	-455	-1.3	0.0	-1.3
103	Empey St. S.P.S.	127	308	435	0.4	1.0	1.3
104	Somerset Rd. S.P.S.	-107	67	-39	-0.3	0.2	-0.1
105	Lawren S. Harris Dr. S.P.S.	-121	61	-60	-0.3	0.2	-0.2
106	Somerset Rd. S.P.S.	-74	43	-31	-0.2	0.1	-0.1
107	Somerset Rd. S.P.S.	-47	41	-6	-0.1	0.1	0.0
108	Somerset Rd. S.P.S.	178	45	223	0.5	0.1	0.6
109	Empey St. S.P.S.	336	140	476	1.0	0.4	1.4
110	Brantford W.W.T.P.	40	30	71	0.1	0.1	0.2
1101	Brantford W.W.T.P.	-30	10	-20	-0.1	0.0	-0.1
1102	Brantford W.W.T.P.	-45	14	-31	-0.1	0.0	-0.1
1103	Brantford W.W.T.P.	-14	4	-10	0.0	0.0	0.0
1104	Brantford W.W.T.P.	29	28	57	0.1	0.1	0.2
1105	Brantford W.W.T.P.	-5	45	40	0.0	0.1	0.1
1106	Brantford W.W.T.P.	333	80	414	0.9	0.3	1.2
1107	Brantford W.W.T.P.	-36	56	20	-0.1	0.2	0.1
1108	Brantford W.W.T.P.	-23	26	3	-0.1	0.1	0.0
1109	Brantford W.W.T.P.	-19	25	6	-0.1	0.1	0.0
111	Brantford W.W.T.P.	-6	5	0	0.0	0.0	0.0
1110	Brantford W.W.T.P.	-29	29	0	-0.1	0.1	0.0
1201	Brantford W.W.T.P.	131	56	187	0.4	0.2	0.5
1202	Brantford W.W.T.P.	71	22	93	0.2	0.1	0.3
1203	Brantford W.W.T.P.	222	292	514	0.6	0.9	1.5
1204	Brantford W.W.T.P.	-18	73	54	-0.1	0.2	0.2
1205	Brantford W.W.T.P.	0	49	49	0.0	0.2	0.2
1206	Brantford W.W.T.P.	657	31	689	1.9	0.1	2.0
1301	Brantford W.W.T.P.	71	26	97	0.2	0.1	0.3
1302	Brantford W.W.T.P.	-6	13	7	0.0	0.0	0.0
1303	Brantford W.W.T.P.	-25	51	26	-0.1	0.2	0.1
1304	Brantford W.W.T.P.	82	50	132	0.2	0.2	0.4
1305	Brantford W.W.T.P.	-60	5	-55	-0.2	0.0	-0.2
1306	Brantford W.W.T.P.	5	9	14	0.0	0.0	0.0
1307	Brantford W.W.T.P.	-18	24	6	-0.1	0.1	0.0
1308	Brantford W.W.T.P.	-18	4	-14	-0.1	0.0	0.0
1309	Brantford W.W.T.P.	85	26	110	0.2	0.1	0.3
1310	Brantford W.W.T.P.	312	20	332	0.9	0.1	0.9
1311	Brantford W.W.T.P.	-21	55	35	-0.1	0.2	0.1
1312	Brantford W.W.T.P.	-60	8	-52	-0.2	0.0	-0.1
1401	Somerset Rd. S.P.S.	61	63	124	0.2	0.2	0.4
1402	Brantford W.W.T.P.	-33	16	-17	-0.1	0.1	0.0
1403	Somerset Rd. S.P.S.	-15	24	9	0.0	0.1	0.0
1404	Brantford W.W.T.P.	14	16	30	0.0	0.1	0.1
1405	Brantford W.W.T.P.	-24	25	1	-0.1	0.1	0.0
1406	Brantford W.W.T.P.	-23	18	-5	-0.1	0.1	0.0
1407	Brantford W.W.T.P.	-11	42	30	0.0	0.1	0.1
1408	Brantford W.W.T.P.	-42	116	74	-0.1	0.4	0.2

Appendix B
Traffic Zone Details - Wastewater Flows

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
1501	Brantford W.W.T.P.	47	273	320	0.1	0.9	1.0
1502	Brantford W.W.T.P.	77	29	106	0.2	0.1	0.3
1503	Brantford W.W.T.P.	30	6	36	0.1	0.0	0.1
1504	Brantford W.W.T.P.	-5	19	13	0.0	0.1	0.0
1505	Brantford W.W.T.P.	-18	2	-17	-0.1	0.0	0.0
1506	Brantford W.W.T.P.	39	5	45	0.1	0.0	0.1
1507	Brantford W.W.T.P.	4	20	24	0.0	0.1	0.1
1508	Brantford W.W.T.P.	73	53	127	0.2	0.2	0.4
1509	Brantford W.W.T.P.	55	47	102	0.2	0.1	0.3
1510	Brantford W.W.T.P.	106	92	198	0.3	0.3	0.6
1511	Brantford W.W.T.P.	-14	25	12	0.0	0.1	0.0
1512	Brantford W.W.T.P.	-3	35	33	0.0	0.1	0.1
1601	Somerset Rd. S.P.S.	-6	68	62	0.0	0.2	0.2
1602	Somerset Rd. S.P.S.	178	65	243	0.5	0.2	0.7
1603	Somerset Rd. S.P.S.	-65	53	-13	-0.2	0.2	0.0
1604	Brantford W.W.T.P.	-40	100	60	-0.1	0.3	0.2
1605	Somerset Rd. S.P.S.	-13	13	0	0.0	0.0	0.0
1606	Somerset Rd. S.P.S.	-76	61	-16	-0.2	0.2	0.0
1607	Somerset Rd. S.P.S.	65	66	131	0.2	0.2	0.4
1608	Brantford W.W.T.P.	-76	63	-13	-0.2	0.2	0.0
1609	Brantford W.W.T.P.	-16	28	12	0.0	0.1	0.0
1610	Brantford W.W.T.P.	-10	29	19	0.0	0.1	0.1
1611	Brantford W.W.T.P.	-38	37	-1	-0.1	0.1	0.0
1612	Brantford W.W.T.P.	-17	25	8	0.0	0.1	0.0
1701	Brantford W.W.T.P.	0	1,131	1,131	0.0	3.5	3.5
1702	Brantford W.W.T.P.	33	2,926	2,959	0.1	9.1	9.2
1703	Brantford W.W.T.P.	0	2,943	2,943	0.0	9.2	9.2
1704	Brantford W.W.T.P.	-5	586	581	0.0	1.8	1.8
1801	St.Andrew's S.P.S.	-36	82	47	-0.1	0.3	0.2
1802	Greenwich St. S.P.S.	-36	176	140	-0.1	0.5	0.4
1803	Greenwich St. S.P.S.	-12	19	7	0.0	0.1	0.0
1804	Greenwich St. S.P.S.	-55	41	-14	-0.2	0.1	0.0
1805	Greenwich St. S.P.S.	-1	127	127	0.0	0.4	0.4
1806	Greenwich St. S.P.S.	8	30	37	0.0	0.1	0.1
1901	Greenwich St. S.P.S.	114	241	355	0.3	0.8	1.1
1902	Greenwich St. S.P.S.	0	94	94	0.0	0.3	0.3
1903	Alexander Dr. S.P.S.	-37	93	56	-0.1	0.3	0.2
1904	Greenwich St. S.P.S.	-19	18	-1	-0.1	0.1	0.0
1905	Greenwich St. S.P.S.	64	48	112	0.2	0.1	0.3
2001	Brantford W.W.T.P.	-95	104	9	-0.3	0.3	0.1
2002	Greenwich St. S.P.S.	0	67	67	0.0	0.2	0.2
2003	Greenwich St. S.P.S.	0	19	19	0.0	0.1	0.1
2004	Greenwich St. S.P.S.	-85	165	80	-0.2	0.5	0.3
2005	Greenwich St. S.P.S.	59	41	100	0.2	0.1	0.3
2006	Greenwich St. S.P.S.	-45	24	-21	-0.1	0.1	-0.1
2007	Greenwich St. S.P.S.	50	16	66	0.1	0.0	0.2
2008	Greenwich St. S.P.S.	54	22	76	0.2	0.1	0.2
201	Empey St. S.P.S.	709	182	891	2.0	0.6	2.6
202	Empey St. S.P.S.	-49	38	-11	-0.1	0.1	0.0
203	Empey St. S.P.S.	7	21	28	0.0	0.1	0.1
204	Empey St. S.P.S.	-31	21	-10	-0.1	0.1	0.0
205	Empey St. S.P.S.	74	32	106	0.2	0.1	0.3
206	Empey St. S.P.S.	-5	40	35	0.0	0.1	0.1
207	Empey St. S.P.S.	-109	76	-34	-0.3	0.2	-0.1
2101	Greenwich St. S.P.S.	-11	34	24	0.0	0.1	0.1

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
2102	Greenwich St. S.P.S.	65	68	132	0.2	0.2	0.4
2103	Brantford W.W.T.P.	3	20	24	0.0	0.1	0.1
2104	Brantford W.W.T.P.	6	7	13	0.0	0.0	0.0
2105	Brantford W.W.T.P.	-27	1	-26	-0.1	0.0	-0.1
2106	Greenwich St. S.P.S.	-2	132	130	0.0	0.4	0.4
2201	Brantford W.W.T.P.	47	10	57	0.1	0.0	0.2
2202	Brantford W.W.T.P.	-77	2	-75	-0.2	0.0	-0.2
2203	Brantford W.W.T.P.	-80	2	-78	-0.2	0.0	-0.2
2204	Brantford W.W.T.P.	-45	2	-43	-0.1	0.0	-0.1
2205	Brantford W.W.T.P.	-51	1	-50	-0.1	0.0	-0.1
2206	Brantford W.W.T.P.	-85	4	-81	-0.2	0.0	-0.2
2207	Brantford W.W.T.P.	-55	3	-52	-0.2	0.0	-0.1
2208	Brantford W.W.T.P.	106	28	134	0.3	0.1	0.4
2209	Brantford W.W.T.P.	-72	2	-69	-0.2	0.0	-0.2
2210	Brantford W.W.T.P.	-65	2	-63	-0.2	0.0	-0.2
2211	Brantford W.W.T.P.	-25	2	-23	-0.1	0.0	-0.1
2212	Brantford W.W.T.P.	-55	2	-53	-0.2	0.0	-0.1
2213	Brantford W.W.T.P.	29	9	38	0.1	0.0	0.1
2214	Brantford W.W.T.P.	14	10	24	0.0	0.0	0.1
2215	Brantford W.W.T.P.	42	15	57	0.1	0.0	0.2
2216	Brantford W.W.T.P.	98	26	124	0.3	0.1	0.4
2217	Brantford W.W.T.P.	-42	3	-39	-0.1	0.0	-0.1
2218	Brantford W.W.T.P.	-49	4	-45	-0.1	0.0	-0.1
2301	Brantford W.W.T.P.	-36	53	16	-0.1	0.2	0.1
2302	Brantford W.W.T.P.	49	55	104	0.1	0.2	0.3
2303	Brantford W.W.T.P.	-35	30	-5	-0.1	0.1	0.0
2304	Brantford W.W.T.P.	67	86	153	0.2	0.3	0.5
2305	Brantford W.W.T.P.	-33	41	8	-0.1	0.1	0.0
2306	Brantford W.W.T.P.	-2	42	40	0.0	0.1	0.1
2307	Brantford W.W.T.P.	-45	60	15	-0.1	0.2	0.1
2308	Brantford W.W.T.P.	-35	113	77	-0.1	0.4	0.3
2309	Brantford W.W.T.P.	16	63	79	0.0	0.2	0.2
2310	Brantford W.W.T.P.	61	65	126	0.2	0.2	0.4
2401	Brantford W.W.T.P.	0	12	12	0.0	0.0	0.0
2402	Brantford W.W.T.P.	26	24	51	0.1	0.1	0.2
2403	Brantford W.W.T.P.	23	40	63	0.1	0.1	0.2
2404	Brantford W.W.T.P.	14	33	46	0.0	0.1	0.1
2405	Brantford W.W.T.P.	106	129	235	0.3	0.4	0.7
2406	Brantford W.W.T.P.	18	26	44	0.1	0.1	0.1
2407	Brantford W.W.T.P.	13	24	37	0.0	0.1	0.1
2408	Brantford W.W.T.P.	-6	43	38	0.0	0.1	0.1
2409	Brantford W.W.T.P.	-31	25	-6	-0.1	0.1	0.0
2410	Brantford W.W.T.P.	34	38	72	0.1	0.1	0.2
2411	Brantford W.W.T.P.	45	60	105	0.1	0.2	0.3
2412	Brantford W.W.T.P.	20	102	122	0.1	0.3	0.4
2413	Brantford W.W.T.P.	90	77	167	0.3	0.2	0.5
2414	Brantford W.W.T.P.	0	39	39	0.0	0.1	0.1
2415	Brantford W.W.T.P.	0	20	20	0.0	0.1	0.1
2416	Brantford W.W.T.P.	-33	21	-13	-0.1	0.1	0.0
2417	Brantford W.W.T.P.	0	65	65	0.0	0.2	0.2
2418	Brantford W.W.T.P.	2	71	74	0.0	0.2	0.2
2419	Brantford W.W.T.P.	37	31	69	0.1	0.1	0.2
2420	Brantford W.W.T.P.	69	97	166	0.2	0.3	0.5
2421	Brantford W.W.T.P.	41	30	71	0.1	0.1	0.2
2422	Brantford W.W.T.P.	242	74	316	0.7	0.2	0.9

Appendix B
Traffic Zone Details - Wastewater Flows

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
2423	Brantford W.W.T.P.	32	29	61	0.1	0.1	0.2
2424	Brantford W.W.T.P.	-40	29	-11	-0.1	0.1	0.0
2425	Brantford W.W.T.P.	115	134	249	0.3	0.4	0.7
2501	Brantford W.W.T.P.	-35	54	19	-0.1	0.2	0.1
2502	Brantford W.W.T.P.	14	75	89	0.0	0.2	0.3
2503	Brantford W.W.T.P.	75	42	117	0.2	0.1	0.3
2504	Brantford W.W.T.P.	28	32	59	0.1	0.1	0.2
2505	Brantford W.W.T.P.	48	47	95	0.1	0.1	0.3
2506	Brantford W.W.T.P.	80	52	132	0.2	0.2	0.4
2507	Brantford W.W.T.P.	88	44	132	0.2	0.1	0.4
2508	Brantford W.W.T.P.	-15	8	-7	0.0	0.0	0.0
2509	Brantford W.W.T.P.	4	21	25	0.0	0.1	0.1
2510	Brantford W.W.T.P.	-10	19	8	0.0	0.1	0.0
2511	Brantford W.W.T.P.	-11	11	0	0.0	0.0	0.0
2512	Brantford W.W.T.P.	17	12	29	0.0	0.0	0.1
2513	Brantford W.W.T.P.	15	11	25	0.0	0.0	0.1
2514	Brantford W.W.T.P.	60	8	68	0.2	0.0	0.2
2601	Brantford W.W.T.P.	-55	6	-49	-0.2	0.0	-0.1
2602	Brantford W.W.T.P.	-24	20	-4	-0.1	0.1	0.0
2603	Brantford W.W.T.P.	-7	16	10	0.0	0.1	0.0
2604	Brantford W.W.T.P.	-15	6	-9	0.0	0.0	0.0
2605	Brantford W.W.T.P.	-95	4	-91	-0.3	0.0	-0.3
2606	Brantford W.W.T.P.	-30	2	-28	-0.1	0.0	-0.1
2607	Brantford W.W.T.P.	11	0	11	0.0	0.0	0.0
2608	Brantford W.W.T.P.	-95	7	-88	-0.3	0.0	-0.2
2609	Brantford W.W.T.P.	-8	27	19	0.0	0.1	0.1
2610	Brantford W.W.T.P.	-47	32	-15	-0.1	0.1	0.0
2611	Brantford W.W.T.P.	2	10	12	0.0	0.0	0.0
2612	Brantford W.W.T.P.	195	28	222	0.6	0.1	0.6
2613	Brantford W.W.T.P.	25	2	27	0.1	0.0	0.1
2614	Brantford W.W.T.P.	-6	9	4	0.0	0.0	0.0
2615	Brantford W.W.T.P.	88	13	101	0.2	0.0	0.3
2701	Brantford W.W.T.P.	-41	50	9	-0.1	0.2	0.0
2702	Brantford W.W.T.P.	-4	79	76	0.0	0.2	0.2
2703	Brantford W.W.T.P.	-9	19	10	0.0	0.1	0.0
2704	Brantford W.W.T.P.	-95	13	-82	-0.3	0.0	-0.2
2705	Brantford W.W.T.P.	23	9	31	0.1	0.0	0.1
2706	Brantford W.W.T.P.	-7	57	51	0.0	0.2	0.2
2707	Brantford W.W.T.P.	186	38	224	0.5	0.1	0.6
2708	Brantford W.W.T.P.	113	61	173	0.3	0.2	0.5
2709	Brantford W.W.T.P.	64	22	86	0.2	0.1	0.3
2710	Brantford W.W.T.P.	283	57	340	0.8	0.2	1.0
2801	Brantford W.W.T.P.	-70	38	-32	-0.2	0.1	-0.1
2802	Brantford W.W.T.P.	-87	9	-78	-0.2	0.0	-0.2
2803	Brantford W.W.T.P.	133	25	158	0.4	0.1	0.5
2804	Brantford W.W.T.P.	-66	85	19	-0.2	0.3	0.1
2805	Brantford W.W.T.P.	-70	4	-66	-0.2	0.0	-0.2
2806	Brantford W.W.T.P.	69	62	131	0.2	0.2	0.4
2807	Brantford W.W.T.P.	0	1	1	0.0	0.0	0.0
2808	Brantford W.W.T.P.	0	26	26	0.0	0.1	0.1
2901	Brantford W.W.T.P.	104	13	117	0.3	0.0	0.3
2902	Brantford W.W.T.P.	155	5	160	0.4	0.0	0.5
2903	Brantford W.W.T.P.	0	5	5	0.0	0.0	0.0
2904	Brantford W.W.T.P.	224	67	291	0.6	0.2	0.8
3001	Brantford W.W.T.P.	154	72	226	0.4	0.2	0.7

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
3002	Brantford W.W.T.P.	35	31	66	0.1	0.1	0.2
3003	Brantford W.W.T.P.	123	75	197	0.3	0.2	0.6
3004	Brantford W.W.T.P.	10	65	76	0.0	0.2	0.2
301	Brantford W.W.T.P.	2	61	64	0.0	0.2	0.2
302	Brantford W.W.T.P.	-35	74	39	-0.1	0.2	0.1
303	Brantford W.W.T.P.	-103	66	-37	-0.3	0.2	-0.1
304	Brantford W.W.T.P.	-22	14	-8	-0.1	0.0	0.0
305	Brantford W.W.T.P.	-80	94	14	-0.2	0.3	0.1
306	Brantford W.W.T.P.	81	65	146	0.2	0.2	0.4
3101	Brantford W.W.T.P.	313	884	1,197	0.9	2.8	3.7
3102	Brantford W.W.T.P.	1,378	501	1,879	3.9	1.6	5.5
3103	Brantford W.W.T.P.	0	1	1	0.0	0.0	0.0
3104	Brantford W.W.T.P.	0	70	70	0.0	0.2	0.2
3105	Brantford W.W.T.P.	0	287	287	0.0	0.9	0.9
3201	Fifth Ave. S.P.S.	-122	112	-10	-0.3	0.4	0.0
3202	Fifth Ave. S.P.S.	129	64	193	0.4	0.2	0.6
3203	Fifth Ave. S.P.S.	342	70	413	1.0	0.2	1.2
3204	Fifth Ave. S.P.S.	170	17	187	0.5	0.1	0.5
3205	Fifth Ave. S.P.S.	0	9	9	0.0	0.0	0.0
3301	Greenwich St. S.P.S.	2,278	155	2,433	6.5	0.5	6.9
3302	Fifth Ave. S.P.S.	-101	97	-4	-0.3	0.3	0.0
3401	Greenwich St. S.P.S.	666	429	1,095	1.9	1.3	3.2
3402	Greenwich St. S.P.S.	124	213	337	0.4	0.7	1.0
3403	Greenwich St. S.P.S.	3,557	339	3,896	10.1	1.1	11.1
3404	Greenwich St. S.P.S.	1,031	88	1,119	2.9	0.3	3.2
3405	Brantford W.W.T.P.	23	402	425	0.1	1.3	1.3
3406	Brantford W.W.T.P.	295	193	488	0.8	0.6	1.4
3407	Greenwich St. S.P.S.	393	70	464	1.1	0.2	1.3
3501	Greenwich St. S.P.S.	-19	39	20	-0.1	0.1	0.1
3502	Greenwich St. S.P.S.	-4	13	9	0.0	0.0	0.0
3503	Greenwich St. S.P.S.	-53	29	-24	-0.2	0.1	-0.1
3504	Greenwich St. S.P.S.	-4	7	3	0.0	0.0	0.0
3505	Fifth Ave. S.P.S.	51	38	90	0.1	0.1	0.3
3506	Fifth Ave. S.P.S.	58	43	101	0.2	0.1	0.3
3507	Fifth Ave. S.P.S.	1,302	67	1,369	3.7	0.2	3.9
3508	Brantford W.W.T.P.	-10	20	10	0.0	0.1	0.0
3509	Fifth Ave. S.P.S.	522	17	539	1.5	0.1	1.5
3510	Fifth Ave. S.P.S.	23	64	88	0.1	0.2	0.3
3511	Brantford W.W.T.P.	-10	2	-8	0.0	0.0	0.0
3512	Fifth Ave. S.P.S.	616	18	633	1.7	0.1	1.8
3601	Brantford W.W.T.P.	-21	45	24	-0.1	0.1	0.1
3602	Brantford W.W.T.P.	-32	37	4	-0.1	0.1	0.0
3603	Brantford W.W.T.P.	40	32	72	0.1	0.1	0.2
3604	Brantford W.W.T.P.	-5	78	73	0.0	0.2	0.2
3701	Brantford W.W.T.P.	3,225	91	3,316	9.1	0.3	9.4
3702	Brantford W.W.T.P.	3,838	178	4,016	10.9	0.6	11.4
3703	Brantford W.W.T.P.	-67	22	-45	-0.2	0.1	-0.1
3704	Brantford W.W.T.P.	1,001	168	1,168	2.8	0.5	3.4
3705	Brantford W.W.T.P.	-33	73	40	-0.1	0.2	0.1
3706	Brantford W.W.T.P.	158	33	190	0.4	0.1	0.5
3707	Brantford W.W.T.P.	-178	94	-83	-0.5	0.3	-0.2
3708	Brantford W.W.T.P.	342	183	525	1.0	0.6	1.5
3709	Brantford W.W.T.P.	-195	157	-37	-0.6	0.5	-0.1
3710	Brantford W.W.T.P.	-9	23	14	0.0	0.1	0.0
3901	Brantford W.W.T.P.	0	335	335	0.0	1.0	1.0

Appendix B
Traffic Zone Details - Wastewater Flows

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
401	Brantford W.W.T.P.	-62	81	20	-0.2	0.3	0.1
402	Brantford W.W.T.P.	-26	24	-2	-0.1	0.1	0.0
403	Empey St. S.P.S.	56	50	106	0.2	0.2	0.3
404	Empey St. S.P.S.	-16	25	9	0.0	0.1	0.0
405	Empey St. S.P.S.	1,027	118	1,145	2.9	0.4	3.3
406	Empey St. S.P.S.	461	67	528	1.3	0.2	1.5
407	Empey St. S.P.S.	252	64	316	0.7	0.2	0.9
4501	Brantford W.W.T.P.	2,556	326	2,882	7.2	1.0	8.3
4502	Brantford W.W.T.P.	409	39	448	1.2	0.1	1.3
4503	Brantford W.W.T.P.	123	309	432	0.3	1.0	1.3
4601	Brantford W.W.T.P.	0	102	102	0.0	0.3	0.3
4602	Brantford W.W.T.P.	1,062	131	1,193	3.0	0.4	3.4
4603	Brantford W.W.T.P.	53	3	56	0.2	0.0	0.2
4701	Empey St. S.P.S.	-60	104	44	-0.2	0.3	0.2
4702	Empey St. S.P.S.	-36	23	-13	-0.1	0.1	0.0
4703	Johnson Rd. S.P.S.	-35	26	-9	-0.1	0.1	0.0
4704	Johnson Rd. S.P.S.	747	27	774	2.1	0.1	2.2
4705	Johnson Rd. S.P.S.	-39	14	-26	-0.1	0.0	-0.1
4706	Johnson Rd. S.P.S.	-19	22	3	-0.1	0.1	0.0
4801	Greenwich St. S.P.S.	-28	222	193	-0.1	0.7	0.6
4802	Greenwich St. S.P.S.	219	127	346	0.6	0.4	1.0
4803	Greenwich St. S.P.S.	227	60	286	0.6	0.2	0.8
4901	Empey St. S.P.S.	-25	45	20	-0.1	0.1	0.1
4902	Empey St. S.P.S.	-44	32	-12	-0.1	0.1	0.0
4903	Empey St. S.P.S.	-110	62	-48	-0.3	0.2	-0.1
4904	Empey St. S.P.S.	-66	51	-15	-0.2	0.2	0.0
4905	Empey St. S.P.S.	621	69	690	1.8	0.2	2.0
4906	Empey St. S.P.S.	-26	31	5	-0.1	0.1	0.0
5001	Empey St. S.P.S.	0	657	657	0.0	2.1	2.1
5002	Empey St. S.P.S.	-5	509	504	0.0	1.6	1.6
5003	Empey St. S.P.S.	0	323	323	0.0	1.0	1.0
5004	Empey St. S.P.S.	-20	1,065	1,045	-0.1	3.3	3.3
501	Empey St. S.P.S.	-35	50	15	-0.1	0.2	0.1
502	Empey St. S.P.S.	-107	61	-46	-0.3	0.2	-0.1
503	Empey St. S.P.S.	-60	47	-12	-0.2	0.1	0.0
504	Empey St. S.P.S.	594	48	642	1.7	0.2	1.8
505	Empey St. S.P.S.	-66	45	-21	-0.2	0.1	0.0
506	Empey St. S.P.S.	-95	94	-1	-0.3	0.3	0.0
507	Empey St. S.P.S.	-47	29	-18	-0.1	0.1	0.0
508	Empey St. S.P.S.	-87	59	-28	-0.2	0.2	-0.1
509	Empey St. S.P.S.	-109	56	-52	-0.3	0.2	-0.1
510	Empey St. S.P.S.	-55	48	-7	-0.2	0.1	0.0
5101	Empey St. S.P.S.	0	2	2	0.0	0.0	0.0
5102	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5103	Empey St. S.P.S.	0	4	4	0.0	0.0	0.0
5104	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5105	Empey St. S.P.S.	652	18	670	1.8	0.1	1.9
5106	Empey St. S.P.S.	223	6	230	0.6	0.0	0.7
5107	Empey St. S.P.S.	1,896	87	1,983	5.4	0.3	5.6
511	Empey St. S.P.S.	-113	56	-57	-0.3	0.2	-0.1
512	Empey St. S.P.S.	275	118	393	0.8	0.4	1.1
513	Brantford W.W.T.P.	183	22	205	0.5	0.1	0.6
514	Empey St. S.P.S.	72	58	130	0.2	0.2	0.4
515	Empey St. S.P.S.	-16	101	85	0.0	0.3	0.3
516	Empey St. S.P.S.	167	12	179	0.5	0.0	0.5

Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
5201	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5202	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5203	Empey St. S.P.S.	356	16	372	1.0	0.0	1.1
5204	Empey St. S.P.S.	224	6	230	0.6	0.0	0.7
5205	Empey St. S.P.S.	805	67	871	2.3	0.2	2.5
5206	Empey St. S.P.S.	719	21	740	2.0	0.1	2.1
5301	Empey St. S.P.S.	61	2	63	0.2	0.0	0.2
5302	Empey St. S.P.S.	54	1	55	0.2	0.0	0.2
5303	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5401	Empey St. S.P.S.	183	226	409	0.5	0.7	1.2
5402	Empey St. S.P.S.	564	32	596	1.6	0.1	1.7
5403	Empey St. S.P.S.	591	22	613	1.7	0.1	1.7
5404	Empey St. S.P.S.	555	64	619	1.6	0.2	1.8
5405	Empey St. S.P.S.	420	718	1,138	1.2	2.2	3.4
5406	Empey St. S.P.S.	1,182	57	1,238	3.4	0.2	3.5
5407	Empey St. S.P.S.	503	22	525	1.4	0.1	1.5
5408	Empey St. S.P.S.	625	29	654	1.8	0.1	1.9
5501	Empey St. S.P.S.	1,059	275	1,334	3.0	0.9	3.9
5502	Empey St. S.P.S.	939	36	975	2.7	0.1	2.8
5503	Empey St. S.P.S.	425	13	438	1.2	0.0	1.2
5504	Empey St. S.P.S.	206	10	216	0.6	0.0	0.6
5505	Empey St. S.P.S.	137	10	147	0.4	0.0	0.4
5506	Empey St. S.P.S.	448	88	537	1.3	0.3	1.5
5507	Empey St. S.P.S.	741	162	903	2.1	0.5	2.6
5508	Empey St. S.P.S.	739	44	783	2.1	0.1	2.2
5509	Empey St. S.P.S.	498	35	533	1.4	0.1	1.5
5510	Empey St. S.P.S.	411	31	442	1.2	0.1	1.3
5511	Empey St. S.P.S.	703	85	788	2.0	0.3	2.3
5512	Empey St. S.P.S.	793	155	948	2.3	0.5	2.7
5601	Empey St. S.P.S.	-15	0	-15	0.0	0.0	0.0
5602	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5603	Empey St. S.P.S.	-15	0	-15	0.0	0.0	0.0
5604	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5605	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5606	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5607	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5608	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5609	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5610	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5611	Empey St. S.P.S.	7	35	42	0.0	0.1	0.1
5612	Empey St. S.P.S.	7	0	7	0.0	0.0	0.0
5613	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5614	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5615	Empey St. S.P.S.	0	0	0	0.0	0.0	0.0
5701	Brantford W.W.T.P.	-25	0	-25	-0.1	0.0	-0.1
5702	Brantford W.W.T.P.	0	0	0	0.0	0.0	0.0
5703	Brantford W.W.T.P.	-30	0	-30	-0.1	0.0	-0.1
5704	Brantford W.W.T.P.	0	0	0	0.0	0.0	0.0
5705	Brantford W.W.T.P.	0	0	0	0.0	0.0	0.0
5706	Brantford W.W.T.P.	-5	2	-3	0.0	0.0	0.0
5707	Brantford W.W.T.P.	489	30	518	1.4	0.1	1.5
5708	Brantford W.W.T.P.	534	31	565	1.5	0.1	1.6
5709	Brantford W.W.T.P.	609	213	822	1.7	0.7	2.4
5710	Brantford W.W.T.P.	917	97	1,014	2.6	0.3	2.9
5711	Brantford W.W.T.P.	789	44	833	2.2	0.1	2.4

Appendix B
Traffic Zone Details - Wastewater Flows

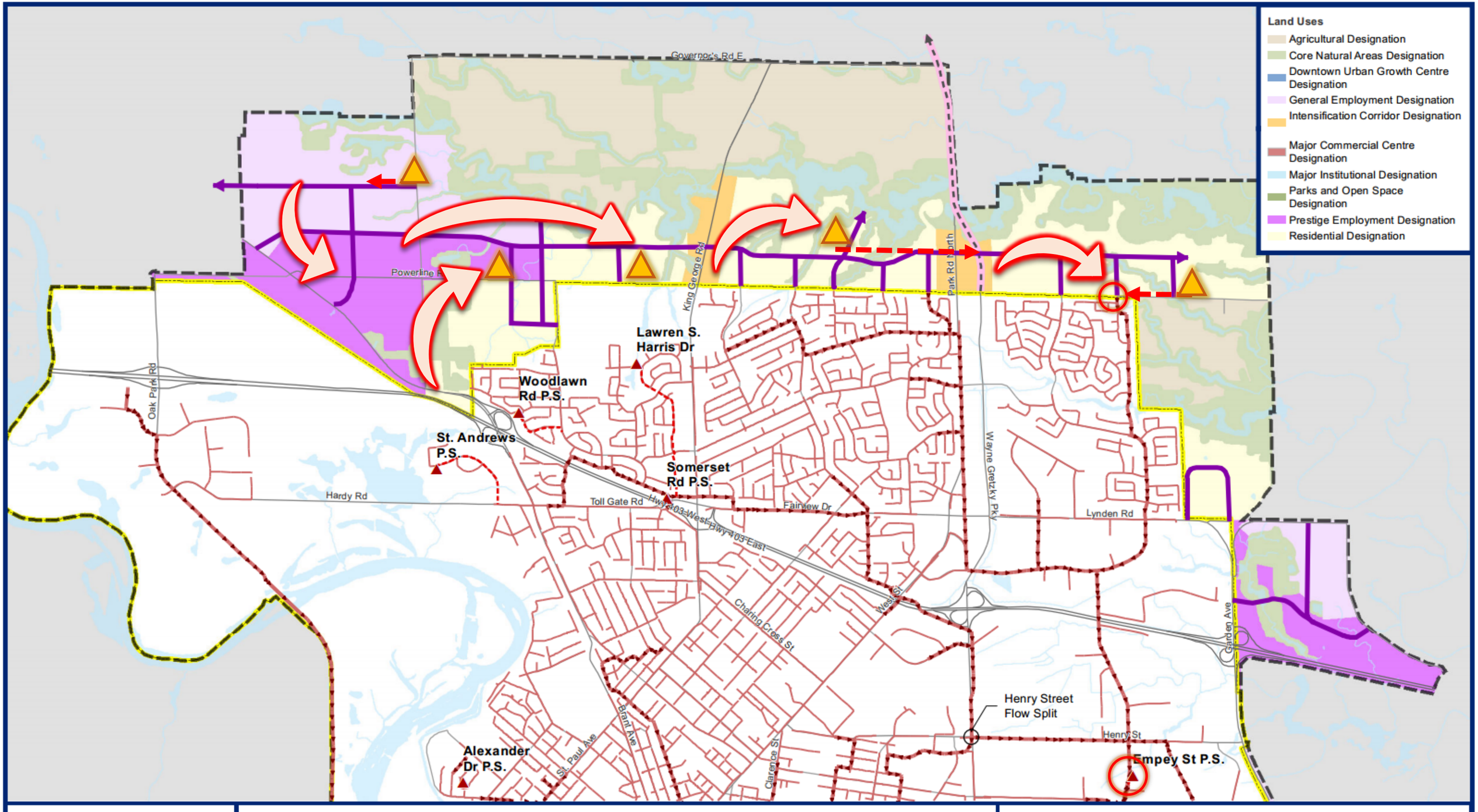
Traffic Zone Name	Wastewater Catchment	Growth-RES (People)	Growth-EMP (People)	Growth-TOTAL (People)	ADWF-RES (L/s)	ADWF-EMP (L/s)	ADWF-TOTAL (L/s)
5712	Brantford W.W.T.P.	361	80	441	1.0	0.3	1.3
5801	Brantford W.W.T.P.	0	209	209	0.0	0.7	0.7
5802	Brantford W.W.T.P.	0	0	0	0.0	0.0	0.0
5803	Brantford W.W.T.P.	-10	844	834	0.0	2.6	2.6
5804	Brantford W.W.T.P.	232	462	694	0.7	1.4	2.1
5805	Brantford W.W.T.P.	0	478	478	0.0	1.5	1.5
5806	Brantford W.W.T.P.	191	375	566	0.5	1.2	1.7
5900	Brantford W.W.T.P.	-20	747	727	-0.1	2.3	2.3
5901	Brantford W.W.T.P.	-10	810	800	0.0	2.5	2.5
5902	Brantford W.W.T.P.	0	563	563	0.0	1.8	1.8
5903	Brantford W.W.T.P.	1,212	44	1,256	3.4	0.1	3.6
5904	Brantford W.W.T.P.	2,190	92	2,282	6.2	0.3	6.5
6001	Brantford W.W.T.P.	0	196	196	0.0	0.6	0.6
6002	Brantford W.W.T.P.	0	169	169	0.0	0.5	0.5
6003	Brantford W.W.T.P.	0	156	156	0.0	0.5	0.5
6004	Brantford W.W.T.P.	0	391	391	0.0	1.2	1.2
6005	Brantford W.W.T.P.	0	425	425	0.0	1.3	1.3
6006	Brantford W.W.T.P.	0	1,152	1,152	0.0	3.6	3.6
6007	Brantford W.W.T.P.	-5	1,089	1,084	0.0	3.4	3.4
6008	Brantford W.W.T.P.	0	21	21	0.0	0.1	0.1
6009	Brantford W.W.T.P.	-10	681	671	0.0	2.1	2.1
601	Empey St. S.P.S.	-46	45	0	-0.1	0.1	0.0
6010	Brantford W.W.T.P.	0	548	548	0.0	1.7	1.7
602	Empey St. S.P.S.	-57	60	2	-0.2	0.2	0.0
603	Empey St. S.P.S.	-124	61	-63	-0.4	0.2	-0.2
604	Empey St. S.P.S.	-120	49	-70	-0.3	0.2	-0.2
605	Empey St. S.P.S.	-90	50	-41	-0.3	0.2	-0.1
606	Empey St. S.P.S.	-133	74	-59	-0.4	0.2	-0.1
7001	Brantford W.W.T.P.	0	0	0	0.0	0.0	0.0
701	Empey St. S.P.S.	0	159	159	0.0	0.5	0.5
702	Empey St. S.P.S.	174	122	296	0.5	0.4	0.9
703	Empey St. S.P.S.	141	66	207	0.4	0.2	0.6
704	Empey St. S.P.S.	267	76	343	0.8	0.2	1.0
705	Empey St. S.P.S.	696	204	900	2.0	0.6	2.6
706	Empey St. S.P.S.	357	110	467	1.0	0.3	1.4
707	Empey St. S.P.S.	0	354	354	0.0	1.1	1.1
708	Empey St. S.P.S.	1,251	174	1,425	3.5	0.5	4.1
7901	Empey St. S.P.S.	-20	4	-17	-0.1	0.0	0.0
801	Empey St. S.P.S.	0	556	556	0.0	1.7	1.7
8501	Brantford W.W.T.P.	596	19	614	1.7	0.1	1.7
8502	Brantford W.W.T.P.	1,690	69	1,759	4.8	0.2	5.0
8600	Brantford W.W.T.P.	4,333	181	4,514	12.3	0.6	12.9
8701	Brantford W.W.T.P.	92	9	102	0.3	0.0	0.3
901	Empey St. S.P.S.	644	1,348	1,993	1.8	4.2	6.0
902	Empey St. S.P.S.	0	99	99	0.0	0.3	0.3
903	Empey St. S.P.S.	0	92	92	0.0	0.3	0.3

C

City of Brantford

APPENDIX C

EXPANSION LANDS CONCEPTS



THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network
- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features
- 2016 Municipal
- New Municipal

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain

Wastewater Servicing Concepts

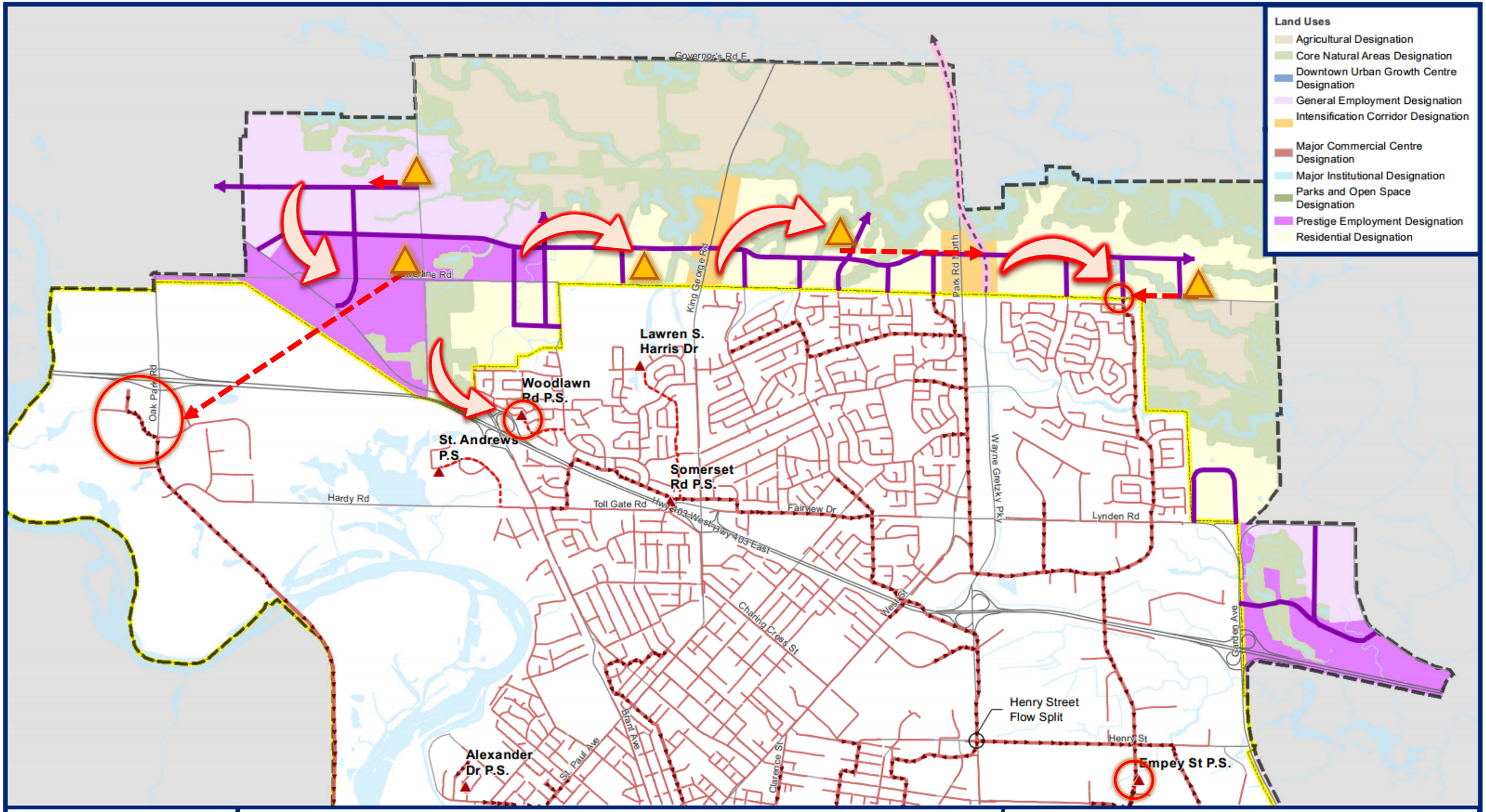
All Flows to Coulbeck Road Concept

0 0.65 1.3 Kilometers

N

June 2021
717036-WW-006b
NAD 1983 CSRS UTM Zone 17N

BluePlan



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- 2016 Municipal
- New Municipal

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain

Wastewater Servicing Concepts

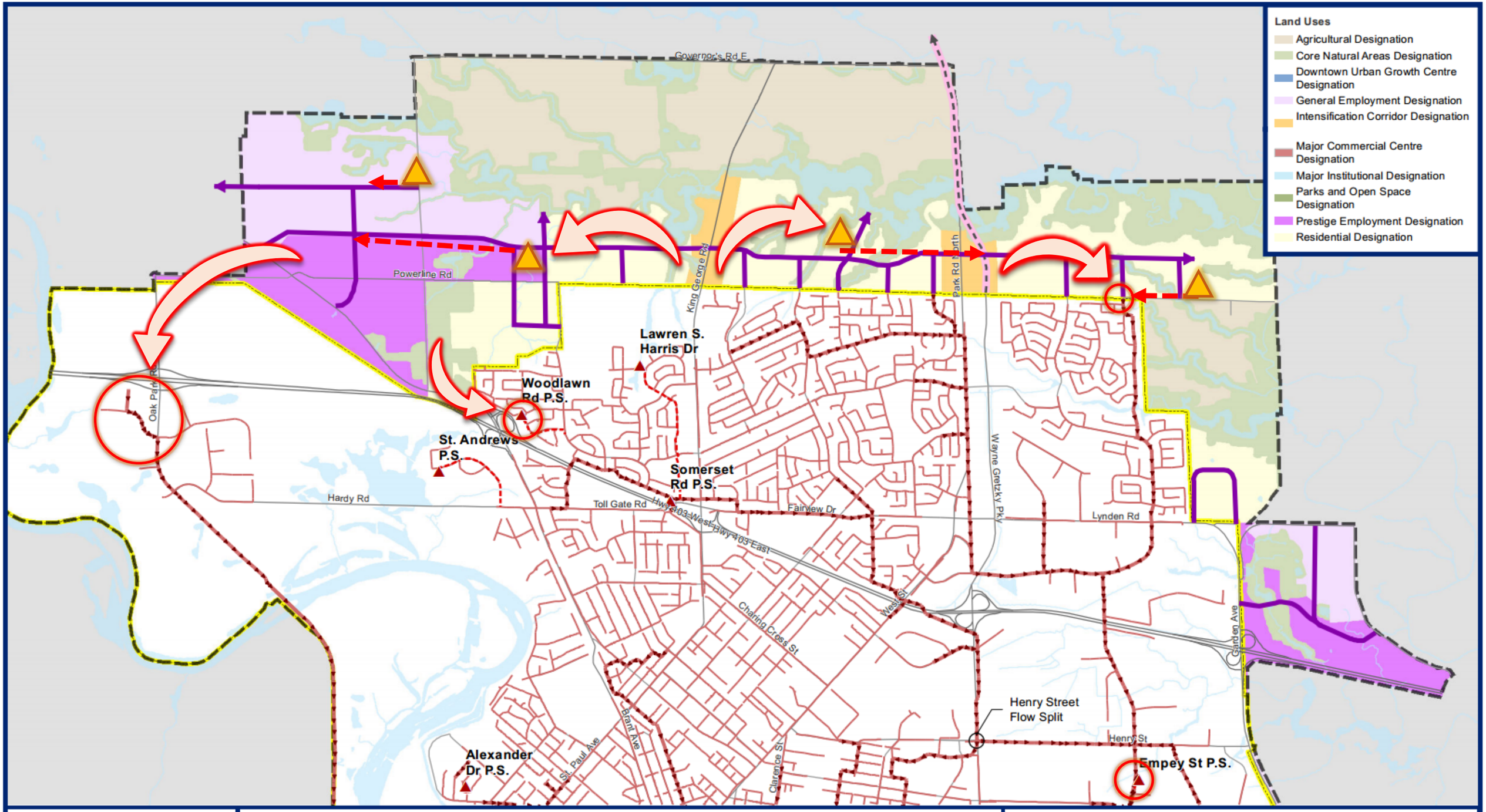
Flow Split with all Residential Lands to Coulbeck Road Concept

0 0.65 1.3 Kilometers

N

June 2021
717036-WW-006b
NAD 1983 CSRS UTM Zone 17N

BluePlan



THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network
- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features
- 2016 Municipal
- New Municipal

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain

Wastewater Servicing Concepts

Flow Split at King George Concept

N

0 0.65 1.3 Kilometers

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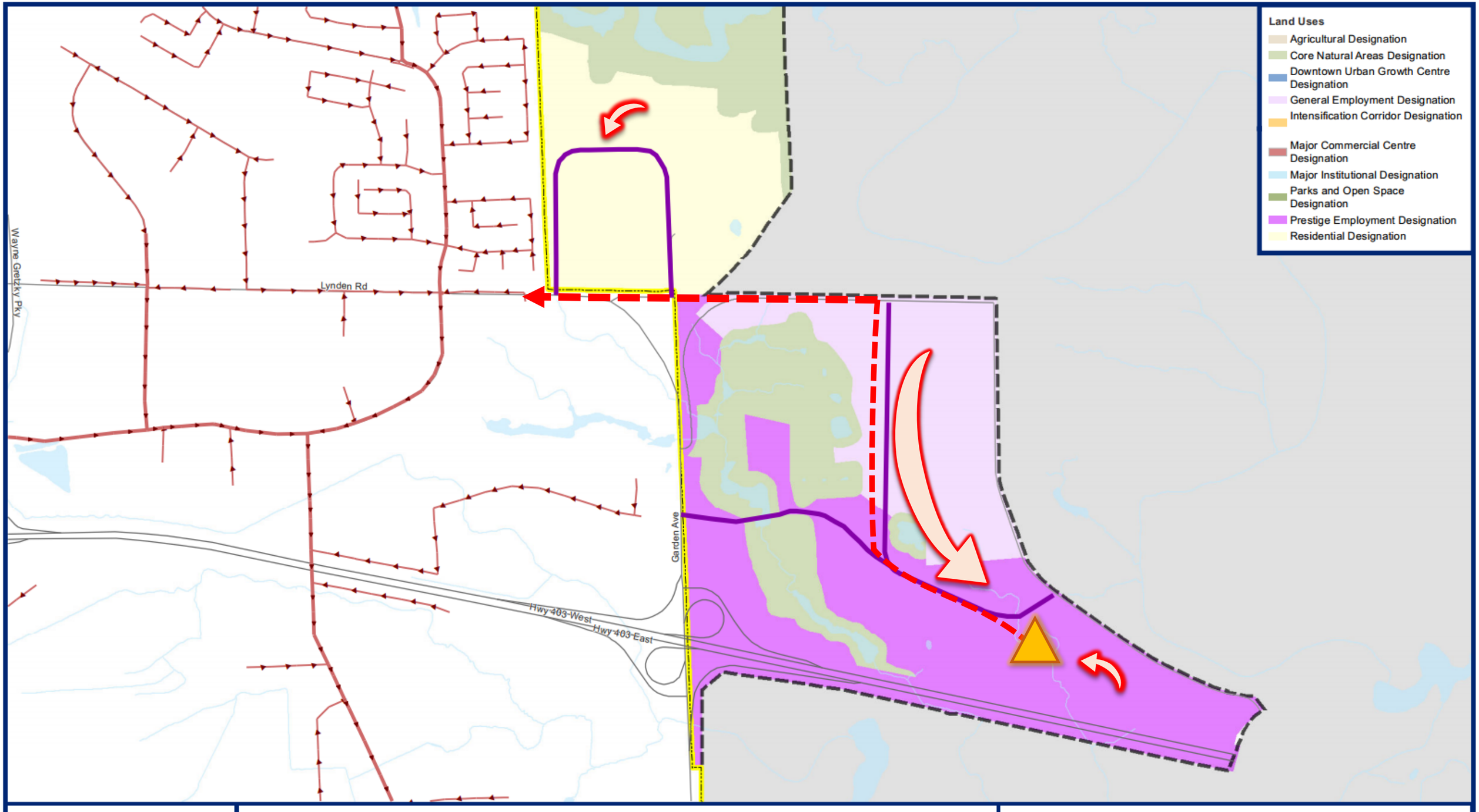

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network
- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features
- 2016 Municipal
- New Municipal

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain

Wastewater Servicing Concepts

Sinclair Boulevard Tie In Concept

0 0.2 0.4 Kilometers

N

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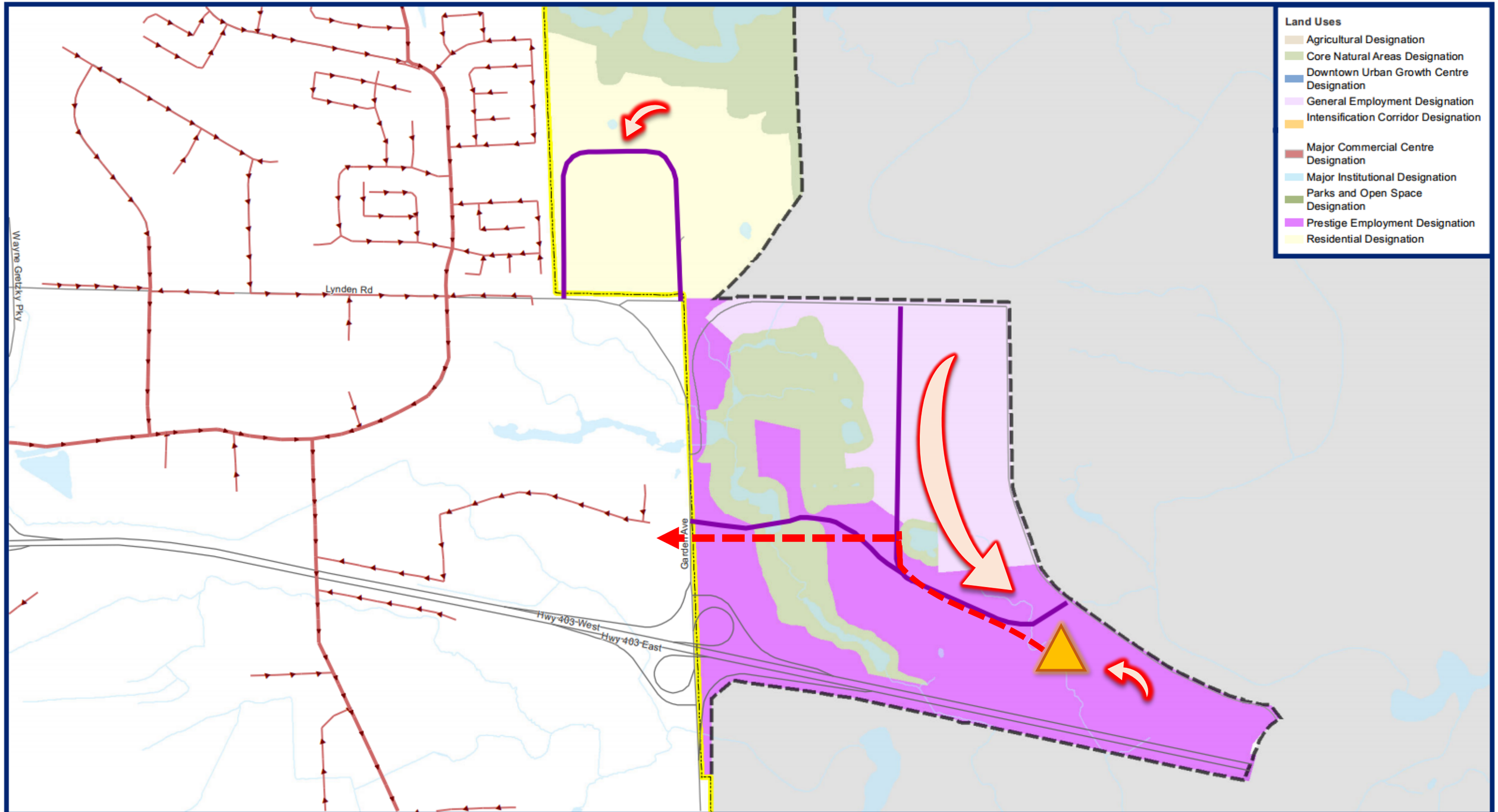

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network
- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features
- 2016 Municipal
- New Municipal

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain

Wastewater Servicing Concepts

Lynden Road Tie In Concept

0 0.2 0.4 Kilometers

N

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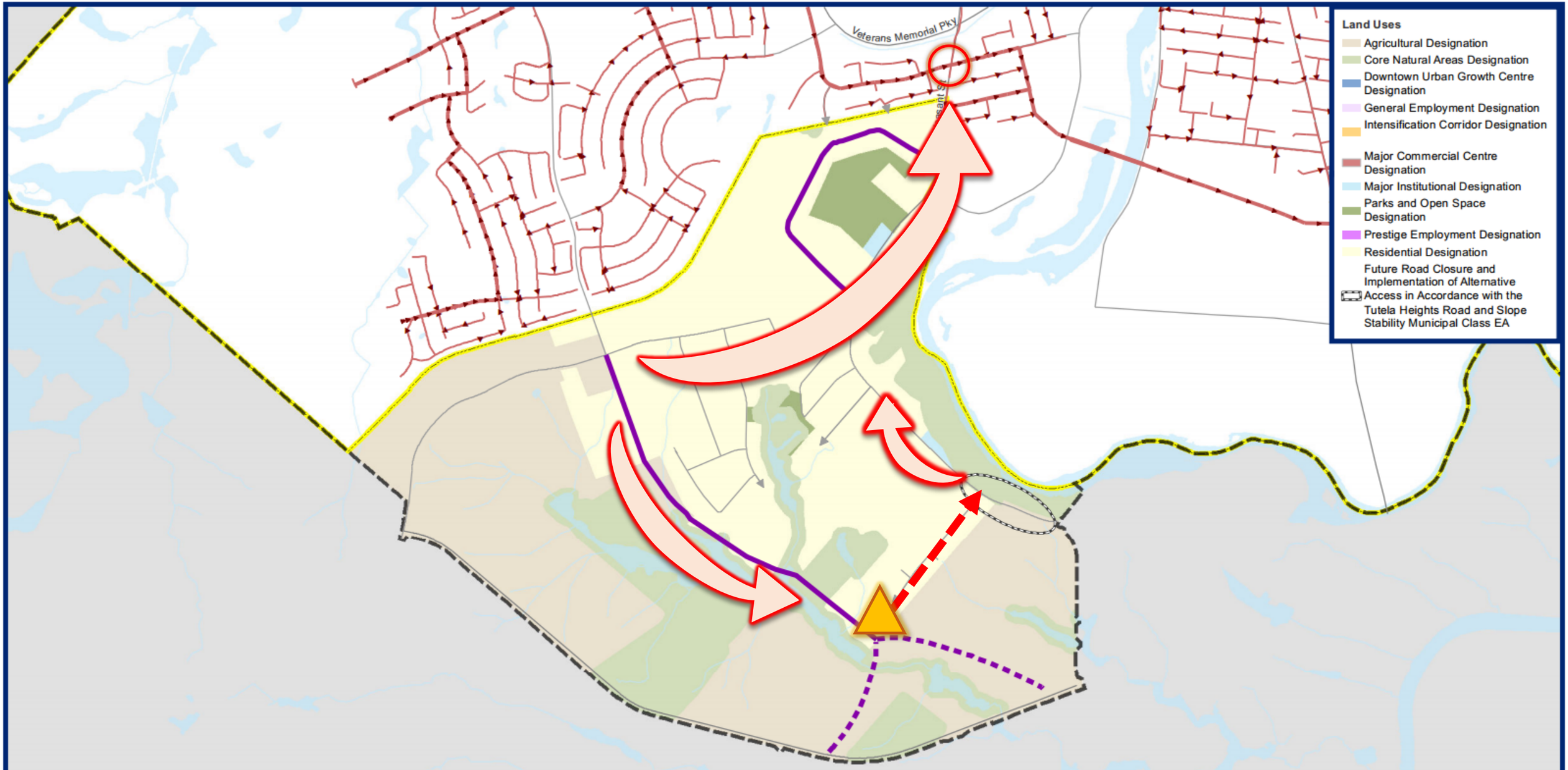

BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network
- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features
- 2016 Municipal Boundary
- New Municipal Boundary

Road Options
- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain
- Connection to City

Wastewater Servicing Concepts

Tie into Mount Pleasant Road Concept

0 0.5 1 Kilometers

N

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Veterans Memorial Pky

Mount Pleasant St

Land Uses

- Agricultural Designation
- Core Natural Areas Designation
- Downtown Urban Growth Centre Designation
- General Employment Designation
- Intensification Corridor Designation
- Major Commercial Centre Designation
- Major Institutional Designation
- Parks and Open Space Designation
- Prestige Employment Designation
- Residential Designation
- Future Road Closure and Implementation of Alternative Access in Accordance with the Tutela Heights Road and Slope Stability Municipal Class EA

THE CORPORATION OF THE CITY OF BRANTFORD

Water, Wastewater and Stormwater Master Servicing Plan Update

Wastewater Network

- Sewage Treatment Plant
- Sewage Pumping Station
- Forcemains
- Sanitary Mains (<= 300 mm)
- Sanitary Trunks (> 300 mm)

General Features

- 2016 Municipal Boundary
- New Municipal Boundary

Road Options

- Collector Roads
- Major Arterial Roads
- Controlled Access Major Arterial

- New Pumping Station
- New Forcemain
- Connection to City

Wastewater Servicing Concepts

Tie into Gilkinson Street Concept

0 0.5 1 Kilometers

N

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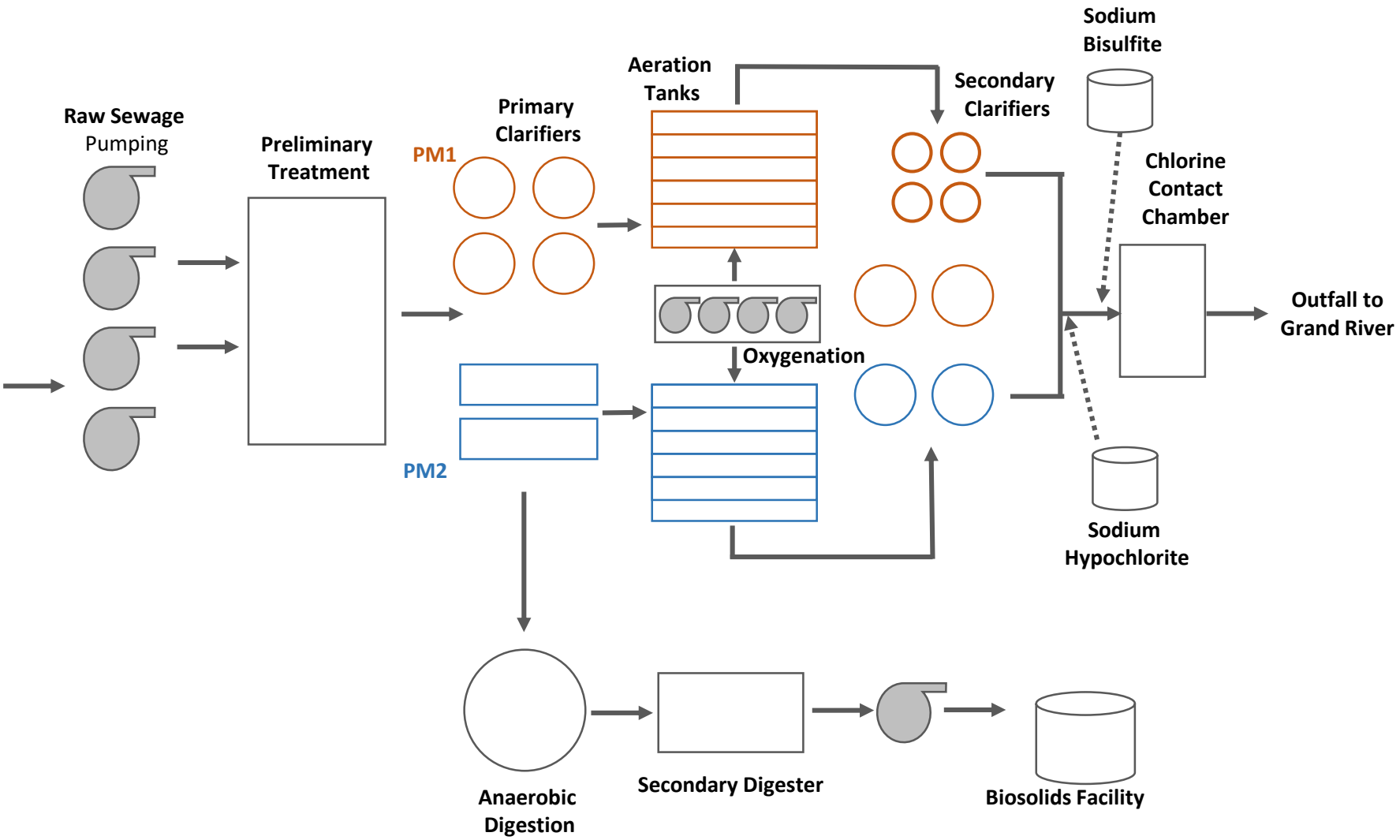
D

City of Brantford

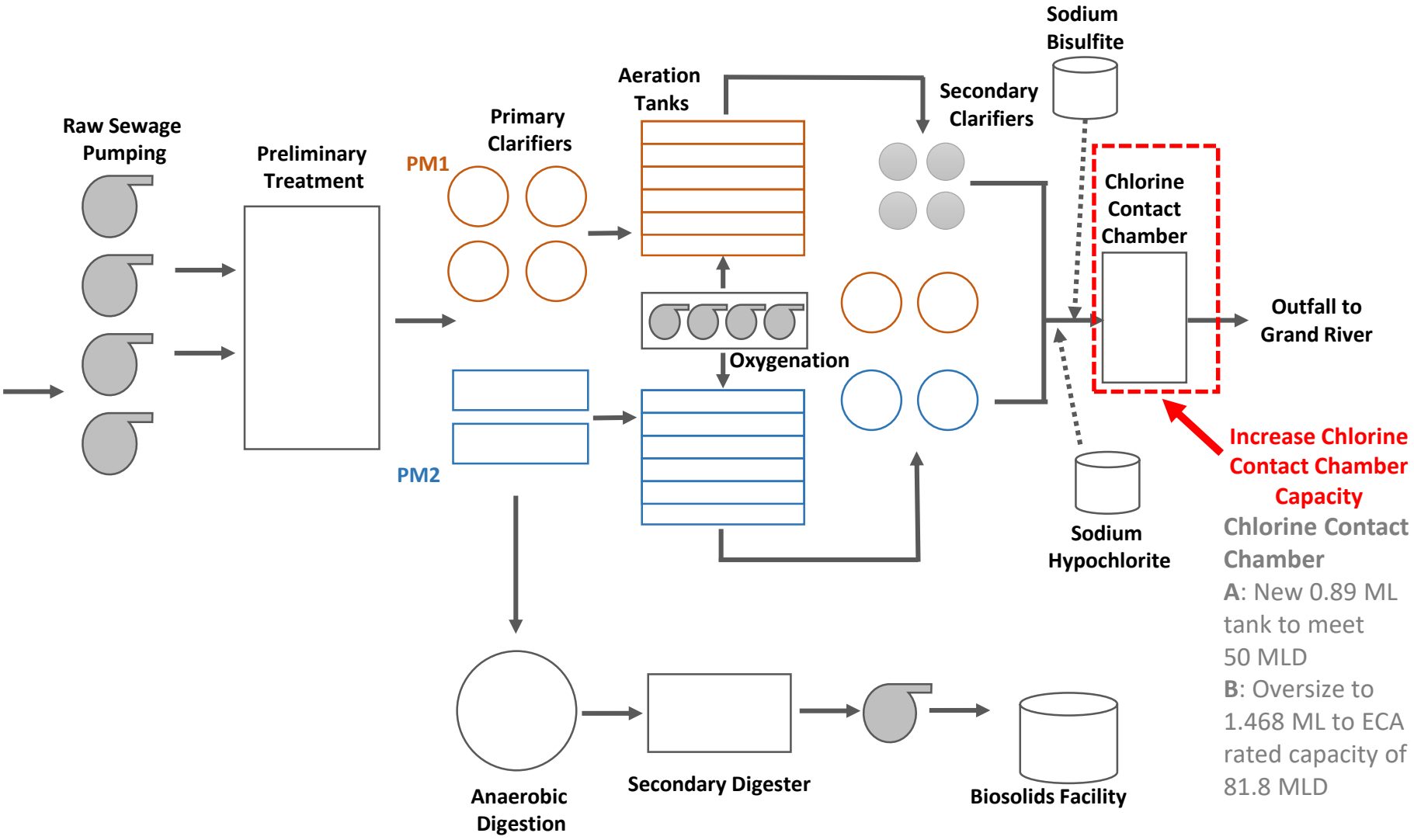
APPENDIX D

WASTEWATER TREATMENT PLANT CONCEPTS

WWTP Alternative 1: No Upgrades Rated Capacity: 35.28 MLD (35,280 m^3/day)

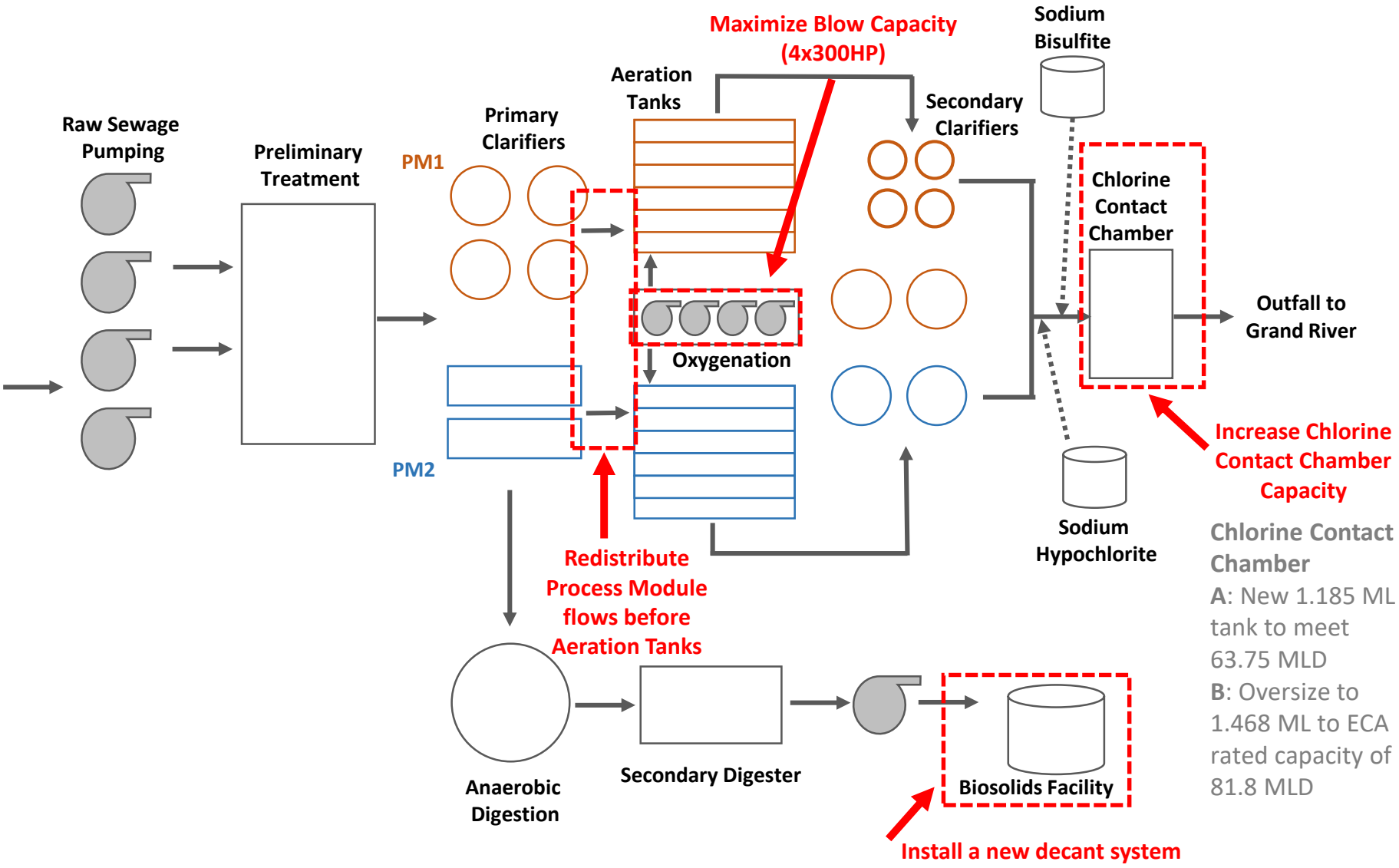


WWTP Alternative 2: Minimal Process Upgrades Rated Capacity:
50 MLD (50,000 m^3/day)



WWTP Alternative 3: optimize Process Flows

Upgrades Rated Capacity: 62 MLD (62,000 m^3/day)



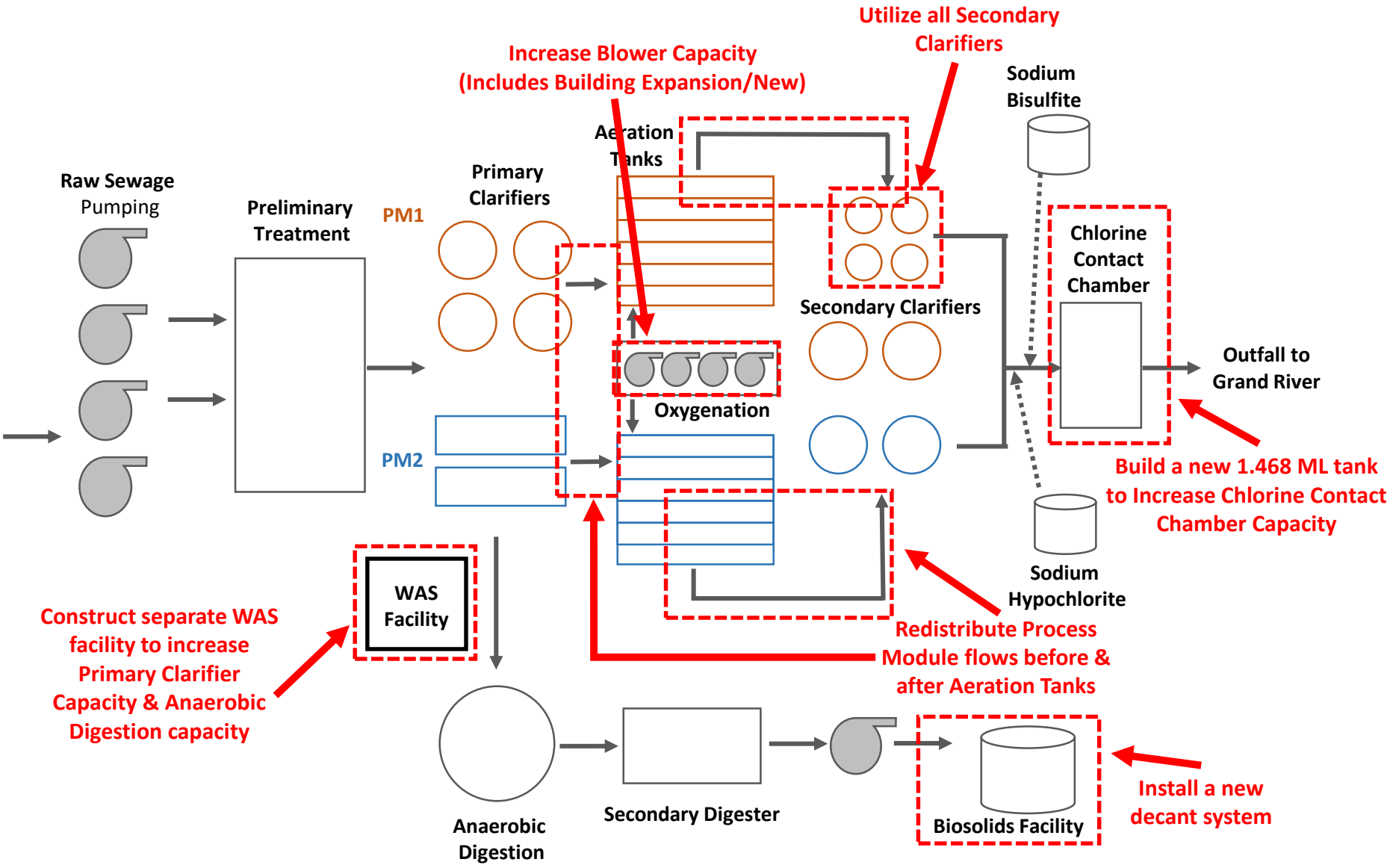
Chlorine Contact Chamber

A: New 1.185 ML tank to meet 63.75 MLD

B: Oversize to 1.468 ML to ECA rated capacity of 81.8 MLD

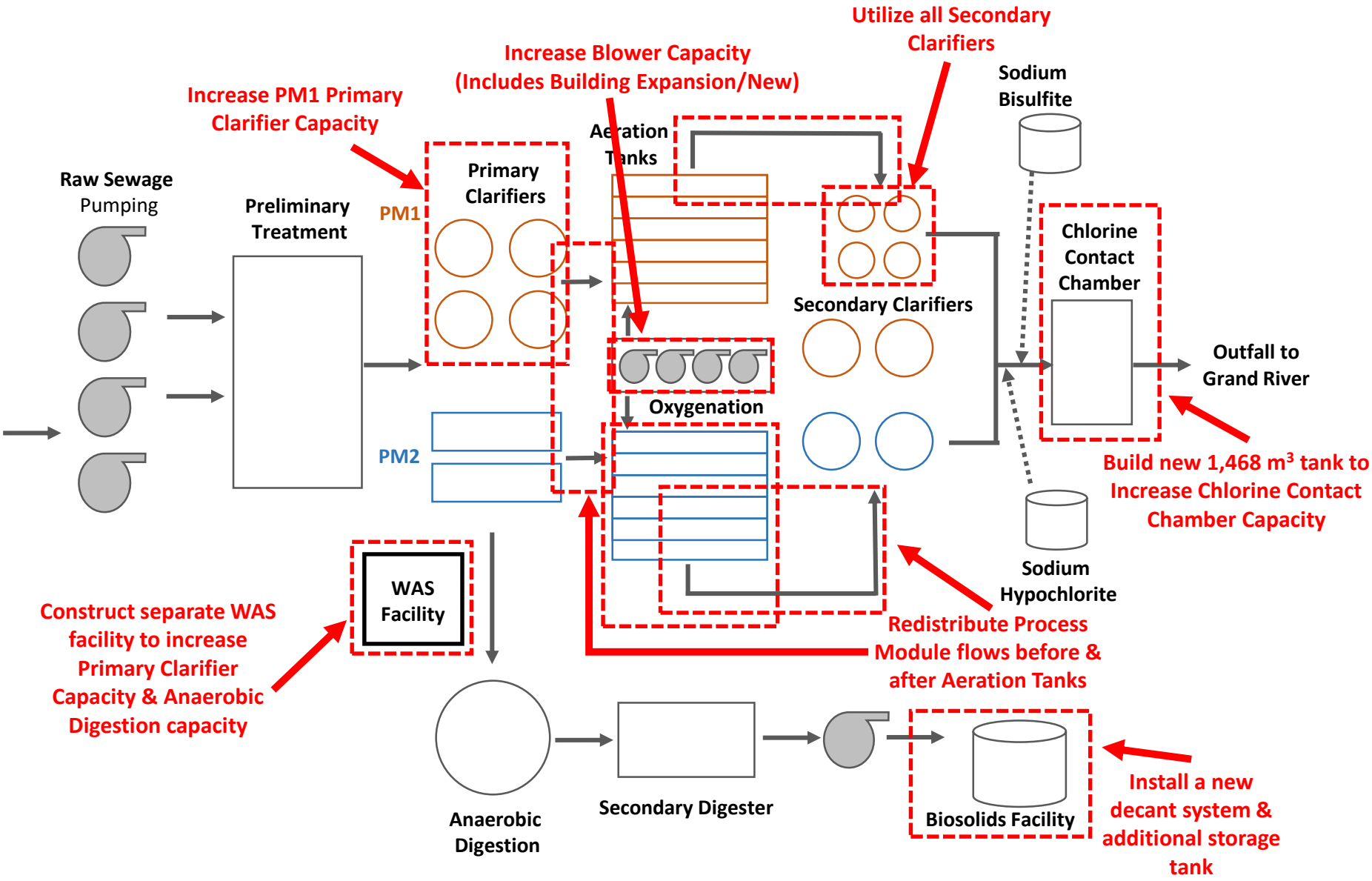
WWTP Alternative 4: Utilize Full Available Capacity

Rated Capacity: 81.8 MLD (81,800 m^3/day)

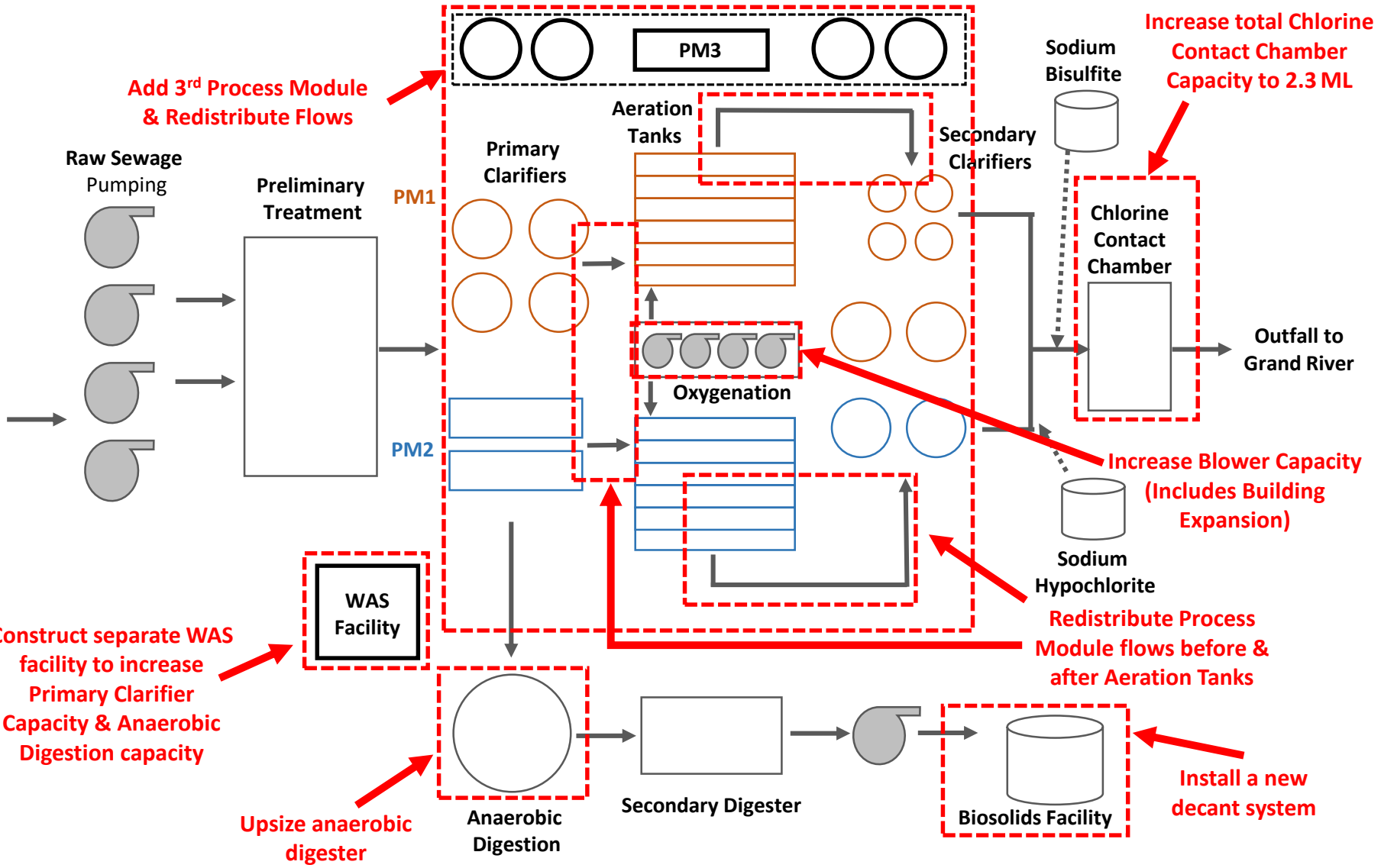


WWTP Alternative 5: Maintenance Redundancy

Rated Capacity: 92 MLD (92,000 m^3/day)



WWTP Alternative 6: Major Upgrades Rated Capacity: 110 MLD (110,000 m^3/day)



E

City of Brantford

APPENDIX E

EVALUATION TABLES

Appendix E Table 1: Holmedale Water Treatment Plant Evaluation

Category	Criteria	Alternative 1: No upgrades	Alternative 2: Minimal Upgrades – 50 MLD	Alternative 3: Moderate Upgrades – 65 MLD	Alternative 4: Moderate Upgrades – 81.8 MLD	Alternative 5: Moderate Upgrades for Maintenance Redundancy – 92 MLD	Alternative 6: Major Upgrades – 110 MLD
Technical Impacts	Meets existing and future servicing needs	- Only services existing system and does not accommodate any growth flows	- Only accommodates growth flows for the City up to 2031	- Accommodates City growth but does not allow for growth flexibility to service Cainsville and Airport lands	- Supports growth post 2051	- Allows growth flexibility to service all City growth and Cainsville and Airport lands	- Allows growth flexibility to service all City growth and Cainsville and Airport lands
	Provides a reliable service	- No focus on security of supply	- Minimal focus on security of supply	- Provides some redundancy	- Provides redundancy for major system processes	- Provides redundancy for major system processes	- Provides redundancy for major system processes
	Minimizes and manages construction risk	- Minimal impacts during construction	- Moderate impacts during construction	- Moderate impacts during construction	- Moderate impacts during construction	- Moderate impacts during construction	- Moderate impacts during construction
	Supports phased expansion of the system	- Does not service all City growth	- No flexibility to service growth flows beyond 2051	- Services all growth	- Services all growth	- Services all growth	- Services all growth
	Operational Complexity	- Minimal changes to existing operations	- Moderate changes to existing operations	- Moderate changes to existing operations	- Major changes to existing operations	- Major changes to existing operations	- System would be oversized for existing flows
	Resiliency to climate change	- No additional measures for system resiliency	- No additional measures for system resiliency	- Supports further expansion of plant	- Allows processes to be taken offline for maintenance	- Provides more flexibility for processes to be taken offline for maintenance	- Provides more flexibility for processes to be taken offline for maintenance
Environmental Impacts	Protects environment features	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid
	Protects wildlife and species at risk	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid	- Construction to avoid
	Minimizes climate change impacts	- Minimal to no changes to existing GHG production	- Moderate increase in GHG due to increased facility operations	- Moderate increase in GHG due to increased facility operations	- Moderate increase in GHG due to increased facility operations	- Major increase in GHG due to increased facility operations	- Major increase in GHG due to increased facility operations
Social and Cultural Impacts	Protects resident quality of life	- Minimal to no impacts to existing residents	- Some impacts to existing residents	- Some impacts to existing residents	- Moderate impacts to existing residents	- Major impacts to existing residents	- Greatest impacts to existing residents
	Manages and minimizes construction impacts	- Construction impacts at existing facility	- Increased construction impacts at existing facility	- Increased construction impacts at existing facility	- Moderate construction impacts at existing facility	- Major construction impacts at existing facility	- Greatest construction impacts at existing facility
	Protects cultural heritage and archeological features	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological	- Unknown impacts to cultural heritage and archeological
Financial Impacts	Capital and life-cycle costs	$0 M	~$5 M	~$10 M	~$17.5 M	~$28.5 M	~$120 M
	Operation and maintenance costs	- No increase of O&M costs	- Minimal increase of O&M costs	- Increased O&M costs	- Increased O&M costs	- Increased O&M costs	- Highest O&M costs
	Aligns with approval and permitting process	- At existing site	- At existing site	- At existing site	- At existing site	- At existing site	- At existing site

Appendix E Table 2: North Brantford Alternative Evaluation

Category	Criteria	Alternative 1 – New Trunk Sewer to Baxter Road	Alternative 2 – Upgrade Existing Sewers to Park Road North
Technical Impacts	Meets existing and future servicing needs	- Yes	- Yes
	Provides a reliable service	- Services both existing and growth - Potential to service growth areas and existing septic areas	- Services existing lands only - Local upgrades sensitive to intensification distribution
	Minimizes and manages construction risk	- Construction along major arterial - Consolidated upgrades downstream are still needed	- Construction along minor collector - Consolidated upgrades downstream are still needed
	Supports phased expansion of the system	- Can supports north expansion lands - Aligns with strengthening KG corridor	- Does not support North Expansion Lands - Relieves existing deficiencies
	Operational Complexity	- Additional sewer under major arterial road; minor changes in complexity	- No changes to existing complexity
	Resiliency to climate change	- New sewers to accommodate future PWWF - Sewers to Park Road North trunk at capacity	- Upsize Park Road North trunk sewer provides additional capacity
Environmental Impacts	Protects environment features	- No impact, construction in right-of way	- No impact, construction in right-of way
	Protects wildlife and species at risk	- No impact, construction in right-of way	- No impact, construction in right-of way
	Minimizes climate change impacts	- No changes	- No changes
Social and Cultural Impacts	Protects resident quality of life	- Improved LOS to properties along King George with septic - Sewers at capacity need more I/I reduction	- Maintained LOS to properties with septic - Sewers at capacity are upsized
	Manages and minimizes construction impacts	- High impact to traffic and businesses	- Moderate impact to local roads
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	Capital and life-cycle costs	- $$$$ - $19M	- $$ - $3.3M
	Operation and maintenance costs	- I/I needed upstream of Park Road North sewer	- Reduced I/I needs due to upsized sewer
	Aligns with approval and permitting process	- No land acquisition needed	- No land acquisition needed

Appendix E Table 3: Empey Street WWPS Catchment Alternative Evaluation

Category	Criteria	Alternative 1A: Existing Flow Split with Downtown Sewer & Empey Upgrades	Alternative 1B: Existing Flow Split with new Downtown Trunk Sewer	Alternative 2A: Redirect Flows to Empey WWPS and Deep Tunnel	Alternative 2B: Redirect Flows to Empey WWPS and Upgrade Empey WWPS
Technical Impacts	**Meets existing and future servicing needs**	- Yes	- Yes	- Yes	- Yes
	Provides a reliable service	- Services existing and growth - Reduced reliance on pumping	- Services existing and growth - Reduced reliance on pumping	- Services existing and growth - No reliance on pumping	- Services existing and growth - More reliance on pumping
	Minimizes and manages construction risk	- Minimal WWPS upgrades - Construction on minor collector/ local	- Minimal WWPS upgrades - Construction on major arterial	- Complex implementation - Optimizes flow split	- No sewer upgrades - Optimizes flow split
	Supports phased expansion of the system	- Utilizes Empey capacity - Limits sewer upgrades	- Utilizes Empey capacity - Significant new sewers	- Does not utilize Empey capacity - Significant new sewers	- Maximizes Empey capacity
	Operational Complexity	- Similar operational complexity	- Similar operational complexity	- Reduced complexity due to WWPS elimination	- Similar operational complexity - Continued use of Empey
	Resiliency to climate change	- New sewer provides additional capacity	- New sewer provides additional capacity	- New sewer provides additional capacity	- Higher reliance on pumping
Environmental Impacts	**Protects environment features**	- No impact, construction at existing facility	- Potential impacts dependent on alignment	- Potential impacts dependent on alignment	- No impact, construction at existing facility
	Protects wildlife and species at risk	- No impact, construction at existing facility	- Potential impacts dependent on alignment	- Potential impacts dependent on alignment	- No impact, construction at existing facility
	Minimizes climate change impacts	- GHG contribution from increased operation at WWPS	- GHG contribution from increased operation at WWPS	- Decommissioning Empey WWPS results in efficiency	- GHG contribution from increased operation at WWPS
Social and Cultural Impacts	**Protects resident quality of life**	- Maintains/improves current LOS to customers	- Maintains/improves current LOS to customers	- Maintains/improves current LOS to customers	- Maintains/improves current LOS to customers
	Manages and minimizes construction impacts	- High construction disruption	- High construction disruption	- High construction disruption	- Moderate construction disruption
	Protects cultural heritage and archeological features	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological	- Unknown impacts to Cultural Heritage and Archeological
Financial Impacts	**Capital and life-cycle costs**	- $$ - $9-13M	- $$$$ - $15-19M	- $$$$$$ - $34M	- $ - $2-6M
	Operation and maintenance costs	- Long term maintenance needs at Empey	- Long term maintenance needs at Empey	- Reduction in O&M due to decommissioning of Empey	- Long term O&M needs at Empey with increased capacity
	Aligns with approval and permitting process	- No site acquisition	- No site acquisition	- Site acquisition may be needed	- No site acquisition

Appendix E Table 4: Greenwich WWPS Catchment Alternative Evaluation

Category	Criteria	Alternative 1 – Optimize Flow Split and Divert Flows	Alternative 2 – Maintain Flow Split
Technical Impacts	Meets existing and future servicing needs	- Yes	- Yes
	Provides a reliable service	- Services existing and growth - Less reliant on Grand River crossings	- Services existing and growth - Maintains reliance of Grand River crossings
	Minimizes and manages construction risk	- Construction along minor arterial	- Sewer upgrades upstream of Greenwich WWPS along minor arterial and in easement
	Supports phased expansion of the system	- Optimize new Icomm trunk sewer capacity	- Catharine Street sewers at capacity
	Operational Complexity	- No changes to existing complexity	- No changes to existing complexity
	Resiliency to climate change	- Reduces reliance on high flows through two river crossings	- Increases reliance on high flows through two river crossings
Environmental Impacts	Protects environment features	- Additional diverted flows do not cross Grand River	- Diverted flows cross Grand River through two siphons
	Protects wildlife and species at risk	- No impact	- No impact
	Minimizes climate change impacts	- No changes	- No changes
Social and Cultural Impacts	Protects resident quality of life	- Maintains/improves current LoS to customers - I/I reduction is still required	- Maintains/improves current LoS to customers - I/I reduction is still required
	Manages and minimizes construction impacts	- Moderate construction impact to residents and businesses	- Moderate construction impact to residents and businesses
	Protects cultural heritage and archeological features	- Unknown impacts to CH and Archeo	- Unknown impacts to CH and Archeo
Financial Impacts	Capital and life-cycle costs	- $ - $3M	- $$ - $5M
	Operation and maintenance costs	- Marginally Reduced O&M needs at siphons	- Maintained or increased O&M needs at siphons
	Aligns with approval and permitting process	- No land acquisition needed	- No land acquisition needed

F

City of Brantford

APPENDIX F

CAPITAL PROGRAM PROJECT SHEETS

Wastewater Capital Program

Capital Program ID	Name	Overview	Sanitary Catchment	Project Description	Required Studies	Study Scope	Study Objectives	Class EA Schedule	Project Type	Size/Capacity	Length (m)	Class Estimate Type	Project Complexity	Accuracy Range	Area Condition	Funding Source/ Responsibility	Total Estimated Cost (2020$)	Timeline	DC Benefit to Existing Class
WW-SS-001	Oak Park Road Trunk Sewer	New trunk sewer extending from North-South Collector's Road to Oak Park Road along Powerline Road	WWTP	New trunk sewer extending from North-South Collector's Road to Oak Park Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Oak Park watermain alignment (Capital Program project W-M-001 and W-M-002) with costs shared between water and wastewater.	Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk sewer crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.	B	Sewer 5m	825 mm	3,578	Class 4	High	50%	Suburban	DC Eligible	$ 25,985,000	0-5 Years	A
WW-SS-002	North-South Collector's Road Trunk Sewer	New trunk sewer extending along North-South Collector's Road from East-West Collector's Road to Powerline Road	WWTP	New trunk sewer extending along North-South Collector's Road from East-West Collector's Road to Powerline Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	825 mm	405	Class 4	Low	30%	Rural	DC Eligible	$ 1,050,000	0-5 Years	A
WW-SS-003	North-South Collector's Road Trunk Sewer	New trunk sewer from northern East-West Collector's Road to North-South Collector's Road	WWTP	New trunk sewer extending along north-south collector's road from northern east-west collector's road to north-south collector's road to service lands north of east-west collector's road. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	525 mm	421	Class 4	Low	30%	Rural	DC Eligible	$ 577,000	10-20 Years	A
WW-SS-004	East-West Collector's Road Trunk Sewer (West of King George Road)	New trunk sewer along East-West Collector's Road from King George Road to Balmoral Drive road extension	Northwest-2 WWPS	New trunk sewer extending along east-west collector's road east of Northwest-2 WWPS and west of King George Road. Sewer sized to accommodatefull buildout.	-	-	-	A	Sewer 5m	525 mm	1,008	Class 4	Low	30%	Rural	DC Eligible	$ 1,382,000	10-20 Years	A
WW-SS-005	East-West Collector's Road Trunk Sewer (West of King George Road)	New trunk sewer along East-West Collector's Road from Balmoral Drive road extension to Northwest-2 WWPS	Northwest-2 WWPS	New trunk sewer extending along east-west collector's road east of Northwest-2 WWPS and west of King George Road. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	600 mm	400	Class 4	Low	30%	Rural	DC Eligible	$ 703,000	5-10 Years	A
WW-SS-006	East-West Collector's Road Trunk Sewer (East of King George Road)	New trunk sewer along East-West Collector's Road east of King George Road and west of of North WWPS.	North WWPS	New trunk sewer extending along east-west collector's road east of King George Road. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	525 mm	438	Class 4	Low	30%	Suburban	DC Eligible	$ 660,000	10-20 Years	A
WW-SS-007	East-West Collector's Road Trunk Sewer (East of King George Road)	New trunk sewer along East-West Collector's Road east of King George Road and west of of North WWPS.	North WWPS	New trunk sewer extending along east-west collector's road east of King George Road and west of North WWPS. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	675 mm	813	Class 4	Low	30%	Rural	DC Eligible	$ 1,758,000	10-20 Years	A
WW-SS-008	East-West Collector's Road Trunk Sewer (East of King George Road)	New trunk sewer along East-West Collector's Road east of King George Road and west of North WWPS.	North WWPS	New trunk sewer extending along east-west collector's road east of King George Road extending to North SPS. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	675 mm	397	Class 4	Low	30%	Rural	DC Eligible	$ 859,000	10-20 Years	A
WW-SS-009	East-West Collector's Road Trunk Sewer (East of North WWPS)	New trunk sewer along East-West Collector's Road east of North WWPS	Empey Street WWPS	New trunk sewer extending from North WWPS forcemain to west of Park Road North. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	675 mm	633	Class 4	Low	30%	Rural	DC Eligible	$ 1,841,000	5-10 Years	A
WW-SS-010	East-West Collector's Road Trunk Sewer (East of North WWPS)	New trunk sewer along East-West Collector's Road east of North WWPS	Empey Street WWPS	New trunk sewer extending from west of Park Road North to east of Wayne Gretzky Parkway. Sewer sized to accommodate full buildout.	-	-	-	A+	Sewer 5m	825 mm	621	Class 4	Low	30%	Rural	DC Eligible	$ 1,611,000	5-10 Years	A
WW-SS-011	East-West Collector's Road Trunk Sewer (East of North WWPS)	New trunk sewer along East-West Collector's Road east of North WWPS	Empey Street WWPS	New trunk sewer extending from east of Wayne Gretzky Parkway to Coulbeck Road trunk sewer. Sewer sized to accommodate full buildout.	-	-	-	A	Sewer 5m	975 mm	1,459	Class 4	Low	30%	Rural	DC Eligible	$ 6,104,000	0-5 Years	A
WW-SS-012	East Expansion Lands Trunk Sewer	New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George Road	East WWPS	New trunk sewer from Lynden Road to East WWPS along East collector's road	-	-	-	A	Sewer 5m	525 mm	1,966	Class 4	Low	30%	Rural	DC Eligible	$ 4,231,000	5-10 Years	A
WW-SS-013	Lynden Road Trunk Sewer Upgrades	Upgrades along Lynden Road to Brantwood Park Road trunk sewer	Empey Street WWPS	Upsize existing 250 mm sewer along Lynden Road from East SPS forcemain to Brantwood Park Road	-	-	-	A+	Sewer 5m	525 mm	356	Class 4	Med	40%	Suburban	DC Eligible	$ 588,000	0-5 Years	A
WW-SS-014	Mount Pleasant Road Trunk Sewer Upgrades	Upgrades to trunk sewer along Mount Pleasant Road	WWTP	Upgrade existing sewer along Mount Pleasant Road from Gilkison Street to the trunk sewer connection at Delamere Street.	-	-	-	A+	Sewer 5m	825 mm	735	Class 4	Med	40%	Suburban	DC Eligible	$ 2,302,000	0-5 Years	B
WW-SS-015	Mount Pleasant Road Trunk Sewer	New trunk sewer along Mount Pleasant Road	WWTP	New trunk sewers along Mount Pleasant Road from Tutela Heights Road to existing trunk sewer on Mount Pleasant Road.	-	-	-	A+	Sewer 5m	825 mm	675	Class 4	Med	40%	Suburban	DC Eligible	$ 2,114,000	0-5 Years	A
WW-SS-016	Tutela Heights Road Trunk Sewer	New trunk sewer along Tutela Heights Road	WWTP	New trunk sewers along Tutela Heights Road from Tutela Heights WWPS forcemain to Mount Pleasant Road.	-	-	-	A+	Sewer 5m	750 mm	790	Class 4	Med	40%	Rural	DC Eligible	$ 2,087,000	5-10 Years	A
WW-SS-017	Bodine Road Easement Sewer Upgrades	Upsize existing sewer from Roy Boulevard to Henry Street crossing under Highway 403	Empey Street WWPS	Upsize existing 975 mm sewer 270 m east of Bodine Road from Roy Boulevard to Henry Street crossing under Highway 403 to address future capacity issues. Sewer sized to accommodate full buildout. Project cost includes ongoing flow monitoring in existing trunk sewer to ensure I&I doesn't trigger project earlier than anticipated	-	-	-	A+	Sewer 5m	1350 mm	1,639	Class 4	High	50%	Suburban	DC Eligible	$ 22,997,000	20+ Years	B
WW-SS-018	North Ashgrove Avenue Sewer Upgrades	Upgrade existing sewers on Ashgrove Avenue	Empey Street WWPS	Upgrade existing 375-500 mm sewers on Memorial Drive from Kensington Drive to Ashgrove Avenue and on Ashgrove Avenue from Memorial Drive to the Homestead Place to address capacity issues in North Brantford.	-	-	-	A+	Sewer 5m	600 mm	1,595	Class 4	Low	30%	Suburban	City	$ 3,083,000	0-5 Years	C
WW-SS-019	Summerhayes Crescent Servicing Study	Study to determine feasibility of connecting Summerhayes Crescent to existing or proposed sewer system in North Brantford.	-	Feasibility study to assess the connection of the exising septic service lands to the existing King George sewer or pumping the services to WW-SS-006 and North WWPS. Feasibility study to determine sewer upsizing needs.	Feasibility Study.	The study will be a feasibility study to determine if the existing Summerhayes subdivision can be connected to the City's wastewater system.	Determine the best servicing strategy for the Summerhayes subdivision including maintaining existing septic systems, connecting to existing King George Road sewer including any potential sewer upsizing or pumping flows to proposed North WWPS in North Expansion Lands.	B	Sewer 5m	0 mm	-	Class 4	Low	30%	Rural	City	$ 150,000	0-5 Years	E
WW-SS-020	Henry Street Flow Split Reconfiguration	Reconfigure flow split at Henry Street and Wayne Gretzky Streeet	Empey Street WWPS	Reconfigure sewer flow split to redirect flows to Empey WWPS to relieve downstream sewer capacity constraints	-	-	-	A+	Sewer 10m	825 mm	50	Class 4	High	50%	Urban	DC Eligible	$ 493,000	0-5 Years	D
WW-SS-021	Grand River Avenue Sewer Upgrades	Upsize existing sewers from Jubilee Avenue to Icomm Drive	Greenwich Street WWPS	Optimize Grand River Avenue and Jubilee Avenue flow split by diverting more flows to Grand River Avenue. Upsize existing 300 mm sanitary sewers along Grand River Avenue to accommodate increased flows.	-	-	-	A+	Sewer 5m	525 mm	1,369	Class 4	High	50%	Suburban	City	$ 3,653,000	5-10 Years	E
WW-SS-022	Oakhill Sewer Upgrades	Upsize existing sewers from Jennings Road to Colborne Street West	WWTP	Existing sewer downsizes from 1050 mm to 675/750 mm. Upsize sewer to accommodate growth flows from the North Expansion Lands as well as address any potential operational issues due to the smaller sewer diameter.	-	-	-	A+	Sewer 5m	1050 mm	1,128	Class 4	Med	40%	Suburban	DC Eligible	$ 4,963,000	10-20 Years	B
WW-SS-023	Downtown Sewers	0	WWTP	0	-	-	-	A+	Sewer 5m	525 mm	40,000	Class 4	Med	40%	Suburban	Developer/City	$ 6,103,000	10-20 Years	C
WW-SS-024	Mohawk Street Sewer Upgrades	Upsize existing sewer on Mohawk Street from Mohawk Street siphon (south of Forest Road) to WWTP entrance	Empey Street WWPS	Upsize existing 1200 mm sewer on Mohawk Street from Mohawk Street siphon (south of Forest Road) to WWTP entrance to address future capacity issues. Sewer sized to accommodate full buildout. Project cost includes ongoing flow monitoring in existing trunk sewer to ensure I&I doesn't trigger project earlier than anticipated.	-	-	-	A+	Sewer 5m	1350 mm	915	Class 4	High	50%	Suburban		$ 5,902,000	20+ Years	B
WW-FM-001	Northwest-1 WWPS Forcemain	New forcemain for Northwest-1 WWPS	WWTP	New forcemain extending from Northwest-1 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate North Expansion Lands flows with space to allow for potential twinning for full buildout flows.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-1 WWPS (Costs included in Capital Program project WW-PS-001).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	250 mm	894	Class 4	Low	30%	Rural	DC Eligible	$ 982,000	10-20 Years	A
WW-FM-002	Northwest-2 WWPS Forcemain	New Northwest-2 WWPS forcemain	WWTP	New forcemain extending from Northwest-2 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate existing flows and full buildout flows.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-2 WWPS (Costs included in Capital Program project WW-PS-002).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	400 mm	1,448	Class 4	Med	40%	Suburban	DC Eligible	$ 2,948,000	5-10 Years	A
WW-FM-003	North WWPS Forcemain	New North WWPS forcemain	Empey Street WWPS	New forcemain from North WWPS to east-west collector road trunk sewer. Forcemain sized to accommodate existing flows and trigger land flows.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the North WWPS (Costs included in Capital Program project WW-PS-003).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	350 mm	592	Class 4	Low	30%	Rural	DC Eligible	$ 882,000	10-20 Years	A
WW-FM-004	Northeast WWPS Forcemain	New Northeast WWPS forcemain.	Empey Street WWPS	New forcemain from Northeast WWPS to Coulbeck Road trunk sewer. Forcemain sized to accommodate existing flows and full buildout.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northeast WWPS (Costs included in Capital Program project WW-PS-004).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	200 mm	525	Class 4	Low	30%	Rural	DC Eligible	$ 582,000	0-5 Years	A
WW-FM-005	East WWPS Forcemain	New East WWPS forcemain	0	New forcemain extending from East WWPS to Lynden Road trunk sewer	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the East WWPS (Costs included in Capital Program project WW-PS-005).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	350 mm	2,307	Class 4	Med	40%	Suburban	DC Eligible	$ 3,974,000	5-10 Years	A
WW-FM-006	Tutela Heights WWPS Forcemain	New Tutela Heights WWPS forcemain.	WWTP	New forcemain extending from Tutela Heights WWPS to Tutela Heights Road trunk sewer	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Tutela Heights WWPS (Costs included in Capital Program project WW-PS-006).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Forcemain	350 mm	1,235	Class 4	Low	30%	Suburban	DC Eligible	$ 1,826,000	10-20 Years	A
WW-PS-001	Northwest-1 Wastewater Pumping Station	New WWPS located northeast of Golf Road.	WWTP	New WWPS located northeast of Golf Road. Flows will be pumped to the trunk sewer along north-south collector road, draining to Oak Park Road. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-1 WWPS forcemain alignment (Capital Program project WW-FM-001) .	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	27 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 2,405,000	10-20 Years	A
WW-PS-002	Northwest-2 Wastewater Pumping Station	New WWPS located east of Golf Road.	WWTP	New SPS located east of Golf Road on east-west collector's road. Flows will be pumped to the trunk sewer along the north-south collector road, draining to Oak Park Road. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-12WWPS forcemain alignment (Capital Program project WW-FM-002).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	124 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 5,444,000	5-10 Years	A
WW-PS-003	North Wastewater Pumping Station	New WWPS located along the East-West Collector's Road	Empey Street WWPS	New WWPS located along the east-west collector's road between King George Road and Park Road, south of Jones Creek. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the North WWPS forcemain alignment (Capital Program project WW-FM-003).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	101 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 4,462,000	10-20 Years	A
WW-PS-004	Northeast Wastewater Pumping Station	New WWPS located along Powerline Road, east of Coulbeck Road.	Empey Street WWPS	New WWPS located along Powerline Road, east of Coulbeck Road. Flows will be pumped to Coulbeck Road trunk sewer.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the NortheastWWPS forcemain alignment (Capital Program project WW-FM-004).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	37 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 3,240,000	0-5 Years	A
WW-PS-005	East Wastewater Pumping Station	New WWPS located in southeast East Expansion Lands	Empey Street WWPS	New WWPS located in southeast East Expansion Lands along collector road. Flows will be pumped to trunk sewer on Lynden Road	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the East WWPS forcemain alignment (Capital Program project WW-FM-005).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	92 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 4,078,000	5-10 Years	A

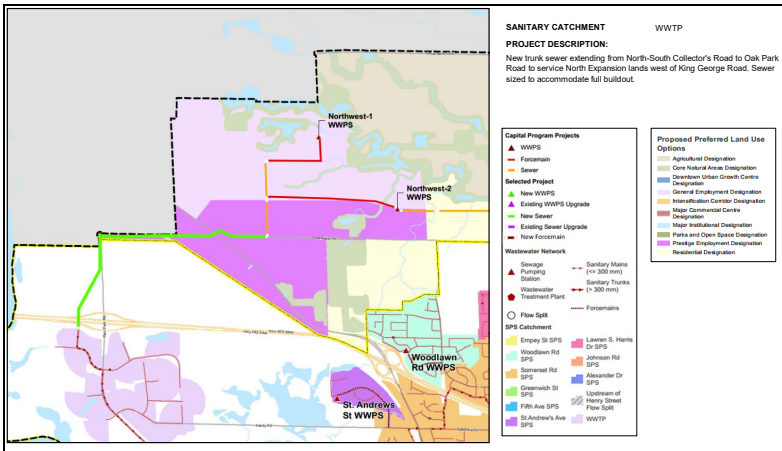
WW-PS-006	Tutela Heights Wastewater Pumping Station	New WWPS located in Tutela Heights	WWTP	New WWPS located in south Tutela Heights along collector road. Flows to be pumped to trunk sewer on Tutela Heights Road, extending to Mount Pleasant Road trunk sewer.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Tutela Heights WWPS forcemain alignment (Capital Program project WW-FM-006).	Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.	B	Pumping	44 L/s	-	Class 4	High	50%	Rural	DC Eligible	$ 2,406,000	10-20 Years	A
WW-PS-007	Empey Street WWPS Storage Upgrades	Increase existing Empey Street WWPS storage	WWTP	Twinned Wet Well (Duplicate of existing 0.5 ML of storage), 2 ML Storage Chamber, includes 4 new pumps and a new control building.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.	Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.	B	Pumping	0 L/s	-	Class 4	Med	40%	Rural	DC Eligible	$ 15,100,000	0-5 Years	D
WW-PS-008	Empey Street WWPS Rehabilitation and Improvements	Address operational concerns related to station capacity.	WWTP	Renewal to meet current flow needs including maintenance and repair, rehabilitation, renewal to meet current flow needs.	Feasibility Study.	The study will be a feasibility study to determine the rehab required at Empey WWPS.	Determine the best rehabilitation strategy for the Empey WWPS to address known existing issues, facility age, condition and performance.	A	Pumping	0 L/s	-	Class 4	Med	40%	Rural	City	$ 2,100,000	0-5 Years	E
WW-PS-009	Fifth Avenue Wastewater Pumping Station Upgrades	Upgrade capacity to accommodate existing and future flows.	WWTP	Station upgrades at existing WWPS including upgrading capacity to 130 L/s, and a new forcemain (twinned).	-	-	-	A	Pumping	0 L/s	-	Class 4	Med	40%	Suburban	City	$ 3,512,000	Completion 2021	D
WW-PS-010	Fifth Avenue WWPS Storage Upgrades	Upgrade wet well capacity to accommodate existing and future flows.	WWTP	Add 1 hour of storage to accommodate peak flows, 468 m3 of storage, to address existing and future peak weather flow storage deficit.	-	-	-	A	Pumping	468 L/s	-	Class 4	Med	40%	Suburban	City	$ 2,134,000	0-5 Years	E
WW-PS-011	Greenwich Wastewater Pumping Station Rehabilitation and Improvements	Address operational concerns related to station capacity.	WWTP	Renewal to meet current flow needs including maintenance and repair, rehabilitation and replacing existing pumps with new pumps and non-clog impellers to reduce plugging. Pumps to be selected to match current firm capacity to preservice the existing station capacity.	-	-	-	A	Pumping	0 L/s	-	Class 4	Med	40%	Rural	City	$ 900,000	0-5 Years	E
WW-PS-012	St. Andrews WWPS Storage Upgrades	Upgrade wet well capacity to accommodate existing and future flows.	WWTP	Add an additional 20 m3 of storage to address existing and future peak weather flow storage deficit.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.	Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.	B	Pumping	20 m3	-	Class 4	Low	30%	Suburban	City	$ 243,000	0-5 Years	E
WW-PS-013	Johnson WWPS Storage Upgrades	Upgrade wet well capacity to accommodate existing and future flows.	WWTP	Add an additional 115 m3 of storage to address existing and future peak weather flow storage deficit.	Municipal Class Environmental Assessment (EA)	The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.	Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.	B	Pumping	115 m3	-	Class 4	Low	30%	Suburban	City	$ 559,000	0-5 Years	E
WW-PS-014	Johnson WWPS Rehabilitation	Upgrade capacity to accommodate existing and future flows.	WWTP	Rehabilitation, maintenance and repair to address operational concerns related to WWPS.	Feasibility Study.	The study will be a feasibility study to determine the rehab required at the Johnson WWPS	Determine the best rehabilitation strategy for the Johnson WWPS to address known existing issues, facility age, condition and performance.	A	Pumping		-	Class 4	Low	30%	Suburban	City	$ 400,000	0-5 Years	E
WW-PS-015	Woodlawn WWPS Rehabilitation	Upgrade capacity to accommodate existing and future flows.	WWTP	Rehabilitation, maintenance and repair to address operational concerns related to WWPS.	Feasibility Study.	The study will be a feasibility study to determine the rehab required at the Woodlawn WWPS	Determine the best rehabilitation strategy for the Woodlawn WWPS to address known existing issues, facility age, condition and performance.	A	Pumping		-	Class 4	Low	30%	Suburban	City	$ 400,000	0-5 Years	C
WW-II-001	Flow Monitoring	City wide flow monitoring program.	0	City wide flow monitoring program to address existing issues and provide guidance for wet weather flow management practices.	-	-	-		Wet Weather Reduction		-	Class 4	Low	30%	Suburban	City	$ 8,423,000	0-5 Years	C
WW-II-002	City Wide I&I Program	Wet weather management program to address growth and existing issues.	WWTP	City wide I&I reduction program based on flow monitoring results to address existing issues.	-	-	-		Wet Weather Reduction		-	Class 4	Med	40%	Rural	City	$ 26,738,000	0-5 Years	D
WW-II-003	Greenwich WWPS I&I Reduction	I&I program to manage peak flows in Greenwich WWPS catchment	WWTP	Greenwich WWPS catchment subject to high I&I in catchment. Initiate I&I program to manage peak flows to free up capacity at existing WWPS.	-	-	-		Wet Weather Reduction		-	Class 4	Med	40%	Rural	City	$ 5,568,000	0-5 Years	D
WW-II-004	Johnson WWPS I&I Reduction	I&I program to manage peak flows in John WWPS catchment	0	Johnson WWPS catchment subject to very high I&I in catchment. Initiate I&I program to manage peak flows to free up capacity at existing WWPS.	-	-	-		Wet Weather Reduction		-	Class 4	Med	40%	Rural	City	$ 5,568,000	0-5 Years	D
WW-TP-001	Wastewater Treatment Plant Upgrades - 0-5 Years	Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.	WWTP	Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.	-	-	-	A+	Treatment		-	Class 4	Med	40%	Rural	DC Eligible	$ 7,575,000	0-5 Years	C
WW-TP-002	Wastewater Treatment Plant Upgrades - 5-10 Years	Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.	WWTP	Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.	-	-	-	A+	Treatment		-	Class 4	Med	40%	Rural	DC Eligible	$ 5,568,000	5-10 Years	B
WW-TP-003	Wastewater Treatment Plant Upgrades - 10-15 Years	Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.	WWTP	Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.	-	-	-	A+	Treatment		-	Class 4	Med	40%	Rural	DC Eligible	$ 10,303,000	10-20 Years	B
TOTAL																	**$ 229,516,000**		

PROJECT NO.: WW-SS-001 **TIMELINE:** 0-5 Years

PROJECT NAME: Oak Park Road Trunk Sewer

PROJECT OVERVIEW: New trunk sewer extending from North-South Collector's Road to Oak Park Road along Powerline Road

MAP



SANITARY CATCHMENT WWTP

PROJECT DESCRIPTION:
New trunk sewer extending from North-South Collector's Road to Oak Park Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Oak Park watermain alignment (Capital Program project W-M-001 and W-M-002) with costs shared between water and wastewater.

OBJECTIVES: Determine the best alignment and construction type (ie. Open cut or tunnel) for the trunk sewer crossing Highway 403 including a railway crossing and overhead powerlines along Powerline Road. Determine if alignment can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm	
TOTAL LENGTH:	3578 m	
Tunnelled	0 m	0%
Open Cut - 5m	2578 m	100%
Open Cut - 10m	1000 m	

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 5m
CONSTRUCTION ASSUMPTION:	Sewer 10m

COST ESTIMATION SPREADSHEET

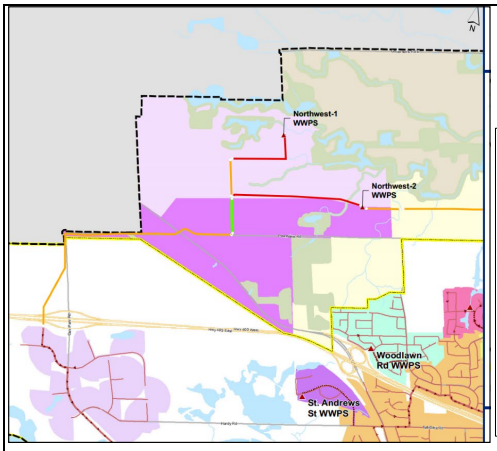
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA			1	$200,000	$200,000	
Sub-Total Study Costs						**$200,000**	
Construction Cost							
Pipe Construction - Open Cut (5m)			m	2578 m	$1,552	$4,001,390	Existing road ROW & expansion lands
Pipe Construction - Open Cut (10m)			m	1000 m	$3,912	$3,911,616	Existing road ROW & expansion lands
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	1	$708,000	$708,000	Paris Road
Major Road Crossings (Highway)			ea.	1	$1,590,000	$1,590,000	Highway 403
Utility Crossings			ea.	2	$708,000	$1,416,000	Railway Crossing (two tracks)
Pipe Construction Uplift (Based on Area Conditions)	10%					$1,162,701	
Additional Construction Costs	20%		ea.			$2,557,941	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,278,971	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$16,627,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$332,500	
Geotechnical Sub-Total Cost						**$332,500**	
Property Requirements	2.0%					$ 332,500	
Property Requirements Sub-Total						**$332,500**	
Consultant Engineering/Design	12%					$ 1,995,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,995,200**	
In House Labour/Engineering/Wages/CA	6%					$ 997,600	
In-house Labour/Wages Sub-Total						**$997,600**	
Project Contingency	25%					$5,071,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$5,071,000**	
Non-Refundable HST	1.76%					$428,700	
Non-Refundable HST Sub-Total						**$428,700**	
Total (2020 Dollars)						**$25,985,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$25,985,000**	**2020 Estimate**

PROJECT NO.: WW-SS-002 **TIMELINE:** 0-5 Years

PROJECT NAME: North-South Collector's Road Trunk Sewer

PROJECT OVERVIEW: New trunk sewer extending along North-South Collector's Road from East-West Collector's Road to Powerline Road

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New trunk sewer extending along North-South Collector's Road from East-West Collector's Road to Powerline Road to service North Expansion lands west of King George Road. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm	
TOTAL LENGTH:	405 m	
Tunnelled	0 m	0%
Open Cut	405 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

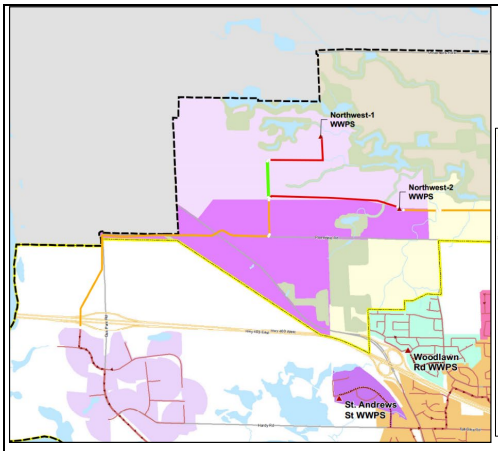
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	405 m	$1,552	$628,612	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	0	$708,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,590,000	$0	
Utility Crossings			ea.	0	$708,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$62,861	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$62,861	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$754,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$3,800	
Geotechnical Sub-Total Cost						**$3,800**	
Property Requirements	1.0%					$ 7,500	
Property Requirements Sub-Total						**$7,500**	
Consultant Engineering/Design	15%					$ 113,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$113,100**	
In House Labour/Engineering/Wages/CA	8%					$ 60,300	
In-house Labour/Wages Sub-Total						**$60,300**	
Project Contingency	10%					$94,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$94,000**	
Non-Refundable HST	1.76%					$17,100	
Non-Refundable HST Sub-Total						**$17,100**	
Total (2020 Dollars)						**$1,050,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,050,000**	2020 Estimate

PROJECT NO.: WW-SS-003 **TIMELINE:** 10-20 Years

PROJECT NAME: North-South Collector's Road Trunk Sewer

PROJECT OVERVIEW: New trunk sewer from northern East-West Collector's Road to North-South Collector's Road

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New trunk sewer extending along north-south collector's road from northern east-west collector's road to north-south collector's road to service lands north of east-west collector's road. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm	
TOTAL LENGTH:	421 m	
Tunnelled	0 m	0%
Open Cut	421 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

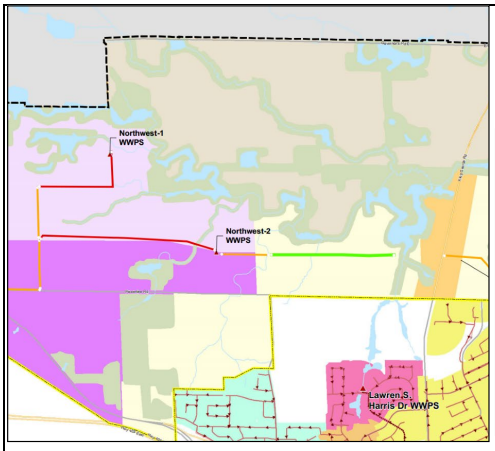
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	421 m	$820	$345,288	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$6,500	$0	
Minor Creek Crossings			ea.	0	$200,000	$0	
Major Creek Crossings			ea.	0	$1,045,000	$0	
Road Crossings			ea.	0	$460,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,045,000	$0	
Utility Crossings			ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$34,529	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$34,529	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$414,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$2,100	
Geotechnical Sub-Total Cost						**$2,100**	
Property Requirements	1.0%					$ 4,100	
Property Requirements Sub-Total						**$4,100**	
Consultant Engineering/Design	15%					$ 62,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$62,100**	
In House Labour/Engineering/Wages/CA	8%					$ 33,100	
In-house Labour/Wages Sub-Total						**$33,100**	
Project Contingency	10%					$52,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$52,000**	
Non-Refundable HST	1.76%					$9,400	
Non-Refundable HST Sub-Total						**$9,400**	
Total (2020 Dollars)						**$577,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$577,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-SS-004
TIMELINE: 10-20 Years
PROJECT NAME: East-West Collector's Road Trunk Sewer (West of King George Road)
PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road from King George Road to Balmoral Drive road extension

MAP



SANITARY CATCHMENT: Northwest-2 WWPS

PROJECT DESCRIPTION:
New trunk sewer extending along east-west collector's road east of Northwest-2 WWPS and west of King George Road. Sewer sized to accommodatefull buildout.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm	
TOTAL LENGTH:	1008 m	
Tunnelled	0 m	0%
Open Cut	1008 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1008 m	$820	$826,723	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$6,500	$0	
Minor Creek Crossings			ea.	0	$200,000	$0	
Major Creek Crossings			ea.	0	$1,045,000	$0	
Road Crossings			ea.	0	$460,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,045,000	$0	
Utility Crossings			ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$82,672	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$82,672	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$992,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$5,000	
Geotechnical Sub-Total Cost						**$5,000**	
Property Requirements	1.0%					$ 9,900	
Property Requirements Sub-Total						**$9,900**	
Consultant Engineering/Design	15%					$ 148,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$148,800**	
In House Labour/Engineering/Wages/CA	8%					$ 79,400	
In-house Labour/Wages Sub-Total						**$79,400**	
Project Contingency	10%					$124,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$124,000**	
Non-Refundable HST	1.76%					$22,500	
Non-Refundable HST Sub-Total						**$22,500**	
Total (2020 Dollars)						**$1,382,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,382,000**	**2020 Estimate**

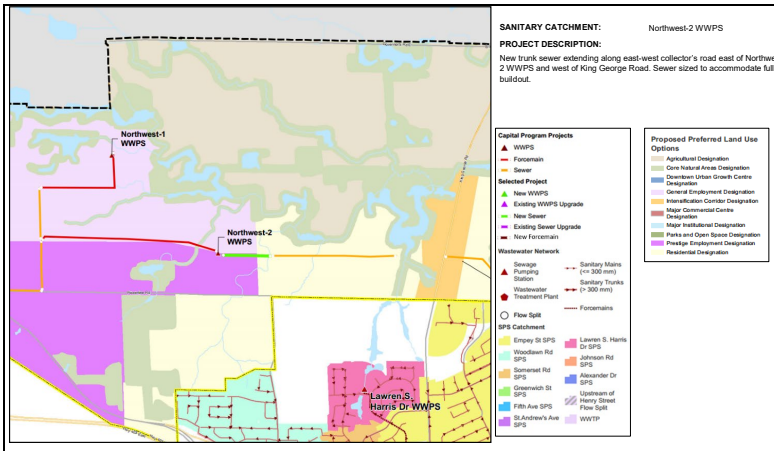
City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-SS-005 **TIMELINE:** 5-10 Years

PROJECT NAME: East-West Collector's Road Trunk Sewer (West of King George Road)

PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road from Balmoral Drive road extension to Northwest-2 WWPS

MAP



SANITARY CATCHMENT: Northwest-2 WWPS

PROJECT DESCRIPTION:
New trunk sewer extending along east-west collector's road east of Northwest-2 WWPS and west of King George Road. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	400 m	
Tunnelled	0 m	0%
Open Cut	400 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

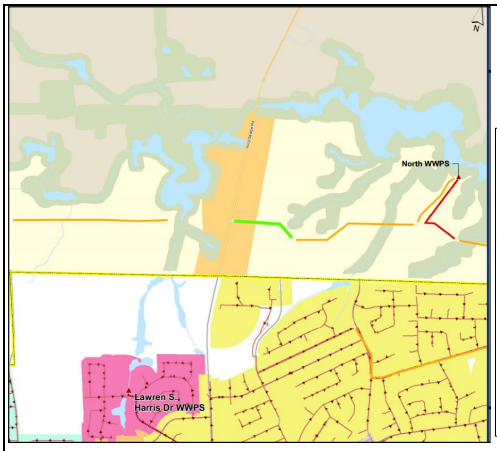
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	400 m	$1,052	$420,648	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$8,000	$0	
Minor Creek Crossings			ea.	0	$230,000	$0	
Major Creek Crossings			ea.	0	$1,270,000	$0	
Road Crossings			ea.	0	$550,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,270,000	$0	
Utility Crossings			ea.	0	$550,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$42,065	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$42,065	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$505,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$2,500	
Geotechnical Sub-Total Cost						**$2,500**	
Property Requirements	1.0%					$ 5,100	
Property Requirements Sub-Total						**$5,100**	
Consultant Engineering/Design	15%					$ 75,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$75,800**	
In House Labour/Engineering/Wages/CA	8%					$ 40,400	
In-house Labour/Wages Sub-Total						**$40,400**	
Project Contingency	10%					$63,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$63,000**	
Non-Refundable HST	1.76%					$11,500	
Non-Refundable HST Sub-Total						**$11,500**	
Total (2020 Dollars)						**$703,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$703,000**	2020 Estimate

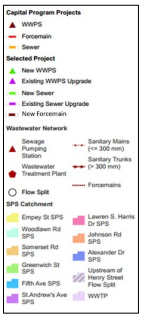
PROJECT NO.: WW-SS-006 **TIMELINE:** 10-20 Years

PROJECT NAME: East-West Collector's Road Trunk Sewer (East of King George Road)

PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of King George Road and west of of North WWPS.

MAP





SANITARY CATCHMENT: North WWPS

PROJECT DESCRIPTION:
New trunk sewer extending along east-west collector's road east of King George Road. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm
TOTAL LENGTH:	438 m

Tunnelled	0 m	0%
Open Cut	438 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

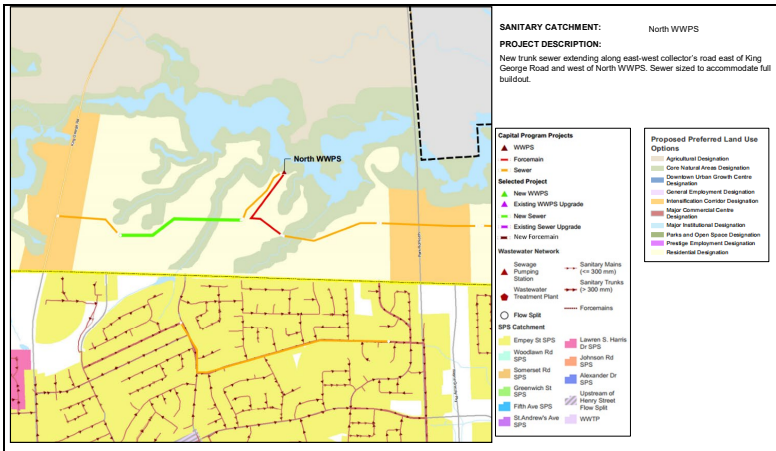
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	438 m	$820	$359,231	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$6,500	$0	
Minor Creek Crossings			ea.	0	$200,000	$0	
Major Creek Crossings			ea.	0	$1,045,000	$0	
Road Crossings			ea.	0	$460,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,045,000	$0	
Utility Crossings			ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$35,923	
Additional Construction Costs	10%		ea.			$39,515	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$39,515	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$474,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$2,400	
Geotechnical Sub-Total Cost						**$2,400**	
Property Requirements	1.0%					$ 4,700	
Property Requirements Sub-Total						**$4,700**	
Consultant Engineering/Design	15%					$ 71,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$71,100**	
In House Labour/Engineering/Wages/CA	8%					$ 37,900	
In-house Labour/Wages Sub-Total						**$37,900**	
Project Contingency	10%					$59,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$59,000**	
Non-Refundable HST	1.76%					$10,800	
Non-Refundable HST Sub-Total						**$10,800**	
Total (2020 Dollars)						**$660,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$660,000**	**2020 Estimate**

PROJECT NO.: WW-SS-007 **TIMELINE:** 10-20 Years

PROJECT NAME: East-West Collector's Road Trunk Sewer (East of King George Road)

PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of King George Road and west of of North WWPS.

MAP



SANITARY CATCHMENT: North WWPS

PROJECT DESCRIPTION:
New trunk sewer extending along east-west collector's road east of King George Road and west of North WWPS. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	675 mm	
TOTAL LENGTH:	813 m	
Tunnelled	0 m	0%
Open Cut	813 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

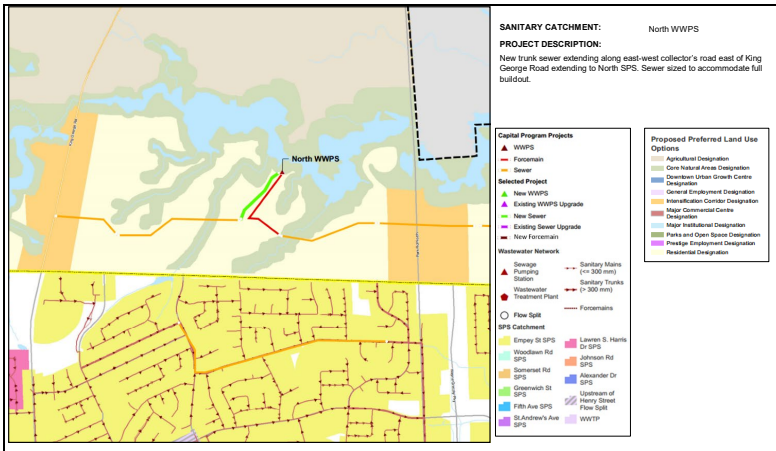
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	813 m	$1,295	$1,052,741	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$8,100	$0	
Minor Creek Crossings			ea.	0	$282,000	$0	
Major Creek Crossings			ea.	0	$1,335,000	$0	
Road Crossings			ea.	0	$606,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,335,000	$0	
Utility Crossings			ea.	0	$606,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$105,274	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$105,274	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,263,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$6,300	
Geotechnical Sub-Total Cost						**$6,300**	
Property Requirements	1.0%					$ 12,600	
Property Requirements Sub-Total						**$12,600**	
Consultant Engineering/Design	15%					$ 189,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$189,500**	
In House Labour/Engineering/Wages/CA	8%					$ 101,000	
In-house Labour/Wages Sub-Total						**$101,000**	
Project Contingency	10%					$157,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$157,000**	
Non-Refundable HST	1.76%					$28,700	
Non-Refundable HST Sub-Total						**$28,700**	
Total (2020 Dollars)						**$1,758,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,758,000**	**2020 Estimate**

PROJECT NO.: WW-SS-008 **TIMELINE:** 10-20 Years

PROJECT NAME: East-West Collector's Road Trunk Sewer (East of King George Road)

PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of King George Road and west of North WWPS.

MAP



SANITARY CATCHMENT: North WWPS

PROJECT DESCRIPTION:
New trunk sewer extending along east-west collector's road east of King George Road extending to North SPS. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	675 mm	
TOTAL LENGTH:	397 m	
Tunnelled	0 m	0%
Open Cut	397 m	100%

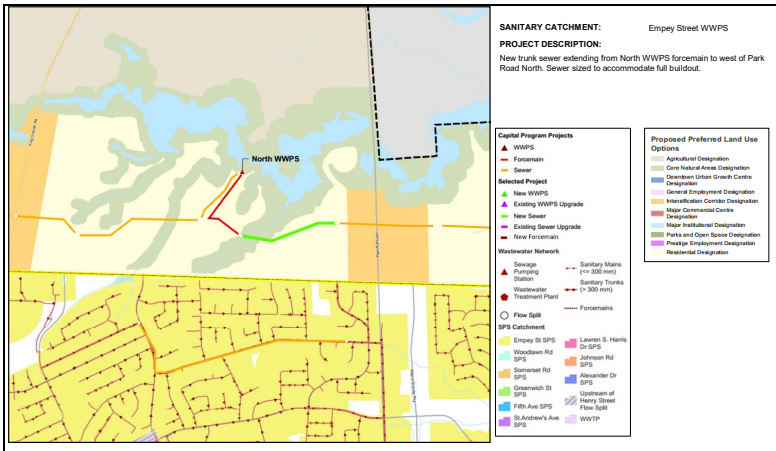
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost						
Study	Feasibility Study				$0	
Study	EA				$0	
Sub-Total Study Costs					**$0**	
Construction Cost						
Pipe Construction - Open Cut		m	397 m	$1,295	$514,069	Proposed Collector Road ROW
Pipe Construction - Tunneling		m	0 m	$8,100	$0	
Minor Creek Crossings		ea.	0	$282,000	$0	
Major Creek Crossings		ea.	0	$1,335,000	$0	
Road Crossings		ea.	0	$606,000	$0	
Major Road Crossings (Highway)		ea.	0	$1,335,000	$0	
Utility Crossings		ea.	0	$606,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%				$0	
Additional Construction Costs	10%	ea.			$51,407	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%	ea.			$51,407	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs					**$617,000**	
SANITARY CATCHMENT:	**SANITARY CATCHMENT:**	**SANITARY CATCHMENT:**	**SANITARY CATCHMENT:**		**SANITARY CATCHMENT:**	**SANITARY CATCHMENT:**
Geotechnical / Hydrogeological / Materials	0.5%				$3,100	
Geotechnical Sub-Total Cost					**$3,100**	
Property Requirements	1.0%				$ 6,200	
Property Requirements Sub-Total					**$6,200**	
Consultant Engineering/Design	15%				$ 92,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total					**$92,600**	
In House Labour/Engineering/Wages/CA	8%				$ 49,400	
In-house Labour/Wages Sub-Total					**$49,400**	
Project Contingency	10%				$77,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total					**$77,000**	
Non-Refundable HST	1.76%				$14,000	
Non-Refundable HST Sub-Total					**$14,000**	
Total (2020 Dollars)					**$859,000**	Rounded to nearest $1,000
Other Estimate						
Chosen Estimate					**$859,000**	2020 Estimate

PROJECT NO.: WW-SS-009 **TIMELINE:** 5-10 Years
PROJECT NAME: East-West Collector's Road Trunk Sewer (East of North WWPS)
PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of North WWPS

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New trunk sewer extending from North WWPS forcemain to west of Park Road North. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	675 mm
TOTAL LENGTH:	633 m

Tunnelled	0 m	0%
Open Cut	633 m	100%

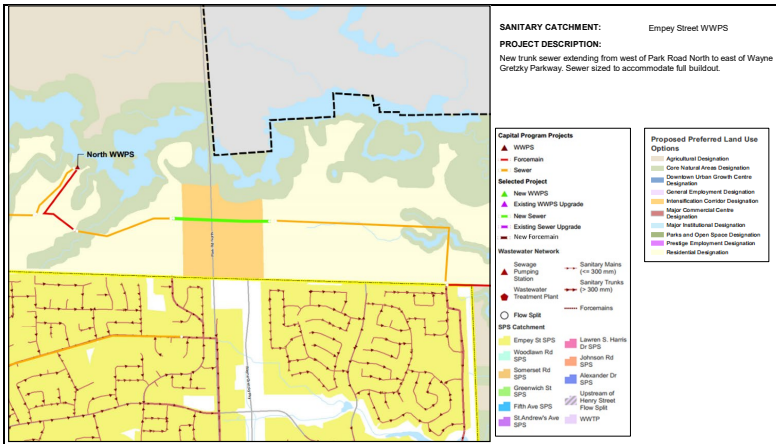
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	633 m	$1,295	$819,662	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$8,100	$0	
Minor Creek Crossings			ea.	1	$282,000	$282,000	
Major Creek Crossings			ea.	0	$1,335,000	$0	
Road Crossings			ea.	0	$606,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,335,000	$0	
Utility Crossings			ea.	0	$606,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$110,166	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$110,166	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,322,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$6,600	
Geotechnical Sub-Total Cost						**$6,600**	
Property Requirements	1.0%					$ 13,200	
Property Requirements Sub-Total						**$13,200**	
Consultant Engineering/Design	15%					$ 198,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$198,300**	
In House Labour/Engineering/Wages/CA	8%					$ 105,800	
In-house Labour/Wages Sub-Total						**$105,800**	
Project Contingency	10%					$165,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$165,000**	
Non-Refundable HST	1.76%					$30,000	
Non-Refundable HST Sub-Total						**$30,000**	
Total (2020 Dollars)						**$1,841,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,841,000**	**2020 Estimate**

PROJECT NO.: WW-SS-010 **TIMELINE:** 5-10 Years
PROJECT NAME: East-West Collector's Road Trunk Sewer (East of North WWPS)
PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of North WWPS

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New trunk sewer extending from west of Park Road North to east of Wayne Gretzky Parkway. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm	
TOTAL LENGTH:	621 m	
Tunnelled	0 m	0%
Open Cut	621 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

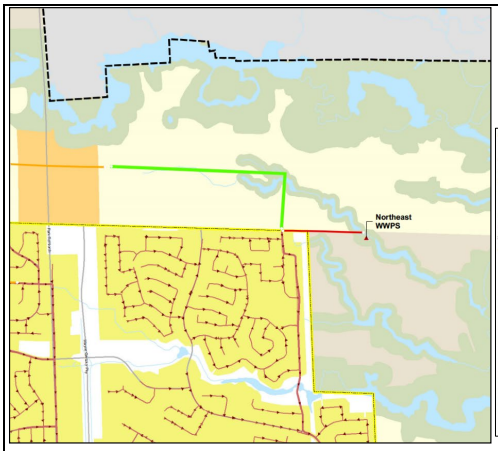
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	621 m	$1,552	$963,872	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	0	$708,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,590,000	$0	
Utility Crossings			ea.	0	$708,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$96,387	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$96,387	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,157,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$5,800	
Geotechnical Sub-Total Cost						**$5,800**	
Property Requirements	1.0%					$ 11,600	
Property Requirements Sub-Total						**$11,600**	
Consultant Engineering/Design	15%					$ 173,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$173,600**	
In House Labour/Engineering/Wages/CA	8%					$ 92,600	
In-house Labour/Wages Sub-Total						**$92,600**	
Project Contingency	10%					$144,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$144,000**	
Non-Refundable HST	1.76%					$26,300	
Non-Refundable HST Sub-Total						**$26,300**	
Total (2020 Dollars)						**$1,611,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,611,000**	**2020 Estimate**

PROJECT NO.: WW-SS-011 **TIMELINE:** 0-5 Years

PROJECT NAME: East-West Collector's Road Trunk Sewer (East of North WWPS)

PROJECT OVERVIEW: New trunk sewer along East-West Collector's Road east of North WWPS

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New trunk sewer extending from east of Wayne Gretzky Parkway to Coulbeck Road trunk sewer. Sewer sized to accommodate full buildout.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	975 mm	
TOTAL LENGTH:	1459 m	
Tunnelled	0 m	0%
Open Cut	1459 m	100%

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

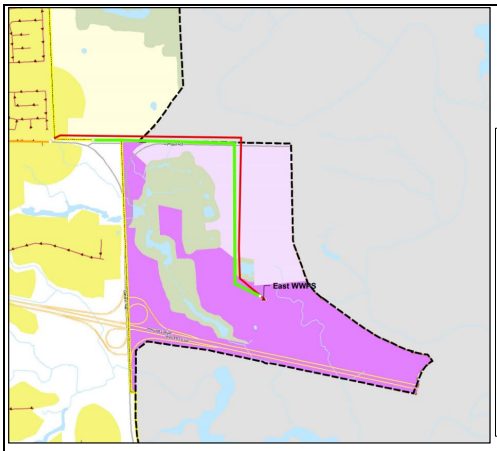
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1459 m	$1,968	$2,871,068	Proposed Collector Road ROW
Pipe Construction - Tunneling			m	0 m	$10,200	$0	
Minor Creek Crossings			ea.	0	$374,000	$0	
Major Creek Crossings			ea.	0	$1,700,000	$0	
Road Crossings			ea.	1	$782,000	$782,000	Powerline Road
Major Road Crossings (Highway)			ea.	0	$1,700,000	$0	
Utility Crossings			ea.	0	$782,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$365,307	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$365,307	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$4,384,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$21,900	
Geotechnical Sub-Total Cost						**$21,900**	
Property Requirements	1.0%					$ 43,800	
Property Requirements Sub-Total						**$43,800**	
Consultant Engineering/Design	15%					$ 657,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$657,600**	
In House Labour/Engineering/Wages/CA	8%					$ 350,700	
In-house Labour/Wages Sub-Total						**$350,700**	
Project Contingency	10%					$546,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$546,000**	
Non-Refundable HST	1.76%					$99,500	
Non-Refundable HST Sub-Total						**$99,500**	
Total (2020 Dollars)						**$6,104,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$6,104,000**	2020 Estimate

PROJECT NO.: WW-SS-012 **TIMELINE:** 5-10 Years

PROJECT NAME: East Expansion Lands Trunk Sewer

PROJECT OVERVIEW: New trunk watermain along East-West Collector Road in Pressure District 2/3 east of King George Road

MAP



SANITARY CATCHMENT: East WWPS

PROJECT DESCRIPTION:
New trunk sewer from Lynden Road to East WWPS along East collector's road

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm
TOTAL LENGTH:	1966 m

Tunnelled	0 m	0%
Open Cut	1966 m	100%

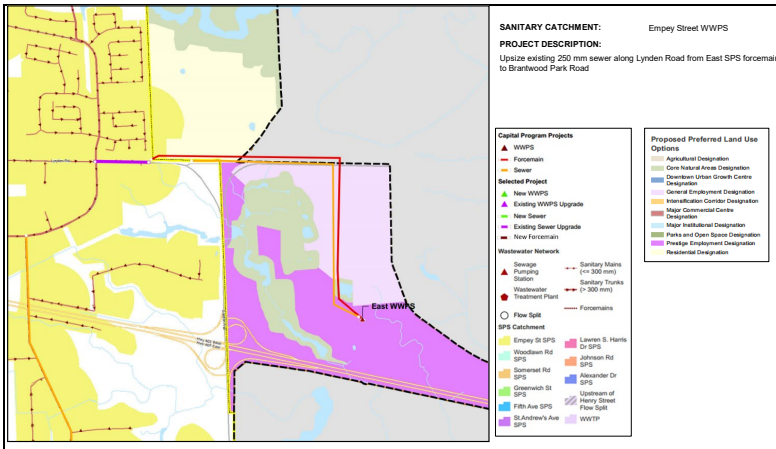
CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1966 m	$820	$1,612,438	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,500	$0	
Minor Creek Crossings			ea.	0	$200,000	$0	
Major Creek Crossings			ea.	0	$1,045,000	$0	
Road Crossings			ea.	0	$460,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,045,000	$0	
Utility Crossings			ea.	2	$460,000	$920,000	Rail Crossing (two tracks)
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$253,244	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$253,244	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,039,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$15,200	
Geotechnical Sub-Total Cost						**$15,200**	
Property Requirements	1.0%					$ 30,400	
Property Requirements Sub-Total						**$30,400**	
Consultant Engineering/Design	15%					$ 455,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$455,900**	
In House Labour/Engineering/Wages/CA	8%					$ 243,100	
In-house Labour/Wages Sub-Total						**$243,100**	
Project Contingency	10%					$378,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$378,000**	
Non-Refundable HST	1.76%					$69,000	
Non-Refundable HST Sub-Total						**$69,000**	
Total (2020 Dollars)						**$4,231,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$4,231,000**	**2020 Estimate**

PROJECT NO.: WW-SS-013 **TIMELINE:** 0-5 Years
PROJECT NAME: Lynden Road Trunk Sewer Upgrades
PROJECT OVERVIEW: Upgrades along Lynden Road to Brantwood Park Road trunk sewer

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
Upsize existing 250 mm sewer along Lynden Road from East SPS forcemain to Brantwood Park Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm	
TOTAL LENGTH:	356 m	
Tunnelled	0 m	0%
Open Cut	356 m	100%

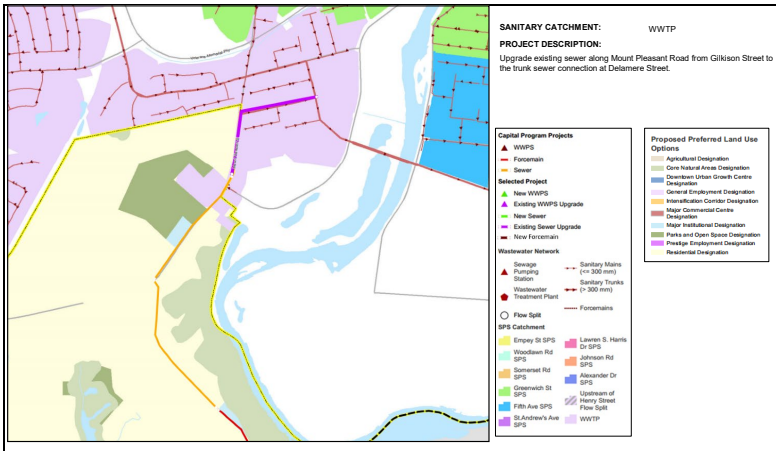
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	356 m	$820	$291,977	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,500	$0	
Minor Creek Crossings			ea.	0	$200,000	$0	
Major Creek Crossings			ea.	0	$1,045,000	$0	
Road Crossings			ea.	0	$460,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,045,000	$0	
Utility Crossings			ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$29,198	
Additional Construction Costs	15%		ea.			$48,176	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$32,118	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$401,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$4,000	
Geotechnical Sub-Total Cost						**$4,000**	
Property Requirements	1.5%					$ 6,000	
Property Requirements Sub-Total						**$6,000**	
Consultant Engineering/Design	15%					$ 60,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$60,200**	
In House Labour/Engineering/Wages/CA	8%					$ 32,100	
In-house Labour/Wages Sub-Total						**$32,100**	
Project Contingency	15%					$75,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$75,000**	
Non-Refundable HST	1.76%					$9,600	
Non-Refundable HST Sub-Total						**$9,600**	
Total (2020 Dollars)						**$588,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$588,000**	**2020 Estimate**

PROJECT NO.: WW-SS-014 **TIMELINE:** 0-5 Years
PROJECT NAME: Mount Pleasant Road Trunk Sewer Upgrades
PROJECT OVERVIEW: Upgrades to trunk sewer along Mount Pleasant Road

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Upgrade existing sewer along Mount Pleasant Road from Gilkison Street to the trunk sewer connection at Delamere Street.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm
TOTAL LENGTH:	735 m

Tunnelled	0 m	0%
Open Cut	735 m	100%

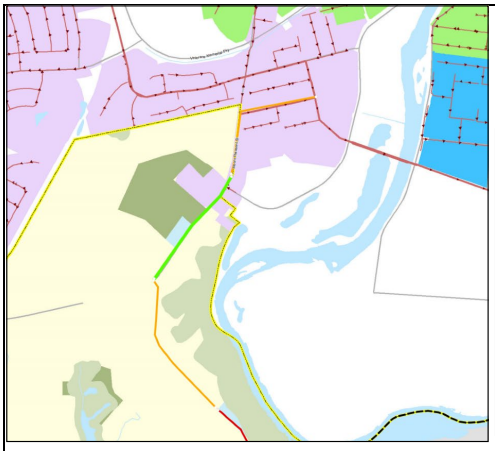
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	735 m	$1,552	$1,140,815	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	0	$708,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,590,000	$0	
Utility Crossings			ea.	0	$708,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$114,082	
Additional Construction Costs	15%		ea.			$188,235	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$125,490	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,569,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$15,700	
Geotechnical Sub-Total Cost						**$15,700**	
Property Requirements	1.5%					$ 23,500	
Property Requirements Sub-Total						**$23,500**	
Consultant Engineering/Design	15%					$ 235,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$235,400**	
In House Labour/Engineering/Wages/CA	8%					$ 125,500	
In-house Labour/Wages Sub-Total						**$125,500**	
Project Contingency	15%					$295,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$295,000**	
Non-Refundable HST	1.76%					$37,600	
Non-Refundable HST Sub-Total						**$37,600**	
Total (2020 Dollars)						**$2,302,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,302,000**	**2020 Estimate**

PROJECT NO.: WW-SS-015 **TIMELINE:** 0-5 Years
PROJECT NAME: Mount Pleasant Road Trunk Sewer
PROJECT OVERVIEW: New trunk sewer along Mount Pleasant Road

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New trunk sewers along Mount Pleasant Road from Tutela Heights Road to existing trunk sewer on Mount Pleasant Road.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm
TOTAL LENGTH:	675 m

Tunnelled	0 m	0%
Open Cut	675 m	100%

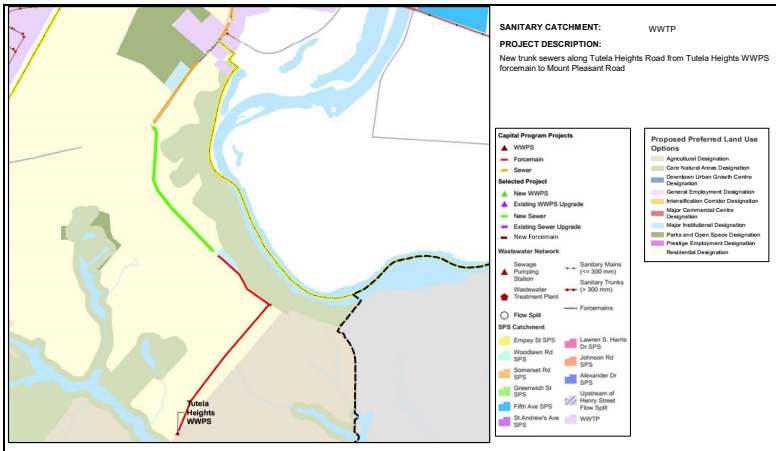
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	675 m	$1,552	$1,047,687	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	0	$708,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,590,000	$0	
Utility Crossings			ea.	0	$708,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$104,769	
Additional Construction Costs	15%		ea.			$172,868	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$115,246	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,441,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$14,400	
Geotechnical Sub-Total Cost						**$14,400**	
Property Requirements	1.5%					$ 21,600	
Property Requirements Sub-Total						**$21,600**	
Consultant Engineering/Design	15%					$ 216,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$216,200**	
In House Labour/Engineering/Wages/CA	8%					$ 115,300	
In-house Labour/Wages Sub-Total						**$115,300**	
Project Contingency	15%					$271,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$271,000**	
Non-Refundable HST	1.76%					$34,600	
Non-Refundable HST Sub-Total						**$34,600**	
Total (2020 Dollars)						**$2,114,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,114,000**	2020 Estimate

PROJECT NO.: WW-SS-016 **TIMELINE:** 5-10 Years
PROJECT NAME: Tutela Heights Road Trunk Sewer
PROJECT OVERVIEW: New trunk sewer along Tutela Heights Road

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New trunk sewers along Tutela Heights Road from Tutela Heights WWPS forcemain to Mount Pleasant Road

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	750 mm	
TOTAL LENGTH:	790 m	
Tunnelled	0 m	0%
Open Cut	790 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

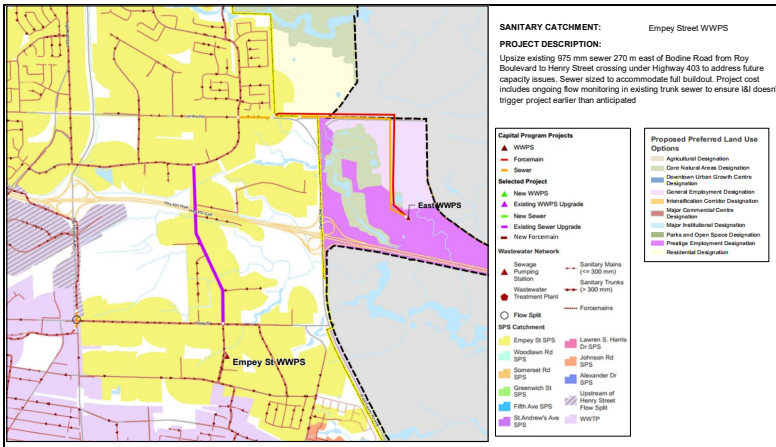
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	790 m	$1,440	$1,137,995	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$8,200	$0	
Minor Creek Crossings			ea.	0	$284,000	$0	
Major Creek Crossings			ea.	0	$1,350,000	$0	
Road Crossings			ea.	0	$612,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,350,000	$0	
Utility Crossings			ea.	0	$612,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	15%		ea.			$170,699	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$113,799	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,422,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$14,200	
Geotechnical Sub-Total Cost						**$14,200**	
Property Requirements	1.5%					$ 21,300	
Property Requirements Sub-Total						**$21,300**	
Consultant Engineering/Design	15%					$ 213,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$213,300**	
In House Labour/Engineering/Wages/CA	8%					$ 113,800	
In-house Labour/Wages Sub-Total						**$113,800**	
Project Contingency	15%					$268,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$268,000**	
Non-Refundable HST	1.76%					$34,100	
Non-Refundable HST Sub-Total						**$34,100**	
Total (2020 Dollars)						**$2,087,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,087,000**	**2020 Estimate**

PROJECT NO.: WW-SS-017 **TIMELINE:** 20+ Years

PROJECT NAME: Bodine Road Easement Sewer Upgrades

PROJECT OVERVIEW: Upsize existing sewer from Roy Boulevard to Henry Street crossing under Highway 403

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:

Upsize existing 975 mm sewer 270 m east of Bodine Road from Roy Boulevard to Henry Street crossing under Highway 403 to address future capacity issues. Sewer sized to accommodate full buildout. Project cost includes ongoing flow monitoring in existing trunk sewer to ensure I&I doesn't trigger project earlier than anticipated

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	1350 mm
TOTAL LENGTH:	1639 m
Tunnelled	665 m 41%
Open Cut	974 m 59%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

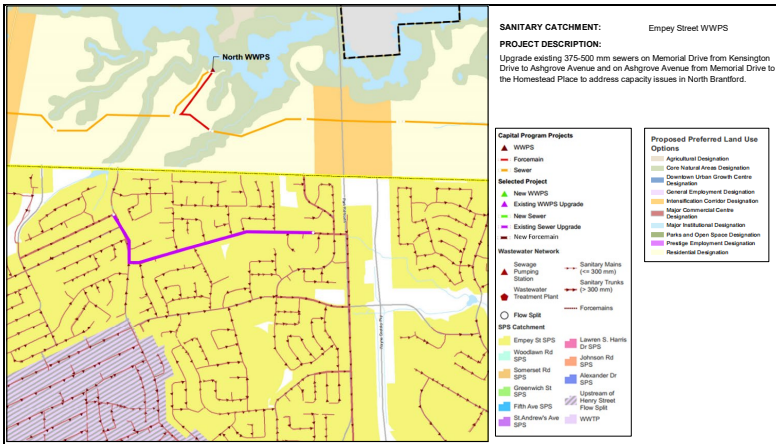
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	974 m	$2,795	$2,722,584	
Pipe Construction - Tunneling			m	665 m	$11,500	$7,647,500	
Minor Creek Crossings			ea.	0	$450,000	$0	
Major Creek Crossings			ea.	0	$1,945,000	$0	
Road Crossings			ea.	0	$910,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,945,000	$0	
Utility Crossings			ea.	0	$910,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$1,037,008	
Additional Construction Costs	20%		ea.			$2,281,418	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,140,709	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$14,829,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$296,600	
Geotechnical Sub-Total Cost						**$296,600**	
Property Requirements	2.0%					$ 296,600	
Property Requirements Sub-Total						**$296,600**	
Consultant Engineering/Design	12%					$ 1,779,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,779,500**	
In House Labour/Engineering/Wages/CA	6%					$ 889,700	
In-house Labour/Wages Sub-Total						**$889,700**	
Project Contingency	25%					$4,523,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$4,523,000**	
Non-Refundable HST	1.76%					$382,400	
Non-Refundable HST Sub-Total						**$382,400**	
Total (2020 Dollars)						**$22,997,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$22,997,000**	**2020 Estimate**

PROJECT NO.: WW-SS-018
PROJECT NAME: North Ashgrove Avenue Sewer Upgrades
PROJECT OVERVIEW: Upgrade existing sewers on Ashgrove Avenue

TIMELINE: 0-5 Years

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
Upgrade existing 375-500 mm sewers on Memorial Drive from Kensington Drive to Ashgrove Avenue and on Ashgrove Avenue from Memorial Drive to the Homestead Place to address capacity issues in North Brantford.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	600 mm	
TOTAL LENGTH:	1595 m	
Tunnelled	0 m	0%
Open Cut	1595 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

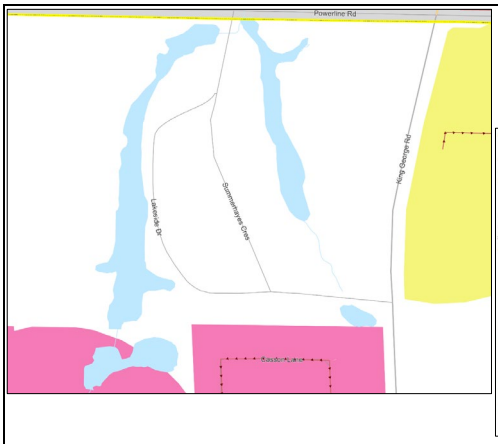
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1595 m	$1,052	$1,677,333	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$8,000	$0	
Minor Creek Crossings			ea.	0	$230,000	$0	
Major Creek Crossings			ea.	0	$1,270,000	$0	
Road Crossings			ea.	0	$550,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,270,000	$0	
Utility Crossings			ea.	0	$550,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$167,733	
Additional Construction Costs	10%		ea.			$184,507	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$184,507	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,214,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$11,100	
Geotechnical Sub-Total Cost						**$11,100**	
Property Requirements	1.0%					$ 22,100	
Property Requirements Sub-Total						**$22,100**	
Consultant Engineering/Design	15%					$ 332,100	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$332,100**	
In House Labour/Engineering/Wages/CA	8%					$ 177,100	
In-house Labour/Wages Sub-Total						**$177,100**	
Project Contingency	10%					$276,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$276,000**	
Non-Refundable HST	1.76%					$50,300	
Non-Refundable HST Sub-Total						**$50,300**	
Total (2020 Dollars)						**$3,083,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,083,000**	**2020 Estimate**

PROJECT NO.: WW-SS-019 **TIMELINE:** 0-5 Years

PROJECT NAME: Summerhayes Crescent Servicing Study

PROJECT OVERVIEW: Study to determine feasibility of connecting Summerhayes Crescent to existing or proposed sewer system in North Brantford.

MAP



SANITARY CATCHMENT: -

PROJECT DESCRIPTION:

Feasibility study to assess the connection of the exising septic service lands to the existing King George sewer or pumping the services to WW-SS-006 and North WWPS. Feasbility study to determine sewer upsizing needs.

REQUIRED STUDIES: Feasibility Study.

STUDY SCOPE: The study will be a feasibility study to determine if the existing Summerhayes subdivision can be connected to the City's wastewater system.

OBJECTIVES: Determine the best servicing strategy for the Summerhayes subdivision including maintaining existing septic systems, connecting to existing King George Road sewer including any potential sewer upsizing or pumping flows to proposed North WWPS in North Expansion Lands.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	
TOTAL LENGTH:	0 m
Tunnelled	0 m
Open Cut	0 m

	#DIV/0!
	#DIV/0!

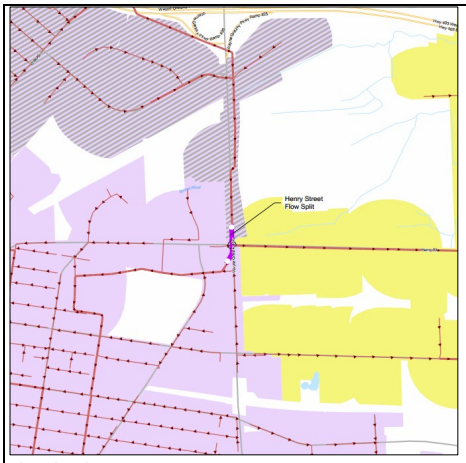
CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Sewer 5m

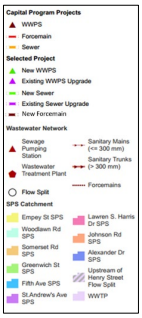
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study	1	$150,000	$150,000	
Study	EA			$0	
Sub-Total Study Costs				**$150,000**	
Sub-Total Construction Base Costs				**$0**	
Geotechnical / Hydrogeological / Materials	0.5%			$0	
Geotechnical Sub-Total Cost				**$0**	
Property Requirements	1.0%			$ -	
Property Requirements Sub-Total				**$0**	
Consultant Engineering/Design	15%			$ -	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total				**$0**	
In House Labour/Engineering/Wages/CA	8%			$ -	
In-house Labour/Wages Sub-Total				**$0**	
Project Contingency	10%			$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total				**$0**	
Non-Refundable HST	1.76%			$0	
Non-Refundable HST Sub-Total				**$0**	
Total (2020 Dollars)				**$150,000**	Rounded to nearest $1,000
Other Estimate					
Chosen Estimate				**$150,000**	2020 Estimate

PROJECT NO.: WW-SS-020 **TIMELINE:** 0-5 Years
PROJECT NAME: Henry Street Flow Split Reconfiguration
PROJECT OVERVIEW: Reconfigure flow split at Henry Street and Wayne Gretzky Streeet

MAP





SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
Reconfigure sewer flow split to redirect flows to Empey WWPS to relieve downstream sewer capacity constraints

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Urban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	825 mm	
TOTAL LENGTH:	50 m	
Tunnelled	0 m	0%
Open Cut	50 m	100%

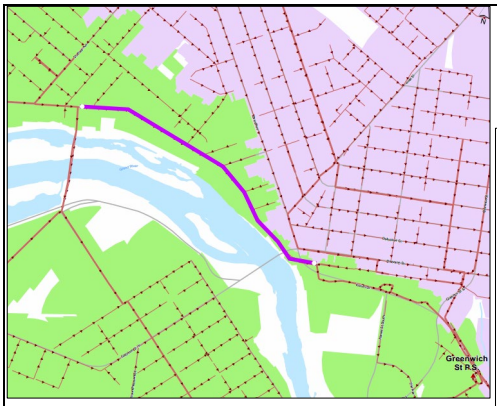
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 10m

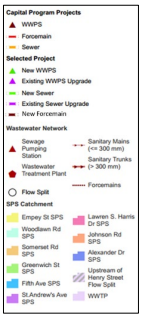
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	50 m	$3,912	$195,581	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$9,800	$0	
Minor Creek Crossings			ea.	0	$316,000	$0	
Major Creek Crossings			ea.	0	$1,590,000	$0	
Road Crossings			ea.	0	$708,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,590,000	$0	
Utility Crossings			ea.	0	$708,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	20%					$39,116	
Additional Construction Costs	20%		ea.			$46,939	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$23,470	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$305,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$6,100	
Geotechnical Sub-Total Cost						**$6,100**	
Property Requirements	2.0%					$ 6,100	
Property Requirements Sub-Total						**$6,100**	
Consultant Engineering/Design	15%					$ 45,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$45,800**	
In House Labour/Engineering/Wages/CA	8%					$ 24,400	
In-house Labour/Wages Sub-Total						**$24,400**	
Project Contingency	25%					$97,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$97,000**	
Non-Refundable HST	1.76%					$8,100	
Non-Refundable HST Sub-Total						**$8,100**	
Total (2020 Dollars)						**$493,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$493,000**	**2020 Estimate**

PROJECT NO.: WW-SS-021 **TIMELINE:** 5-10 Years
PROJECT NAME: Grand River Avenue Sewer Upgrades
PROJECT OVERVIEW: Upsize existing sewers from Jubilee Avenue to Icomm Drive

MAP





SANITARY CATCHMENT: Greenwich Street WWPS

PROJECT DESCRIPTION:
Optimize Grand River Avenue and Jubilee Avenue flow split by diverting more flows to Grand River Avenue. Upsize existing 300 mm sanitary sewers along Grand River Avenue to accommodate increased flows.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm
TOTAL LENGTH:	1369 m

Tunnelled	0 m	0%
Open Cut	1369 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

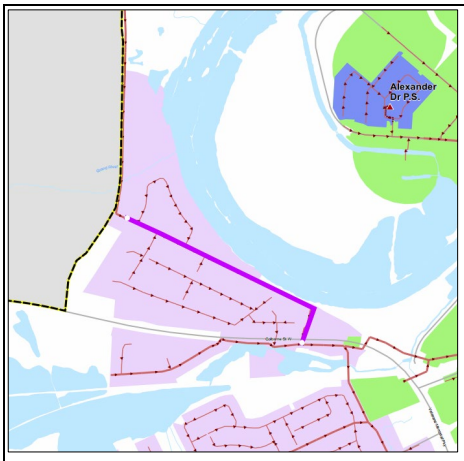
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost						
Study	Feasibility Study				$0	
Study	EA				$0	
Sub-Total Study Costs					**$0**	
Construction Cost						
Pipe Construction - Open Cut		m	1369 m	$820	$1,122,801	Existing road ROW
Pipe Construction - Tunneling		m	0 m	$6,500	$0	
Minor Creek Crossings		ea.	0	$200,000	$0	
Major Creek Crossings		ea.	0	$1,045,000	$0	
Road Crossings		ea.	1	$460,000	$460,000	Coulborne
Major Road Crossings (Highway)		ea.	0	$1,045,000	$0	
Utility Crossings		ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%				$158,280	
Additional Construction Costs	20%	ea.			$348,216	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%	ea.			$174,108	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs					**$2,263,000**	
Geotechnical / Hydrogeological / Materials	2.0%				$45,300	
Geotechnical Sub-Total Cost					**$45,300**	
Property Requirements	2.0%				$ 45,300	
Property Requirements Sub-Total					**$45,300**	
Consultant Engineering/Design	15%				$ 339,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total					**$339,500**	
In House Labour/Engineering/Wages/CA	8%				$ 181,000	
In-house Labour/Wages Sub-Total					**$181,000**	
Project Contingency	25%				$719,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total					**$719,000**	
Non-Refundable HST	1.76%				$60,100	
Non-Refundable HST Sub-Total					**$60,100**	
Total (2020 Dollars)					**$3,653,000**	Rounded to nearest $1,000
Other Estimate						
Chosen Estimate					**$3,653,000**	**2020 Estimate**

PROJECT NO.: WW-SS-022
PROJECT NAME: Oakhill Sewer Upgrades
PROJECT OVERVIEW: Upsize existing sewers from Jennings Road to Colborne Street West

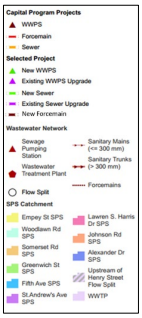
TIMELINE: 10-20 Years

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Existing sewer downsizes from 1050 mm to 675/750 mm. Upsize sewer to accommodate growth flows from the North Expansion Lands as well as address any potential operational issues due to the smaller sewer diameter.



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	1050 mm	
TOTAL LENGTH:	1128 m	
Tunnelled	0 m	0%
Open Cut	1128 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

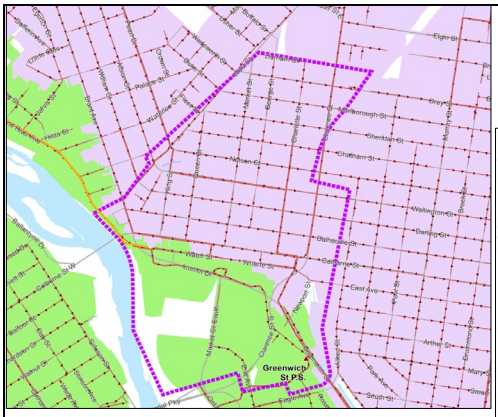
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1128 m	$2,181	$2,459,693	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$10,400	$0	
Minor Creek Crossings			ea.	0	$428,000	$0	
Major Creek Crossings			ea.	0	$1,780,000	$0	
Road Crossings			ea.	0	$844,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,780,000	$0	
Utility Crossings			ea.	0	$844,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$245,969	
Additional Construction Costs	15%		ea.			$405,849	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$270,566	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,382,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$33,800	
Geotechnical Sub-Total Cost						**$33,800**	
Property Requirements	1.5%					$ 50,700	
Property Requirements Sub-Total						**$50,700**	
Consultant Engineering/Design	15%					$ 507,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$507,300**	
In House Labour/Engineering/Wages/CA	8%					$ 270,600	
In-house Labour/Wages Sub-Total						**$270,600**	
Project Contingency	15%					$637,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$637,000**	
Non-Refundable HST	1.76%					$81,200	
Non-Refundable HST Sub-Total						**$81,200**	
Total (2020 Dollars)						**$4,963,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$4,963,000**	**2020 Estimate**

PROJECT NO.: WW-SS-023
PROJECT NAME: Downtown Sewers
PROJECT OVERVIEW:

TIMELINE: 10-20 Years

MAP



SANITARY CATCHMENT: WWTP
PROJECT DESCRIPTION:

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	525 mm
TOTAL LENGTH:	40000 m

Tunnelled	0 m	0%
Open Cut	40000 m	100%

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

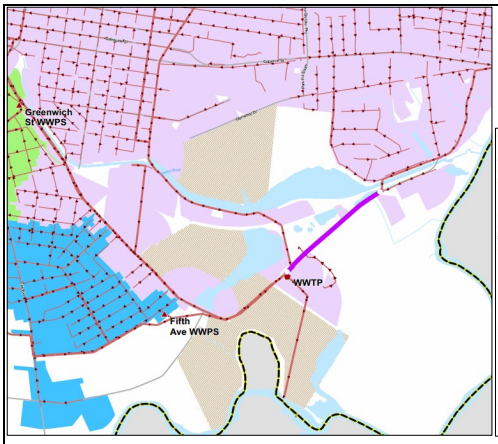
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost						
Study	Feasibility Study		1	$50,000	$50,000	
Study	EA				$0	
Sub-Total Study Costs					**$50,000**	
Construction Cost						
Pipe Construction - Open Cut		m	40000 m	$75	$3,000,000	Upsizing Allowance
Pipe Construction - Tunneling		m	0 m	$6,500	$0	
Minor Creek Crossings		ea.	0	$200,000	$0	
Major Creek Crossings		ea.	0	$1,045,000	$0	
Road Crossings		ea.	0	$460,000	$0	
Major Road Crossings (Highway)		ea.	0	$1,045,000	$0	
Utility Crossings		ea.	0	$460,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%				$300,000	
Additional Construction Costs	15%	ea.			$495,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%	ea.			$330,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs					**$4,125,000**	
Geotechnical / Hydrogeological / Materials	1.0%				$41,300	
Geotechnical Sub-Total Cost					**$41,300**	
Property Requirements	1.5%				$ 61,900	
Property Requirements Sub-Total					**$61,900**	
Consultant Engineering/Design	15%				$ 618,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total					**$618,800**	
In House Labour/Engineering/Wages/CA	8%				$ 330,000	
In-house Labour/Wages Sub-Total					**$330,000**	
Project Contingency	15%				$777,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total					**$777,000**	
Non-Refundable HST	1.76%				$99,000	
Non-Refundable HST Sub-Total					**$99,000**	
Total (2020 Dollars)					**$6,103,000**	Rounded to nearest $1,000
Other Estimate						
Chosen Estimate					**$6,103,000**	2020 Estimate

PROJECT NO.: WW-SS-024 **TIMELINE:** 20+ Years

PROJECT NAME: Mohawk Street Sewer Upgrades

PROJECT OVERVIEW: Upsize existing sewer on Mohawk Street from Mohawk Street siphon (south of Forest Road) to WWTP entrance

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:

Upsize existing 1200 mm sewer on Mohawk Street from Mohawk Street siphon (south of Forest Road) to WWTP entrance to address future capacity issues. Sewer sized to accommodate full buildout. Project cost includes ongoing flow monitoring in existing trunk sewer to ensure I&I doesn't trigger project earlier than anticipated.

REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	1350 mm
TOTAL LENGTH:	915 m
Tunnelled	0 m 0%
Open Cut	915 m 100%

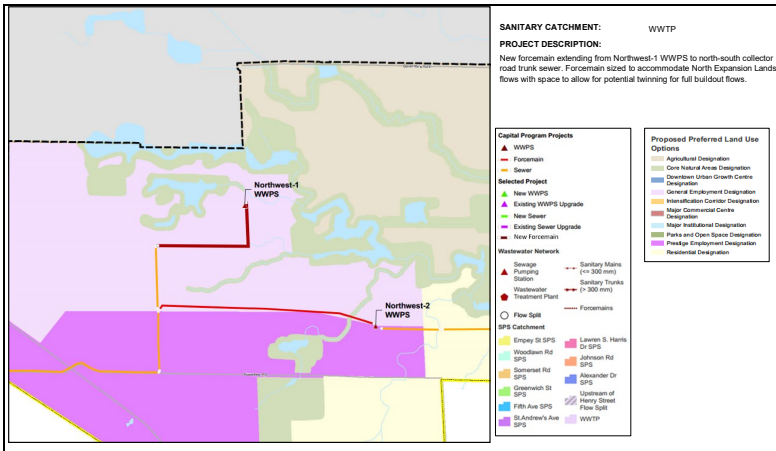
CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Sewer 5m

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY		COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study					$0	
Study	EA					$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	915 m	$2,795	$2,557,663	
Pipe Construction - Tunneling			m	0 m	$11,500	$0	
Minor Creek Crossings			ea.	0	$450,000	$0	
Major Creek Crossings			ea.	0	$1,945,000	$0	
Road Crossings			ea.	0	$910,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,945,000	$0	
Utility Crossings			ea.	0	$910,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$255,766	
Additional Construction Costs	20%		ea.			$562,686	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$281,343	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,657,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$73,100	
Geotechnical Sub-Total Cost						**$73,100**	
Property Requirements	2.0%					$ 73,100	
Property Requirements Sub-Total						**$73,100**	
Consultant Engineering/Design	15%					$ 548,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$548,600**	
In House Labour/Engineering/Wages/CA	8%					$ 292,600	
In-house Labour/Wages Sub-Total						**$292,600**	
Project Contingency	25%					$1,161,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,161,000**	
Non-Refundable HST	1.76%					$97,000	
Non-Refundable HST Sub-Total						**$97,000**	
Total (2020 Dollars)						**$5,902,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,902,000**	**2020 Estimate**

PROJECT NO.: WW-FM-001 **TIMELINE:** 10-20 Years
PROJECT NAME: Northwest-1 WWPS Forcemain
PROJECT OVERVIEW: New forcemain for Northwest-1 WWPS

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New forcemain extending from Northwest-1 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate North Expansion Lands flows with space to allow for potential twinning for full buildout flows.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-1 WWPS (Costs included in Capital Program project WW-PS-001).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	250 mm
TOTAL LENGTH:	894 m

Tunnelled	0 m	0%
Open Cut	894 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

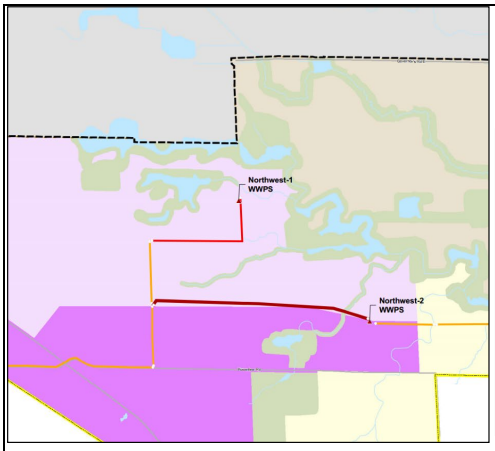
COST ESTIMATION SPREADSHEET

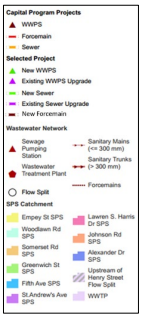
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	894 m	$657	$587,108	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,400	$0	
Minor Creek Crossings			ea.	0	$32,000	$0	
Major Creek Crossings			ea.	0	$214,000	$0	
Road Crossings			ea.	0	$88,000	$0	
Major Road Crossings (Highway)			ea.	0	$214,000	$0	
Utility Crossings			ea.	0	$88,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$58,711	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$58,711	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$705,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$3,500	
Geotechnical Sub-Total Cost						**$3,500**	
Property Requirements	1.0%					$ 7,100	
Property Requirements Sub-Total						**$7,100**	
Consultant Engineering/Design	15%					$ 105,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$105,800**	
In House Labour/Engineering/Wages/CA	8%					$ 56,400	
In-house Labour/Wages Sub-Total						**$56,400**	
Project Contingency	10%					$88,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$88,000**	
Non-Refundable HST	1.76%					$16,000	
Non-Refundable HST Sub-Total						**$16,000**	
Total (2020 Dollars)						**$982,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$982,000**	2020 Estimate

PROJECT NO.: WW-FM-002
PROJECT NAME: Northwest-2 WWPS Forcemain
PROJECT OVERVIEW: New Northwest-2 WWPS forcemain

TIMELINE: 5-10 Years

MAP





SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New forcemain extending from Northwest-2 WWPS to north-south collector road trunk sewer. Forcemain sized to accommodate existing flows and full buildout flows.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-2 WWPS (Costs included in Capital Program project WW-PS-002).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	400 mm	
TOTAL LENGTH:	1448 m	
Tunnelled	0 m	0%
Open Cut	1448 m	100%

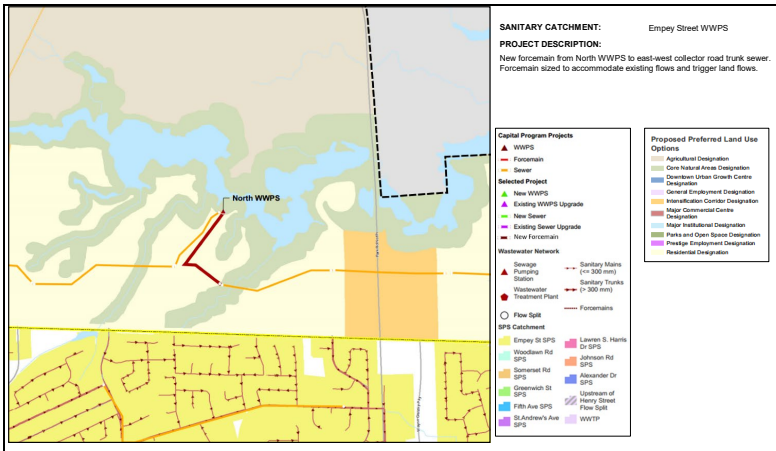
CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1448 m	$873	$1,264,071	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$6,350	$0	
Minor Creek Crossings			ea.	1	$197,000	$197,000	
Major Creek Crossings			ea.	0	$1,023,000	$0	
Road Crossings			ea.	0	$451,000	$0	
Major Road Crossings (Highway)			ea.	0	$1,023,000	$0	
Utility Crossings			ea.	0	$451,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$146,107	
Additional Construction Costs	15%		ea.			$241,077	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$160,718	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,009,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$20,100	
Geotechnical Sub-Total Cost						**$20,100**	
Property Requirements	1.5%					$ 30,100	
Property Requirements Sub-Total						**$30,100**	
Consultant Engineering/Design	15%					$ 301,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$301,400**	
In House Labour/Engineering/Wages/CA	8%					$ 160,700	
In-house Labour/Wages Sub-Total						**$160,700**	
Project Contingency	15%					$378,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$378,000**	
Non-Refundable HST	1.76%					$48,200	
Non-Refundable HST Sub-Total						**$48,200**	
Total (2020 Dollars)						**$2,948,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,948,000**	2020 Estimate

PROJECT NO.: WW-FM-003 **TIMELINE:** 10-20 Years
PROJECT NAME: North WWPS Forcemain
PROJECT OVERVIEW: New North WWPS forcemain

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New forcemain from North WWPS to east-west collector road trunk sewer. Forcemain sized to accommodate existing flows and trigger land flows.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the North WWPS (Costs included in Capital Program project WW-PS-003).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	350 mm
TOTAL LENGTH:	592 m

Tunnelled	0 m	0%
Open Cut	592 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

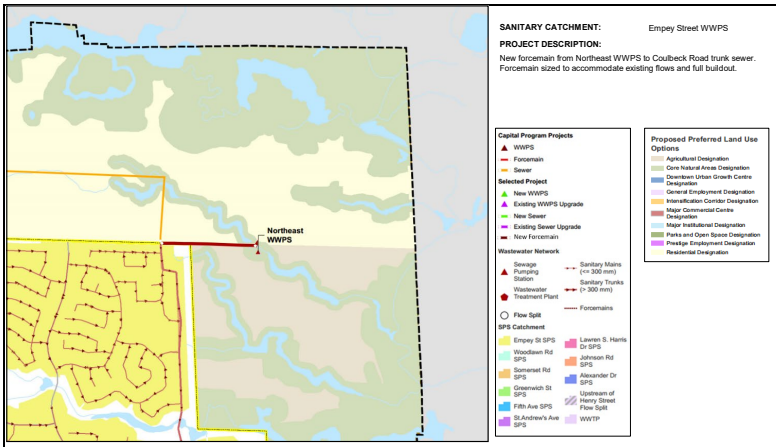
COST ESTIMATION SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study		0			$0	
Study	EA		0			$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	592 m	$805	$476,377	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,550	$0	
Minor Creek Crossings			ea.	1	$51,000	$51,000	
Major Creek Crossings			ea.	0	$253,000	$0	
Road Crossings			ea.	0	$113,000	$0	
Major Road Crossings (Highway)			ea.	0	$253,000	$0	
Utility Crossings			ea.	0	$113,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%					$0	
Additional Construction Costs	10%		ea.			$52,738	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$52,738	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$633,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$3,200	
Geotechnical Sub-Total Cost						**$3,200**	
Property Requirements	1.0%					$ 6,300	
Property Requirements Sub-Total						**$6,300**	
Consultant Engineering/Design	15%					$ 95,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$95,000**	
In House Labour/Engineering/Wages/CA	8%					$ 50,600	
In-house Labour/Wages Sub-Total						**$50,600**	
Project Contingency	10%					$79,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$79,000**	
Non-Refundable HST	1.76%					$14,400	
Non-Refundable HST Sub-Total						**$14,400**	
Total (2020 Dollars)						**$882,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$882,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-FM-004 **TIMELINE:** 0-5 Years
PROJECT NAME: Northeast WWPS Forcemain
PROJECT OVERVIEW: New Northeast WWPS forcemain.

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New forcemain from Northeast WWPS to Coulbeck Road trunk sewer. Forcemain sized to accommodate existing flows and full buildout.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northeast WWPS (Costs included in Capital Program project WW-PS-004).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	200 mm
TOTAL LENGTH:	525 m

Tunnelled	0 m	0%
Open Cut	525 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

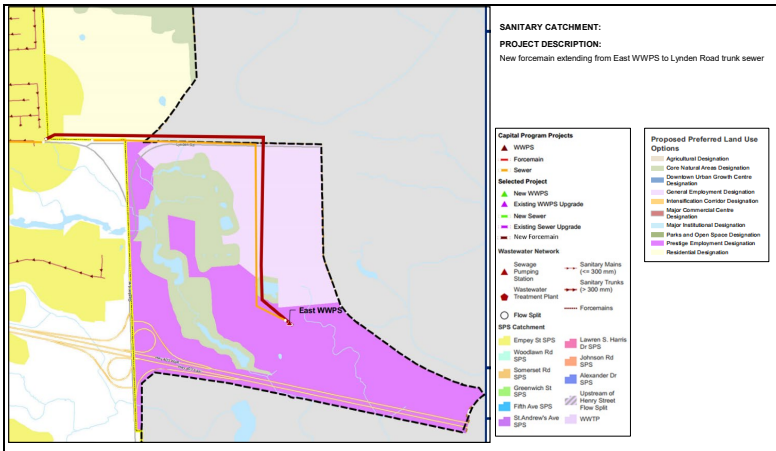
COMPONENT	PROJECT COMPONENT DESCRIPTION		ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost						
Study	Feasibility Study		0		$0	
Study	EA		0		$0	
Sub-Total Study Costs					**$0**	
Construction Cost						
Pipe Construction - Open Cut		m	525 m	$604	$317,192	Existing road ROW
Pipe Construction - Tunneling		m	0 m	$1,350	$0	
Minor Creek Crossings		ea.	1	$31,000	$31,000	
Major Creek Crossings		ea.	0	$207,000	$0	
Road Crossings		ea.	0	$85,000	$0	
Major Road Crossings (Highway)		ea.	0	$207,000	$0	
Utility Crossings		ea.	0	$85,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	0%				$0	
Additional Construction Costs	10%	ea.			$34,819	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%	ea.			$34,819	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs					**$418,000**	
Geotechnical / Hydrogeological / Materials	0.5%				$2,100	
Geotechnical Sub-Total Cost					**$2,100**	
Property Requirements	1.0%				$ 4,200	
Property Requirements Sub-Total					**$4,200**	
Consultant Engineering/Design	15%				$ 62,700	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total					**$62,700**	
In House Labour/Engineering/Wages/CA	8%				$ 33,400	
In-house Labour/Wages Sub-Total					**$33,400**	
Project Contingency	10%				$52,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total					**$52,000**	
Non-Refundable HST	1.76%				$9,500	
Non-Refundable HST Sub-Total					**$9,500**	
Total (2020 Dollars)					**$582,000**	Rounded to nearest $1,000
Other Estimate						
Chosen Estimate					**$582,000**	2020 Estimate

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-FM-005
PROJECT NAME: East WWPS Forcemain
PROJECT OVERVIEW: New East WWPS forcemain

TIMELINE: 5-10 Years

MAP



SANITARY CATCHMENT:

PROJECT DESCRIPTION:
New forcemain extending from East WWPS to Lynden Road trunk sewer

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the East WWPS (Costs included in Capital Program project WW-PS-005).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	350 mm	
TOTAL LENGTH:	2307 m	
Tunnelled	0 m	0%
Open Cut	2307 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

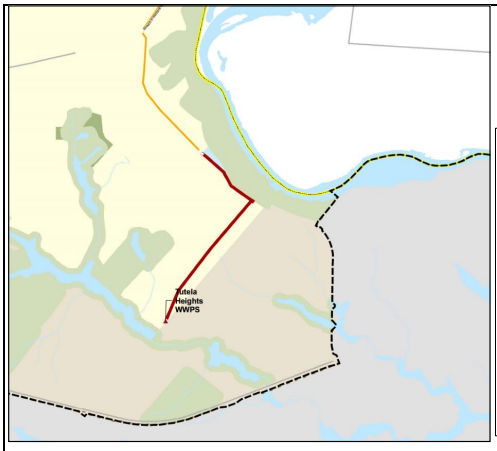
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	2307 m	$805	$1,856,420	Proposed Collector Road and Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,550	$0	
Minor Creek Crossings			ea.	0	$51,000	$0	
Major Creek Crossings			ea.	0	$253,000	$0	
Road Crossings			ea.	0	$113,000	$0	
Major Road Crossings (Highway)			ea.	0	$253,000	$0	
Utility Crossings			ea.	1	$113,000	$113,000	Railway
Pipe Construction Uplift (Based on Area Conditions)	10%					$196,942	
Additional Construction Costs	15%		ea.			$324,954	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$216,636	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,708,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$27,100	
Geotechnical Sub-Total Cost						**$27,100**	
Property Requirements	1.5%					$ 40,600	
Property Requirements Sub-Total						**$40,600**	
Consultant Engineering/Design	15%					$ 406,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$406,200**	
In House Labour/Engineering/Wages/CA	8%					$ 216,600	
In-house Labour/Wages Sub-Total						**$216,600**	
Project Contingency	15%					$510,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$510,000**	
Non-Refundable HST	1.76%					$65,000	
Non-Refundable HST Sub-Total						**$65,000**	
Total (2020 Dollars)						**$3,974,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,974,000**	**2020 Estimate**

PROJECT NO.: WW-FM-006 **TIMELINE:** 10-20 Years

PROJECT NAME: Tutela Heights WWPS Forcemain

PROJECT OVERVIEW: New Tutela Heights WWPS forcemain.

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:

New forcemain extending from Tutela Heights WWPS to Tutela Heights Road trunk sewer

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Tutela Heights WWPS (Costs included in Capital Program project WW-PS-006).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED DIAMETER:	350 mm	
TOTAL LENGTH:	1235 m	
Tunnelled	0 m	0%
Open Cut	1235 m	100%

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Forcemain

COST ESTIMATION SPREADSHEET

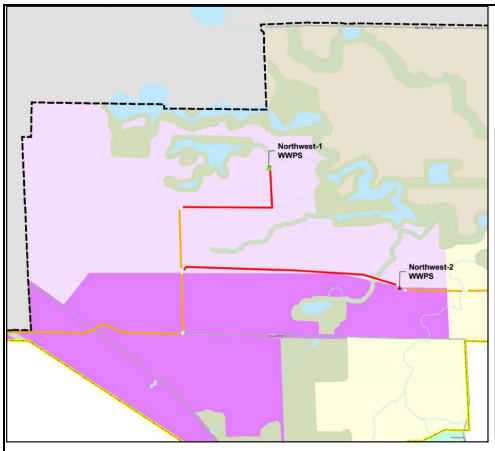
COMPONENT	PROJECT COMPONENT DESCRIPTION			ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost							
Study	Feasibility Study			0		$0	
Study	EA			0		$0	
Sub-Total Study Costs						**$0**	
Construction Cost							
Pipe Construction - Open Cut			m	1235 m	$805	$993,792	Existing road ROW
Pipe Construction - Tunneling			m	0 m	$1,550	$0	
Minor Creek Crossings			ea.	0	$51,000	$0	
Major Creek Crossings			ea.	0	$253,000	$0	
Road Crossings			ea.	0	$113,000	$0	
Major Road Crossings (Highway)			ea.	0	$253,000	$0	
Utility Crossings			ea.	0	$113,000	$0	
Pipe Construction Uplift (Based on Area Conditions)	10%					$99,379	
Additional Construction Costs	10%		ea.			$109,317	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$109,317	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,312,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$6,600	
Geotechnical Sub-Total Cost						**$6,600**	
Property Requirements	1.0%					$ 13,100	
Property Requirements Sub-Total						**$13,100**	
Consultant Engineering/Design	15%					$ 196,800	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$196,800**	
In House Labour/Engineering/Wages/CA	8%					$ 105,000	
In-house Labour/Wages Sub-Total						**$105,000**	
Project Contingency	10%					$163,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$163,000**	
Non-Refundable HST	1.76%					$29,800	
Non-Refundable HST Sub-Total						**$29,800**	
Total (2020 Dollars)						**$1,826,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$1,826,000**	**2020 Estimate**

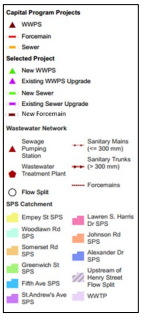
City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-PS-001
PROJECT NAME: Northwest-1 Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located northeast of Golf Road.

TIMELINE: 10-20 Years

MAP





SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New WWPS located northeast of Golf Road. Flows will be pumped to the trunk sewer along north-south collector road, draining to Oak Park Road. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-1 WWPS forcemain alignment (Capital Program project WW-FM-001) .

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	27 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$150,000	$150,000	
Sub-Total Study Costs				**$150,000**	

COST ESTIMATION SPREADSHEET

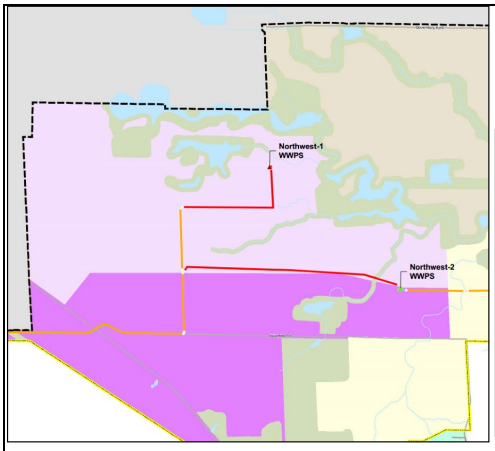
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	27 L/s	$45,000	$1,215,000	
Additional Construction Costs	15%		ea.			$182,250	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$139,725	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,537,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$15,400	
Geotechnical Sub-Total Cost						**$15,400**	
Property Requirements	1.5%					$ 23,100	
Property Requirements Sub-Total						**$23,100**	
Consultant Engineering/Design	15%					$ 230,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$230,600**	
In House Labour/Engineering/Wages/CA	8%					$ 123,000	
In-house Labour/Wages Sub-Total						**$123,000**	
Project Contingency	15%					$289,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$289,000**	
Non-Refundable HST	1.76%					$36,900	
Non-Refundable HST Sub-Total						**$36,900**	
Total (2020 Dollars)						**$2,405,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,405,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-PS-002
PROJECT NAME: Northwest-2 Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located east of Golf Road.

TIMELINE: 5-10 Years

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New SPS located east of Golf Road on east-west collector's road. Flows will be pumped to the trunk sewer along the north-south collector road, draining to Oak Park Road. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Northwest-12WWPS forcemain alignment (Capital Program project WW-FM-002).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	124 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

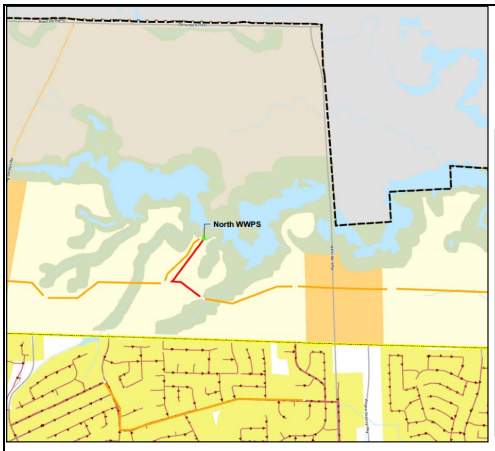
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$150,000	$150,000	
Sub-Total Study Costs				**$150,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	124 L/s	$23,000	$2,852,000	
Additional Construction Costs	15%		ea.			$427,800	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$327,980	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,608,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$36,100	
Geotechnical Sub-Total Cost						**$36,100**	
Property Requirements	1.5%					$ 54,100	
Property Requirements Sub-Total						**$54,100**	
Consultant Engineering/Design	15%					$ 541,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$541,200**	
In House Labour/Engineering/Wages/CA	8%					$ 288,600	
In-house Labour/Wages Sub-Total						**$288,600**	
Project Contingency	15%					$679,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$679,000**	
Non-Refundable HST	1.76%					$86,600	
Non-Refundable HST Sub-Total						**$86,600**	
Total (2020 Dollars)						**$5,444,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,444,000**	**2020 Estimate**

PROJECT NO.: WW-PS-003 **TIMELINE:** 10-20 Years
PROJECT NAME: North Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located along the East-West Collector's Road

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New WWPS located along the east-west collector's road between King George Road and Park Road, south of Jones Creek. Pumping Station sized for North Expansion Lands while securing site capacity to allow for upgrades for full buildout flows post 2051.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the North WWPS forcemain alignment (Capital Program project WW-FM-003).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	101 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

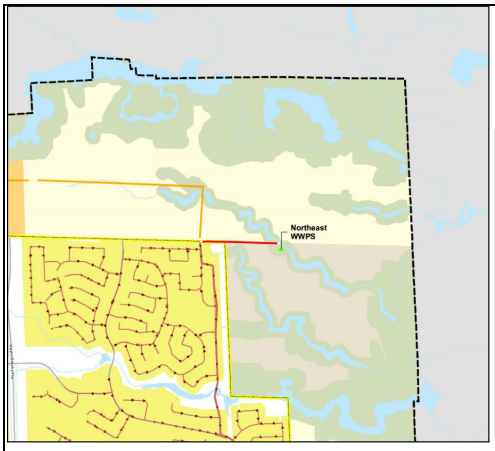
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$150,000	$150,000	
Sub-Total Study Costs				**$150,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	101 L/s	$23,000	$2,323,000	
Additional Construction Costs	15%		ea.			$348,450	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$267,145	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,939,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$29,400	
Geotechnical Sub-Total Cost						**$29,400**	
Property Requirements	1.5%					$ 44,100	
Property Requirements Sub-Total						**$44,100**	
Consultant Engineering/Design	15%					$ 440,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$440,900**	
In House Labour/Engineering/Wages/CA	8%					$ 235,100	
In-house Labour/Wages Sub-Total						**$235,100**	
Project Contingency	15%					$553,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$553,000**	
Non-Refundable HST	1.76%					$70,500	
Non-Refundable HST Sub-Total						**$70,500**	
Total (2020 Dollars)						**$4,462,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$4,462,000**	**2020 Estimate**

PROJECT NO.: WW-PS-004 **TIMELINE:** 0-5 Years
PROJECT NAME: Northeast Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located along Powerline Road, east of Coulbeck Road.

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New WWPS located along Powerline Road, east of Coulbeck Road. Flows will be pumped to Coulbeck Road trunk sewer.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the NortheastWWPS forcemain alignment (Capital Program project WW-FM-004).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	37 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$150,000	$150,000	
Sub-Total Study Costs				**$150,000**	

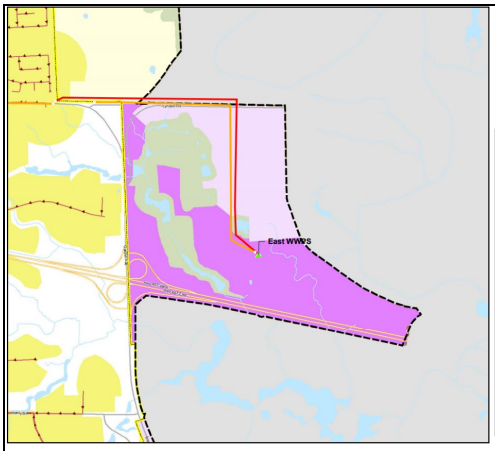
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	37 L/s	$45,000	$1,665,000	
Additional Construction Costs	15%		ea.			$249,750	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$191,475	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,106,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$21,100	
Geotechnical Sub-Total Cost						**$21,100**	
Property Requirements	1.5%					$ 31,600	
Property Requirements Sub-Total						**$31,600**	
Consultant Engineering/Design	15%					$ 315,900	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$315,900**	
In House Labour/Engineering/Wages/CA	8%					$ 168,500	
In-house Labour/Wages Sub-Total						**$168,500**	
Project Contingency	15%					$396,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$396,000**	
Non-Refundable HST	1.76%					$50,500	
Non-Refundable HST Sub-Total						**$50,500**	
Total (2020 Dollars)						**$3,240,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$3,240,000**	**2020 Estimate**

PROJECT NO.: WW-PS-005
PROJECT NAME: East Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located in southeast East Expansion Lands

TIMELINE: 5-10 Years

MAP



SANITARY CATCHMENT: Empey Street WWPS

PROJECT DESCRIPTION:
New WWPS located in southeast East Expansion Lands along collector road. Flows will be pumped to trunk sewer on Lynden Road

REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the East WWPS forcemain alignment (Capital Program project WW-FM-005).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	92 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

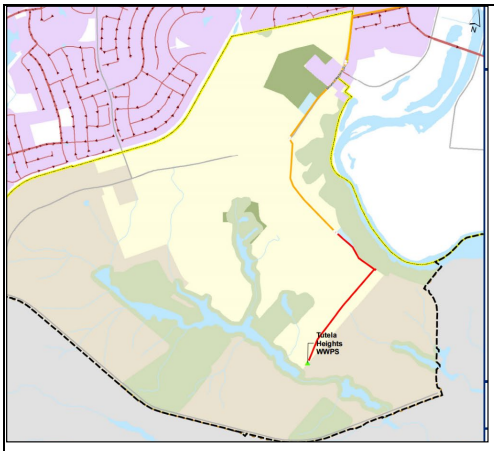
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$150,000	$150,000	
Sub-Total Study Costs				**$150,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	92 L/s	$23,000	$2,116,000	
Additional Construction Costs	15%		ea.			$317,400	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$243,340	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$2,677,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$26,800	
Geotechnical Sub-Total Cost						**$26,800**	
Property Requirements	1.5%					$ 40,200	
Property Requirements Sub-Total						**$40,200**	
Consultant Engineering/Design	15%					$ 401,600	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$401,600**	
In House Labour/Engineering/Wages/CA	8%					$ 214,200	
In-house Labour/Wages Sub-Total						**$214,200**	
Project Contingency	15%					$504,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$504,000**	
Non-Refundable HST	1.76%					$64,200	
Non-Refundable HST Sub-Total						**$64,200**	
Total (2020 Dollars)						**$4,078,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$4,078,000**	**2020 Estimate**

PROJECT NO.: WW-PS-006 **TIMELINE:** 10-20 Years
PROJECT NAME: Tutela Heights Wastewater Pumping Station
PROJECT DESCRIPTION: New WWPS located in Tutela Heights

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
New WWPS located in south Tutela Heights along collector road. Flows to be pumped to trunk sewer on Tutela Heights Road, extending to Mount Pleasant Road trunk sewer.

REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**

STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment. This study will be done in conjunction with the Tutela Heights WWPS forcemain alignment (Capital Program project WW-FM-006).

OBJECTIVES: Determine the best construction methodology for the new wastewater pumping station including location of buildings. Determine forcemain alignment and if it can be coordinated with local development.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	High	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	50%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	44 L/s

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$250,000	$250,000	**Additional Local Issues**
Sub-Total Study Costs				**$250,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			L/s	44 L/s	$23,000	$1,012,000	
Additional Construction Costs	20%		ea.			$202,400	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$121,440	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,336,000**	
Geotechnical / Hydrogeological / Materials	2.0%					$26,700	
Geotechnical Sub-Total Cost						**$26,700**	
Property Requirements	2.0%					$ 26,700	
Property Requirements Sub-Total						**$26,700**	
Consultant Engineering/Design	15%					$ 200,400	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$200,400**	
In House Labour/Engineering/Wages/CA	8%					$ 106,900	
In-house Labour/Wages Sub-Total						**$106,900**	
Project Contingency	25%					$424,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$424,000**	
Non-Refundable HST	1.76%					$35,400	
Non-Refundable HST Sub-Total						**$35,400**	
Total (2020 Dollars)						**$2,406,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,406,000**	**2020 Estimate**

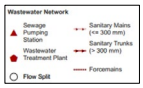
PROJECT NO.: WW-PS-007
PROJECT NAME: Empey Street WWPS Storage Upgrades
PROJECT DESCRIPTION: Increase existing Empey Street WWPS storage

TIMELINE: 0-5 Years

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Twinned Wet Well (Duplicate of existing 0.5 ML of storage), 2 ML Storage Chamber, includes 4 new pumps and a new control building.



REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**
STUDY SCOPE: The study will be a Schedule "B" project in accordance with all requirements of the Municipal Class Environmental Assessment.
OBJECTIVES: Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$100,000	$100,000	
Sub-Total Study Costs				**$100,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$0**	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$0**	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						**$0**	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$0**	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						**$0**	
Total (2020 Dollars)						**$100,000**	Rounded to nearest $1,000
Other Estimate						**$15,100,000**	From Preliminary Cost Estimate
Chosen Estimate						**$15,100,000**	**2020 Estimate**

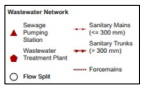
City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-PS-008 **TIMELINE:** 0-5 Years
PROJECT NAME: Empey Street WWPS Rehabilitation and Improvements
PROJECT DESCRIPTION: Address operational concerns related to station capacity.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Renewal to meet current flow needs including maintenance and repair, rehabilitation, renewal to meet current flow needs.



REQUIRED STUDIES: Feasibility Study.
STUDY SCOPE: The study will be a feasibility study to determine the rehab required at Empey WWPS.
OBJECTIVES: Determine the best rehabilitation strategy for the Empey WWPS to address known existing issues, facility age, condition and performance.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study	1	$500,000	$500,000	
Study	EA		$100,000	$0	
Sub-Total Study Costs				**$500,000**	

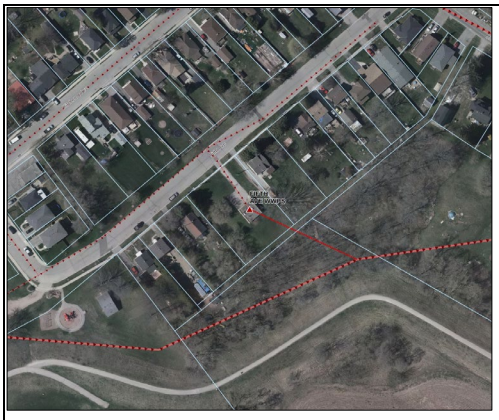
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$0**	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$0**	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						**$0**	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$0**	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						**$0**	
Total (2020 Dollars)						**$500,000**	Rounded to nearest $1,000
Other Estimate						**$2,100,000**	From Capacity Analysis and Condition Assessment Report
Chosen Estimate						**$2,100,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

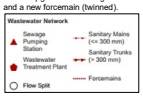
PROJECT NO.:	**WW-PS-009**	**TIMELINE:**	**Completion 2021**
PROJECT NAME:	**Fifth Avenue Wastewater Pumping Station Upgrades**		
PROJECT DESCRIPTION:	Upgrade capacity to accommodate existing and future flows.		

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Station upgrades at existing WWPS including upgrading capacity to 130 L/s, and a new forcemain (twinned). 11.232



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$200,000	$200,000	
Sub-Total Study Costs				**$200,000**	

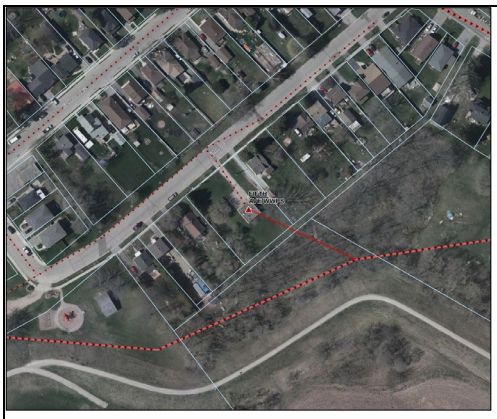
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$0**	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$0**	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						**$0**	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$0**	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						**$0**	
Total (2020 Dollars)						**$200,000**	Rounded to nearest $1,000
Other Estimate						**$3,512,000**	From Detailed Design Opinion of Costs
Chosen Estimate						**$3,512,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

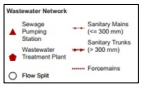
PROJECT NO.: WW-PS-010 **TIMELINE:** 0-5 Years
PROJECT NAME: Fifth Avenue WWPS Storage Upgrades
PROJECT DESCRIPTION: Upgrade wet well capacity to accommodate existing and future flows.

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Add 1 hour of storage to accommodate peak flows, 468 m3 of storage, to address existing and future peak weather flow storage deficit.



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	468

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$75,000	$75,000	
Sub-Total Study Costs				**$75,000**	

COST ESTIMATION SPREADSHEET

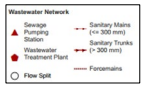
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			m3	468	$2,500	$1,170,000	
Additional Construction Costs	15%		ea.			$175,500	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$134,550	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$1,480,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$14,800	
Geotechnical Sub-Total Cost						**$14,800**	
Property Requirements	0.0%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	10%					$ 148,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$148,000**	
In House Labour/Engineering/Wages/CA	8%					$ 118,400	
In-house Labour/Wages Sub-Total						**$118,400**	
Project Contingency	15%					$264,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$264,000**	
Non-Refundable HST	1.76%					$33,600	
Non-Refundable HST Sub-Total						**$33,600**	
Total (2020 Dollars)						**$2,134,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$2,134,000**	**2020 Estimate**

PROJECT NO.: WW-PS-011 **TIMELINE:** 0-5 Years
PROJECT NAME: Greenwich Wastewater Pumping Station Rehabilitation and Improvements
PROJECT DESCRIPTION: Address operational concerns related to station capacity.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Renewal to meet current flow needs including maintenance and repair, rehabilitation and replacing existing pumps with new pumps and non-clog impellers to reduce plugging. Pumps to be selected to match current firm capacity to preservice the existing station capacity.



REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$200,000	$200,000	
Sub-Total Study Costs				**$200,000**	

COST ESTIMATION SPREADSHEET

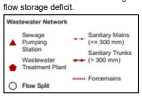
COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Additional Construction Costs	15%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$0**	
Geotechnical / Hydrogeological / Materials	1.0%					$0	
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.5%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$0**	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						**$0**	
Project Contingency	15%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$0**	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						**$0**	
Total (2020 Dollars)						**$200,000**	Rounded to nearest $1,000
Other Estimate						**$900,000**	From Capacity Analysis and Condition Assessment Report
Chosen Estimate						**$900,000**	**2020 Estimate**

PROJECT NO.: WW-PS-012 **TIMELINE:** 0-5 Years
PROJECT NAME: St. Andrews WWPS Storage Upgrades
PROJECT DESCRIPTION: Upgrade wet well capacity to accommodate existing and future flows.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Add an additional 20 m3 of storage to address existing and future peak weather flow storage deficit.



REQUIRED STUDIES: Municipal Class Environmental Assessment (EA)
STUDY SCOPE: The study will be a Schedule "B" project in accordance with all requirements of the Municipal Class Environmental Assessment.
OBJECTIVES: Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	20

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

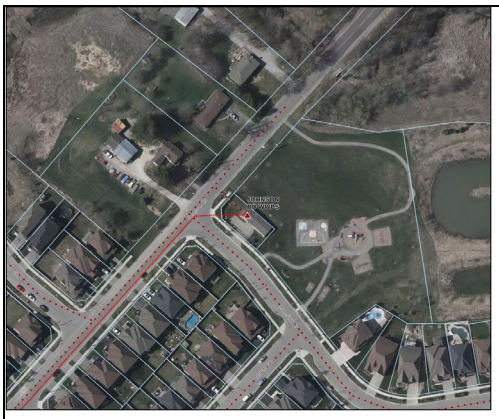
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$75,000	$75,000	
Sub-Total Study Costs				**$75,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			m3	20	$5,000	$100,000	
Additional Construction Costs	10%		ea.			$10,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$11,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$121,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$600	
Geotechnical Sub-Total Cost						**$600**	
Property Requirements	1.0%					$ 1,200	
Property Requirements Sub-Total						**$1,200**	
Consultant Engineering/Design	15%					$ 18,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$18,200**	
In House Labour/Engineering/Wages/CA	8%					$ 9,700	
In-house Labour/Wages Sub-Total						**$9,700**	
Project Contingency	10%					$15,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$15,000**	
Non-Refundable HST	1.76%					$2,700	
Non-Refundable HST Sub-Total						**$2,700**	
Total (2020 Dollars)						**$243,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$243,000**	**2020 Estimate**

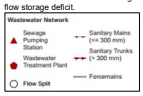
PROJECT NO.: WW-PS-013 **TIMELINE:** 0-5 Years
PROJECT NAME: Johnson WWPS Storage Upgrades
PROJECT DESCRIPTION: Upgrade wet well capacity to accommodate existing and future flows.

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Add an additional 115 m3 of storage to address existing and future peak weather flow storage deficit.



REQUIRED STUDIES: **Municipal Class Environmental Assessment (EA)**
STUDY SCOPE: The study will be a Schedule 'B' project in accordance with all requirements of the Municipal Class Environmental Assessment.
OBJECTIVES: Determine the best construction methodology for the wastewater pumping station expansion and upgrades including wet well construction.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	115

CLASS EA REQUIREMENTS:	B
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA	1	$75,000	$75,000	
Sub-Total Study Costs				**$75,000**	

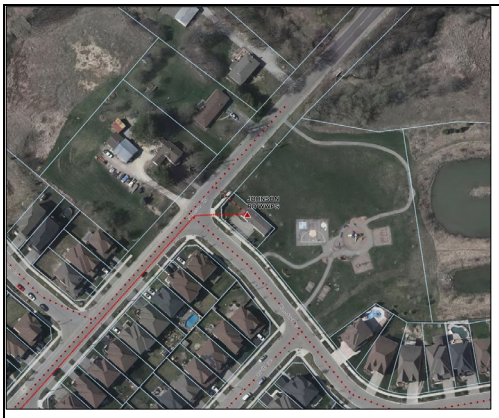
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Facility Construction			m3	115	$2,500	$287,500	
Additional Construction Costs	10%		ea.			$28,750	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$31,625	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$348,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$1,700	
Geotechnical Sub-Total Cost						**$1,700**	
Property Requirements	1.0%					$ 3,500	
Property Requirements Sub-Total						**$3,500**	
Consultant Engineering/Design	15%					$ 52,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$52,200**	
In House Labour/Engineering/Wages/CA	8%					$ 27,800	
In-house Labour/Wages Sub-Total						**$27,800**	
Project Contingency	10%					$43,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$43,000**	
Non-Refundable HST	1.76%					$7,900	
Non-Refundable HST Sub-Total						**$7,900**	
Total (2020 Dollars)						**$559,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$559,000**	**2020 Estimate**

PROJECT NO.: WW-PS-014
PROJECT NAME: Johnson WWPS Rehabilitation
PROJECT DESCRIPTION: Upgrade capacity to accommodate existing and future flows.

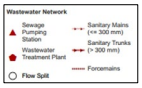
TIMELINE: 0-5 Years

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Rehabilitation, maintenance and repair to address operational concerns related to WWPS.



REQUIRED STUDIES: Feasibility Study.
STUDY SCOPE: The study will be a feasibility study to determine the rehab required at the Johnson WWPS
OBJECTIVES: Determine the best rehabilitation strategy for the Johnson WWPS to address known existing issues, facility age, condition and performance.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study	1	$50,000	$50,000	
Study	EA			$0	
Sub-Total Study Costs				**$50,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Rehabilitation							
Additional Construction Costs	10%		ea.			$0	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$0	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$0**	
Geotechnical / Hydrogeological / Materials	0.5%					$0	
Geotechnical Sub-Total Cost						**$0**	
Property Requirements	1.0%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$0**	
In House Labour/Engineering/Wages/CA	8%					$ -	
In-house Labour/Wages Sub-Total						**$0**	
Project Contingency	10%					$0	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$0**	
Non-Refundable HST	1.76%					$0	
Non-Refundable HST Sub-Total						**$0**	
Total (2020 Dollars)						**$50,000**	Rounded to nearest $1,000
Other Estimate						**$400,000**	From Capacity Analysis and Condition Assessment Report
Chosen Estimate						**$400,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-PS-015 **TIMELINE:** 0-5 Years
PROJECT NAME: Woodlawn WWPS Rehabilitation
PROJECT DESCRIPTION: Upgrade capacity to accommodate existing and future flows.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Rehabilitation, maintenance and repair to address operational concerns related to WWPS.

REQUIRED STUDIES: Feasibility Study.
STUDY SCOPE: The study will be a feasibility study to determine the rehab required at the Woodlawn WWPS
OBJECTIVES: Determine the best rehabilitation strategy for the Woodlawn WWPS to address known existing issues, facility age, condition and performance.

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study	1	$50,000	$50,000	
Study	EA			$0	
Sub-Total Study Costs				**$50,000**	

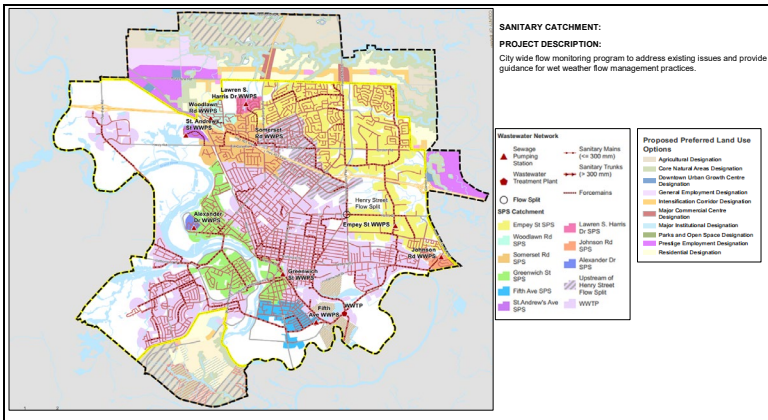
COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Rehabilitation			Lump Sum	1 L/s	$23,000	$23,000	
Additional Construction Costs	10%		ea.			$2,300	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$2,530	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$28,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$100	
Geotechnical Sub-Total Cost						**$100**	
Property Requirements	1.0%					$ 300	
Property Requirements Sub-Total						**$300**	
Consultant Engineering/Design	15%					$ 4,200	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$4,200**	
In House Labour/Engineering/Wages/CA	8%					$ 2,200	
In-house Labour/Wages Sub-Total						**$2,200**	
Project Contingency	10%					$3,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$3,000**	
Non-Refundable HST	1.76%					$600	
Non-Refundable HST Sub-Total						**$600**	
Total (2020 Dollars)						**$88,000**	Rounded to nearest $1,000
Other Estimate						**$400,000**	From Capacity Analysis and Condition Assessment Report
Chosen Estimate						**$400,000**	**2020 Estimate**

City of Brantford
Water, Wastewater, and Stormwater Master Servicing Plan Update - 2051 Amendment
Wastewater Capital Program

PROJECT NO.: WW-II-001 **TIMELINE:** 0-5 Years
PROJECT NAME: Flow Monitoring
PROJECT DESCRIPTION: City wide flow monitoring program.

MAP



SANITARY CATCHMENT:

PROJECT DESCRIPTION:
City wide flow monitoring program to address existing issues and provide guidance for wet weather flow management practices.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Low	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	30%	
Area Condition:	Suburban	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	
CONSTRUCTION ASSUMPTION:	

COST ESTIMATE SPREADSHEET

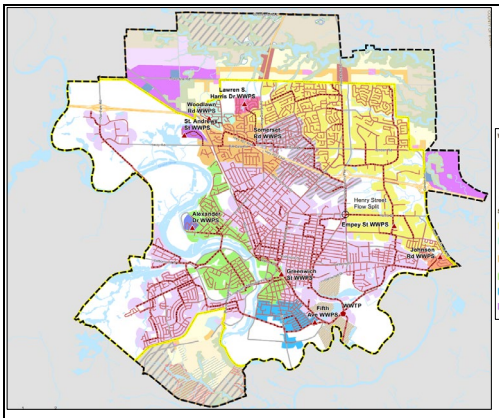
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Flow Monitoring Program			years	20	$250,000	$5,000,000	
Additional Construction Costs	10%		ea.			$500,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$550,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$6,050,000**	
Geotechnical / Hydrogeological / Materials	0.5%					$30,300	
Geotechnical Sub-Total Cost						**$30,300**	
Property Requirements	1.0%					$ 60,500	
Property Requirements Sub-Total						**$60,500**	
Consultant Engineering/Design	15%					$ 907,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$907,500**	
In House Labour/Engineering/Wages/CA	8%					$ 484,000	
In-house Labour/Wages Sub-Total						**$484,000**	
Project Contingency	10%					$753,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$753,000**	
Non-Refundable HST	1.76%					$137,300	
Non-Refundable HST Sub-Total						**$137,300**	
Total (2020 Dollars)						**$8,423,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$8,423,000**	**2020 Estimate**

PROJECT NO.: WW-II-002 **TIMELINE:** 0-5 Years
PROJECT NAME: City Wide I&I Program
PROJECT DESCRIPTION: Wet weather management program to address growth and existing issues.

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
City wide I&I reduction program based on flow monitoring results to address existing issues.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	
CONSTRUCTION ASSUMPTION:	

COST ESTIMATE SPREADSHEET

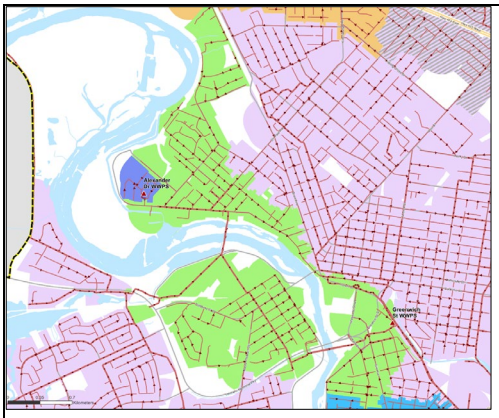
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
I&I Reduction			L/s	100 L/s	$150,000	$15,000,000	
Additional Construction Costs	15%		ea.			$2,250,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$1,725,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$18,975,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$189,800	
Geotechnical Sub-Total Cost						**$189,800**	
Property Requirements	1.5%					$ 284,600	
Property Requirements Sub-Total						**$284,600**	
Consultant Engineering/Design	12%					$ 2,277,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$2,277,000**	
In House Labour/Engineering/Wages/CA	6%					$ 1,138,500	
In-house Labour/Wages Sub-Total						**$1,138,500**	
Project Contingency	15%					$3,430,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$3,430,000**	
Non-Refundable HST	1.76%					$442,800	
Non-Refundable HST Sub-Total						**$442,800**	
Total (2020 Dollars)						**$26,738,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$26,738,000**	**2020 Estimate**

PROJECT NO.: WW-II-003 **TIMELINE:** 0-5 Years
PROJECT NAME: Greenwich WWPS I&I Reduction
PROJECT DESCRIPTION: I&I program to manage peak flows in Greenwich WWPS catchment

MAP



SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:
Greenwich WWPS catchment subject to high I&I in catchment. Initiate I&I program to manage peak flows to free up capacity at existing WWPS.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	
CONSTRUCTION ASSUMPTION:	

COST ESTIMATE SPREADSHEET

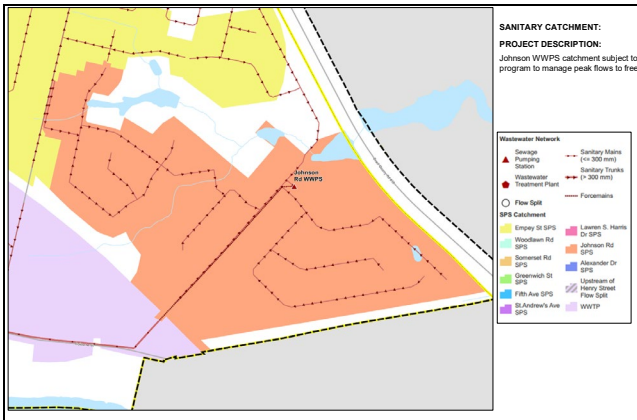
COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
I&I Program			L/s	20 L/s	$150,000	$3,000,000	
Additional Construction Costs	15%		ea.			$450,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$345,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,795,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$38,000	
Geotechnical Sub-Total Cost						**$38,000**	
Property Requirements	1.5%					$ 56,900	
Property Requirements Sub-Total						**$56,900**	
Consultant Engineering/Design	15%					$ 569,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$569,300**	
In House Labour/Engineering/Wages/CA	8%					$ 303,600	
In-house Labour/Wages Sub-Total						**$303,600**	
Project Contingency	15%					$714,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$714,000**	
Non-Refundable HST	1.76%					$91,000	
Non-Refundable HST Sub-Total						**$91,000**	
Total (2020 Dollars)						**$5,568,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,568,000**	**2020 Estimate**

PROJECT NO.: WW-II-004
PROJECT NAME: Johnson WWPS I&I Reduction
PROJECT DESCRIPTION: I&I program to manage peak flows in John WWPS catchment
TIMELINE: 0-5 Years

MAP



SANITARY CATCHMENT:

PROJECT DESCRIPTION:
Johnson WWPS catchment subject to very high I&I in catchment. Initiate I&I program to manage peak flows to free up capacity at existing WWPS.

REQUIRED STUDIES: -
STUDY SCOPE: -
OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	
CONSTRUCTION ASSUMPTION:	

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
I&I Program			L/s	20 L/s	$150,000	$3,000,000	
Additional Construction Costs	15%		ea.			$450,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$345,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,795,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$38,000	
Geotechnical Sub-Total Cost						**$38,000**	
Property Requirements	1.5%					$ 56,900	
Property Requirements Sub-Total						**$56,900**	
Consultant Engineering/Design	15%					$ 569,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$569,300**	
In House Labour/Engineering/Wages/CA	8%					$ 303,600	
In-house Labour/Wages Sub-Total						**$303,600**	
Project Contingency	15%					$714,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$714,000**	
Non-Refundable HST	1.76%					$91,000	
Non-Refundable HST Sub-Total						**$91,000**	
Total (2020 Dollars)						**$5,568,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,568,000**	**2020 Estimate**

PROJECT NO.: WW-TP-001 **TIMELINE:** 0-5 Years

PROJECT NAME: Wastewater Treatment Plant Upgrades - 0-5 Years

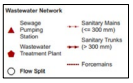
PROJECT DESCRIPTION: Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:

Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.



REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study	1	$150,000	$150,000	
Study	EA			$0	
Sub-Total Study Costs				**$150,000**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
New Chlorine Contact Chamber						$4,000,000	
Additional Construction Costs	15%		ea.			$600,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$460,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$5,060,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$50,600	
Geotechnical Sub-Total Cost						**$50,600**	
Property Requirements	1.5%					$ 75,900	
Property Requirements Sub-Total						**$75,900**	
Consultant Engineering/Design	15%					$ 759,000	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$759,000**	
In House Labour/Engineering/Wages/CA	8%					$ 404,800	
In-house Labour/Wages Sub-Total						**$404,800**	
Project Contingency	15%					$953,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$953,000**	
Non-Refundable HST	1.76%					$121,400	
Non-Refundable HST Sub-Total						**$121,400**	
Total (2020 Dollars)						**$7,575,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$7,575,000**	2020 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$151,500		
Design	Design fees, Town fees for design, contract admin	13%	$984,750		
Construction	City fees, base costs and project contingency	85%	$6,438,750		
TOTAL			$7,575,000		

PROJECT NO.: WW-TP-002 **TIMELINE:** 5-10 Years

PROJECT NAME: Wastewater Treatment Plant Upgrades - 5-10 Years

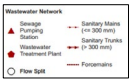
PROJECT DESCRIPTION: Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:

Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.



REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
Upsize existing oxygenation blowers						$2,000,000	
PM1 & PM2 cross connection piping upgrades						$500,000	
Install a new decant system for biosolds storage						$500,000	
Additional Construction Costs	15%		ea.			$450,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$345,000	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$3,795,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$38,000	
Geotechnical Sub-Total Cost						**$38,000**	
Property Requirements	1.5%					$ 56,900	
Property Requirements Sub-Total						**$56,900**	
Consultant Engineering/Design	15%					$ 569,300	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$569,300**	
In House Labour/Engineering/Wages/CA	8%					$ 303,600	
In-house Labour/Wages Sub-Total						**$303,600**	
Project Contingency	15%					$714,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$714,000**	
Non-Refundable HST	1.76%					$91,000	
Non-Refundable HST Sub-Total						**$91,000**	
Total (2020 Dollars)						**$5,568,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$5,568,000**	2020 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$111,360		
Design	Design fees, Town fees for design, contract admin	13%	$723,840		
Construction	City fees, base costs and project contingency	85%	$4,732,800		
TOTAL			$5,568,000		

PROJECT NO.: WW-TP-003 **TIMELINE:** 10-20 Years

PROJECT NAME: Wastewater Treatment Plant Upgrades - 10-15 Years

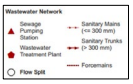
PROJECT DESCRIPTION: Moderate process upgrades at the WWTP to utilize full available capacity of 81,800 m3/day.

MAP

SANITARY CATCHMENT: WWTP

PROJECT DESCRIPTION:

Moderate process upgrades to re-establish existing capacity including constructing a new 1,468 m3 Chlorine Contact Chamber, upsizing existing oxygenation blowers, aeration tanks PM1 and PM2 cross connection piping upgrades, new waste activated sludge (WAS) facility to support primary clarifiers and anaerobic digesters and install a new decant system in the Biosolids Storage Tank.



REQUIRED STUDIES: -

STUDY SCOPE: -

OBJECTIVES: -

CONSTRUCTION

Class Estimate Type:	Class 4	Class adjusts Construction Contingency and expected accuracy
Project Complexity	Med	Complexity adjusts Construction Contingency, and expected accuracy
Accuracy Range:	40%	
Area Condition:	Rural	Area Condition uplifts unit cost and restoration

PROPOSED CAPACITY	

CLASS EA REQUIREMENTS:	A+
CONSTRUCTION ASSUMPTION:	Other

COST ESTIMATE SPREADSHEET

COMPONENT	PROJECT COMPONENT DESCRIPTION	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Study Cost					
Study	Feasibility Study			$0	
Study	EA			$0	
Sub-Total Study Costs				**$0**	

COST ESTIMATION SPREADSHEET

COMPONENT	RATE (%)	RATE ($)	UNIT	ESTIMATED QUANTITY	COST PER UNIT	SUB-TOTAL	COMMENTS
Construction Cost							
New WAS facility						$5,500,000	
Additional Construction Costs	15%		ea.			$825,000	Includes Mob/Demob,connections, inspection, hydrants, signage, traffic management, bonding, insurance
Provisional & Allowance	10%		ea.			$632,500	Provisional Labour and Materials in addition to base construction cost
Sub-Total Construction Base Costs						**$6,958,000**	
Geotechnical / Hydrogeological / Materials	1.0%					$69,600	
Geotechnical Sub-Total Cost						**$69,600**	
Property Requirements	0.0%					$ -	
Property Requirements Sub-Total						**$0**	
Consultant Engineering/Design	15%					$ 1,228,500	includes planning, pre-design, detailed design, training, CA, commissioning
Engineering/Design Sub-Total						**$1,228,500**	
In House Labour/Engineering/Wages/CA	8%					$ 556,600	
In-house Labour/Wages Sub-Total						**$556,600**	
Project Contingency	15%					$1,322,000	Construction Contingency is dependent on Cost Estimate Class and Project Complexity
Project Contingency Sub-Total						**$1,322,000**	
Non-Refundable HST	1.76%					$168,600	
Non-Refundable HST Sub-Total						**$168,600**	
Total (2020 Dollars)						**$10,303,000**	Rounded to nearest $1,000
Other Estimate							
Chosen Estimate						**$10,303,000**	2020 Estimate

COST ESTIMATE SUMMARY - FOR PHASING ESTIMATING ONLY

PROJECT COMPONENT	PROJECT COMPONENT DESCRIPTION	PERCENTAGE	TOTAL	YEAR	COMMENTS
Study	Feasibility study, EA	2%	$206,060		
Design	Design fees, Town fees for design, contract admin	13%	$1,339,390		
Construction	City fees, base costs and project contingency	85%	$8,757,550		
TOTAL			**$10,303,000**		