

GEI Consultants Canada

CITY OF BRANTFORD

Water and Wastewater Master Servicing Plan – Development Charges Update
2025 Amendment

Volume III – Water Master Plan

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Key Acronyms and Definitions

ADD (Average Day Demand)

Average Day Demand is the typical daily water consumption within the distribution system.

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.

BPS (Booster Pumping Station)

A Booster Pumping Station allows water, within the distribution system, to be lifted from an area of lower elevation to an area of higher elevation. Within the Brantford water distribution system, a booster pumping station typically refers to smaller pumping stations.

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 2021.

ET (Elevated Tank)

An Elevated Tank is a raised water storage facility which stores water for everyday use and for emergencies, discharging to the distribution system by gravity.

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.

FF (Fire Flow)

Fire Flow is the short-term large water demand needed to fight a fire, typically evaluated under maximum day demand conditions to establish conservative conditions.

FUS (Fire Underwriters Survey)

The Fire Underwriters Survey is national organization which provides data and guidance on public fire protection for fire insurance statistical work and underwriting purposes of subscribing insurance companies. Included within their water supply for public fire protection document is guidance for estimating required fire flows.

HGL (Hydraulic Grade Line)

A Hydraulic Grade Line, within the pressurized water distribution system, refers to the level of a column of water would raise to in a piezometer which is the sum of the pressure head and elevation head.

LOS (Level of Service)

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

LOSB (Lands Outside Service Boundary)

Lands which do not fall under the City's responsibility for water, wastewater, and stormwater servicing.

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.

MDD (Maximum Day Demand)

Maximum Day Demand is the peak daily water consumption within the distribution system.

ML (Million Litres)

Million Litres is a unit of measure for volume.

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.

PD (Pressure District)

A Pressure District is an area bounded specific elevations which allow for acceptable pressures to be maintained within that specific area.

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.

PRV (Pressure Reducing Valve)

A Pressure Reducing Valve is a type of valve which allows for the water pressure to be reduced. This is typical in areas with lower elevation than their surroundings such that high water pressures are avoided.

PS (Pumping Station)

A Pumping Station allows water, within the distribution system, to be lifted from an area of lower elevation to an area of higher elevation and help to regulate flows and pressures.

PTTW (Permit to take Water)

Permit to Take Water is a permit issued by the MECP which allows water taking, from either surface water or ground water, to a specific flow rate.

Res (Reservoir)

A Reservoir refers to an inground water storage facility which stores water for everyday use and for emergencies, discharging to the distribution system by pumps.

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.

TDH (Total Dynamic Head)

Total Dynamic Head is the losses a pump must overcome to lift water from a lower elevation to a higher elevation. This can be calculated by the summation of elevation head, friction head loss, and pressure head.

TWL (Top Water Level)

Top Water Level is the maximum height of water within storage facilities (i.e. inground reservoir or elevated tank). Typically, these are presented as either meters above sea level (masl) or as height from the bottom of the storage facility.

Water Treatment Plant (WTP)

A Water Treatment Plant is a facility which contains a treatment process to clean water, passing through many steps to meet water quality requirements, before it enters the water distribution system.

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, businesses, and other water users.

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 infrastructure. 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 completed the preparation of the 2021 Master Servicing Plan Update – 2051 Amendment (2021 MSP Update) for water, wastewater, and stormwater services under the Municipal Engineers Association (MEA) Master Plan Class Environmental Assessment process. This update amended the 2020 MSP to extend the planning horizon to 2051 and was completed in 2021. Since then, comprehensive block plans have identified higher densities than originally assumed, creating a need to reassess servicing capacities. The 2025 MSP Amendment builds upon the 2020 and 2021 plans by incorporating updated growth forecasts, revised density targets, and provincial policy changes. It evaluates the impacts of increased density and additional growth through sensitivity analysis, updates

hydraulic modeling, and identifies associated capital programs and cost implications to inform the City's Development Charges By-law and long-term infrastructure planning.

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 undertook 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 , approved by the Ministry of Municipal Affairs in August 2021, coming into effect August 5, 2021. The Official Plan has since been amended from time to time, and the current office consolidation is dated August 2025.

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 undertook an update to its MSP. In 2021, the MSP was amended to extend the planning horizon to 2051. This update incorporated minimal additional growth beyond 2041 and refined servicing assumptions based on updated population and employment forecasts.

The 2021 MSP Update – 2051 Amendment provided 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 and came into effect August 5, 2021.

The 2021 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 2021 MSP Update to the 2041 growth horizon, updated growth numbers were provided by the Province's Growth Plan to the 2051 growth horizon.

The 2021 MSP Update – 2051 Amendment was 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.

The 2025 MSP Amendment builds upon these previous MSPs, subsequent monitoring and data collection, studies since 2021, hydraulic modelling calibrations based on system update, and additional evaluations. It considers the impacts of increased density and potential additional growth through the assessment of alternate density targets. The amendment also identifies the associated capital program and cost implications to inform updates to the City's Development Charges By-law.

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 2021 MSP Update evaluated 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 2025 MSP Amendment builds upon the 2020 and 2021 updates by incorporating revised density targets, updated growth forecasts, and provincial policy changes. It evaluates alternate growth scenarios and selects the High Growth Scenario as the preferred planning basis to ensure resiliency and adaptability. The amendment updates hydraulic modeling, confirms servicing capacity for intensification and greenfield development, and identifies associated capital programs and cost implications to inform the City's Development Charges By-law and long-term financial planning.

The key objectives of the 2025 MSP Amendment are as follows:

- Review and confirm servicing capacity under revised growth scenarios, selecting the High Growth Scenario as the preferred planning basis;
- Update and refine water and wastewater servicing strategies to reflect higher density targets and provincial policy direction.
- Consider and incorporate proposed water, wastewater, and stormwater infrastructure needs to support the full buildout lands within the new municipal boundary beyond 2051;
- Maintain level of service objectives while optimizing infrastructure and minimizing under-sizing risks;
- 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;
- Identify and prioritize capital projects with updated Class 4 cost estimates and escalation factors to ensure financial accuracy;
- Utilize recently completed and on-going projects to update infrastructure status, capacity and cost estimates;
- Provide a framework for implementation and integration with other master plans, including the Transportation Master Plan;
- Incorporate updated hydraulic modelling and system calibrations based on recent monitoring and data collection; Align the capital program with the upcoming Development Charges Background Study (2026) and the City's 10-year capital forecast; and
- Continue to support sustainable servicing solutions and resiliency in response to climate growth pressures.

1.5. Master Servicing Plan Documentation Layout

The 2025 MSP Amendment, 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** and fulfill the municipal master servicing plan requirement.

The 2025 MSP Amendment is organized into six volumes as described below.

Volume I – Executive Summary

Volume I provides a brief overview of the 2025 MSP Amendment. 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
- Appendix G – Treatment Capacity Technical Memorandum

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 and **Volume VI** were part of the 2020 MSP. The 2025 MSP Amendment did not complete any Stormwater updates or additional Public Consultation; therefore, these volumes are not part of this 2025 Amendment Document package. The content of the Volumes as they appeared in the 2020 MSP is outlined below.

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. The Stormwater Master Plan will be updated during the 2030 MSP update. Therefore, this volume was not updated as part of the 2025 MSP Amendment.

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

No additional consultation activities were undertaken for the 2025 Amendment; refer to **Volume VI** of the 2021 MSP Update for consultation documentation.

2. Water 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 a system-wide capital program, and operations and maintenance practices.

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

Through the Master Servicing Plan; 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 water system. A fulsome summary of the MSP Policies and LOS objectives review and recommendations is included in **Appendix A** of **Volume II**.

2.1. Water Servicing Principles and Policies

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

"**The City of Brantford is looking to provide an efficient, sustainable, and safe water system that meets regulatory requirements, minimizes service disruptions, and is capable of accommodating growth**"

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

2.2. Water Design Criteria and Hydraulic Performance Criteria

A guiding principle of design criteria is to ensure that the demand 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 Master Servicing Plan to ensure water demands are accurate and will support sizing and timing of future infrastructure such as pipes and facilities.

2.2.1. Water Design Criteria and Level of Service Summary

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

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

Table 1: Water Design Criteria and Level of Service

Criteria		Draft Targets
Water Use	Per Capita Rate	270 Liters/capita/day (residential and employment)
	Max Day Peaking Factor	1.8
System Performance	Pressures	40-100 psi
	Fire flow	Land use/FUS-lite approach
	Velocities	Maintain minimum velocity > 0.3 m/s Flag velocities >1.5 m/s Maintain peak velocities <2.0 m/s
Facility Capacity	Facility Triggers (supply and pumping)	80% Planning and Design 90% Construction
	Water Storage	Total Storage Needs = Balancing + Fire + Emergency Balancing = 25% MDD Fire = Greater of MECP population-based calculation or the highest landuse based FF needs Emergency = 50% of Balancing + Fire * Each PD to be storage self-sufficient
	Pumping	Firm capacity = largest pump out of service Firm capacity provides MDD if sufficient storage within PD Firm capacity provides largest of MDD+FF or PHD if insufficient storage within PD *FF needs based on highest landuse based FF within the PD

Development of the water demand criteria for the Master Plan Update is detailed further in **Appendix B** in **Volume II**.

2.3. Water Use Design Criteria

2.3.1. Per Capita Demand

An analysis of historic water treatment plant production and water billing records was completed and presented in **Table 2**. Billing data was provided by the City in the form of lot meter readings from 2008-2024. The WTP production describes billed yearly consumption within the City and was used to calculate an average day demand (ADD).

Table 2: Historic Water Use

Year	Billing (MLD)	Average Day Demand (MLD)	Non-Revenue Water (%)	Per Capita Rate (L/c/d)
2008	31.1	34.2	9%	247
2009	29.9	33.3	10%	238
2010	30.1	33.5	10%	239
2011	29.9	33.6	11%	243
2012	30.2	37.0	18%	256
2013	-	33.4	-	-
2014	29.7	33.1	8%	225
2015	30.4	32.8	6%	221
2016	30.0	32.4	6%	218
2017	29.4	31.5	6%	227
2018	30.6	32.9	7%	230
2019	29.2	33.1	12%	225
2020	30.5	33.3	8%	219
2021	29.8	32.5	8%	211
2022	29.6	33.5	12%	208
2023	28.9	33.0	13%	201
Average Historic Water Use	**30.0**	**33.3**	**10%**	**227**
5-Year Average Historic Water Use (2019-2023)[(1)]	**29.6**	**33.1**	**10%**	**213**
Historic Design Criteria (2019)	**-**	**-**	**-**	**300**

[(1)] Note that treatment projections were based on 2020-2024.

Growth related per capita rate of 270 L/c/d was recommended for the following reasons:

- This represents a decrease in the existing design criteria per capita rates of 10% and is in line with the recommended wastewater 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.

2.3.2. Peaking Factor

An analysis of historic water treatment plant production, including average and maximum day demands and calculated peaking, was completed and presented in **Table 3.**

Table 3: Peaking Factor

Year	Average Day Demand (MLD)	Max Day Demand (MLD)	Peaking Factor
2008	34.2	53.5	1.56
2009	33.3	48.0	1.44
2010	33.5	50.7	1.51
2011	33.6	57.5	1.71
2012	37.0	57.2	1.55
2013	33.4	47.2	1.41
2014	33.1	42.2	1.28
2016	32.8	46.9	1.43
2017	32.4	46.5	1.44
2018	31.5	46.7	1.49
2019	32.9	44.7	1.36
2020	33.1	47.6	1.44
2021	33.3	49.5	1.49
2022	32.5	43.9	1.35
2023	33.5	50.9	1.52
Average	**33.3**	**48.9**	**1.47**

A peaking factor of 1.8 was recommended for the following reasons:

- Represents a decrease in the existing design criteria maximum day demand peaking factor of 10%.
- The recommended peaking factor remains above the observed historic 10-year maximum day peaking factor, and above the MECP recommended maximum day peaking factor of 1.65 for a population base between 75,001 to 150,000 or 1.5 for a population base greater than 150,000 (2051 Population); providing reasonable flexibility in the criteria to accommodate potential changes in future usage rates.

2.3.3. Starting Point Methodology

The five-year rolling average of average day demands was used to establish baseline system average day demands. Baseline system max day demand was calculated using a peaking factor of 1.8.

2.3.4. Growth Demand Projections

Future system demands were developed using a starting point methodology, the standard approach within Southern Ontario for projecting future growth demands. Expected demand due to growth was added to the starting point demand to establish future demands. An example is provided below.

2051 ADD = Baseline ADD[1] + (2051 total equ.pop.[2] – 2016 total equ.pop) * 270 L/c/d

2.4. System Hydraulic Performance Criteria

2.4.1. Pressures

System pressure objectives consistent with the MECP Criteria are as follows:

- Maintain system pressures between 40-100 psi under average day demand (ADD), maximum day demand (MDD), and peak hour demand (PHD) scenarios
- Maintain system pressures above 20 psi under MDD + fire flow conditions

2.4.2. Fire Flow – Network Capacity

The recommended process of defining fire flow targets is as follows:

- FUS and land use-based approach
- Fire flow at a hydrant is governed by land use with the highest fire flow target
- Due to current uncertainties, within the City of Brantford's existing water network, on the magnitude of water system upgrades as a result of fire flow targets, a sensitivity analysis was to be performed to ensure reasonable targets can be met.

Table 4 summarizes the system fire flow targets that were used in assessing system capacity.

[1] ADD – Average Day Demand
[2] Equ. Pop – Total of the combined people and employment population

Table 4: Range of Recommended Fire Flow Targets

Landuse	Typical FUS Range (L/s)	# of Hydrants	Target Fire Flow (L/s)
Dead End Residential	27-100 L/s	-	50 (4.3 MLD)
Single/ Semi Family	27-162 L/s	1	75 (6.5 MLD)
Townhouse/ Row House	82-167 L/s	1-2	125 (10.8 MLD)
Multi Family	117-368 L/s	2	150 (13.0 MLD)
Commercial	111-185 L/s	2-3	175 (15.1 MLD)
Institutional	96-334 L/s	2-3	175 (15.1 MLD)
Industrial	133-299 L/s	3-4	250 (21.6 MLD) [(1)]
City Center	-	3	225 (19.4 MLD)

[(1)] Northwest PS was designed to provide a fire flow of 189 L/s (16.3 MLD) to PD4, this facility will continue to support PD4 under its designed conditions, providing a maximum fire flow of 189 L/s (16.3 MLD), until upgrades are completed at the pumping station to allow for an increased fire flow.

2.4.2.1. Peak Velocities

The current design criteria requires new watermains to maintain peak velocities, under peak hour conditions, less than 1.5 m/s and any peak velocities which exceed 2.0 m/s should be flagged for review and mitigation. An additional design criterion was considered for this MSPU to include flagging minimum velocities less than 0.3 m/s.

2.4.3. Water Facilities Capacity Objectives

2.4.3.1. Facility Upgrade Triggers

Industry best practice and recommended methodology for supply and 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

2.4.3.2. Storage Capacity

Potential short-term loss of City raw water supply due to upstream overflow or spill events has been identified and is a significant concern based on the following high-risk factors:

- Single supply source for the entire City of Brantford
- Frequency of intake closures due to upstream contaminant spill
- Limited raw water storage capacity

As such, evaluated through the Water Treatment Plant Emergency Water Supply and Canal Upgrades Study (AECOM, 2019), the City aims to maintain a total system storage capacity of at least 48 hours at maximum day demand through a combination of storage in the Holmedale Canal and treated distribution system storage. This is to ensure some water supply is available if the intake from the Grand River must be temporarily closed due to upstream contamination concerns. Dredging of the Holmedale Canel was recommended in the Water Treatment Plant Emergency Water Supply and Canal Upgrades Study (AECOM, 2019) to regain design capacity storage volume to the extent possible. Further, treated water storage will be supplemental to raw storage in the event of the listed high-risk factors occurring.

System (treated) storage will be evaluated on a pressure district by pressure district basis using the approach of:

Total Storage = Fire Storage (A) + Equalization Storage (B) + Emergency Storage (C)

- Fire storage (A) needs for water reservoirs will be sized to be the greater of:
    - FUS fire storage need based on the highest land use needs as identified within the pressure district; or,
    - Ministry of the Environment, Conservation and Parks (MECP) population-based storage requirement.
- Equalization Storage (B) to be based on the MECP 25% of maximum day demand to meet peak demands
- Emergency Storage (C) to be based on the 50% of Fire Storage (A) + Equalization Storage (B)

To mitigate against the interruption of supply capacity each Pressure District Fire Storage is to be calculated independently. Storage capacity can be supplemented by a second pressure district; however, the City shall maintain adequate storage in the system to support each pressure district as if it was independently supplied while further considering maintaining water quality.

2.4.3.3. Pumping Firm Capacity

The evaluation of pumping firm capacities, at both pumping stations and water treatment plant high lift pumps, considered historic and future pumping needs, current firm capacity definition, and storage within a pressure district. The recommended approach in determination of pumping firm capacities is as follows:

- Firm capacity is defined as the largest pump out of service
- The pump capacity shall be sized to provide
    - Max day demands where sufficient elevated storage is available
    - The greater of peak hour demand or max day demand + fire flow where no/insufficient elevated storage is available; further, fire flow needs are based on the highest land use-based fire flow target within the Pressure District

2.5. Capital Cost Projections

A capital cost is provided for all projects proposed as part of this Master Servicing Plan. For the majority of the water 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.

3. Planning & Growth Projections

Ontario's A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020) provides a framework for implementing the Province's vision for managing growth and provides context on where and how to grow. The Growth Plan for the Greater Golden Horseshoe was repealed under O. Reg. 328/24 and integrated into the Provincial Planning Statement (2024).
While this Plan has since been repealed, several of the core principles have been integrated into the Provincial Planning Statement (2024), such as the concept of strategic growth areas.
The Growth Plan provides population and employment forecasts for all upper- and single-tier municipalities in the GGH. The Provincial growth forecasts are a foundational component of the Growth Plan and must be reviewed in consultation with municipalities at least every five years.
The City is forecasted to have a population of 165,000 and a corresponding local employment base of 80,000 jobs by 2051. The City's new OP (2023) has been prepared to appropriately plan where and how this growth will be accommodated and the supporting infrastructure that is required.

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 Provincial Planning Statement (2024) 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.

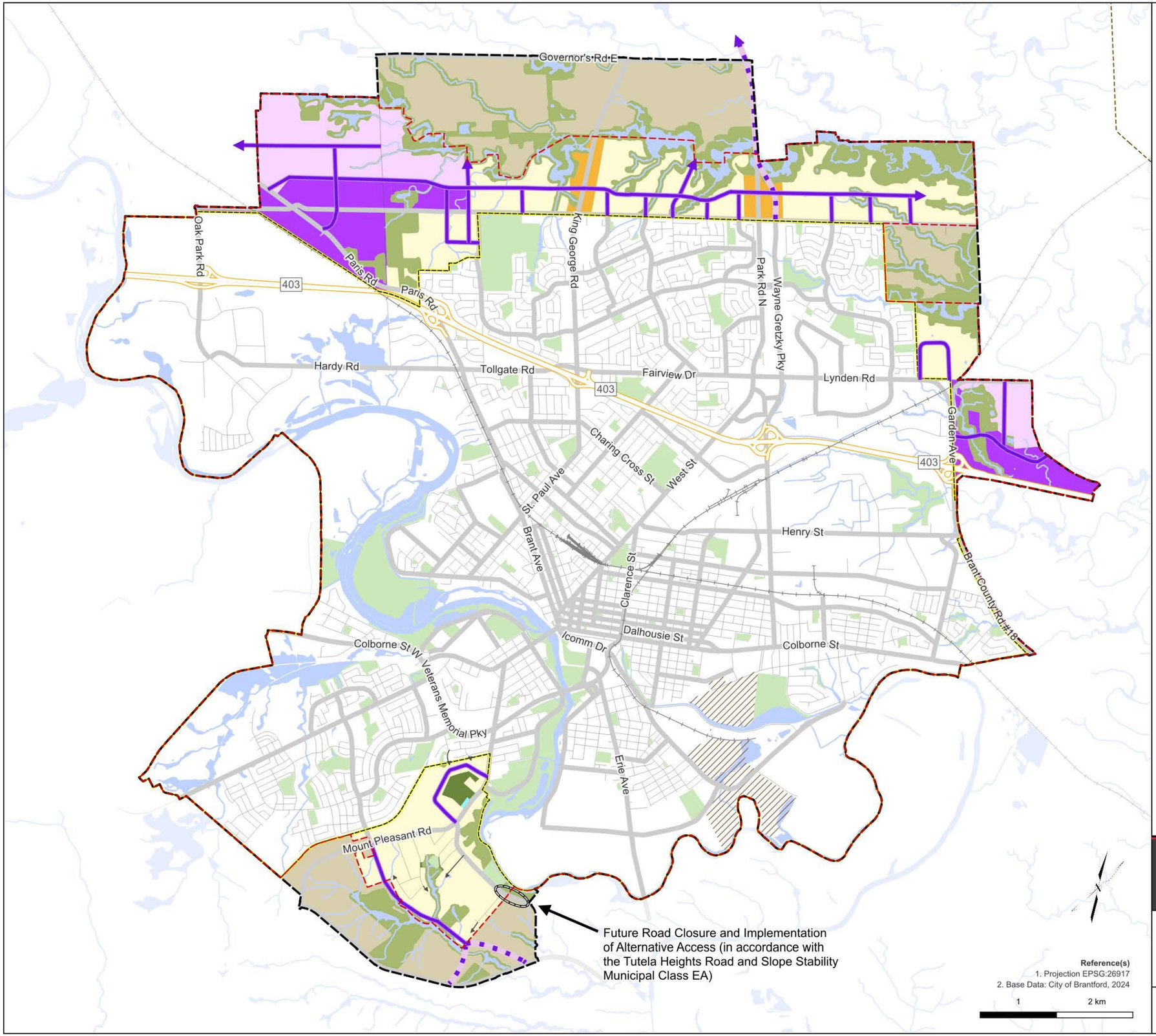
The MCR identified both growth and intensification targets as well as Settlement Area boundary expansion needs. **Figure 1** presents the Settlement Area Boundary Expansion Lands which are further subdivided into the following sub-areas:

- 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 Lands Outside Settlement Boundary (LOSB), which are lands held for future Settlement Area expansion following substantial development of the current proposed Settlement Area Boundary Expansion areas.



Proposed Preferred Road Options

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

Proposed Preferred Land Use Options

- 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

General Features

- Expressway / Highway
- Arterial and Collector Roads
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Settlement Area Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 1
Preferred Land Uses

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

GEI

Last Updated: June 2026
Document ID: 2404322-G-001

Document Path: B:\Working\BRANTFORD ON, CITY OF\2404322 Master Servicing Plan - 2025 Development Charges Update\05_GIS\6_Final Report\2404322-G-001.qgz

The population projections for the Expansion Lands within the Settlement Area Boundary are provided in **Table 5.** The population projection was estimated by applying a high-density scenario to these expansion areas, excluding Natural Heritage Areas. The densities include:

- 30 jobs per hectare for North and East Expansion Employment Lands; and
- 90 residents and jobs combined per hectare for North and East Expansion Residential Lands; and,
- 75 residents and jobs combined per hectare for Tutela Heights.

Table 5: Expansion Lands Population Projections

Settlement Area Boundary Expansion Lands	Area (ha)	Population		
		Residential[(1)]	Employment[(2)]	Total
North Expansion Lands	1,883	52,816	26,794	79,613
East Expansion Lands	240	4,421	3,496	7,916
Tutela Heights	581	25,461	834	26,294

(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 land

3.1.1. Settlement Area Boundary Expansion Water Servicing

The water 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 Water System

Existing residents within the Tutela Heights area are now integrated into the City of Brantford's existing water system. To support the anticipated intensification and growth in the area, it is proposed to upsize the existing watermains on Conklin Road, Mount Pleasant Road, and Tutela Heights Road, and to construct new distribution watermains on Davern Road and the planned Collector Road.

3.2. Population and Employment Growth Analysis

Growth projections for the City of Brantford were provided by SGL and subsequently updated by long-range planning at the City 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.

The need to evaluate the City's water and wastewater infrastructure with increased densities were a result of recent development applications and provincial planning initiatives. As such a sensitivity analysis was completed to confirm the impacts of various density targets on the infrastructure needed and financial implications. **Table 6** presents the full population and employment breakdowns. **Appendix A** of **Volume II** provides a detailed breakdown of existing (2021) and 2051 population and employment projections by Traffic Survey Zone.

Following the update to baseline population from 2016 to 2021, the density targets were applied on a parcel basis, within each traffic zone to fully evaluate the increase in population and employment projections. Since the completion of the 2020 MSP Update and the 2021 Amendment, comprehensive block planning and provincial policy changes have resulted in higher density targets and revised growth assumptions shown in **Table 7**. The 2025 MSP Amendment incorporates these changes through a sensitivity analysis of three growth scenarios - Low, Medium, and High - to evaluate infrastructure needs under varying conditions. The High Growth Scenario was selected as the preferred planning basis to ensure resiliency and minimize under-sizing risks.

Table 6: New Density Targets

Area	Density (people or jobs/ha)		
	Low	Medium	High
Expansion Lands, Greenfield - Res	60	75	90
Expansion Lands, Greenfield - Emp	25	25	30
Tutela Heights	50	65	75
Intensification Corridors	60	80	100
Downtown Core	150	200	250

Table 7: Growth Population Estimates

Total MSP Growth	Population[(1)]	Employment[(1)]	Total[(1)]	Growth from 2021[(1)]	Additional Growth in LOSB
2021	103,596	36,993	140,589	-	-
2051 (2021 MSP)	164,736	83,362	248,098	107,509	-
2051 – Low	166,684	83,585	250,268	109,679	35,623
2051 – Med	181,651	88,350	270,001	129,412	35,623
2051 – High	196,044	96,792	292,836	152,247	35,623

[(1)]Does not include LOSB.

This analysis confirmed that higher density development accelerates infrastructure triggers and increases capital program requirements. Updated hydraulic modeling and servicing strategies were developed to accommodate these projections.

3.2.1. Growth by Water Pressure District

Table 8 summarizes growth needs by water pressure district from Traffic Zone data.

Table 8: Pressure District Population and Employment Growth

Pressure District	Population		Employment	
	2021	2051	2021	2051
Pressure District 1	47,402	85,237	9,346	25,104
Pressure District 2/3	47,261	95,961	24,487	48,259
Pressure District 4	8,633	14,846	3,160	23,429
Total	**103,596**	**196,044**	**36,993**	**96,792**

3.3. County Agreements

Cainsville, in the County of Brant, is currently serviced via a single 300 mm watermain on Colborne Street. As part of the 2016 Boundary Adjustment Agreement, the City committed to allowing the County to connect to the City's service water infrastructure and provide adequate capacity on the City's design criteria for the Cainsville Lands.

The Cainsville's Water, Wastewater, and Stormwater Servicing MSP was completed in 2024 and identified an increase in water acquisition from the City as their preferred alternative for increasing municipal water supply. This would require an updated servicing agreement with the City of Brantford. The existing and 2051 populations are provided in **Table 9** to provide context; if the County and City enter into an agreement in the future.

Table 9: Cainsville Population Growth

County of Brant Servicing	Population & Employment	
	Existing	2051
Cainsville	7,500[(1)]	12,070

[(1)] Cainsville existing population as in 2021 based on Cainsville's Water, Wastewater, and Stormwater Servicing MSP in 2024, which includes the total population from both serviced and not serviced properties.

3.3.1. 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, which includes the LOSB, 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 recommended servicing plan.

The growth projection, detailed in **Table 10**,for the remainder of the urban boundary area was estimated by applying a density to these remaining areas, not including Natural Heritage Areas. These densities include:

- 60 residents and jobs combined per hectare for North Expansion Lands
- 75 residents and jobs combined per hectare for Tutela Heights

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

Table 10: Municipal Boundary Full Buildout Population & Employment

LOSB	Area (ha)	Population & Employment
North Expansion Lands	360	21,571
Tutela Heights	187	14,052
Total LOSB	**547**	**35,623**

4. Existing Water Distribution System

4.1. Existing Water Infrastructure

The Brantford water system consists of one (1) water treatment plant, five (5) pumping stations, four (4) storage reservoirs, and two (2) elevated tanks (ET) with one ET in operation and one ET currently under construction. A water system schematic is provided in **Appendix A**. Further, the City of Brantford's water system is organized into three pressure districts: Pressure District 1 (PD1), Pressure District 2/3 (PD2/3), and Pressure District 4 (PD4).

Water supply originates from the Grand River and is treated at the Holmedale Water Treatment Plant (WTP). The WTP High Lift Pump (HLP) Station delivers water directly to PD1 including the new Shellard Elevated Tank (ET) and reservoirs in PD2/3 and PD4, while secondary pump stations deliver water within PD2/3 and PD4. The boundaries along the pressure districts consist of a series of closed valves and pipes, and pressure reducing valves (PRV) to decrease the pressure to the acceptance range of level of service. The hydraulic grade lines (HGL) for the three pressure districts are included in **Table 11**.

Table 11: Pressure District HGL

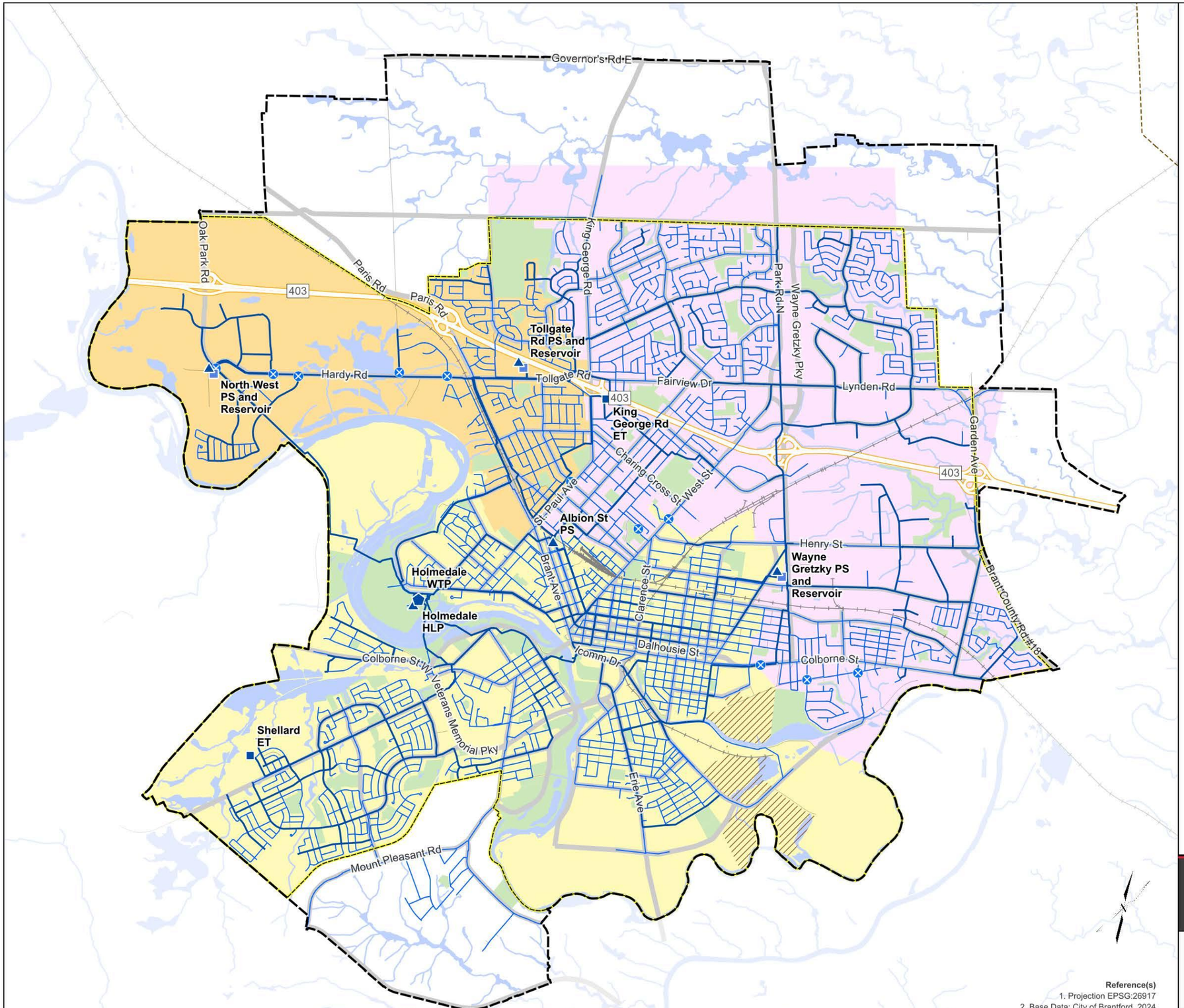
Pressure District	HGL (m)
Pressure District 1	271
Pressure District 2/3	281
Pressure District 4	304

Pressure District 1 generally consists of the low elevations within south Brantford, along the Grand River and is fed directly from the Holmedale WTP HLP station via trunk watermains. Storage for PD1 is provided at the WTP Reservoir (Res) and new Shellard ET. PD1 is a large pressure district that includes the residential Greenfield growth area in southwest Brantford along Shellard Lane as well as the downtown Brantford Urban Growth Centre. Tutela Heights was recently integrated into PD1 and is no longer serviced by Mount Pleasant.

Water is pumped into Pressure District 2/3 from the Holmedale WTP via several pumping stations. Storage and pumping for PD2/3 is provided by the Tollgate Road Reservoir (Res) and Pumping Station (PS), Wayne Gretzky Parkway Res and PS, Albion Street Booster Pumping Station (BPS) and King George ET. PD2/3 is a large, combined pressure district that comprises the residential and commercial areas in north Brantford, industrial areas in east Brantford and small Greenfield growth area in east Brantford.

Pressure District 4 is fed by a 900 mm watermain from the WTP HLP and is serviced by the Northwest PS and Res. PD4 is a smaller pressure district consisting mainly of industrial areas in Northwest Brantford.

An overview of the existing water distribution system is provided in **Figure 2**.



Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector Roads
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 2
Existing Water System

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

GEI

Last Updated: June 2026
Document ID: 2404322-W-001

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4.1.1. Cainsville Water System Connection

Cainsville, in the County of Brant, is currently serviced via a single 300 mm watermain on Colborne Street connecting to the City's PD2/3 which is primarily fed by Tollgate PS, Albion BPS and Wayne Gretzky PS. The City has a continued servicing agreement with the County of Brant to supply Cainsville with required water including existing and proposed future growth.

4.2. Water Treatment Plant

The Holmedale WTP is located at 324 Grand River Avenue, drawing water from the Holmedale Canal, the intake of which is located in the Grand River, 1.5 km upstream of the WTP. The water treatment facility has a current rated treatment capacity of 100 MLD (Million Liters per Day) based on the Drinking Water Works Permit 063-101 Issue #9 (Oct 2024). A review of the individual process capacities was conducted based on background reports and workshops with City staff. **Table 12** includes the WTP processes and corresponding capacities and an overview of the processes is provided in **Figure 3**. Further details are provided in the Treatment Technical Memorandum; see **Appendix G**.

Table 12: Water Treatment Plant Capacity Process Overview

Process	Elements	Total Design Capacity (MLD)	Rated Firm Capacity with 1 unit offline (MLD)
Permit To Take Water (PTTW)	-	260	n/a
Intake Canal	Storage volume	43.6 ML [1]	n/a
Low Lift Pumping Station[2]	(4) pumps rated @ 44.9 MLD (520 L/s), 3 duty, 1 stand-by	180 (4 pumps running, high reservoir level)	100 (3 pumps running, low reservoir level)
Header	(1) 900 mm dia. pipe	110	n/a
Polymer Feed System[3]	(4) pumps rated @ 11.5 L/min (0.15%) with dosing rate of 0.43 mg/L and (2) 2,839 L feed tanks	115	86.5
Actiflo Trains	(2) trains @ 100 MLD max flow[4]	200	< 50.0
Ozonation	(2) generators and contact chambers rated @ 102 MLD	204	102
Filtration	(8) dual media filtration beds, (2) backwash wells, and (2) backwash pumps	179	157
UV Reactors	(3) units rated @ 50 MLD [5]	150	100

Process	Elements	Total Design Capacity (MLD)	Rated Firm Capacity with 1 unit offline (MLD)
Chlorine Contact Chambers	(2) chambers rated @ 118 MLD based on 30 min CT	236	118
High Lift Pumping Station[6]	(2) pumps @ 173 L/s, (2) pumps @ 405 L/s, (1) diesel pump @ 420 L/s, (2) pumps @ 421 L/s at 74m TDH	209	173
Residual Management Facility	(3) Gravity settler thickeners rated @ 52 L/s, and (2) Belt Filter presses rated @ 9 L/s	125	100

(1) The intake canal capacity is sized as a storage volume in megalitres (ML) during Maximum Day Demand (MDD).

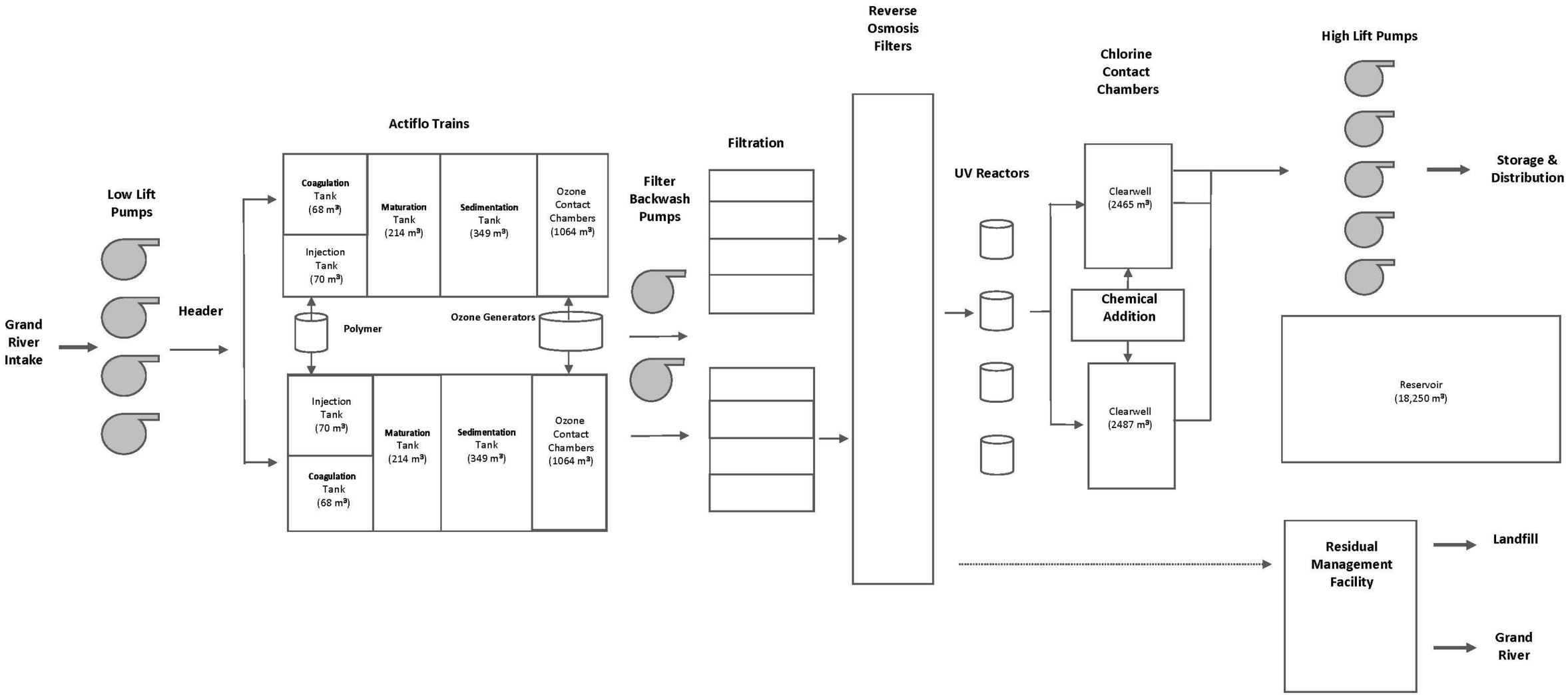
(2) Pump capacities based on Holmedale Low Lift Pump Station Hydraulic Assessment TM#1 (C3 Water, 2019).

(3) Polymer system capacity is based on the Polymer System Upgrade Preliminary Design Report (AECOM, 2019) and includes upgrades not captured in 2022 DWWP.

(4) Although each train is designed for 100,000 m^3/day, with a max guaranteed flow of 68,000m^3/day per train, and a nominal flow of 50,000 m^3/day per train, operations staff note that current capacity per train is <50,000 m^3/day.

(5) A fourth UV unit is planned; operations staff have noted that UV units must be operated under rated capacity of 50,000 m^3/day to protect the sleeves and bulbs.

(6) Capacities are summation of individual pump capacities, based on the flat system curve as described in the P5/P6 High Lift Pumping Station Design Report (RVA, 2022). Pump capacities have been updated based on the April 2024 pump tests by HydraTek. No testing was completed for 5 or 6 pumps operating together so total and firm capacities are only theoretical.



Not-to-scale

Figure 3
Water Treatment Plant Process Diagram

Project Name: Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment	**Client Name:** City of Brantford (Ontario, Canada)

GEI Consultants Canada

Last Updated: December 2025
Document ID: 2404322-W-004

4.3. Water Pumping Stations and Storage Facilities

In the City of Brantford water distribution system, there are currently four (4) stand-alone pumping stations throughout the City and one (1) high lift pumping station (HLP) at the WTP. **Table 13** summarizes the pumping facilities capacities.

Table 13: Pumping Facilities

Pressure District	Facility	Pumps	Installed Capacity (MLD) (1)	Firm Capacity (MLD) (2)	Observed Firm Capacity (MLD) (3)
PD1	Holmedale HLP	5	130.0	100	100
				Total PD1 Firm Capacity	**103.7**
PD2/3	Albion Street BPS	2	45.8	22.9	22.9
	Tollgate PS	4	93.3	70.0	48.0
	Wayne Gretzky PS	5	90.3	67.7 (4)	67.7
				Total PD2/3 Firm Capacity	**138.5**
PD4	Northwest PS	6	47.5	36.3	36.3
				Total PD4 Firm Capacity	**36.3**

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

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

(3) Observed firm capacity is the estimated operating capacity of the station based on pump station pump curves and calculated system curves

(4) Firm capacity for Wayne Gretzky PS includes two smallest pumps out of service as the pump station operates with two smallest pumps on in conjunction or three largest pumps on in conjunction

There are existing hydraulic and operational limitations that restrict the operational capacity of the Tollgate PS and Wayne Gretzky PS. For the purposes of the MSP analysis, the station's operational capacity was used.

Under current system operations, the Albion BPS does not operate on a regular basis and is typically only needed during emergency conditions; however, it is manually operated at regular intervals to support maintenance activities.

4.4. Water Storage Facilities

There are currently four (4) reservoirs and two (2) elevated tanks in the City of Brantford water distribution system. **Table 14** summarizes the storage facilities and their installed capacity.

Table 14: Storage Facilities

Pressure District	HGL (m)	Facility	Installed Capacity	Type	Top Water Level (m)
PD 1	271	Holmedale WTP Res	18.3 ML	Pumped	204
		Shellard ET	6.0 ML	Floating	271
PD 2/3	281	Tollgate Res	11.8 ML	Pumped	246
		Wayne Gretzky Res	13.6 ML	Pumped	230
		King George ET	2.7 ML	Floating	282
PD 4	304	North West Res	12.0 ML	Pumped	250

4.5. System Demands

The population and employment projections presented in **Table 8** and Level of Service criteria presented in **Table 1** were utilized to calculate the average day demand (ADD) and the maximum day demand (MDD). Future system demands were developed using the starting point methodology previously discussed and consists of existing City growth but excluding growth in the LOSB. The total projected ADD and MDD, inclusive of non-revenue water (NRW), are shown in **Table 15** and further detailed in **Appendix B.**

Table 15: System Demands for Areas within the Settlement Boundary

Pressure District	ADD (MLD)		MDD (MLD)	
	2021	2051	2021	2051
Pressure District 1	14.9	29.3	25.3	51.2
Pressure District 2/3	14.6	34.1	24.9	60.1
Pressure District 4	3.5	10.7	6.0	18.8
Total	**33.0**	**74.1**	**56.2**	**130.1**

4.5.1. County Agreements

The City currently supplies potable water to Cainsville, in the County of Brant, through a 300 mm watermain on Colborne Street. 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 water system capacity will be provided based on the City's design criteria.

A Cainsville's Water, Wastewater, and Stormwater Servicing MSP was completed in 2024 and identified an increase in water acquisition from the City as their preferred alternative for increasing municipal water supply. This would require an updated servicing agreement with the City of Brantford. The existing and projected ADD and MDD demands for Cainsville are shown in **Table 16**.

Table 16: Cainsville Demands

County of Brant Servicing	Growth Scenario	ADD (MLD)	MDD (MLD)
Cainsville Buildout	2021[1]	0.70	1.40
	Buildout[2]	1.80	3.70
	Growth	**1.10**	**2.30**

[1] No updated information was provided for 2021; data is consistent with 2016.

[2] Data was taken from the 2024 Cainsville's Water, Wastewater, and Stormwater Servicing MSP Technical Memorandum #2.

4.5.2. 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 LOSB 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 urban boundary area was estimated by applying a density to these remaining areas, not including Natural Heritage Areas. These densities include:

- 30 jobs per hectare for North and East Expansion Employment Lands
- 90 residents per hectare for North and East Expansion Residential Lands
- 75 residents and jobs combined per hectare for Tutela Heights

This approach typically aligns with the residential densities for proposed growth to 2051. The projected ADD and MDD for the buildout of the municipal boundary are shown in **Table 17**.

Table 17: Municipal Boundary Full Buildout Population and Demands

Pressure District	Area (ha)	Population & Employment	ADD (MLD)	MDD (MLD)
Pressure District 1 (Tutela Heights)	187	14,052	3.8	6.8
Pressure District 2/3 (North Expansion Lands)	360	21,571	5.8	10.5
Total	**547**	**35,623**	**9.6**	**17.3**

4.6. Hydraulic Water Model

The City's existing hydraulic model was updated using InfoWater, a water distribution 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, valves, and hydrants.
- Demand analysis and allocation based on billing and plant production records.
- EPS validation through SCADA.
- Establish model scenarios (ADD, MDD, MDD+FF)

4.6.1. Network Development

Updates to the system and watermain were imported directly into the City's existing GIS water system infrastructure data. Before importing the network information into the model, GIS and existing model pipes were analyzed for any discrepancies with respect to watermain diameter and material. A small number of discrepancies were found, and the correct source of information was identified for each case (GIS or existing model).

System network elevations for each model junction were based on the City's ground surface contours.

4.6.2. 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

4.6.3. System Demand Analysis

The system's WTP production demands, detailed in **Table 3**, were evaluated based on SCADA and billing information provided. This process supports determination of:

- Average system demands, including determination of system non-revenue water usage;
- Spatial allocation of system demands; and
- Temporal variation of system demands and peaking factors.

4.6.3.1. Demand Allocation

Using the billing data, average day demand (ADD) were allocated to nodes in the model using a method of spatial allocation. This method takes the average demand of each water meter's parcel and assigns it to the node in the closest proximity.

Further, the average non-revenue water (NRW) from 2019-2023 billing data was distributed equally at each meter and allocated to nodes in the model using the same method of special allocation for the billed demands. The NRW remains constant for all scenarios.

4.6.3.2. Diurnal Demand

System demands were calculated based on the SCADA data provided from 2016-2018 for each of the pressure districts and the point-of-entry. A diurnal curve was created to reflect system average day consumption in 1-hour intervals over a 24-hour period for each of the pressure districts. The demands vary for each pressure district which can be correlated to land use type. The diurnal curves were applied to each pressure district in the model.

4.7. Facility Details, System Control Narrative, and SCADA Validation

SCADA was also used to understand the system control narrative and validate model controls. The model was validated, SCADA versus Model EPS, over seven days during an average day in 2018 based on operations and pump curves following the Pressure District 2/3 and 4 adjustment. This comparison ensured that the model was accurately predicting WTP flow rates, ET levels and cycles, pump controls, and other general system performance.

Calibration is mandatory prior to the use of the model for any capital works decision-making analysis, as well as further applications of the model such as water quality, operations or energy management modelling. The benefits of calibration include discovering and correcting discrepancies in the model data and, occasionally, identification of problems in the field.

5. Assessment of Existing Water Infrastructure

A critical step in the master planning process is the assessment of the existing infrastructure to establish the water 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 demand on the water distribution 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 water system to meet growing demands to the 2051 planning horizon and beyond.

5.1. Opportunities and Constraints

Existing and future water 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 InfoWater hydraulic model was used to analyze the performance of the existing and future system under different demand conditions such as ADD, MDD, PHD and MDD+FF.

In general, the water distribution system has sufficient capacity to deliver water at acceptable service levels, though there are some areas at the higher or lower end of the acceptable pressure range. **Figure 4** highlights some of the key opportunities and constraints within the City's existing distribution system.

The key opportunities and constraints identified by the City and through the modelling exercise include:

Storage

- Capacity constraints in Holmedale canal to achieve 48 hours of system storage at 2051 MDD
- Constraints due to storage deficiencies are realized in all three pressure districts by 2051 with limited balancing storage within the existing system
- Opportunity to increase elevated storage to decrease pumping needs
- Opportunity to replace aging King George Elevated Tank with a new, larger elevated tank

Pumping

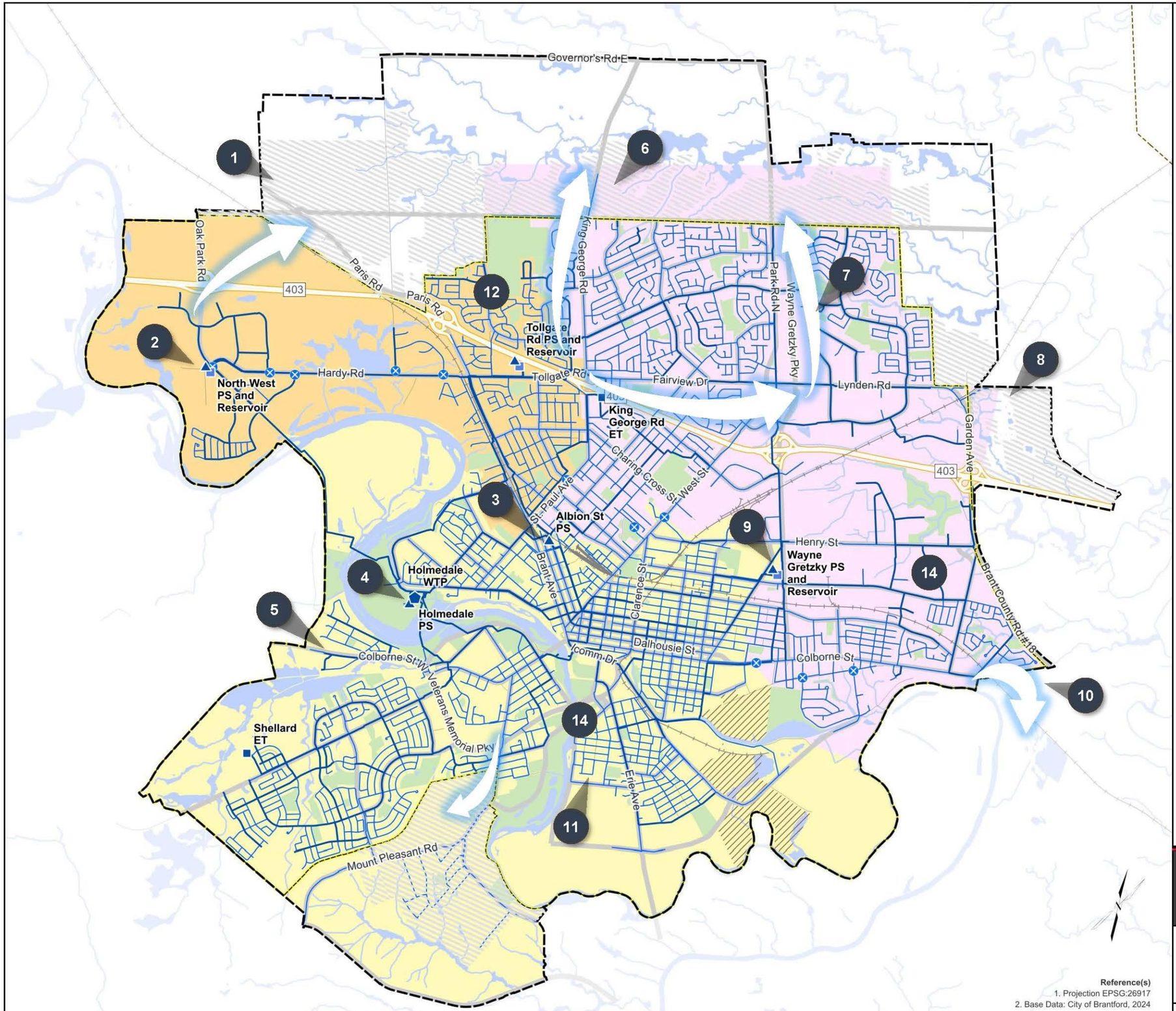
- Limited pumping upgrades needed in PD1 or PD2/3 to accommodate 2051 growth
- PD4 may need pumping upgrades; dependent on storage strategy
- Opportunity to further evaluate aging Albion BPS as growth occurs

Transmission

- Aging watermains will need to be replaced to improve local conveyance
- Trunk watermain upgrades needed to support intensification areas and to service expansion lands
- Existing system fire flow deficiencies are located primarily downtown, in areas of older cast iron watermains, and in areas with limited trunk conveyance

Pressure

- High and low pressures exist due to variation in elevations



Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses
- Expansion Lands

Opportunities & Constraints

1. Future Servicing of northwest employment lands.
2. Managing northwest capacity and water quality.
3. Further evaluation of aging facility as growth occurs.
4. Water treatment capacity and emergency closure storage capacity.
5. Low pressures in local high areas.
6. Increased storage needs within north lands.
7. Upside trunks to support intensification and growth areas.
8. New trunks to support growth areas.
9. Review and optimize operation capacity of existing system storage and pumping capacity.
10. Provide capacity to Cainsville subject to potential servicing agreement.
11. High pressures in low areas near the Grand River.
12. Local trunk and distribution upgrades to support fire flow.

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 4
Existing Water System
Opportunities and Constraints

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

GEI Consultants Canada

Last Updated: December 2025
Document ID: 240432 2-W-002

5.2. Facility Capacity

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

5.2.1. Holmedale Water Treatment Plant

The 2025 MSP Amendment analyzed the projected growth demand within the Holmedale WTP service area to ensure that the facility has adequate capacity within the 2051 growth horizon.

The starting point methodology identified in **Appendix B** of **Volume II** was used to calculate the projected demands for the Holmedale WTP. **Figure 5** presents the Holmedale WTP's existing supply capacity versus the long-term supply need. With the full buildout to 2051, the forecasted demand on the WTP will be above its current treatment capacity.

Although the WTP has a rated capacity of 100 MLD, based on discussions with City staff, not all processes within the treatment plant are limited by this capacity and thus the WTP processes were further reviewed to determine limiting capacities and potential opportunities at the existing facility.

The limitations and opportunities of the processes at the WTP to expand treatment capacity to meet 2051 demand needs are discussed in **Appendix G**. The report further evaluated these opportunities to determine alternative solutions for system upgrades.

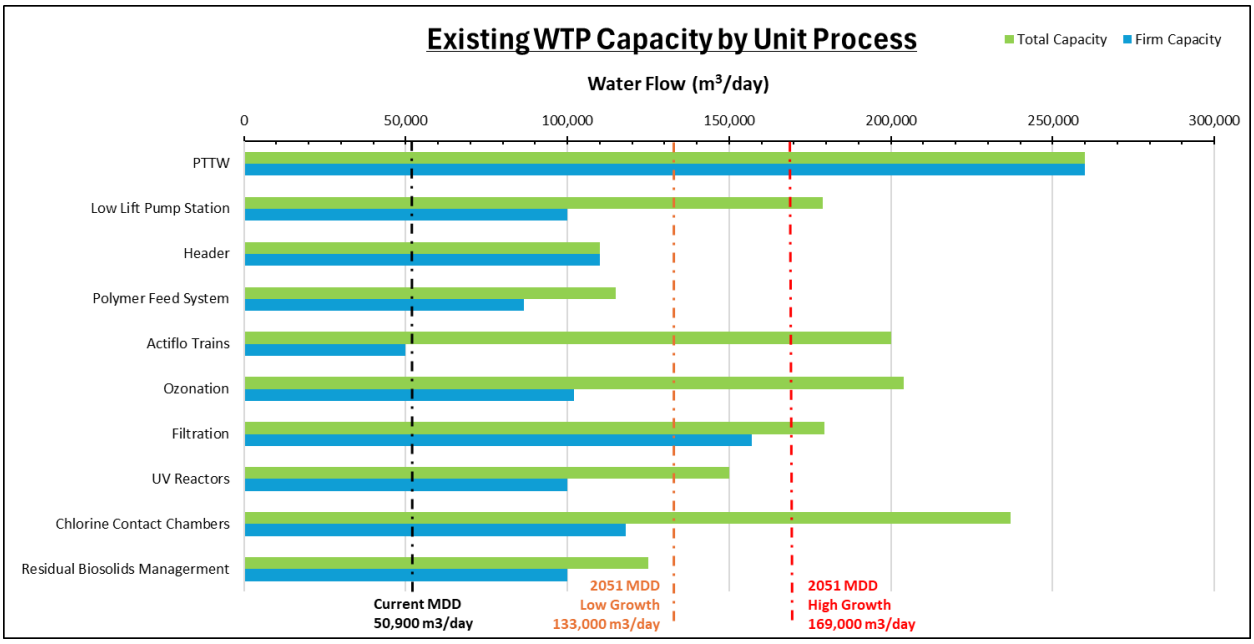


Figure 5: Holmedale WTP Capacity

5.2.2. Pump Station Capacity

Assessment of pumping capacity was based on the ability of the pumping stations to provide observed firm capacity to meet the required demands in the system on a pressure district by pressure district basis. **Table 18** and **Table 19** presents the pumping requirements within the City for existing conditions and for 2051 conditions, respectively.

Table 18: Existing Water Pumping Requirements

Pressure District	Observed Firm Capacity[(1)] (MLD)	Design Condition	2021 Capacity Need (MLD)	2021 Surplus / Deficit (MLD)
Pressure District 1 (including transfer to upper pressure districts)	103.7	MDD+FF	79.1	**24.6**
Pressure District 2/3 Albion BPS Tollgate Rd PS Wayne Gretzky PS	138.6	MDD+FF	47.9	**90.7**
Pressure District 4 North West PS	36.3	MDD+FF	27.6	**8.7**

(1) Observed firm capacity is the estimated operating capacity of the station based on pump station pump curves and calculated system curves

Table 19: Future 2051 Growth Conditions Water Pumping Requirements

Pressure District	Design Condition	2051 Capacity Need (MLD)	Surplus / Deficit (MLD)
Pressure District 1 (including transfer to upper pressure districts)	MDD+FF	176.7	**-73.0**
Pressure District 2/3 Albion BPS Tollgate Rd PS Wayne Gretzky PS	PHD	104.3	**34.3**
Pressure District 4 North West PS	MDD+FF	40.4	**-4.1**

It is noted that Pressure District 1 and Pressure District 2/3 have existing elevated storage facilities; however, in both Pressure Districts there is insufficient floating storage to independently provide balancing storage or fire storage and are dependent on pumped storage to support peak flow needs. As such, pumping capacity for Pressure District 1 and Pressure District 2/3 are required to provide the greater of peak hour demand or max day + fire flow demand.

Pressure District 4 has no floating storage and is entirely dependent on the pump station to provide flow under all conditions. Pumping capacity requirements for Pressure District 4 is to provide the greater of peak hour demand or max day + fire flow demand.

Based on the pumping capacity review:

- Pressure District 1 has insufficient capacity to service 2051 growth. Pumping upgrades are needed to support the combined growth, external servicing agreement, and operational reserve capacity.
- Pressure District 2/3 currently has sufficient theoretical pumping capacity to meet peak flow conditions in 2051
- Pressure District 4 is just over capacity under 2051 demand conditions, and capacity needs will need to be monitored and re-assessed as the pressure district buildout occurs.

In addition to the pumping capacity review, opportunities to optimize the operation of the existing Pressure District 2/3 pump stations were identified:

- The existing Albion BPS is not utilized under typical conditions; however, it requires ongoing maintenance needs. With the projected 2051 growth needs, there remains sufficient pumping capacity within Pressure District 2/3 such that the Albion BPS may not be needed under typical operating conditions. There is an opportunity to further evaluate the decommissioning of Albion BPS following the construction of additional storage within PD2/3.
- The existing Tollgate PS and Wayne Gretzky PS operational capacity is well below the total installed capacity. There is an opportunity to address the existing constraints at both PS to increase the available operational capacity at each station.

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

5.2.3. Storage Capacity

Water storage is provided at several facilities throughout the City as previously identified in **Table 14**. It should be noted that this **Section 5.2.3** is referring to only treated water storage; raw water storage is reviewed under **Section 5.2.1**. **Table 20** and **Table 21** summarize existing storage volumes by pressure district and projected growth storage requirements.

Table 20: Existing Storage Requirements

Pressure District	Storage Capacity (ML)	2021 Capacity Required (ML)				2021 Surplus / Deficit (ML)
		Equalization	Fire	Emergency	Total	
Pressure District 1 Holmedale WTP Res Shellard ET	24.30	6.33	8.16	7.24	**21.73**	**2.57**
Pressure District 2/3 Tollgate Res Wayne Gretzky Res King George ET	28.10	6.23	8.16	7.19	**21.58**	**6.52**
Pressure District 4 North West Res	12.00	1.50	2.24	1.87	**5.61**	**6.39**

Table 21: 2051 Storage Requirements

Pressure District	Storage Capacity (ML)	2051 Capacity Required (ML)				2051 Surplus / Deficit (ML)
		Equalization	Fire	Emergency	Total	
Pressure District 1 Holmedale WTP Res Shellard ET	24.30	14.51	8.16	11.34	**34.01**	**-9.71**
Pressure District 2/3 Tollgate Res Wayne Gretzky Res	25.40	17.65	8.16	12.91	**38.72**	**-13.32**
Pressure District 4 North West Res	12.00	4.70	7.68	6.19	**18.56**	**-6.56**

Based on the storage review, 2051 growth needs are anticipated to trigger storage deficits in all pressure districts

Based on discussions with the City, the King George ET will need major rehabilitation or replacement in the next 10 years, presenting an opportunity to replace and relocate PD2/3 storages. The above table includes the PD2/3 deficit including the available capacity at King George ET. Without the King George ET, the PD2/3 2051 deficit is ~9.4 MLD, excluding the LOSB growth. With the LOSB growth and without the King George ET, the PD2/3 deficit is ~13.3 MLD.

It is also noted that the existing King George ET elevation limits the available pressure within Pressure District 2/3 resulting in marginal pressure with the high elevation areas of PD2/3. The replacement of the King George ET provides an opportunity to optimize the operating levels of Pressure District 2/3 and improves system pressures. This is only feasible when combined with pumping improvements at the Tollgate PS and Wayne Gretzky PS.

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

5.3. System Performance

The City's hydraulic water model was used to support the assessment of the water system's watermain capacity.

5.3.1. Transmission (Trunk Watermains)

Based on the hydraulic modelling results, the existing trunk watermains generally have sufficient capacity to move water under maximum day conditions as presented in **Figure 6**; however, the following trunk watermain needs were identified:

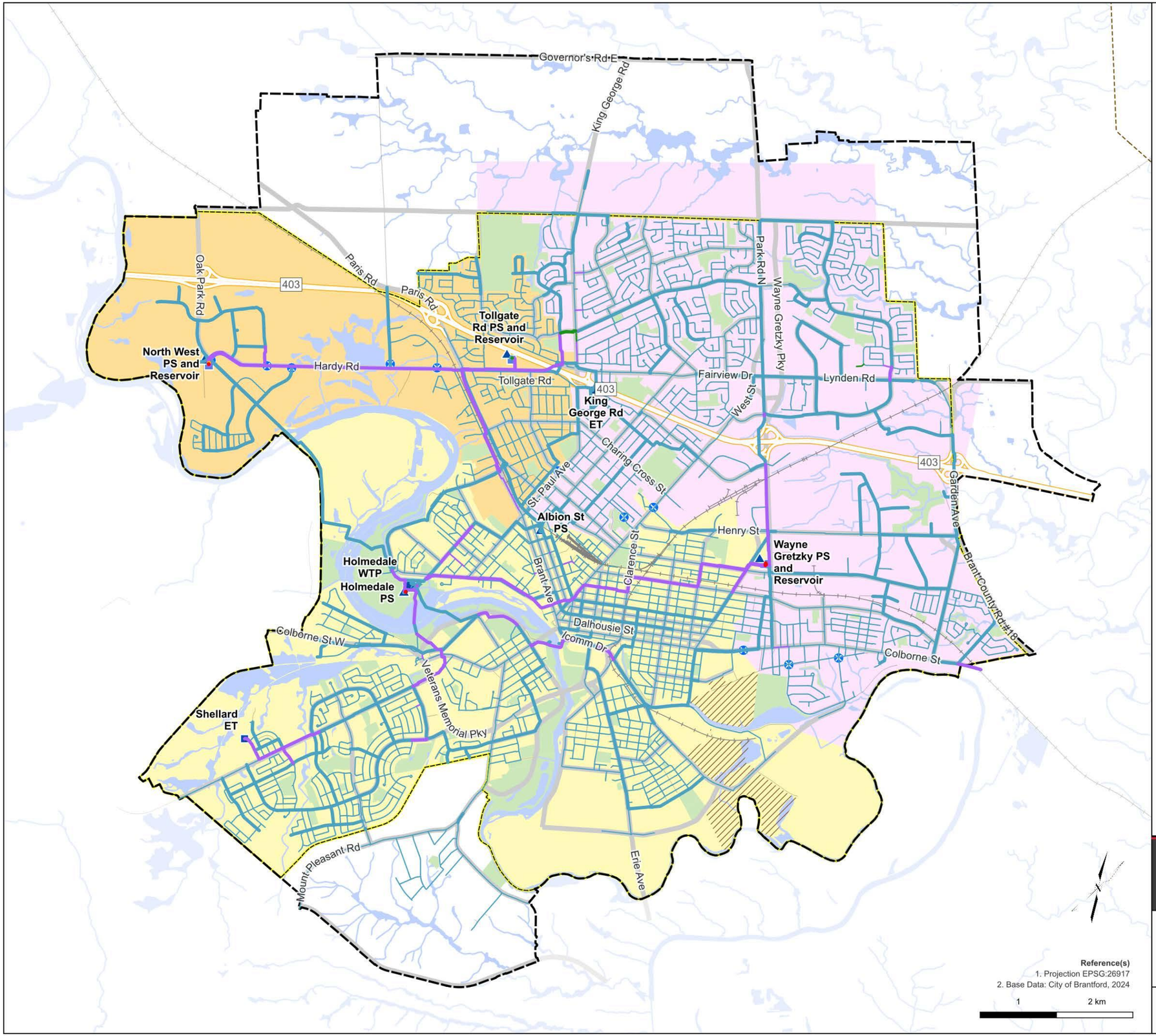
- New trunk watermain to convey flows to expansion areas (North Expansion Lands, East Expansion Lands and Tutela Heights)
- New trunk watermain to convey flows east-west within Pressure District 2/3
- New trunk watermain to convey flows in Pressure District 1 east and south within intensification areas

Servicing strategies are further described in **Section 7**.

5.3.2. Distribution (Local Watermains)

Fire flow deficiencies were identified using a land-use based approach, where the governing land-use, at the closest fire hydrant, determined the fire flow target identified in **Section 2.4.3**. **Figure 7** presents the fire flow deficiencies under existing conditions.

Deficiencies are typically along intensification corridors, pressure district boundaries and along older or smaller watermains.



Peak Velocity

- <0.5 m/s
- 0.5-1.0 m/s
- 1.0-1.5 m/s
- 1.5-2.0 m/s
- >2.0 m/s

Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 6
Existing Max Day Demand (MDD)
Peak Velocity

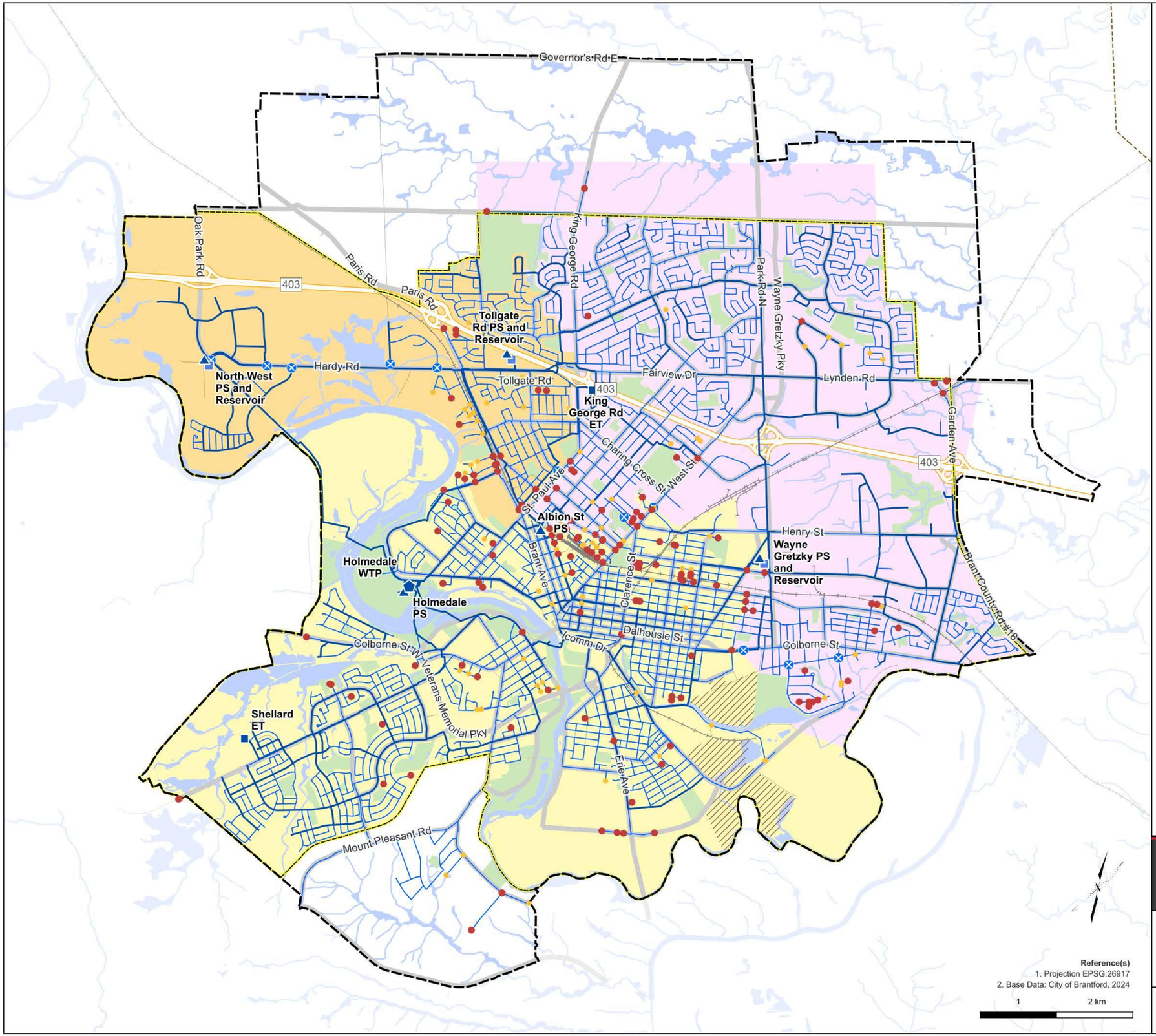
Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

GEI Consultants Canada

Last Updated: July 2026
Document ID: 2404322-W-003

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Fire Flow Deficiencies

- 80-100% Fire Flow Criteria
- <80% Fire Flow Criteria

Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
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Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 0 2 km

Figure 7
Existing Fire Flow Deficiencies

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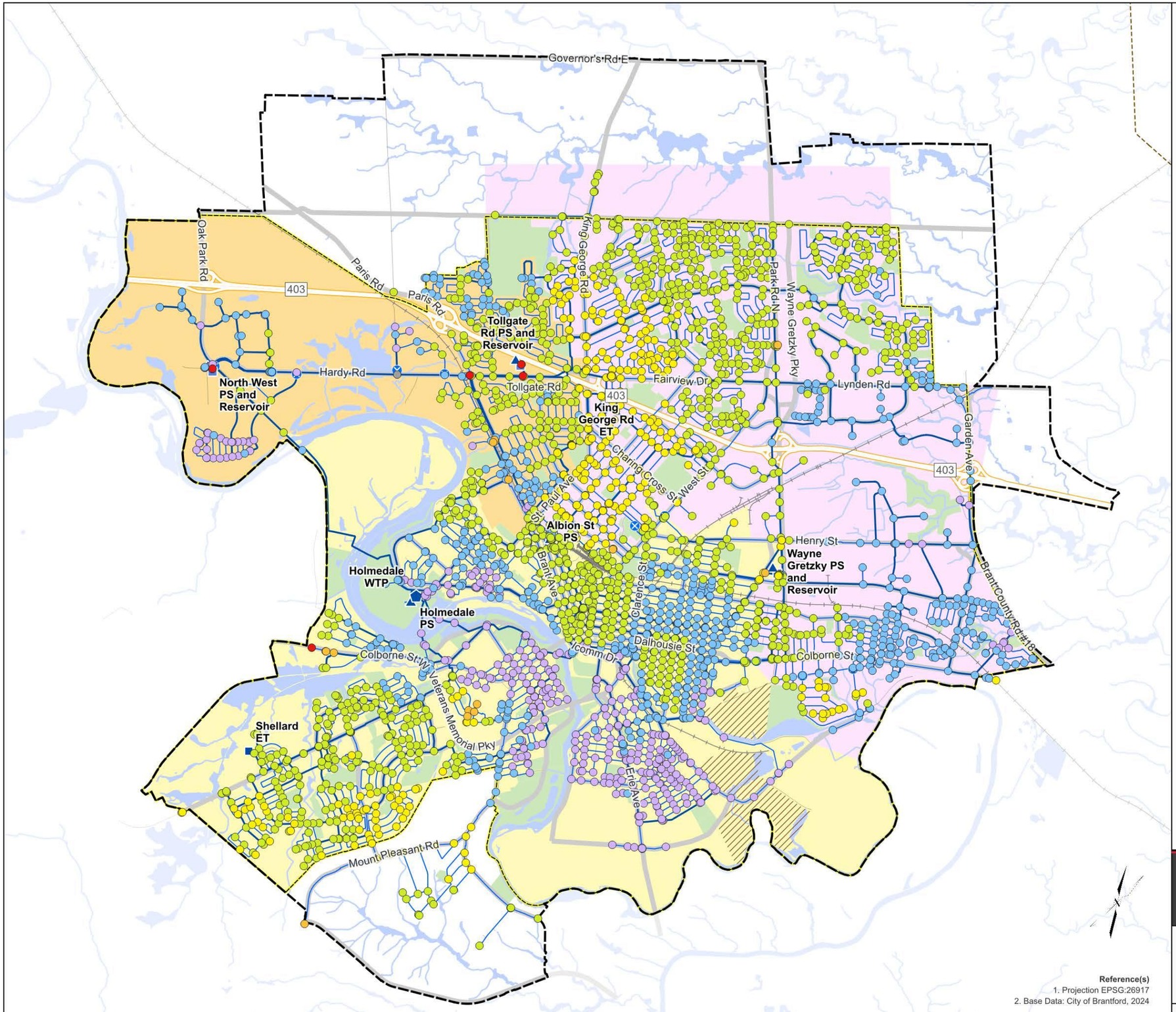
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5.3.3. Pressures

Low pressure areas in the system were previously identified near Colborne Street West and Strawberry Hill. The construction of a new booster pumping station on Colborne Street West has been conditioned to resolve the low pressure areas. Minimum pressures under existing max day demand are presented in **Figure 8**.

5.4. Servicing of Expansion Lands

The Settlement Area Boundary Expansion Lands will require municipal water servicing via an extension of the City's existing water system.



Minimum Pressure (psi)

- <40
- 40 - 50
- 50 - 60
- 60 - 80
- 80 - 90
- 90 - 100
- >100

Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 8
Existing Max Day Demand (MDD) Minimum Pressure

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5.5. County Servicing

The City currently supplies potable water to Cainsville, in the County of Brant, through a 300 mm watermain on Colborne Street. 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 water system capacity will be provided based on the City's design criteria.

A future storage deficit within the Cainsville system requires upgrades which will be provided in one of the two proposed ways, shown in **Figure 9**:

- New Elevated Tank in Cainsville
- Second supply connection to the City

The future servicing method for the Cainsville system will impact the flow required from the City. If a new ET is constructed (Option 1), the City's system will only need to meet MDD, as the new storage will provide peak flow balancing within the Cainsville system. If a new ET is not constructed and a second supply connection from the City is required (Option 2), the new connection will need to have sufficient capacity to support full peak hour demands in Cainsville.

The City's strategy for servicing Cainsville includes accounting for a new ET in Cainsville and ensuring there is water infrastructure to support the new ET. The City will continue to provide MDD flows including buildout in Cainsville.

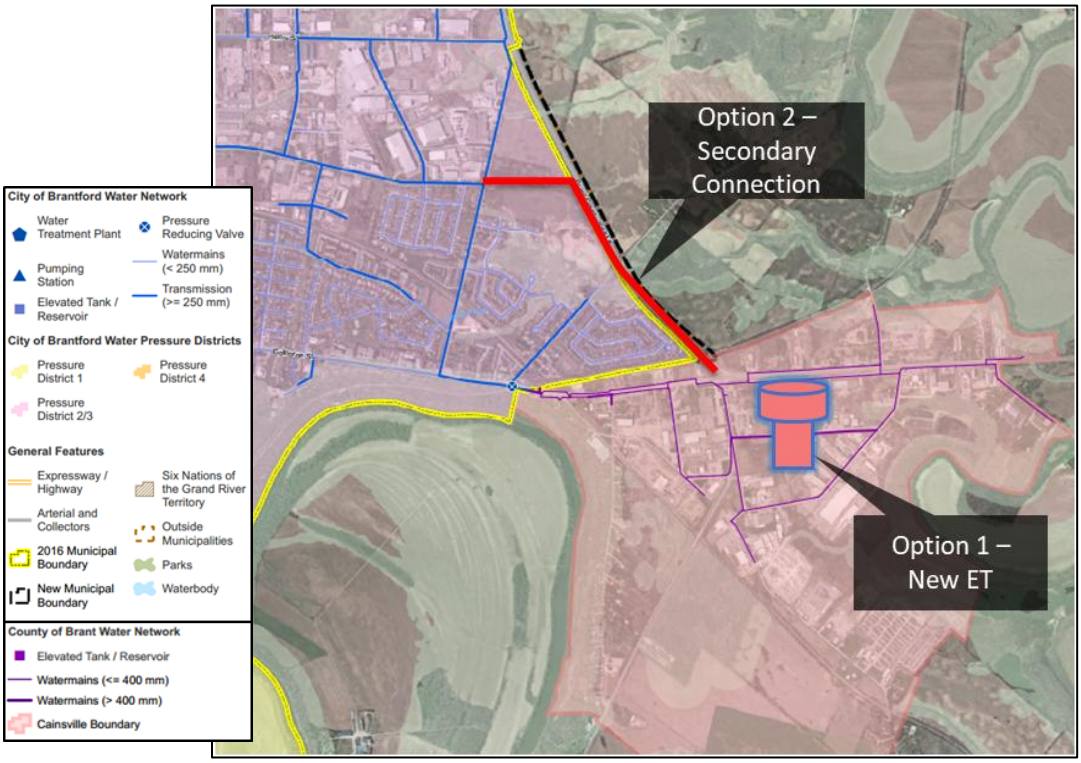


Figure 9: Cainsville Servicing

6. Concepts to Service Expansion Lands

The Settlement Area Boundary Expansion Lands will require municipal water servicing via an extension of the City's existing water system. A broad range of water servicing concepts were established based on high level feasibility to meet the servicing requirements for the North and East Expansion Lands and Tutela Heights. The concepts are based on the City's existing water system configuration and capacity, existing ground elevations within the expansion lands, and the identified natural heritage system.

All opportunities are dependent on the overall servicing concept and ultimate strategy as outlined in **Sections 7** and **8**. Figures for the servicing concepts for the expansion lands are included in **Appendix C**.

6.1. North Expansion Lands

The North Expansion Lands will be serviced via connections to the existing system's trunk watermains along the northern boundary including connections at Oak Park Road, King George Road, Park Road North and Brantwood Park Road.

Servicing opportunities were considered and are outlined below including:

- King George and Oak Park Supply
- Park Road North and Oak Park Supply
- Pressure District 2/3 Supply Only
- Pressure District 4 Supply Only

6.1.1. King George and Oak Park Supply Concept

Under this concept, the residential lands will be serviced as an extension of the City's existing PD2/3, with supply provided predominantly via a new trunk watermain generally along the King George Road and Toll Gate Road right-of-way from Tollgate PS to the North Expansion Lands, with Tollgate PS acting as the primary supply source. Water servicing within the residential North Expansion Lands will consist of a looped watermain network with the trunk watermain generally following the east-west collector road system making a secondary connection to the Park Road North trunk watermain. Under this strategy, upgrades to the existing water system that are needed to support the North Expansion Lands are concentrated within the King George Road alignment. The Park Road North watermain connection is intended to provide a secondary supply source within the limits of the trunk watermain's existing capacity.

The employment lands will be predominately serviced as an extension of the City's PD4, with supply provided via an extension of the existing Oak Park Road trunk watermain, with the North West PS acting as the supply source. Water servicing within the employment North Expansion Lands will consist of a looped watermain network with the trunk watermain generally following the east-west collector road system making a secondary connection to Paris Road.

To support increased pumping and storage needs resulting from the North Expansion Lands, two new ETs, generally located along King George Road in PD2/3 and the north-south collector road, north of Highway 403 in PD4 will be needed. The new PD2/3 ET will replace the City's existing King George ET; as such, the ET and support watermain infrastructure will need to be sized to support both the residential North Expansion Lands and existing PD2/3 needs. The new PD4 ET and support watermain infrastructure will be sized to support the employment North Expansion Lands and existing PD4 needs.

6.1.2. Park Road North and Oak Park Supply Concept

Under this concept, the residential lands will be serviced as an extension of the City's existing PD2/3, with supply provided predominantly via a new trunk watermain generally along the Park Road North right of way, with Wayne Gretzky PS acting as the primary supply source. Water servicing within the residential Settlement Area Boundary Expansion Lands will consist of a looped watermain network with the trunk watermain generally following the east-west collector road system making a secondary connection to the King George trunk watermain. Under this strategy, upgrades to the existing water system needed to support the North Expansion Lands are needed along the Park Road North alignment for north-south conveyance. The King George watermain connection is intended to provide a secondary supply source within the limits of the trunk watermain's existing capacity.

The employment lands will be predominantly serviced as an extension of the City's PD4, with supply provided via an extension of the existing Oak Park Road trunk watermain, with the North West PS acting as the supply source. Water servicing within the employment North Expansion Lands will consist of a looped watermain network with the trunk watermain generally following the east-west collector road system making a secondary connection to Paris Road.

To support increased pumping and storage needs resulting from the North Expansion Lands, two new ETs, generally located along King George Road in PD2/3 and the north-south collector road, north of Highway 403 in PD4 will be needed. The new PD2/3 ET will replace the City's existing King George ET; as such, the ET and support watermain infrastructure will need to be sized to support both the residential North Expansion Lands and existing PD2/3 needs. The new PD4 ET and support watermain infrastructure will be sized to support the employment North Expansion Lands and existing PD4 needs.

6.1.3. Pressure District 2/3 Supply Only Concept

Under this concept, the residential lands will be serviced as an extension of the City's existing PD2/3, with supply provided via new trunk watermains along the King George Road and Park Road North right of ways, with Tollgate PS and Wayne Gretzky PS as supply sources. Water servicing will extend east-west along the collector road to the Employment Expansion Lands which will be serviced by a new Booster Pumping Station (BPS) as the employment lands are

located at a higher elevation than the residential lands. Under this strategy, the extent of the employment lands serviced by the BPS will be the smallest area based on limiting elevations. Upgrades to the existing water system needed to support the expansion lands are required along both the King George Road and Park Road North alignments to provide security of supply. Under this strategy, a Highway 403 crossing will not be required as the North West PS will not be used as a supply source.

To support increased pumping and storage needs resulting from the North Expansion Lands, a new ET, generally located along King George Road will be needed. The new ET will replace the City's existing King George Road ET; and as such, the ET and supporting watermain infrastructure will need to be sized to support both the North Expansion Lands and existing PD2/3 needs.

6.1.4. Pressure District 4 Supply Only Concept

Under this concept, the North Expansion lands will be serviced as an extension of the City's existing PD4, with supply provided predominantly via a new trunk watermain along the Oak Park Road right of way, with North West PS acting as the primary supply source. Water servicing will consist of a trunk watermain generally following the east-west collector road. Residential Expansion Lands will be serviced by the east-west trunk watermain system, which requires a PRV from the high elevations in the western employment lands to the eastern residential lands. Secondary connections will be made in the residential lands at King George Road and Park Road North. Under this strategy, upgrades to the existing water system needed to support the expansion lands are concentrated within the Oak Park Road alignment and second trunk watermain along Paris Road, with pumping capacity upgrades required at the North West PS. The King George Road and Park Road North watermain connections are intended to provide secondary supply sources within the limits of the trunk watermains existing capacity.

To support increased pumping and storage needs resulting from the North Expansion Lands, a new ET, generally located within the new employment lands will be needed. Under this configuration the City's existing King George Road ET will be maintained and will require major rehabilitation.

6.2. East Expansion Lands Servicing Concepts

Water servicing for the East Expansion Lands along the eastern boundary are characterized by a general downward slope southwest to the northeast. As elevations are decreasing, only a portion of the East Expansion Lands can be serviced by the existing PD2/3. The East Expansion Lands will be serviced by connections to the existing system at Lynden Road and Sinclair Boulevard.

Servicing opportunities were considered and are outlined below including:

- New Pressure District

- Private PRVs
- Pressure District 4 Expansion

6.2.1. New Pressure District Concept

Under this concept, the residential lands will be serviced by an extension of the City's existing PD2/3, with supply provided predominantly via a new trunk watermain along Lynden Road. Water servicing within the residential lands will consist of a looped watermain network following the collector road system.

The employment lands south of Lynden Road will be serviced via a watermain extension along the Lynden Road right of way and a watermain extension along Sinclair Boulevard , including two new PRV's to create a new pressure district. Trunk watermains will extend between Lynden Road and Sinclair Road along the collector road system, creating a looped watermain system. The Sinclair Road watermain connection is intended to provide a secondary supply source within the limits of the watermain's existing capacity.

6.2.2. Private PRVs Concept

Under this concept, the residential lands will be serviced by an extension of the City's existing PD2/3, with supply provided predominantly via a new trunk watermain along Lynden Road. Water servicing within the residential lands will consist of a looped watermain network following the collector road system.

The employment lands south of Lynden Road will be serviced via a watermain extension along the Lynden Road right of way and a watermain extension along Sinclair Boulevard. Private PRV's will be installed at identified local high points in the employment lands to ensure pressures are within an acceptable range. Trunk watermains will extend between Lynden Road and Sinclair Road along the collector road system, creating a looped watermain system. The Sinclair Road watermain connection is intended to provide a secondary supply source within the limits of the watermain's existing capacity.

6.2.3. Pressure District 4 Expansion Concept

Under this concept, the existing PD4 boundary will be expanded east to Wayne Gretzky Parkway and PD3 will extend west to Wayne Gretzky Parkway. The new PD3 will operate at a lower HGL than the existing PD2/3.

The east expansion lands will be serviced by an extension of the City's PD3, with supply provided predominantly via a new trunk watermain along Wayne Gretzky Parkway. The residential lands north of Lynden Road will be serviced via a new trunk watermain along Lynden Road. Water servicing within the East Residential Lands will consist of a looped watermain network following the collector road system.

The employment lands south of Lynden Road will be serviced via a watermain extension along the Lynden Road right of way and a watermain extension along Sinclair Boulevard. Trunk watermains will extend between Lynden Road and Sinclair Road along the collector road system, creating a looped watermain system. Direct connections will be made to the new PD3, with no additional PRV's needed. The Sinclair Road watermain connection is intended to provide a secondary supply source within the limits of the watermain's existing capacity.

6.3. Tutela Heights Concepts

Tutela Heights' existing water system is supplied from the County of Brant Mount Pleasant water system; however, it is expected to be fully integrated into the City's network (and disconnected from the County's system) before 2026. The Tutela Heights system currently operates at a higher HGL than the adjacent City PD1 which will result in decreased pressures to the existing serviced areas after the integration.

Servicing opportunities were considered and are outlined below including:

- Connect Only
- Connect and Upgrade Local Network
- Connect, Upgrade and Loop
- Connect, Upgrade, Loop and Booster Pumping Station

6.3.1. Connect Only Concept

Under this concept, the existing system and expansion lands will be serviced by an extension of the City's existing PD1, with supply provided via trunk watermains along the Mount Pleasant Road and Conklin Road right of ways, with Holmedale WTP acting as the primary supply source. The trunk watermains along Mount Pleasant Road and Conklin Road will extend from the City's PD1 to the existing County system, with no upsizing completed in Tutela Heights's existing system. The distribution network from the County of Brant will be disconnected, resulting in lower pressures connected to the City's water system than the County's water system, and automatic flushing devices will be installed at dead ends.

Water servicing within the existing lands will be provided by the existing infrastructure, with no additional upgrades completed. The residential lands will be serviced by a new trunk watermain along the collector road system, extending from the Mount Pleasant Road and Tutela Heights Road to create a looped watermain network.

6.3.2. Connect and Upgrade Local Network Concept

Under this concept, the existing system and expansion lands will be serviced by an extension of the City's existing PD1, with supply provided via trunk watermains along the Mount Pleasant Road and Conklin Road right of ways, with Holmedale WTP acting as the primary supply source. The trunk watermain along Mount Pleasant Road and Conklin Road will be upsized in Tutela's existing system to provide a better trunk loop. The distribution network from the County of

Brant will be disconnected, resulting in lower pressures connected to the City's water system than the County's water system, and automatic flushing devices will be installed at dead ends.

Local watermains within the existing system will be upsized to meet the City's existing level of service. The residential lands will be serviced by a new trunk watermain along the collector road system, extending from the upsized trunk watermains along Mount Pleasant Road and Conklin Road to create a looped watermain network.

6.3.3. Connect, Upgrade and Loop Concept

Under this concept, the existing system and expansion lands will be serviced by an extension of the City's existing PD1, with supply provided via trunk watermains along the Mount Pleasant Road and Conklin Road right of ways, with Holmedale WTP acting as the primary supply source. The trunk watermain along Mount Pleasant Road and Conklin Road will be upsized in Tutela's existing system to provide a better trunk loop. The distribution network from the County of Brant will be disconnected, resulting in lower pressures connected to the City's water system than the County's water system.

Local watermains within the existing system will be upsized to maintain or increase the existing level of service. The residential lands will be serviced by a new trunk watermain along the collector road system, extending from the upsized trunk watermains along Mount Pleasant Road and Conklin Road to create a looped watermain network. To support water quality in the Tutela Heights system, a new watermain will be extended through an unopened road allowance from Mount Pleasant Road to Tutela Heights Road along Phelphs Road. The remaining existing watermains, along Mount Pleasant from Phelphs Road to the municipal boundary and along the Tutela Heights from Davern Road to the municipal boundary, which are servicing existing local properties will need automatic flushers as they are dead ends.

6.3.4. Connect, Upgrade, Loop and Booster Pumping Station Concept

Under this concept, the existing system and expansion lands will be serviced by an extension of the City's existing PD1, with supply provided via trunk watermains along the Mount Pleasant Road and Conklin Road right of ways, with Holmedale WTP acting as the primary supply source. The trunk watermain along Mount Pleasant Road and Conklin Road will be upsized in Tutela's existing system to provide a better trunk loop. The distribution network from the County of Brant will be disconnected.

Local watermains within the existing system will be upsized to maintain or increase the existing level of service. The residential lands will be serviced by a new trunk watermain along the collector road system, extending from the upsized trunk watermains along Mount Pleasant Road and Conklin Road to create a looped watermain network. To support water quality in the Tutela Heights system, a new watermain will be extended through an un-opened road

allowance from Phelps Road to Tutela Heights Road, eliminating the need for additional automatic flushing devices.

In addition to the local system upgrades, a new BPS and Res will be installed to improve system pressures. The BPS will provide pressures similar to the current pressures, experienced in the County system, which would otherwise decrease as a result of a connection to the City's PD1.

7. Water Servicing Concepts

Water 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. These concepts focus on the existing water system while still accommodating growth within the North Expansion Lands, East Expansion Lands, and Tutela Heights. This long list of servicing concepts was developed first to evaluate the feasibility to either be carried forward for further analysis and consideration or being screened out completely.

The following sections summarize all water servicing concepts, with their advantages and disadvantages, such that only desired concepts are carried forward as servicing strategies for further evaluation and costing.

7.1. Servicing Concept Development

As part of this Master Servicing Plan, water concepts were reviewed for existing and future growth areas in order to select the servicing concepts 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 long term reliability and security of the water 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 Greenhouse Gas Emissions; and,
- Avoid/minimizes impact to areas where a disturbance could represent a significant drinking water threat.

Water 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. Holmedale Water Treatment Plant

The capacity of the existing treatment plant is not sufficient to accommodate all projected growth. As such, upgrades are required to facilitate development. **Appendix G** presents three upgrade alternatives to address the additional growth demand. They are as follows:

- **Alternative 1** - upsizing using only existing process technologies,
- **Alternative 2** - decommissioning ozonation process and retrofit tanks into additional Actiflo settling tanks, and
- **Alternative 3** - utilizing the Holmedale Reservoir for chlorine contact time rather than constructing a new clear well.

The alternative figures are included in **Appendix D**.

7.3. System Wide Concepts

Water servicing concepts were developed first to address system wide opportunities and constraints to the existing water system while also servicing the expansion lands. This high-level analysis was done to review and evaluate system pressures, storage needs, and pumping capacities such that a pressure district realignment has the potential to optimize both pressure bands and storage and pumping capacity needs. This process was done by first evaluating and realigning pressure district boundaries and subsequently calculating the storage and pumping capacity needs. Where the pressure district boundaries were realigned from existing, a range of potential boundaries was established such that pumping, and storage needs could be optimized further if the concept was carried forward. To determine the best overall operation of the system while incorporating the increased demands, a variety of pressure district splits were reviewed prior to determining four optimized system concepts.

Four system wide pressure district concepts are presented in the following section. Additional sub-concepts were also developed to present storage and pumping upgrade concepts which would be unique to each pressure district concept. The four pressure district concepts are as follows:

- **Water Servicing Concept 1: Status Quo**
    - Maintains the current pressure district boundaries, PD1, PD2/3 and PD4 with servicing from the existing facilities within each pressure district
    - Storage and pumping capacities at the existing facilities are similarly provided to their current pressure district; additional facilities, where necessary, are presented in the sub-concepts detailed in the sections below
- **Water Servicing Concept 2: Split PD2/3 into PD2 and PD3**
    - Splits the PD2/3 into two pressure districts, PD2 and PD3, where the boundary of the realignment is flexible generally between Wayne Gretzky Parkway and Highway 403; PD1 and PD3 boundary is flexible generally between Brant Avenue and Greenwich Street; PD4 boundary is maintained at existing
    - Storage and pumping facilities within PD1 and PD4 will continue to service their existing pressure districts while facilities within PD2/3 would be split up between PD2 and PD3 geographically; additional facilities, where necessary, are presented in the sub-concepts detailed in the sections below
- **Water Servicing Concept 3: Maximize PD4**
- Expand PD4 boundary east and splitting PD2/3 at Wayne Gretzky Parkway into PD3 and PD2 integrated into PD4 (i.e. PD2 and PD4 are a single pressure district noted as PD4); PD1 boundary is maintained at existing
    - Storage and pumping facilities within PD1 will continue to service their existing pressure districts while facilities within PD3 and PD4 will be serviced to their respective pressure districts based on geography; additional facilities, where necessary, are presented in the sub-concepts detailed in the sections below
- **Water Servicing Concept 4: Split PD1**

- Splits PD1 into PD1, PD1A, and PD1B generally split along Veterans Memorial Parkway and along Colborne Street West; splits PD2/3 into PD2 and PD3 where the boundary of the realignment is flexible generally between Wayne Gretzky Parkway and Highway 403; PD1 and PD3 boundary is flexible generally between Brant Avenue and Greenwich Street; PD4 boundary is maintained at existing location
- Storage and pumping facilities within PD1 will be addressed through the sub-option alternatives; facilities within PD2/3 would be split up between PD2 and PD3 geographically; additional facilities; facilities within PD4 will continue to service their existing pressure district; where necessary, are presented in the sub-concepts detailed in the sections below

Based on these four system wide concepts, outlining pressure district boundaries, sub-concepts for the individual pressure districts addressed storage and pumping deficiencies. These pressure district sub-concepts are provided following the subsequent system wide pressure district concepts.

The water servicing concepts for the Settlement Area Boundary Expansion Lands, previously discussed in **Section 6**, were carried forward and incorporated into the four system wide concepts with the following strategies:

- The North Expansion Lands will be serviced via connections to the existing system's trunk watermains along the northern boundary including connections at King George Road, Oak Park Road, Park Road North and Brantwood Park Road.
- The East Expansion Lands will be serviced by connections to the existing system at Lynden Road and Sinclair Boulevard
- Tutela Heights will be serviced via connections to the existing system at Mount Pleasant Road and Conklin Road

7.3.1. Water Servicing Concept 1: Status Quo

Servicing Concept 1: Status Quo maintains the existing pressure district boundaries within the existing water system, as further described in **Table 22**. This system configuration requires upgrades to both storage, in PD1, PD2/3, and PD4, and pumping, in PD4; as such, the following sub-concepts were presented in **Table 23** to **Table 25**, detailing the servicing sub-concepts.

- Within PD1, the following storage sub-concepts were presented to address the storage deficiency
  - PD1 Sub-Concept 1: Pumped storage at Holmedale WTP
  - PD1 Sub-Concept 2: New, second ET within PD1
  - PD1 Sub-Concept 3: Oversize the ET in PD2/3 providing storage via a PRV to PD1
- Within PD2/3, the following storage sub-concepts were presented to address the storage deficiency
  - PD2/3 Sub-Concept 1: Pumped storage at Tollgate PS or Wayne Gretzky PS
  - PD2/3 Sub-Concept 2: New PD2/3 ET

    - PD2/3 Sub-Concept 3: Decommission Albion BPS with pumped storage or new ET
- Within PD4, the following pumping and storage sub-concepts were presented to address both the pumping and storage deficiencies
    - PD4 Sub-Concept 1: Pumped storage at Northwest PS
    - PD4 Sub-Concept 2: New PD4 ET with existing pumps at Northwest PS

Table 22: Water Servicing System Wide Concept 1

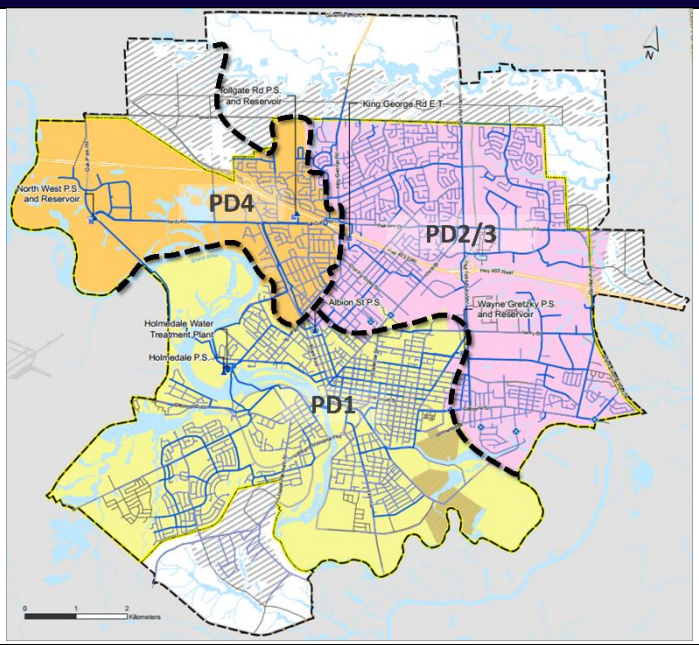
Water Servicing Concept 1: Status Quo	
Overview Under this concept, the existing servicing strategy is maintained, including the current pressure district boundary alignments and existing storage and pumping facility servicing.	
Storage	• Water storage, as either elevated or pumped water storage, is needed in PD1, PD2/3, and PD4
Pumping	• No pumping upgrades needed in PD1 or PD2/3 • PD4 pumping strategy may require pumping upgrades; dependent on storage strategy
Transmission (Watermains)	• Trunk watermain upgrades needed to support intensification areas and to service expansion lands
Pressure	• Current pressures are maintained
Expansion Lands	• Pressure district boundary for PD4 within expansion lands to be optimized further based on local elevations and demands • Allows extension of PD2/3 to service north residential lands east of Balmoral Drive and PD4 extension to service north employment lands west of Balmoral Drive • Requires sub-zoning of PD2/3 to service east expansion lands • Allows connection of Tutela Heights in PD1 along Mount Pleasant Road and Conklin Road
This system wide concept was carried forward and is further reviewed in Section 8.3.	

Table 23: Water Servicing Concept 1 – PD1 Sub-Concepts

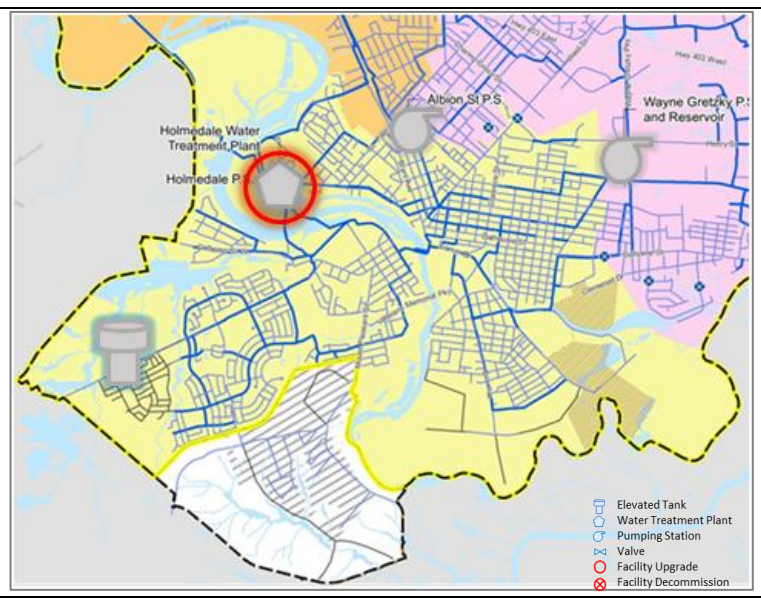
Water Servicing Concept 1: PD1 Storage Sub-Concepts

The following sub-concepts accommodate the PD1 storage deficiency.

PD1 Sub-Concept 1: More pumped storage at Holmedale WTP

Storage within PD1 is provided through reservoir upgrades at the WTP. The existing pumps at the WTP have sufficient capacity to accommodate the increased pump needs to satisfy storage needs.

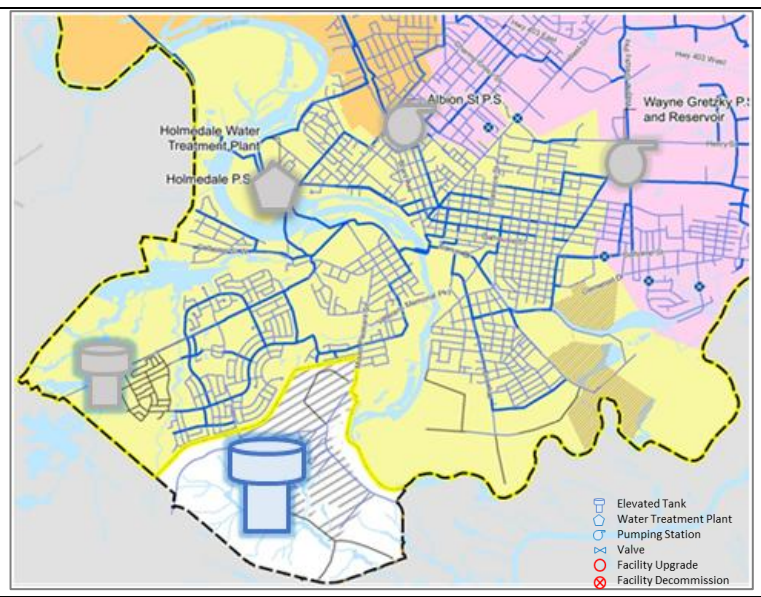
Advantages	Disadvantages
• No new facilities required	• Upgrades required at WTP • More extensive infrastructure upgrades to utilize existing WTP
Carried Forward	



PD1 Sub-Concept 2: New, Second Elevated Tank

Storage within PD1 is provided by a new, second ET, in additional to the existing Shellard ET. The location of the new ET would be subject to a separate EA.

Advantages	Disadvantages
• ET location can be optimized to reduce infrastructure requirement • Potential to locate new ET next to the Shellard ET, within lands already owned by the City	• Shellard ET currently under construction • Second ET required in PD1 may be operationally difficult
Screened Out	



PD1 Sub-Concept 3: Oversized PD2/3 ET with PRV

Storage within PD1 is provided via PD2/3. A new ET within PD2/3 would be oversized to accommodate storage needs within both PD1 and PD2/3 with a PRV to convey the storage, as needed, from PD2/3 into PD1.

Advantages	Disadvantages
• No new facilities required in PD1 • PRV from PD2/3 into PD1 will provide additional security of supply to southeast PD1	• Additional infrastructure upgrades required in PD2/3 • Oversized ET may create water quality impacts before buildout
Carried Forward	

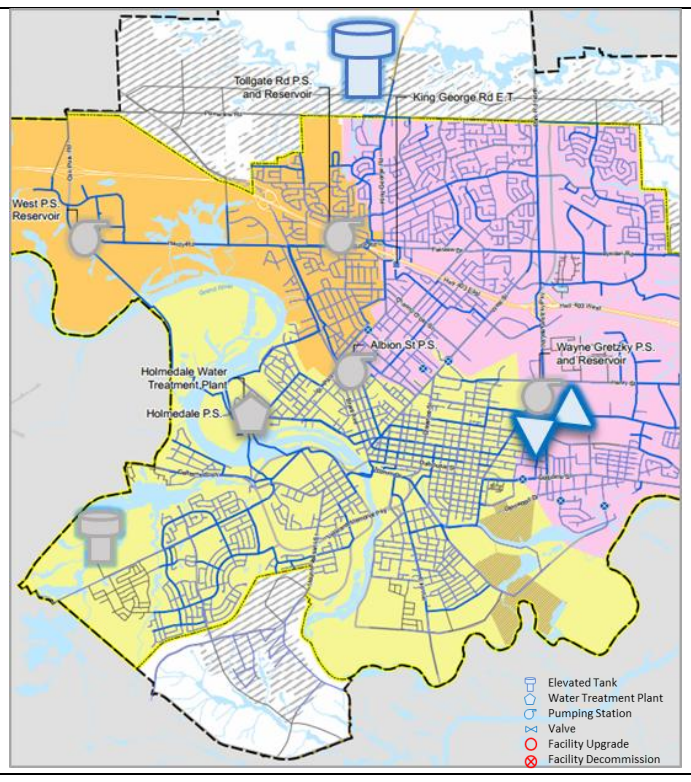


Table 24: Water Servicing Concept 1 – PD2/3 Sub-Concepts

Water Servicing Concept 1: PD2/3 Storage Sub-Concepts

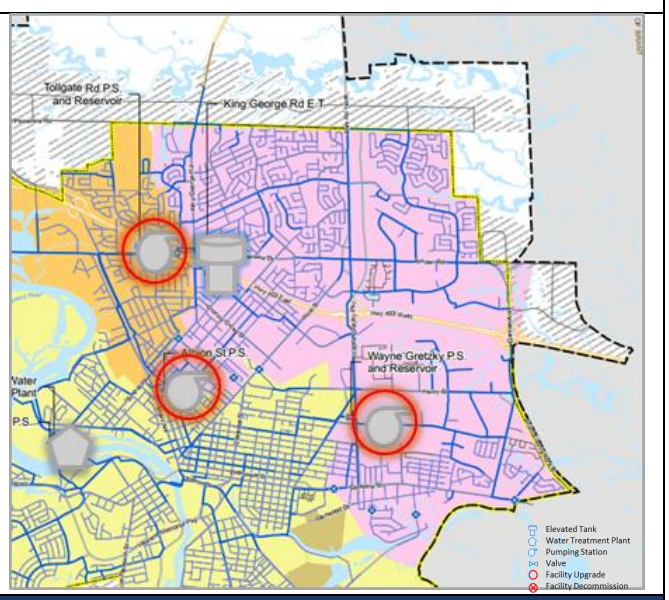
The following sub-concepts to accommodate the PD2/3 storage deficiency.

PD2/3 Sub-Concept 1: Pumped Storage at Tollgate PS or Wayne Gretzky PS

Storage within PD2/3 will be provided by pumping reservoir storage from either Tollgate PS or Wayne Gretzky PS. Either facility will require upgrades to both the existing reservoir and the pumps. Albion BPS is maintained to convey additional flows from PD1 into PD2/3.

Advantages	Disadvantages
• No new facilities required • Albion BPS provides additional transfers to PD2/3	• Requires pumping upgrades at either Wayne Gretzky PS or Tollgate PS • Does not provide the benefits of floating storage and decreases operational flexibility

Screened Out

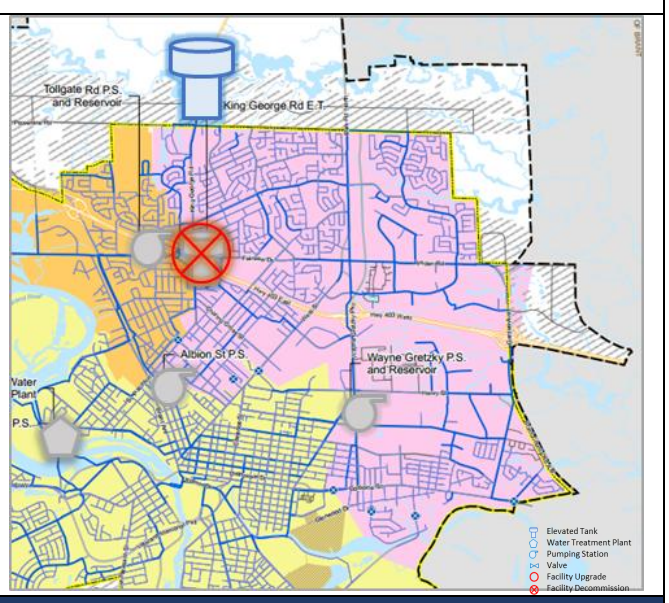


PD2/3 Sub-Concept 2: New PD2/3 ET

Storage within PD2/3 will be provided by constructing a new ET within the expansion lands and decommissioning the existing King George ET.

Advantages	Disadvantages
• ET location can be optimized to reduce infrastructure requirements • Floating storage within PD2/3 presents operational flexibility within a PD with large increase in demands • Allows for the decommissioning of King George ET	• New ET required

Carried Forward



PD2/3 Sub-Concept 3: Decommission Albion BPS with Pumped Storage or New ET

Albion BPS can be decommissioned in combination with PD2/3 Sub-Concept 1 (pumped storage) or Sub-Concept 2 (new ET).

Advantages	Disadvantages
• Albion BPS can be decommissioned	• Decreased operational flexibility • Without a new ET, high risk during a fire or emergency • Greater importance placed on watermain upgrades

Not Carried Forward at this Time

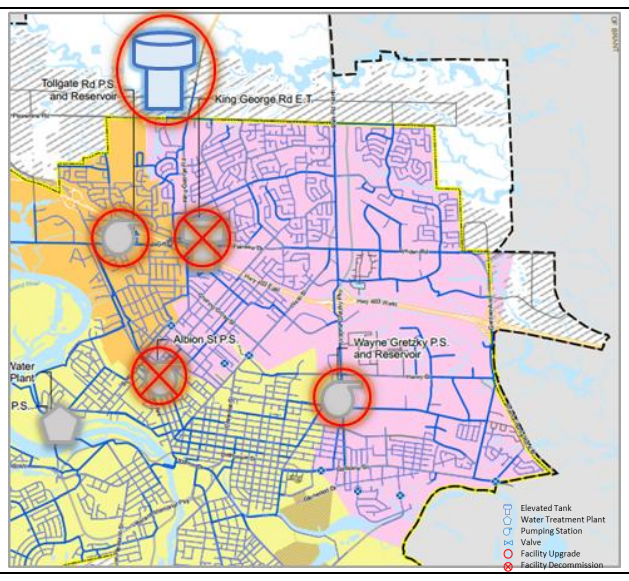


Table 25: Water Servicing Concept 1 – PD4 Sub-Concepts

Water Servicing Concept 1: Status Quo – PD4 Storage and Pumping Sub-Concepts

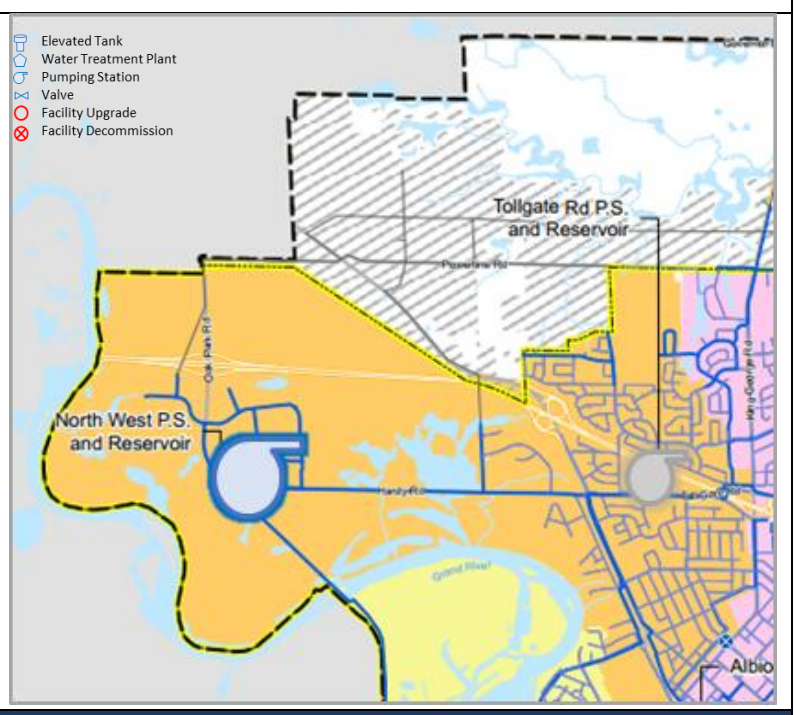
The following sub-concepts to accommodate the PD4 storage and pumping deficiency.

PD4 Sub-Concept 1: Pumped Storage at Northwest Reservoir

Storage and pumping within PD4 will be provided by upgrading the existing Northwest PS pumps and reservoir. The pumps will be sized to convey max day demand plus fire flow.

Advantages	Disadvantages
• No new facilities and minimizes new infrastructure requirements • Increased operational flexibility at Northwest PS • Space is available within Northwest PS lands • Can optimize with expansion lands serviced via PD4	• Additional pumping and inground reservoir cells needed to accommodate fire flows within PD4

Carried Forward

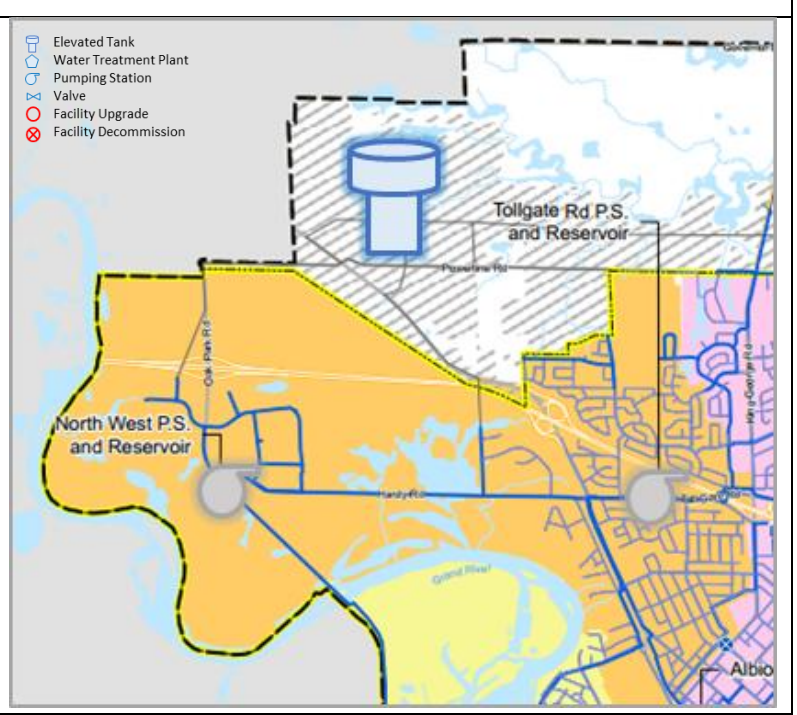


PD4 Sub-Concept 2: New ET with Existing Pumping at Northwest PS

Storage within PD4 will be provided by a new ET within the expansion lands. As the new ET will provide emergency and fire storage, upgrades at Northwest PS are not necessary as it can convey 2051 max day demand with existing pumps.

Advantages	Disadvantages
• ET location can be optimized to reduce infrastructure requirements • Easier to gain approval/ support for an ET within employment lands • No upgrades required at Northwest PS	• Potential negative public perception with two new ETs in north expansion lands

Carried Forward



7.3.2. Water Servicing Concept 2: Split Pressure District 2/3

Servicing Concept 2: Split PD2/3, described in **Table 26**, separates PD2/3 into PD2 and PD3 with a flexible alignment between Wayne Gretzky Parkway and Highway 403. Within both new pressure districts, the HGL is optimized by ground elevations, increasing HGL within PD2 and decreasing the HGL within PD3. Further to the boundary realignment between PD2 and PD3, the PD1 and PD3 boundary is flexible between Brant Avenue and Greenwich Street, due to an opportunity to decrease the HGL within PD3. The PD4 boundary is unchanged.

The system configuration results in Tollgate PS, Albion BPS, and King George ET servicing PD2 and Wayne Gretzky PS servicing PD3 with PD1 and PD4 being serviced by their existing facilities. This results in PD1, PD2, PD3 (dependent on the boundary realignment) and PD4 requiring storage upgrades while PD4 requires pumping upgrades. The decrease in HGL within PD2 and PD3 may require minor upgrades at the respective pumping station to accommodate for a change in Total Dynamic Head (TDH). As PD1 and PD4 are serviced by their existing facilities, additional sub-concepts were not developed as they are the same as Servicing Concept 1: Status Quo – PD1 Sub-Concepts and PD4 Sub-Concepts. The sub-concepts developed for PD2 storage needs are presented in **Table 27**.

- Within PD2, the following storage sub-concepts were presented to address the storage deficiencies in both pressure districts
    - PD2 Sub-Concept 1: Reservoir upgrades at Tollgate PS
    - PD2 Sub-Concept 2: New PD2 ET
    - PD2 Sub-Concept 3: New PD2 ET with PRV support to PD3 (passive feed to consolidate volume)

Table 26: Water Servicing System Wide Concept 2

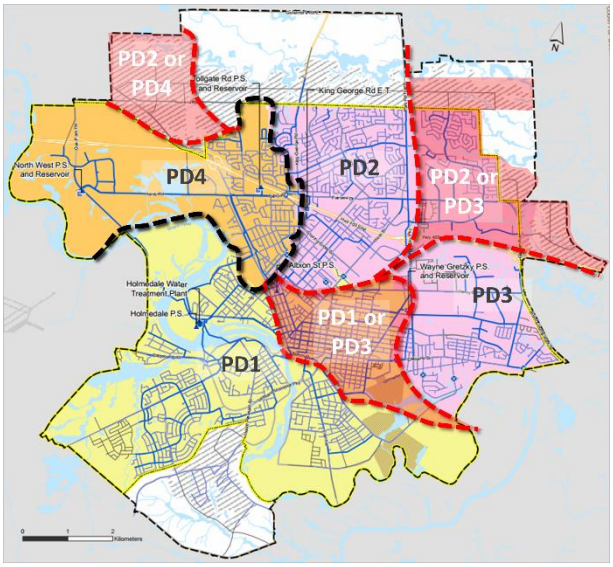
Water Servicing Concept 2: Split PD2/3 into PD2 and PD3	
Overview • Split PD2/3 into PD2 and PD3 to optimize pressures and facility needs • Pressure district boundary realignment is flexible due to ground elevations	
Storage	• Water storage, as either elevated or pumped water storage, is needed in PD1, PD2, and PD4 • Storage needs in PD3 are dependent on the boundary realignment
Pumping	• No pumping upgrades needed in PD1 • Minor upgrades to PD2 and PD3 may be needed to support new pressure districts • Potential PD4 upgrades needed; dependent on storage strategy and boundary realignment
Transmission (Watermains)	• Trunk watermain upgrades needed to support intensification areas and to service expansion lands
Pressure	• Improved pressures to PD2 and PD3
Expansion Lands	• Potential for North Expansion Lands to be service by PD2, PD3 and/or PD4 with possible decreased pressures in North Lands • Does not require sub-zoning of East Expansion Lands; allows natural extension of PD2 or PD3 to service East Expansion Lands along Lynden Road • Allows connection of Tutela Heights in PD1 along Mount Pleasant Road and Conklin Road
This system wide concept was screened out and is not discussed further.	

Table 27: Water Servicing Concept 2 – PD2 Sub-Concepts

Water Servicing Concept 2 – PD2 Storage Concepts

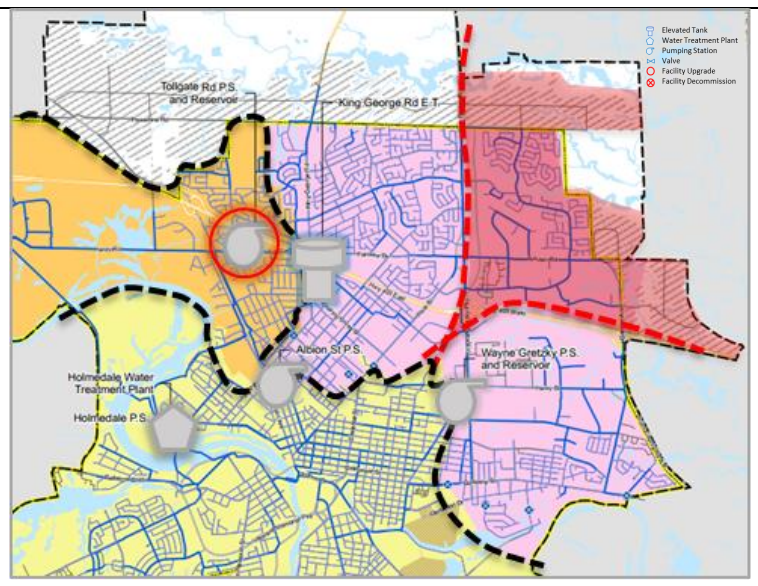
The following sub-concepts to accommodate the PD2 storage deficiency.

PD2 Sub-Concept 1: Reservoir Upgrades at Tollgate PS

Storage within PD2 will be provided by pumped storage at the Tollgate PS requiring upgrades to the existing Tollgate Reservoir.

Advantages	Disadvantages
• Optimizes PD4 facilities as PD2 will service the expansion lands	• Insufficient floating storage, MDD+FF to be provided by pumping • Storage upgrades needed at Tollgate PS • Reduced operational flexibility • Low pressures in new employment lands

Screened Out

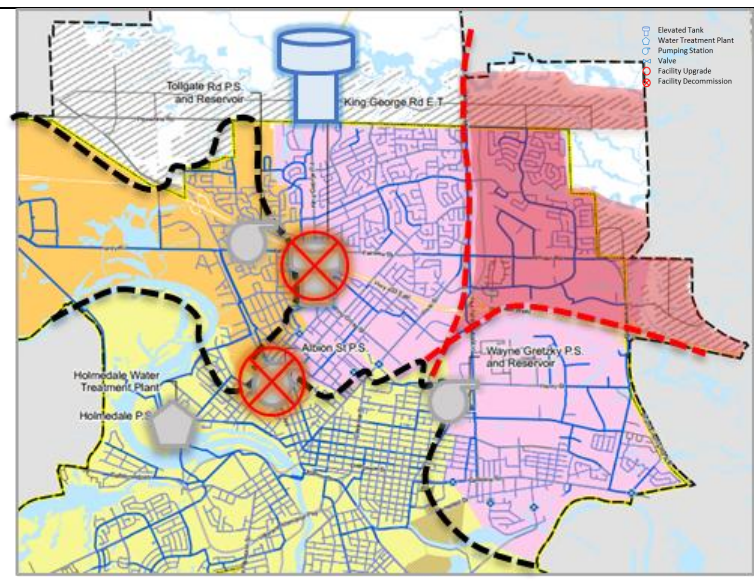


PD2 Sub-Concept 2: New PD2 ET

Storage within PD2 will be provided by constructing a new PD2 ET within the expansion lands and decommissioning the existing King George ET and Albion BPS.

Advantages	Disadvantages
• ET location can be optimized to reduce infrastructure needs • Can optimize system pressures (HGL change) • Increased operational flexibility in PD2	• No floating storage in PD3, reduced operational flexibility • New ET required • Potential storage upgrades at Wayne Gretzky PS

Screened Out

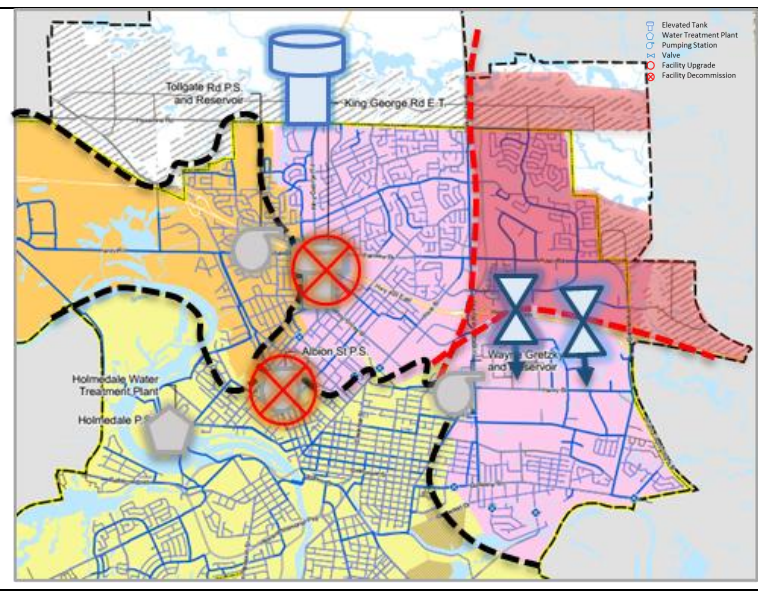


PD2 Sub-Concept 3: New PD2 ET with PRV support to PD3 (passive feed – consolidate volume)

Storage within PD2 will be provided by constructing a new PD2 ET within the expansion lands and decommissioning the existing King George ET and Albion BPS. Additional storage is provided to PD3 via PRVs.

Advantages	Disadvantages
• Can be combined with either Sub-Concept 1 or 2 • Operational flexibility in PD3 in event of a fire or emergency	• PD3 reliance on conveyance from PD2 during fire or emergency

Screened Out



7.3.3. Water Servicing Concept 3: Maximize Pressure District 4

Servicing Concepts 3: Maximize PD4, described in **Table 28**, extends PD4 east to Wayne Gretzky Parkway, incorporating PD2, separating PD4 and PD3. Within both realigned pressure districts, the HGL is optimized by ground elevations, decreasing the HGL in PD3 and maintaining the HGL in PD4. The PD1 boundary is unchanged.

The system configuration results in Tollgate PS, Albion BPS, and Northwest PS servicing PD4, Wayne Gretzky PS servicing PD3, and PD1 being serviced by their existing facilities. This results in PD1, PD3, and PD4 requiring storage upgrades. Due to the change in HGL at Tollgate PS and Wayne Gretzky PS minor upgrades may be required to accommodate the change in TDH. As PD1 is serviced by its existing facilities, additional sub-concepts were not developed as they are the same as Servicing Concept 1: Status Quo – PD1 Sub-Concepts. The sub-concepts developed for PD3 and PD4 storage needs are presented in **Table 29** to **Table 30**.

- Within PD3, the following storage sub-concepts were presented to address the storage deficiencies in both pressure districts
    - PD3 Sub-Concept 1: New ET in PD3 and PD4
    - PD3 Sub-Concept 2: Oversize ET in PD4 with PRV to PD3
- Within PD4, the following storage sub-concepts were presented to address the storage deficiencies in both pressure districts
    - PD4 Sub-Concept 1: Existing pump station storage expansion
    - PD4 Sub-Concept 2: New ET in PD3 and PD4
    - PD4 Sub-Concept 3: PRV support from PD4 to PD3

Table 28: Water Servicing System Wide Concept 3

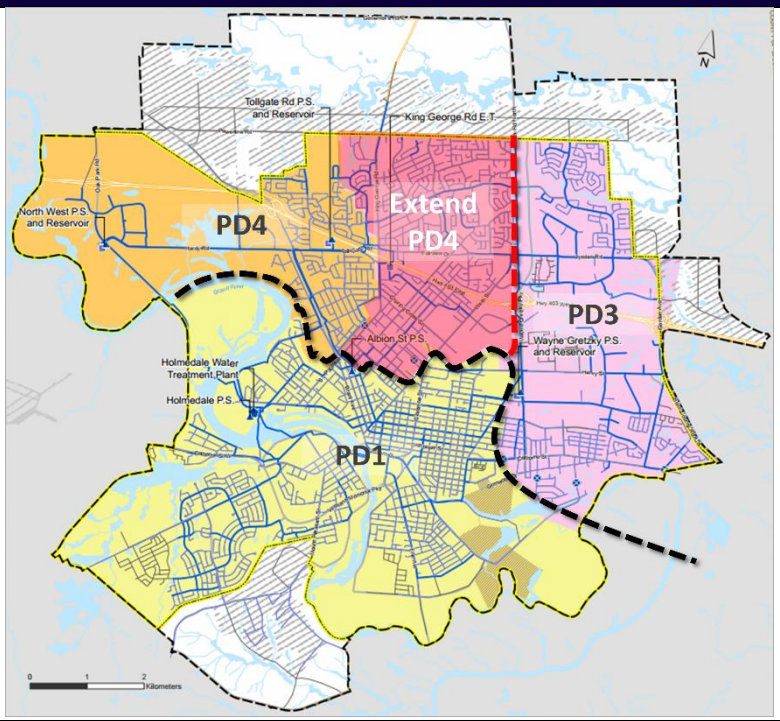
Water Servicing Concept 3: Maximize Pressure District 4	
Overview • Expansion of PD4 eastwards to eliminate PD2 with the PD3 boundary realigned to Wayne Gretzky Parkway • Pressure district boundary realignment to optimize pressures and facility needs	
Storage	• Water storage, as either elevated or pumped water storage, is needed in PD1, PD3, and PD4
Pumping	• Pumping upgrades needed in PD3 and PD4 to accommodate new pressure districts and change in HGL
Transmission (Watermains)	• Trunk watermain upgrades needed to support intensification areas and to service expansion lands
Pressure	• Improved pressures in PD3 and PD4
Expansion Lands	• Allows natural extension of PD4 to service north employment lands and part of residential lands and PD3 to service remaining North residential lands • Does not require sub-zoning of east expansion lands; allows natural extension of PD3 to service east expansion lands along Lynden Road • Allows connection of Tutela Heights in PD1 along Mount Pleasant Road and Conklin Road
This system wide concept was carried forward and is further reviewed in Section 8.3.	

Table 29: Water Servicing Concept 3 - PD3 Sub-Concepts

Water Servicing Concept 3 – PD3 Storage Sub-Concepts

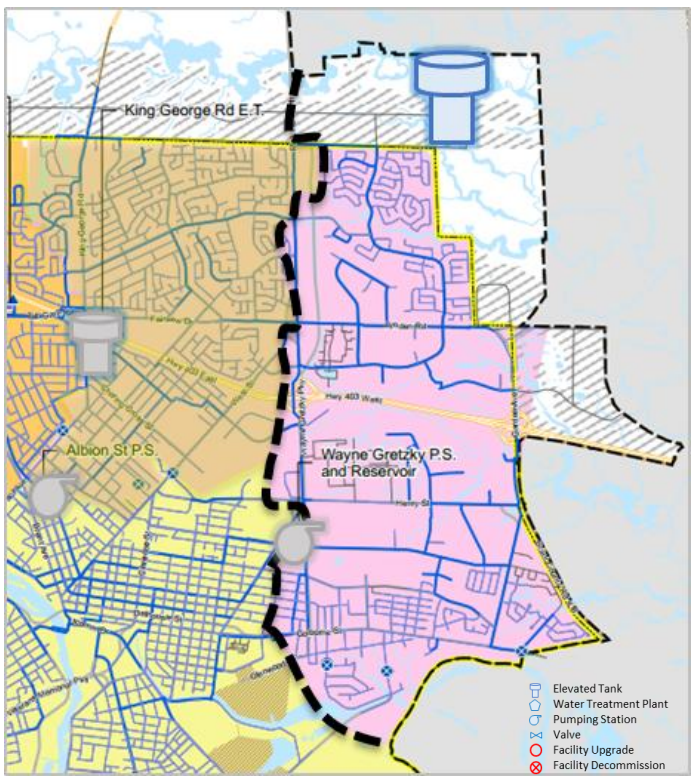
The following sub-concepts to accommodate the PD3 storage deficiency.

PD3 Sub-Concept 1: New ET in PD3 and PD4

Storage within PD3 will be provided by constructing a new PD3 ET within the expansion lands.

Advantages	Disadvantages
• ET location can be optimized to reduce infrastructure requirements • Increases operational flexibility in each PD	• Requires two new ETs which may result in negative public perception • Extensive watermain construction required to strengthen north/ south trunks

Carried Forward



PD3 Sub-Concept 2: Oversize ET in PD4 with PRV into PD3

Storage within PD4 will be provided by constructing a new PD4 ET within the expansion lands with a PRV to provide storage to PD3. Reservoir upgrades are needed at the Wayne Gretzky PS.

Advantages	Disadvantages
• Allows for only ET in PD4 that is easier to locate in employment lands • Pumping at Wayne Gretzky PS is sufficient to accommodate MDD+FF • PRV provides security of supply to PD3	• Increased storage required at Wayne Gretzky • Extensive watermain construction required to strengthen north/south trunks

Carried Forward

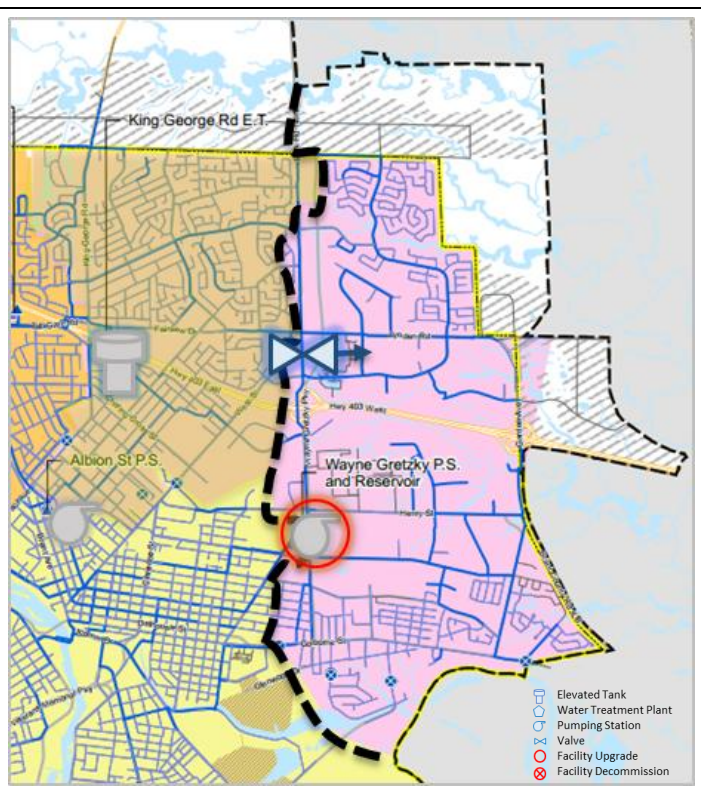


Table 30: Water Servicing Concept 3 – PD4 Sub-Concepts

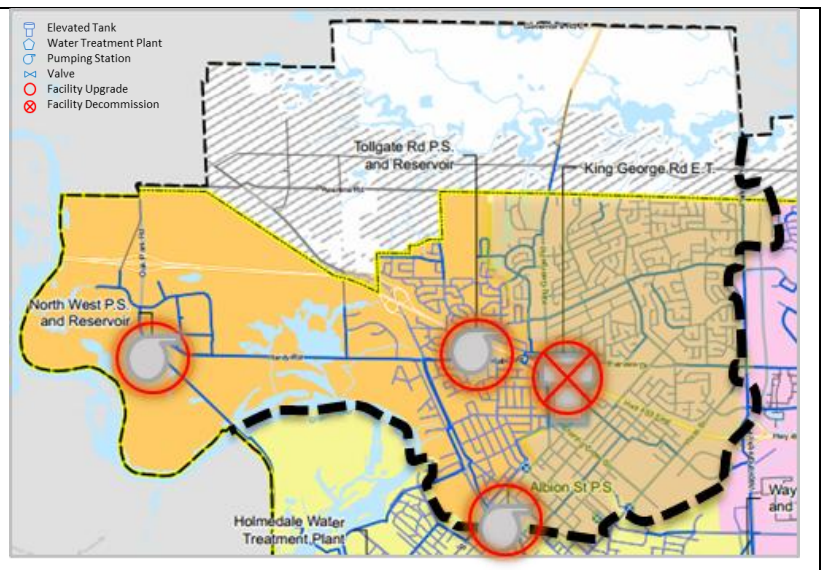
Water Servicing Concept 3 – PD4 Storage Concepts

The following sub-concepts to accommodate the PD4 storage deficiency.

PD4 Sub-Concept 1: Existing PS Storage Expansion

Storage within PD4 will be provided by pumped storage by upgrading the reservoirs at either Northwest PS or Tollgate PS and decommissioning the existing King George ET.

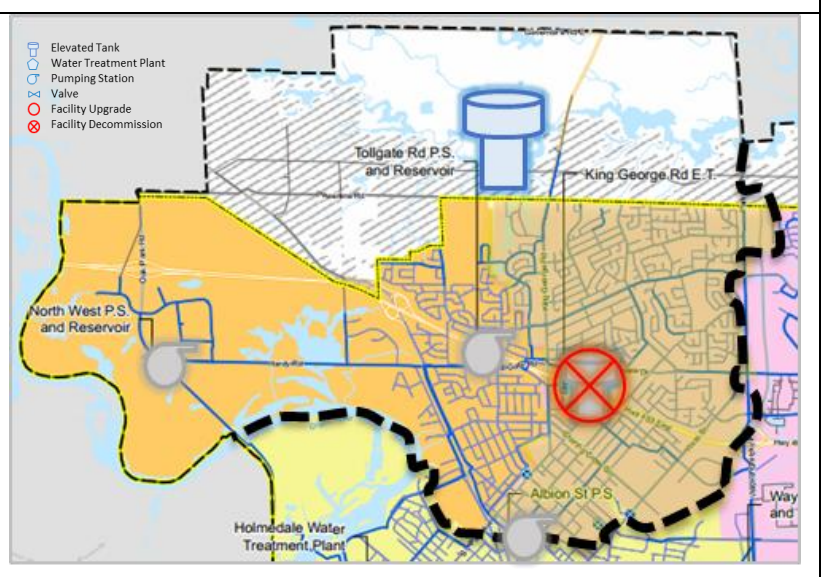
Advantages	Disadvantages
• No new facilities required • Optimize system pressures	• Storage upgrades required at either Northwest PS or Tollgate PS • Decreased operational flexibility
Carried Forward	



PD4 Sub-Concept 2: New ET in PD4 and PD3

Storage within PD4 will be provided by constructing a new PD4 ET within the expansion lands and decommissioning the existing King George ET and Albion BPS.

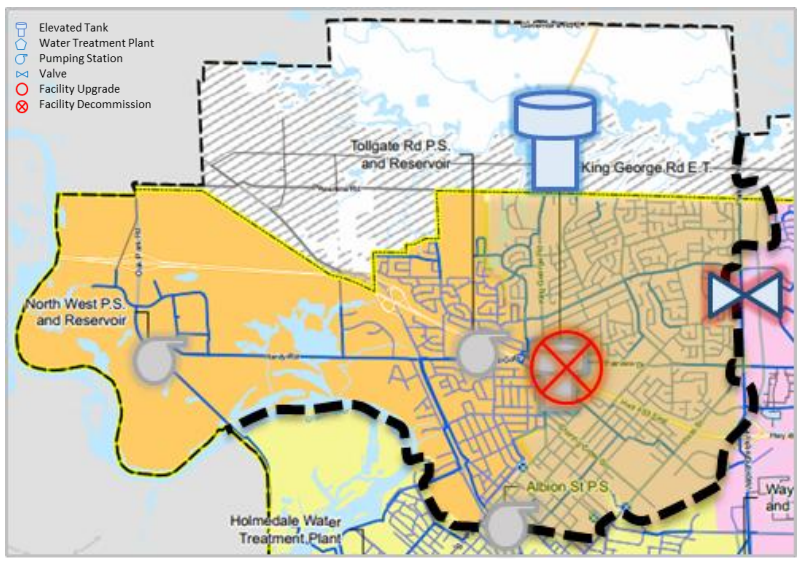
Advantages	Disadvantages
• ET location can be optimized to reduced infrastructure requirements • Increased operational flexibility • Optimize system pressures	• Two new ETs required
Carried Forward	



PD4 Sub-Concept 3: PRV support from PD4 to PD3

Storage within PD4 will be provided by constructing a new PD4 ET within the expansion lands with a PRV to provide storage to PD3. The King George ET will be decommissioned.

Advantages	Disadvantages
• Only one ET required • Optimize system pressures	• More extensive watermain construction (PD3 support)
Carried Forward	



7.3.4. Water Servicing Concept 4: Split Pressure District 1

Servicing Concepts 4: Split PD1, described in **Table 31**, splits PD1 into three pressure districts. PD1 extends from Veterans Memorial Parkway and Greenwich Street, PD1A extends west from Veterans Memorial Parkway, and PD1B extends east along Colborne Street West. The PD2 and PD3 are split into separate pressure districts with a flexible alignment between Wayne Gretzky Parkway and Highway 403. Within both new pressure districts, the HGL is optimized by ground elevations, increasing HGL within PD2 and decreasing the HGL within PD3. The PD4 boundary is unchanged.

The system configuration results in Tollgate PS, Albion BPS, and King George ET servicing PD2 and Wayne Gretzky PS servicing PD3 with PD1 and PD4 being serviced by their existing facilities. This results in PD1A, PD1B, PD2, PD3 (dependent on the boundary realignment) and PD4 requiring storage upgrades while PD1A, PD1B, and PD4 requires pumping upgrades. The decrease in HGL within PD2 and PD3 may require minor upgrades at the respective pumping station to accommodate for a change in Total Dynamic Head (TDH). The sub-concepts developed for PD2 and PD3 were similar to Servicing Concept 2: Split PD2/3 – PD2 Sub-Concepts and PD3 Sub-Concepts and are not presented again. As PD4 is serviced by its existing facilities, additional sub-concepts were not developed as they are the same as Servicing Concept 1: Status Quo – PD4 Sub-Concepts. The sub-concepts developed for PD1 storage needs are presented in **Table 32**.

- Within PD1 and PD1A, the following storage sub-concepts were presented to address the storage deficiencies in both pressure districts
    - Sub-Concept 1: Elevated tank in PD1 with dedicated watermain and new pumping station to PD1A and PD1B
    - Sub-Concept 2: Elevated tank raised with new pumping station
    - Sub-Concept 3: Holmedale HLP raised with dedicated watermain to raised elevated tank and PRV to old PD1
    - Sub-Concept 4: Two sets of pumps at Holmedale HLP to each Pressure District 1

Table 31: Water Servicing System Wide Concept 4

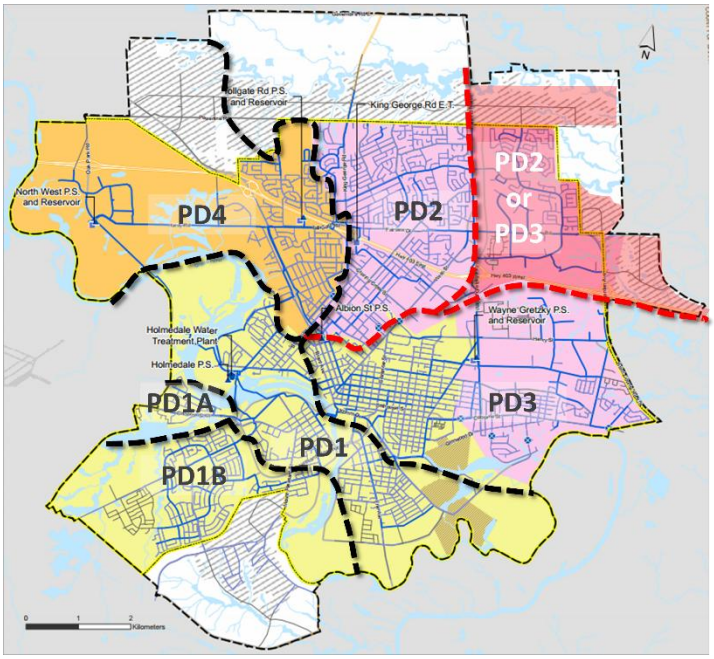
Water Servicing Concept 4: Split Pressure District 1	
Overview • Split PD1 into three pressure districts to optimize PD1 pressures • Split PD2/3 into two pressure districts to optimize pressures and facility needs • Pressure district boundary realignment is flexible due to ground elevations	
Storage	• Water storage, as either elevated or pumped water storage, is needed in all pressure districts
Pumping	• New pumping facilities are needed to accommodate PD1A and PD1B • Minor upgrades to PD2 and PD3 may be needed to support new pressure districts
Transmission (Watermains)	• Trunk watermain upgrades needed to support intensification areas and to service expansion lands
Pressure	• Improved pressures in PD1, PD1A, PD1B, PD2, and PD3
Expansion Lands	• Potential for North Expansion Lands to be service by PD2, PD3 and/or PD4 with possible decreased pressures • Does not require sub-zoning of East Expansion Lands; allows natural extension of PD2 or PD3 to service East Expansion Lands along Lynden Road • Allows connection of Tutela Heights with optimized pressures in PD1B along Mount Pleasant Road and Conklin Road
This system wide concept was screened out and is not discussed further.	

Table 32: Water Servicing Concept 4 - PD1 Sub-Concepts

Water Servicing Concept 4: PD1 Storage Concepts

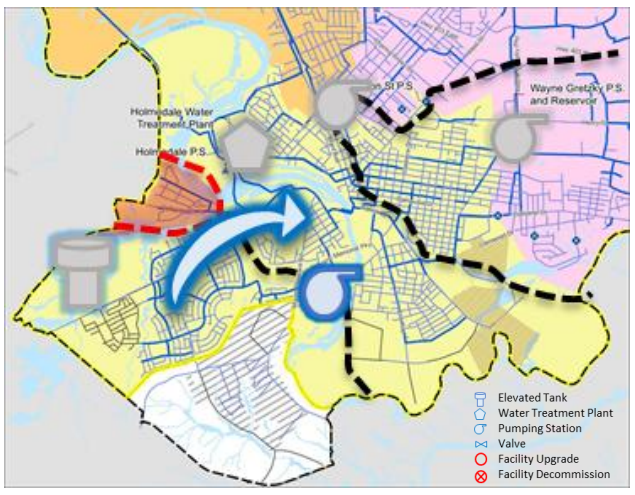
The following sub-concepts to accommodate the PD1 storage deficiency.

PD1 Sub-Concept 1: ET in PD1 with dedicated watermain and new PS to PD1A and PD1B

Storage within PD1 will be provided by a dedicated feed from the Shellard ET into PD1 with two new PS into PD1A and PD1B.

Advantages	Disadvantages
• No modification to new PD1 ET • Increased pressures to Mount Pleasant	• Requires new PS and watermain • High pressures in PD1 are still high

Screened Out

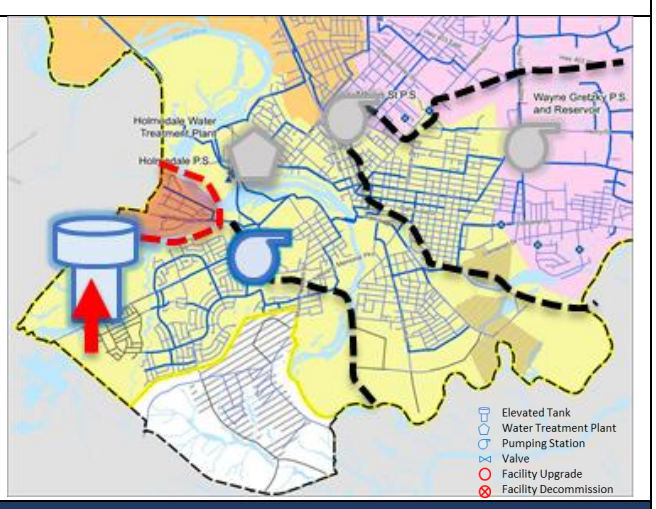


PD1 Sub-Concept 2: ET raised with new PS

Storage within PD1 will be provided by pumped storage from the WTP and storage within PD1A will be provided by raising the existing Shellard ET to a higher HGL.

Advantages	Disadvantages
• Reduces watermain upgrades • PD1 pressures <100 psi with lowered HGL	• Requires modifications at new PD1 ET • Requires new PS for raised ET • New PD1 ET not large enough to support PD1B

Screened Out

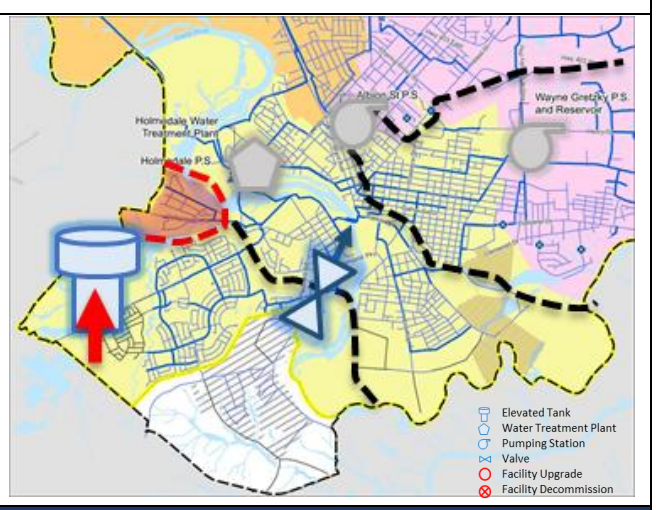


PD1 Sub-Concept 3: Holmedale HLP raised with dedicated watermain to raised ET and PRV to old PD1

Storage to PD1A will be provided by increasing the TDH from the WTP and increasing the height of the Shellard ET to a higher HGL and storage within PD1 will be provided by a PRV from PD1A into PD1.

Advantages	Disadvantages
• Reduces new infrastructure required • Increases operational flexibility • PD1 pressures <100 psi with lowered HGL	• Requires modifications at newly constructed PD1 ET • New PD1 ET not large enough to support PD1B

Screened Out

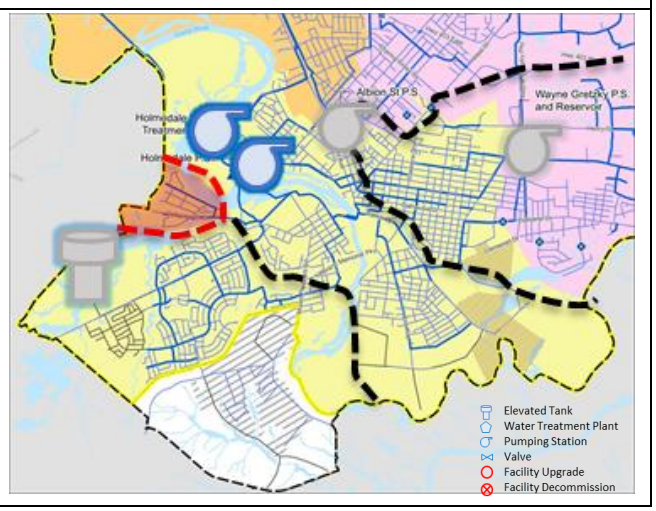


Concept 4: Two sets of pumps at High Lift Pump Station to each Pressure District

Storage to PD1 and PD1A will be provided by pumped storage from the Holmedale WTP via two separate headers with two separate HGLs.

Advantages	Disadvantages
• Reduces new infrastructure required • PD1 pressures <100 psi with lowered HGL	• Requires modifications to Holmedale HLP and new conveyance watermains • PD1B storage through pumping (MDD+FF) or a new ET in Mount Pleasant

Screened Out



7.3.5. System Wide Short Listed Servicing Concepts

These concepts were presented to City staff at an opportunities and constraints workshop and to the public at a Public Information Centre (PIC) in February 2020, and a consensus was reached on the two most viable options. These two options are listed below as being carried forward and are discussed in **Section 8.3**.

- **Concept 1:** Status Quo
  - Maintains current servicing strategy, including current pressure district boundaries
  - This concept was carried forward as a servicing strategy as it is the easiest to implement while minimizing facility upgrade needs
- **Concept 2:** Split Pressure District 2/3 into Pressure District 2 and Pressure District 3
  - Split PD2/3 to optimize pressures and facility needs
  - Pressure district boundary realignment is flexible due to ground elevations
  - This concept was screened out as it would be difficult to implement with complex long term operation
- **Concept 3:** Maximize Pressure District 4
  - Expansion of PD4 eastwards to eliminate PD2 with the PD3 boundary realigned to Wayne Gretzky Parkway
  - Pressure district boundary realignment to optimize pressures and facility needs
  - This concept was carried forward as a servicing strategy as it best optimizes system pressures
- **Concept 4:** Split Pressure District 1
  - Split PD1 into three pressure district to optimize pressures
  - Pressure district boundary realignment is flexible due to ground elevations
  - This concept was screened out as it would be the hardest to implement requiring the most new facilities and watermains

8. Water Servicing Alternatives and Evaluation

8.1. Objectives

Water servicing strategies were carried forward based on the servicing concepts and sub-concepts presented in **Section 7** and reviewed for existing and future growth in the City in order to select the best servicing solutions. The carried forward concepts and sub-concepts are presented as follows:

- **Concept 1:** Status Quo
  - Maintains current servicing strategy, including current pressure district boundaries
  - Sub-Concepts to address storage and pumping deficiencies are as follows:
    - PD1 Sub-Concept 1: More pumped storage at Holmedale WTP
    - PD1 Sub-Concept 3: Oversize the ET in PD2/3 providing storage via a PRV to PD1
    - PD2/3 Sub-Concept 2: New PD2/3 ET
    - PD2/3 Sub-Concept 3: Further evaluation of Albion BPS decommissioning with pumped storage or new ET
    - PD4 Sub-Concept 1: Pumped storage at Northwest PS
    - PD4 Sub-Concept 2: New PD4 ET with existing pumps at Northwest PS
- **Concept 3:** Maximize Pressure District 4
  - Expansion of PD4 eastwards to eliminate PD2 with the PD3 boundary realigned to Wayne Gretzky Parkway
  - Sub-Concepts to address storage and pumping deficiencies are as follows:
    - PD3 Sub-Concept 1 and PD4 Sub-Concept 2: New ET in PD3 and PD4
    - PD3 Sub-Concept 2 and PD4 Sub-Concept 4: Oversize ET in PD4 with PRV to PD3
    - PD4 Sub-Concept 1: Existing pump station storage expansion

The following sections summarize the alternative servicing strategies and evaluation of the strategies. The evaluation process is outlined in **Appendix C** in **Volume II**.

8.2. Facilities

8.2.1. Holmedale Water Treatment Plant

An overview of the water treatment plant alternatives are provided in **Section 7.2**. The evaluation process is summarized in **Table 33**. Alternative 2 provides a greater plant benefit as compared to Alternative 1 and 3; while maintaining a lower capital cost. On a balance of system benefit vs. cost, Alternative 2 was selected as the preferred servicing alternative. For further details, please refer to 2025 Technical Memorandum: Water and Wastewater Treatment Plant Review and Expansion Alternative Evaluation located in **Appendix G**.

Table 33: Holmedale WTP Alternatives & Evaluation

Holmedale WTP Upgrade Alternatives												
	Alternative 1				**Alternative 2**				**Alternative 3**			
Overview	Maintain all existing processes and upsize existing equipment to meet future capacity needs				Decommission Ozonation and retrofit to expand Actiflo				Utilize portion of reservoir for chlorine contact time and maintain existing clearwells			
Advantages	• Processes are familiar to operations staff • Level of treatment is maintained and consistent between trains				• Reduced cost and construction time compared to Alternative 1 • Less operational complexity with one less process to run ahead of RO commissioning				• Moderate cost and construction time			
Disadvantages	• Most costly option which will require the most additional infrastructure • Space restrictions could be encountered on the site				• Potential decline in odour and taste treatment, pending effectiveness of RO system • Potential challenges retrofitting existing structures/equipment, depending on condition. Added complexity of design.				• Increased operational complexity • Reduced disinfection redundancy			
Upgrades, Costs	~ $103 - 163 M				~ $85 - 141 M				~ $96 - 156 M			
Four-Point Criteria Evaluation	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial
Recommended Alternative	• **Not Recommended**: could be considered if RO is not effective at treating odour/taste and ozonation is deemed necessary to maintain.				• **Recommended**: due to reduced construction requirements, cost savings, and better use of existing assets while maintaining the required level of treatment.				• **Not Recommended**: as using the reservoir for disinfection contact time increases operational complexity and reduces system storage and redundancy.			

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

8.3. System Wide & Pressure District Servicing Strategies

8.3.1. System Wide Alternatives

Four pressure district boundary concepts were reviewed in **Section 7.3** and two concepts were carried forward as servicing alternatives to determine the preferred pressure district configuration including:

- **Alternative 1** – Maintain Existing Pressure District Boundaries
- **Alternative 3** – Expand and Maximize Pressure District 4 Boundary

8.3.1.1. Alternative 1 – Maintain Existing Pressure District Boundaries

Under Alternative 1, the existing pressure district boundaries will be maintained. Water will be supplied to the North residential lands in PD2/3 through a primary trunk connection at King George Road with additional watermain connections to the existing system in PD2/3 recommended at Park Road North and Brantwood Park Road. The north employment lands will be serviced by PD4 through a watermain extension at Oak Park Road.

To service the East residential lands north of Lynden Road, a direct connection to the existing PD2/3 system on Lynden Road can be made. To service the employment lands east of Garden Avenue, a new sub-pressure district is required with a connection to PD2/3 through a new PRV at either Lynden Road or at Sinclair Boulevard.

To integrate Tutela Heights into PD1 within the City's system, connections at both Mount Pleasant Road and Conklin Road are required. Sub-pressure districts will be created at the west end of Colborne Street and within the east employment lands.

The key projects required to service Alternative 1 include:

- New PD2/3 Elevated Tank to address storage in largest growth Pressure District with potential to supplement storage in PD1
- Storage upgrades needed in PD4, potentially on existing site
- King George Elevated Tank to be decommissioned
- Pump upgrades at existing facilities including Holmedale HLP, Tollgate PS and Wayne Gretzky PS
- Potential decommissioning of Albion BPS to be further evaluated as growth occurs
- Downtown trunk watermain loop, Conklin Road and Tutela Heights trunk watermain loop, King George trunk watermain, Fairview Drive/Lynden Road trunk watermain, Oak Park trunk watermain and Paris Road trunk watermain

The overview, advantages, disadvantages and evaluation are summarized in **Table 34**.

8.3.1.2. Alternative 3 – Expand and Maximize Pressure District 4 Boundary

Under Alternative 2, the Pressure District 4 boundary will be extended east to Wayne Gretzky Parkway to optimize pressures in Pressure District 3 and Pressure District 4. Water will be supplied to the North employment lands and residential lands west of Wayne Gretzky Parkway

through primary trunk connections at King George Road and Oak Park Road. The remaining North residential lands will be supplied by a connection at Wayne Gretzky Parkway.

To service the East residential lands north of Lynden Road, a direct connection to the existing PD3 system on Lynden can be made. To service the employment lands east of Garden Avenue, a direct connection to PD3 can be made at either Lynden Road, or at Sinclair Boulevard.

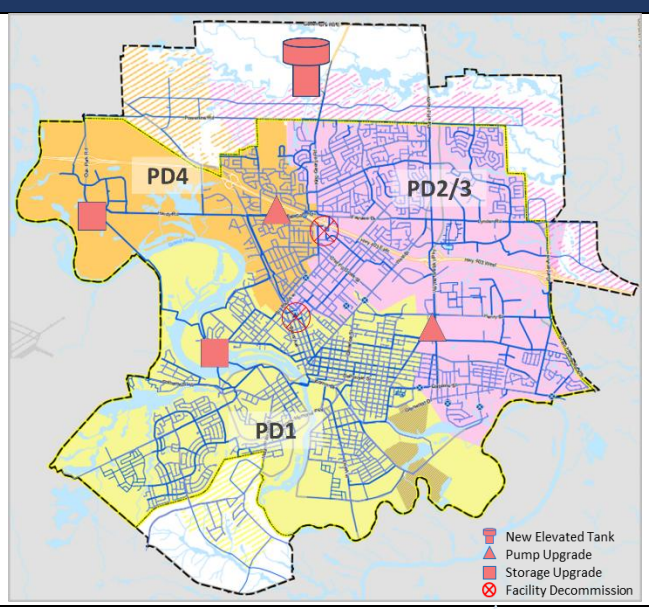
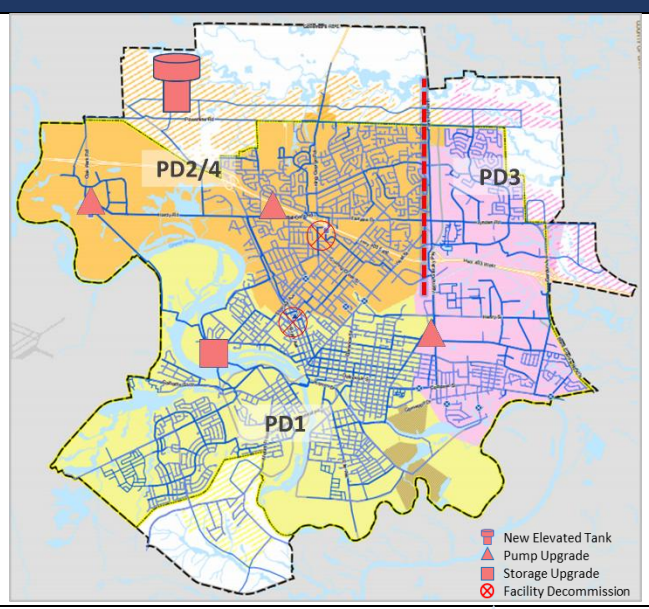
To integrate Tutela Heights into PD1 within the City's system, connections at both Mount Pleasant Road and Conklin Road are required. Sub-pressure districts will be created at the west end of Colborne Street and within the east employment lands.

The key projects required to service Alternative 2 include:

- New PD4 Elevated Tank to address storage in largest growth Pressure District with potential to supplement storage in PD1 and PD3
- King George Elevated Tank to be decommissioned
- Pump upgrades at existing facilities including Holmedale HLP, Tollgate PS, Wayne Gretzky PS and Northwest PS to accommodate change in HGL
- Potential decommissioning of Albion BPS to be further evaluated as growth occurs
- Downtown trunk watermain loop, Conklin Road and Tutela Heights trunk watermain loop, King George trunk watermain, Wayne Gretzky Parkway trunk watermain, Oak Park trunk watermain and Paris Road trunk watermain
- Additional valving needed for boundary delineation

The overview, advantages, disadvantages and evaluation are summarized in **Table 34**.

Table 34: Pressure District Boundary Alternatives & Evaluation

Pressure District Boundary Alternatives		
	Alternative 1: Existing Pressure District Boundary	**Alternative 3:** Maximize Pressure District 4
		
Overview	• Existing pressure district boundaries will be maintained • North employment lands will be serviced by PD4 • Sub-pressure districts created at west end of Colborne Street and within employment lands	• Pressure District 4 is expanded east to Wayne Gretzky Parkway and incorporates Pressure District 2 • Valving is needed for boundary delineation
Storage	• Storage deficit in Pressure District 1, 2/3, and 4 • New water tower is needed in Pressure District 2/3 as King George water tower will be decommissioned (location of a new water tower subject to a separate EA)	• Storage deficit in Pressure Districts 1, 2/4 and 3 • New water tower is needed in Pressure District 2/4 as King George water tower will be decommissioned (location of a new water tower subject to a separate EA)
Pumping	• Pumping deficit in Pressure District 2/3 and potentially PD4 • Pumping upgrade needs at both Wayne Gretzky and Tollgate Pumping Stations will be at existing facilities • Potential Albion Pumping Station decommissioned • Upgrades may be needed to Northwest Pumping Station • Pumping deficit at WTP for both PD1 needs and system supply	• Pumping deficit in Pressure District 2/4 and 3 • Pumping upgrade needs at Wayne Gretzky, Tollgate, and Northwest Pumping station will be at existing facilities • Potential Albion Pumping Station decommissioned • Pumping deficit at WTP for both PD1 needs and system supply
Transmission (Watermains)	• Upgraded trunk watermains will be needed to accommodate growth demands	• New trunk watermains needed to accommodate growth demands and pressure district change
Pressure	• Pressures remain at status quo with no HGL adjustments	• Pressures will be increased within existing Pressure District 2/3 now in Pressure District 2/4 and decreased within new Pressure District 3
Costing	• Facility Upgrades: $26 - $27 M • Watermain Upgrades: $60 M	• Facility Upgrades: $31 - $33 M • Watermain Upgrades: $58 M • Implementation: $8.4 M
Advantages	• Minimal changes in existing operation of pressure districts • Easy implementation of upgrades	• New water tower can be sited in employment lands • Pressures can be optimized
Disadvantages	• Land acquisition needs and potential delays for new water tower	• Land acquisition needs and potential delays for the new water tower • Complex implementation of upgrades which have quick timing and funding needs • Major watermain construction within existing water system
Four-Point Criteria Evaluation	Technical: High; Environmental: High; Social & Cultural: Medium; Financial: Medium	Technical: Medium; Environmental: High; Social & Cultural: Low; Financial: Medium
Recommended Alternative	• **Recommended**: The implementation and construction process is simpler	• **Not Recommended**: Complex implementation with quick timing and funding needs

Evaluation Scoring Legend: High Medium Low

The full evaluation is included in **Appendix E**. Alternative 1 (Existing Pressure District Boundary) provides a greater system benefit with a simpler implementation and construction process as compared to Alternative 2. On the balance of system benefit vs. cost Alternative 1 was selected as the preferred servicing option. Moving forward with Alternative 1, individual pressure districts were evaluated to determine the best servicing alternative for each pressure district, based on the concepts carried forward in the previous section.

8.3.2. Pressure District 1 and Pressure District 2/3 Storage Alternatives

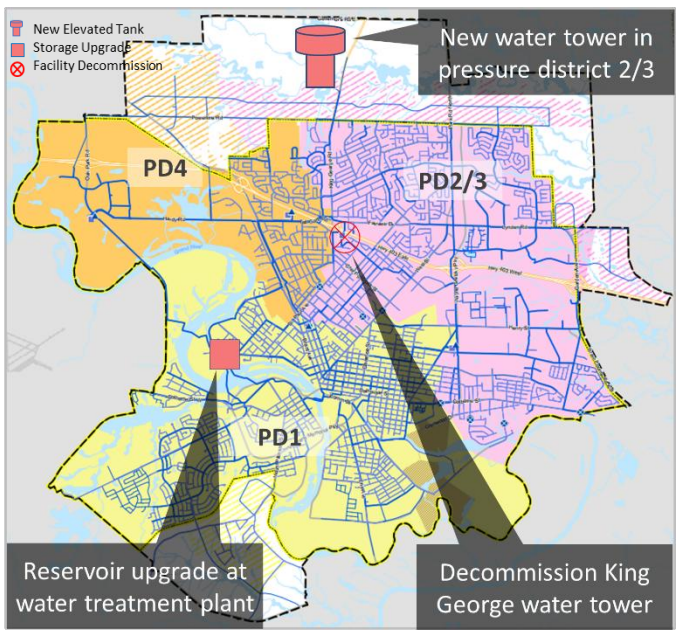
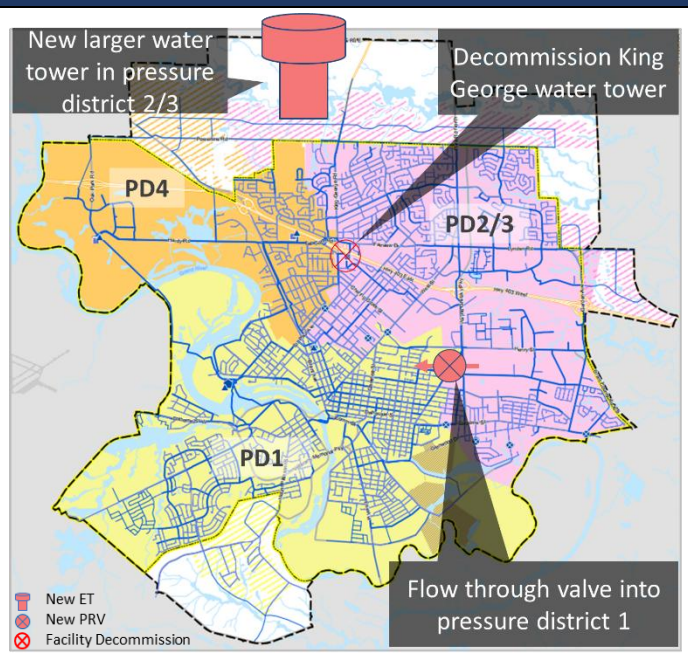
The PD1 and PD2/3 Storage alternatives address the storage deficiencies in both PD1 and PD2/3.

Under Alternative 1, the storage deficiencies in PD1 and PD2/3 are addressed separately though the construction of a new reservoir cell at the Holmedale WTP, providing pumped storage to PD1 and the construction of a new ET within the north expansion lands to provide storage to PD2/3.

Under Alternative 2, the storage deficiencies in PD1 and PD2/3 are addressed together through the construction of an oversized new ET within the PD2/3 north expansion lands with a PRV at Tollgate PS and Wayne Gretzky PS to convey storage from PD2/3 into PD1.

The overview, advantages, disadvantages and evaluation are summarized in **Table 35.**

Table 35: Pressure District 1 Storage Alternatives

Pressure District 1 Storage Alternatives		
	Alternative 1: Pressure District 1 Storage provided by pumps at the Holmedale Water Treatment Plant Reservoir	**Alternative 2:** Pressure District 1 storage is provided from large water tower by valves from Pressure District 2/3
		
Advantages	• No substantial changes to current operations • No significant construction challenges; impacts localized to facility sites • Reduces conveyance watermain upgrades required	• Optimized location for valves provides better conveyance to more vulnerable areas • Allows for phased usage of ET storage; now for PD1 deficit, future for north LOSB • Opportunity to twin ET storage to address phased growth • Provides greater hydraulic benefit and system resiliency
Disadvantages	• Dependence on pumps has higher energy usage and reduced system resiliency	• Greater reliance on watermains • May be more complex to operate the water system
Four-Point Criteria Evaluation	Technical | Environ-mental | Social & Cultural | Financial	Technical | Environ-mental | Social & Cultural | Financial
Recommended Alternative	• **Not Recommended:** Less energy efficient and does not improve system resiliency	• **Recommended**: Hydraulically, more beneficial and alternative allows for future accommodation of growth LOSB

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

The full evaluation is included in **Appendix E**. Alternative 2 (Pressure District 1 storage is provided from large water tower by valves from Pressure District 2/3) is hydraulically more beneficial to the existing system and accommodates future growth within the LOSB by constructing an oversized ET.

8.3.3. Pressure District 4 Storage Alternatives

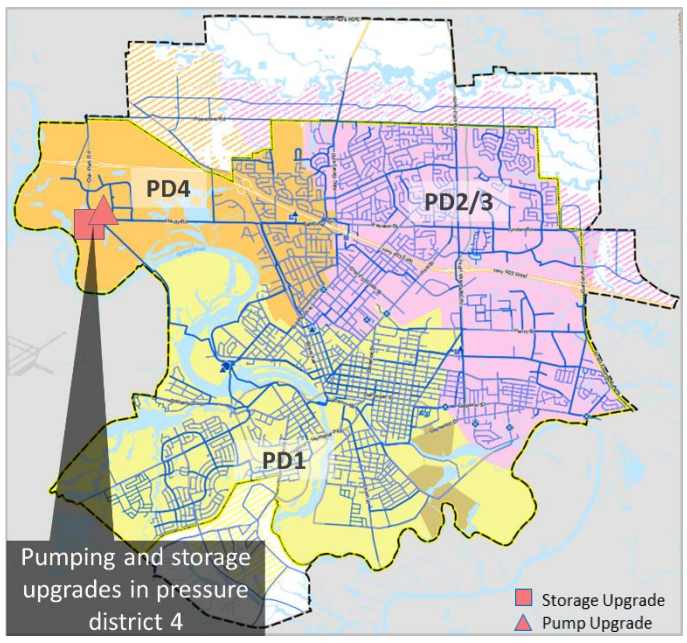
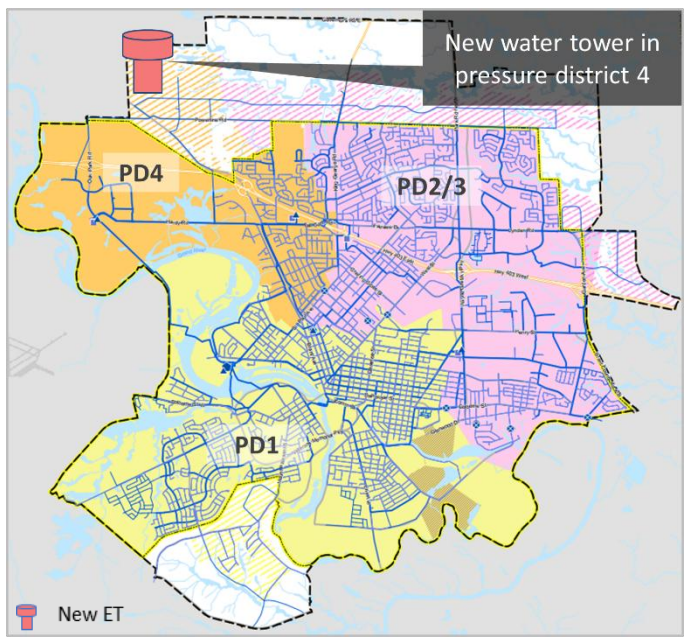
The PD4 Storage alternatives address the storage deficiencies in PD4.

Under Alternative 1, the storage deficiency in PD4 is resolved by upgrading the existing reservoir and pumps at the Northwest PS. This includes the construction of a new cell at the existing facility and installation of new or upsizing of existing pumps.

Under Alternative 2, the storage PD4 deficiencies are addressed through the construction of a new PD4 ET within the expansion lands.

The overview, advantages, disadvantages and evaluation are summarized in **Table 36**.

Table 36: Pressure District 4 Storage Alternatives

Pressure District 4 Storage Alternatives								
	Alternative 1: Upgrade storage at Northwest Reservoir				**Alternative 2: New Pressure District 4 Elevated Tank**			
								
Advantages	• Maximizes use of existing pumping and storage capacity at facility • No substantial change to current operations on facility site				• Location of the water tower can be optimized in employment lands • Provides greater hydraulic benefit and system resiliency • Pump upgrades at the Northwest pumping station are not necessary			
Disadvantages	• Dependence on pumps has higher energy usage and reduced system resiliency • Pump upgrades at the Northwest pumping station may be necessary to accommodate peak demands				• City will have two water towers in the north lands			
Four-Point Criteria Evaluation	Technical	Environ-mental	Social & Cultural	Financial	Technical	Environ-mental	Social & Cultural	Financial
Recommended Alternative	• **Not Recommended:** Less energy efficient and does not improve system resiliency				• **Recommended**: Hydraulically, more beneficial and alternative allows for future accommodation of growth LOSB			

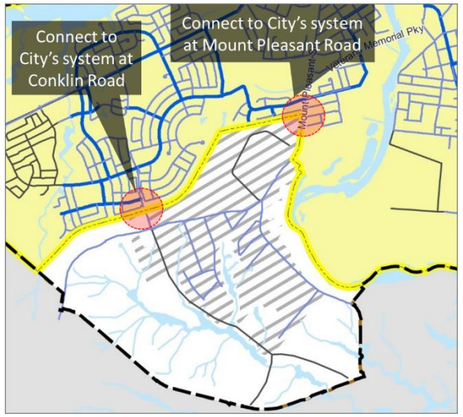
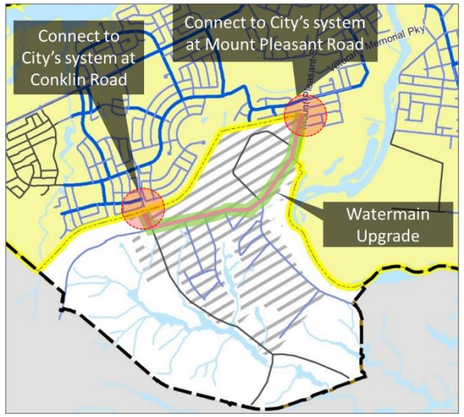
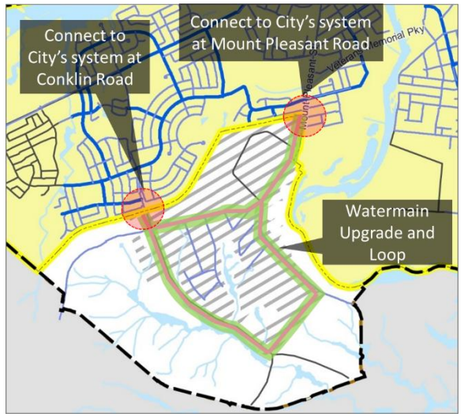
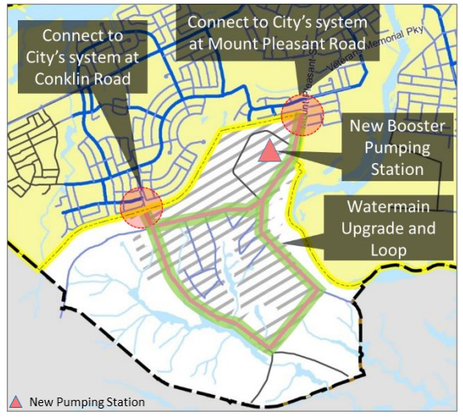
Evaluation Scoring Legend: **High** **Medium** **Low**

The full evaluation is included in **Appendix E**. Alternative 2 (New Pressure District 4 Elevated Tank) is hydraulically more beneficial to the existing system and accommodates future growth within the LOSB by constructing an oversized ET

8.4. Tutela Height Water Servicing

The Tutela Heights water system will be fully integrated into the City's network (and disconnected from the County's system) before 2026. To service both the existing system and growth to 2051, four servicing concepts, presented in **Section 6.3**, were evaluated and presented in **Table 37.**

Table 37: Tutela Heights Servicing Alternatives

Tutela Heights Alternatives				
	Alternative 1: Connect Only	**Alternative 2:** Connect and Upgrade Local Network	**Alternative 3:** Connect, Upgrade, and Loop	**Alternative 4:** Connect, Upgrade, Loop, and Booster Pumping Station
				
Advantages	• Can be implemented immediately	• Increases or maintains existing fire flows • Implementation can be staged	• Increases or maintains existing fire flows • Can be designed appropriately to accommodate future growth	• Maintains existing system pressures • New booster pumping station can be designed to provide appropriate fire flows based on land use
Disadvantages	• Reduction in pressures from existing level of service; however, pressure is maintained above 40 psi • Localized reduction in fire flow below level of service target • Will not service growth needs • Increased operational requirements related to automatic flushers	• Reduction in pressures from existing level of service; however, pressure is maintained above 40 psi • Longer implementation • May or may not service growth, dependent on block plan • Increased operational requirements related to automatic flushers	• Reduction in pressures from existing level of service; however, pressure is maintained above 40 psi • May trigger an EA as the loop would adjacent to Phelps Creek, which is part of the recommended NHS and along an unopened road allowance Need for automatic flushers at municipal boundary on Mount Pleasant Road and Tutela Heights Road to for existing properties	• High financial cost • Will require land acquisition to site a new booster pumping station • An EA will be required
Four-Point Criteria Evaluation	Technical: 🟡 / Environmental: 🟢 / Social & Cultural: 🟡 / Financial: 🟢	Technical: 🟡 / Environmental: 🟢 / Social & Cultural: 🟡 / Financial: 🟡	Technical: 🟢 / Environmental: 🟢 / Social & Cultural: 🟡 / Financial: 🟡	Technical: 🟢 / Environmental: 🟢 / Social & Cultural: 🟡 / Financial: 🔴
Recommended Alternative	• **Not Recommended:** Does not improve system performance and does not service growth needs	• **Not Recommended:** Minimally improves system performance and may or may not service growth needs	• **Recommended**: Improves level of service and can service growth needs	• **Not Recommended:** High cost to implement

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

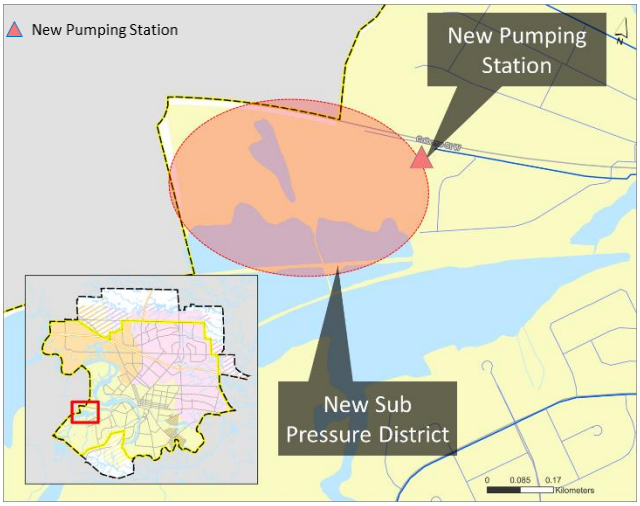
8.5. Local Servicing Needs

In addition to the system wide servicing upgrades, the following local servicing needs were identified.

8.5.1. Colborne Street West

There is a proposed development and six (6) existing properties on Colborne Street West extending west to the municipal boundary in Pressure District 1 with low pressures (<40 psi) due to elevations outside the service range of the existing Pressure District 1. Previous servicing reviews have identified the need for a new pump station to service the proposed development and to extend servicing to the existing low-pressure properties, shown in **Table 38**.

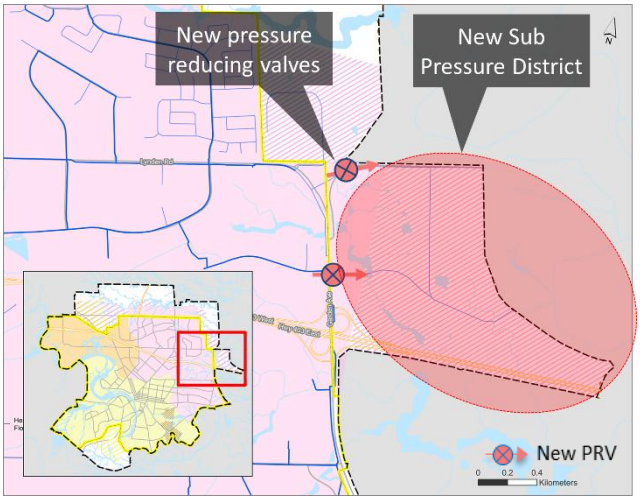
Table 38: Sub Pressure District Concepts

Colborne Street West Pumping Station	
Overview • Area along Colborne Street West, at the Municipal boundary has low pressures due to high ground level elevations • Development proposed further west will need to be serviced by a pumping station	
Planned Upgrades • New sub-pressure district to include existing properties on Colborne Street West and development extending west to the municipal boundary • Developer led pumping station to be sized to provide peak demands and fire flows to the development and existing properties	

8.5.2. East Sub-Pressure District 2/3

Due to low elevations within the east expansion lands, east of Garden Avenue, the area will be serviced via PD2/3 by two PRVs located at Lynden Road and Sinclair Boulevard, as shown in **Table 39**.

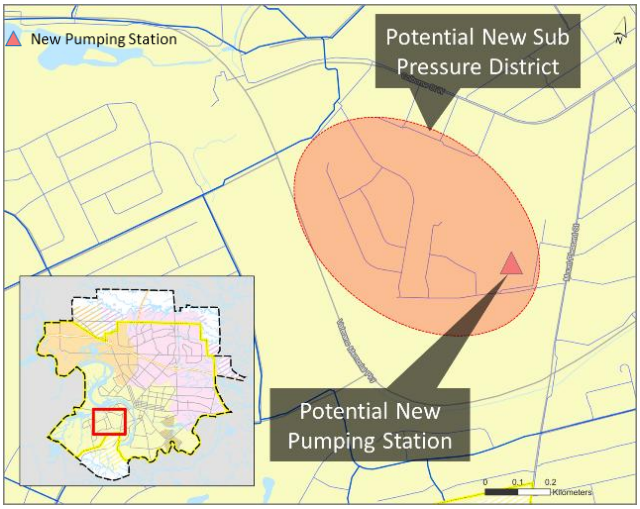
Table 39: East Sub-Pressure District 2/3

East Sub-Pressure District 2/3	
Overview • East expansion lands, east of Garden Avenue, will have high pressures due to low ground level elevations • Growth occurring in the expansion lands will need to be serviced by pressure reducing valves **Planned Upgrades** • New sub-pressure district to include east expansion lands, generally east of Garden Avenue to the municipal boundary • Two municipal owned pressure reducing valves will be sized to provide peak demands and fire flows • New watermain along Garden Avenue will be needed to complete watermain loop	

8.5.3. Strawberry Hill Pumping Station

Further development within the Strawberry Hill area, generally following Hillcrest Avenue and Bell Lane, will require the construction of a new booster pumping station as the existing area currently experiences low pressures marginally exceeding 40 psi, as shown in **Table 40**.

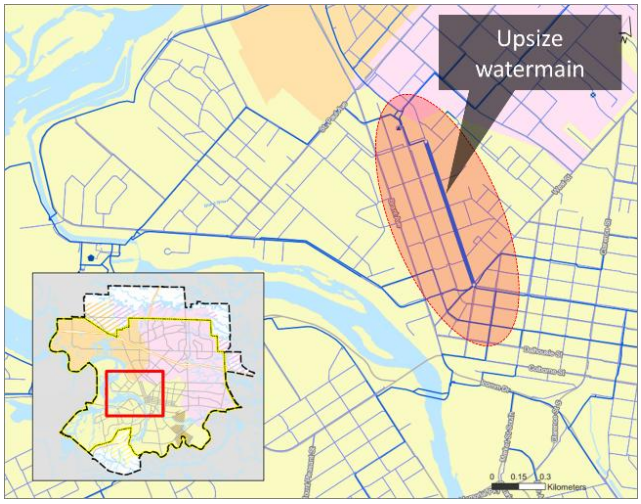
Table 40: Strawberry Hill Pumping Station

Strawberry Hill Pumping Station	
Overview	
• Strawberry Hill area, a local high point, has low pressures due to high ground level elevations • Development potential within this area and its servicing would require a new pumping station	
Proposed Upgrades	
• New sub-pressure district to include proposed development and existing properties • Pumping station to be triggered by development and sized to provide peak demands to the development and/or existing properties	

8.5.4. Downtown Trunk Watermain

Future intensification within the downtown core requires accommodating growth while maintaining the current level of service. Upgrading the existing watermain along Pearl Street will create a loop in the system's downtown core, as shown in **Table 41**.

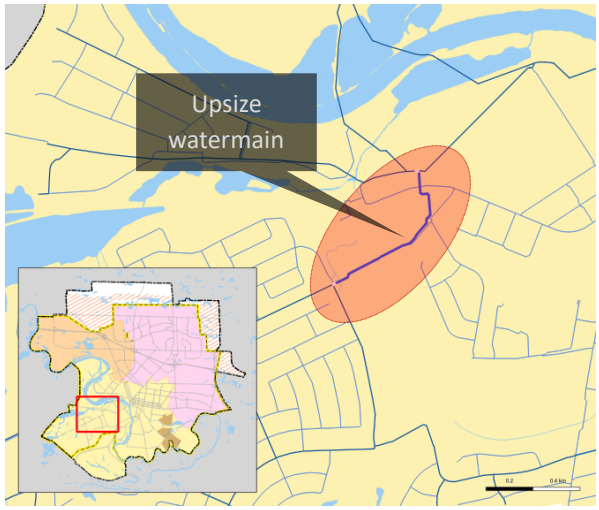
Table 41: Downtown Trunk Watermain

Downtown Trunk Watermain	
Overview • Downtown watermain upgrades needed to support intensification areas • Upsize existing watermains to create a trunk loop in the downtown core **Proposed Upgrades** • Upsize the existing watermain along Pearl Street from St. James Street to West Street to 400 mm	

8.5.5. Shellard Lane Watermain

Projected growth resulted in high watermain velocities above the design criteria of 2.0 m/s. There are limited areas to provide relief in velocities due to the location of PD1 ET. The existing watermains on Shellard Lane were flagged for potential upsizing to provide relief, as shown in **Table 42**.

Table 42: Shellard Lane Watermain

Shellard Lane Watermain	
Overview • High watermain velocities when high growth is applied • Upsize existing watermains to provide relief in velocities	
Proposed Upgrades • Upsize the existing 400 mm watermain to 600 mm, along Shellard Lane from Spalding Drive to Diana Avenue	

8.6. Distribution System Upgrades

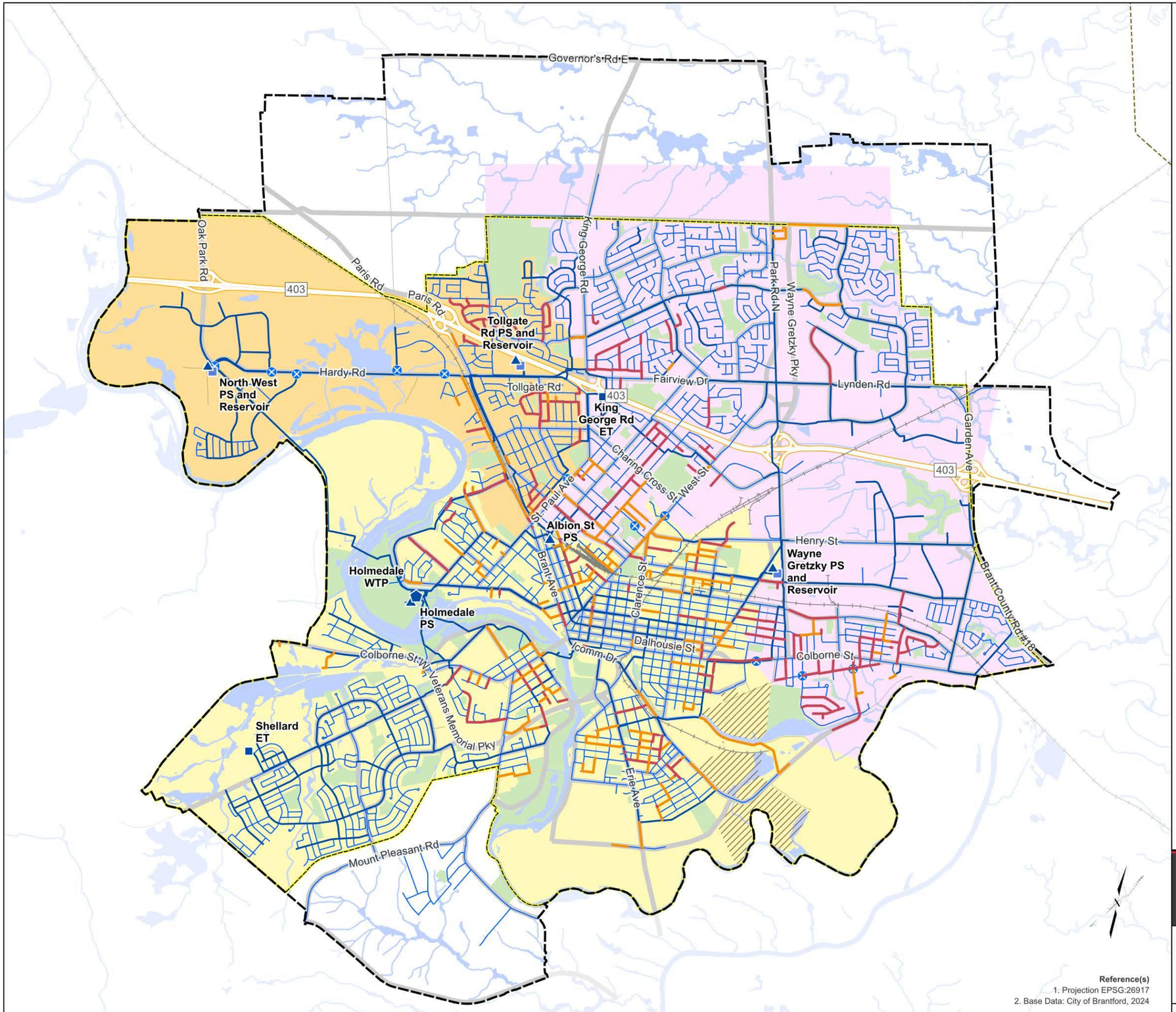
Fire flow deficiencies were identified using a land-use based approach, where the governing land-use, at the closest fire hydrant, determined the fire flow target identified in **Section 2.4.3**. **Figure 10** presents the watermain upgrades to address fire flow deficiencies under existing conditions. **Appendix F** includes the complete detailed list of all the watermain upgrades information.

A strategic approach was followed such that a prioritized capital program was developed using the following triggers:

- Existing deficiencies typically along previously broken and/or cast iron watermains. These areas can be addressed by the City's infrastructure renewal program; and
- Growth development deficiencies within areas of infill/intensification. These areas can be addressed as growth occurs and can be funded by development charges.

Prioritization of capital projects, to address fire flow deficiencies, has been completed using the following methodology:

1. Replacement of watermains with a diameter less than 150 mm
2. Replacement of cast iron watermains with a historic break record
3. Replacement of cast iron watermains
4. Replacement of ductile iron watermains



Watermain Upgrades to Address Fire Flow Deficiencies

- Proposed Replacement
- Proposed Upsize

Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Parks
- Waterbody and Watercourses

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 10
Watermain Upgrades to Address Fire Flow

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford (Ontario, Canada)

GEI Consultants Canada

Last Updated: June 2026
Document ID: 2404322-W-003

Document Path: B:\Working\BRANTFORD ON, CITY OF\2404322 Master Servicing Plan - 2025 Development Charges Update\05_GIS\6_Final Report\2404322-W-003.qgz

8.7. 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, the City's municipal boundary including the LOSB was considered and will be serviced by the following extensions:

North Expansion LOSB

- **LOSB** in the North Expansion Lands will be serviced by an extension of the North-South Collector Road trunk watermain, King George Road trunk watermain and Park Road North trunk watermain, creating a loop.
- **LOSB** west of Balmoral Drive will be serviced by PD4 and lands east of Balmoral Drive will be serviced by PD2/3.
- Pumping for the **LOSB** in PD4 will be provided by the Northwest PS which may require upgrades at the time the **LOSB** enter the Settlement Area Boundary and storage will be serviced by the proposed PD4 ET which has been oversized to include the **LOSB** growth.
- Pumping for the PD2/3 **LOSB** will be provided by Tollgate PS and Wayne Gretzky PS. Storage will be provided by the proposed PD2/3 ET which has been oversized to include the **LOSB**. Upon inclusion of the **LOSB** in the Settlement Area Boundary, additional storage will be required in PD1 as storage is being provided, in the interim to 2051, by the excess capacity from the PD2/3 ET through use of PRVs at the existing Tollgate PS and Wayne Gretzky PS.

Tutela Heights LOSB

- **LOSB** in Tutela Heights will be serviced by an extension of the watermains along Mount Pleasant Road, Tutela Heights Road and the Collector Road.
- Pumping will be provided by the Holmedale HLP and storage will be provided by the Holmedale Res and the PD1 ET. Additional storage and pumping may be required based on the timing of the North Expansion Lands.

9. Preferred Water Servicing Strategy

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

The preferred servicing strategy was developed to ensure that extension of the water distribution 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 Water Servicing Strategy Overview

In general, the preferred water servicing strategy consists of maintaining the existing pressure district split with new elevated tanks in PD2/3 and PD4.

Water will be supplied to the North Expansion residential lands in PD2/3 through a primary trunk connection at King George Road. Additional watermain connections to the existing system in PD2/3 are recommended at Park Road North and Brantwood Park Road. The north employment lands located in PD4 will be supplied through a trunk extension at Oak Park Road.

To service the East Expansion residential lands north of Lynden Road, a direct connection to PD2/3 on Lynden Road can be made. To service the employment lands east of Garden Avenue, a direct connection to PD2/3 at either Lynden Road or Sinclair Boulevard can be made.

To integrate Tutela Heights into PD1 within the City's system, connections at both Mount Pleasant Road and Conklin Road are required.

Each water project is further depicted in **Section 9.1.1** to **9.2.4**.

9.1.1. Holmedale WTP

Upgrades at the Holmedale Water Treatment Plant will increase the rated capacity of the water treatment plant to 2051 demand with completion over the next 0-20 years. Proposed works will be at the existing water treatment plant with minimal disruption to operations and include the following upgrades:

- **Intake Channel:** increase storage volume.
- **Low Lift Pumping Station & Header:** Second low lift pump station which includes new wet well and twin header.
- **Polymer System:** Increase pumping capacity and chemical storage.
- **Actiflo System/Ozonation:** Decommission ozonation equipment and repurpose tanks with Actiflo settling trains. Optimize existing Actiflo trains.
- **Filtration:** Upsize filtration well and backwash pumps. Install an additional filter.
- **Chlorine Contact Chamber:** additional chamber and chemical pumping capacity
- **Residual Management:** Expand capacity at existing facility.

9.1.2. Pumping Stations

The following details the recommended upgrades at existing pumping stations:

- **Holmedale Water Treatment Plant High Lift Pump Upgrades (W-P-001):** Install additional pump to supply elevated tank and reservoirs from reservoirs in PD1
- **Wayne Gretzky Pump Upgrades (W-P-002):** Replace existing pumps with three (3) new pumps at Wayne Gretzky PS to improve operational capacity and support new Pressure District HGL. Install new PRV to allow PD2/3 to backfeed to PD1
- **Tollgate Pump Upgrades (W-P-003):** Replace existing pumps with three (3) new pumps at Tollgate PS to improve operational capacity and support new Pressure District HGL. Install new PRV to allow PD2/3 to backfeed to PD1
- **Albion Booster Pumping Station Upgrades (W-P-006)**: Replace existing pumps with three (3) new pumps at Albion BPS to improve operational capacity.

9.1.2.1. Sub-Pressure District Pumping Stations

The following details the recommended projects for proposed sub-pressure district pumping stations:

- **Colborne Street West Booster Pumping Station (W-P-004)**: New 11.1 MLD booster pumping station to be serviced off of PD1 to service existing properties on Colborne Street and development extending west to the municipal boundary. Construction of this BPS was completed in 2025.
- **Strawberry Hill Booster Pumping Station (W-P-005):** Install new booster pumping station to boost flows from PD1 to a new sub-pressure district extending from Shellard Lane to Mount Pleasant Street. This booster pumping station is required to service future development.

9.1.3. Storage

The following details the recommended storage projects:

- **Pressure District 2/3 Elevated Tank (W-ET-001/W-ET-004):** New twinned ET in PD2/3, sized to service both PD2/3 and PD1 storage deficiency including North Expansion Lands until 2051. Phase 1 to build new 6.0 ML ET within 5 years, followed by Phase 2 to build new 11 ML ET within 10 years. Post 2051, the PD2/3 ET will service PD2/3 and the LOSB with additional storage needed in PD1 post 2051.
- **Pressure District 4 Elevated Tank (W-ET-002):** New 9.0 ML ET in PD4 to service the PD4 storage deficiency including North Expansion Lands and LOSB.
- **Decommissioning of King George Elevated Tank (W-D-001):** Decommissioning of the King George ET as it will be replaced by the new PD2/3 ET.

9.2. System Wide

9.2.1. Existing System Upgrades

Projects to service the existing water system include the following:

- **Upsize Fairview Drive/Lynden Road Trunk Watermain (W-M-027):** Watermain upgrades on Fairview Drive/Lynden Road from King George Road to Brantwood Park Road to 600 mm to support growth in PD2/3.
- **Downtown Trunk Watermain (W-M-028):** Upsize existing watermain along Pearl Street from St. James Street to West Street to 400 mm.
- **Garden Avenue Watermain Upgrade (W-M-029):** Upsize existing watermain along Garden Avenue from Lynden Road to Sinclair Boulevard to 300 mm to create loop within PD2/3.
- **Fire Flow Watermain Upgrades (W-M-030):** Fire flow program to include replacing watermains less than or equal to 100mm, replacing Cast Iron watermains, replacing Asbestos Cement/Ductile Iron watermains (installed before 1990) and upsizing and looping to strengthen local trunk network. All watermain replacements will be PVC.
- **Shellard Lane Watermain (W-M-031):** Upsize existing watermain alone Shellard Lane from Diana Avenue to Spalding Drive to 600mm.

9.2.2. North Expansion Lands

Projects to service the North Expansion Lands include the following:

- **King George Road Watermain (W-M-001):** Upsize existing watermain from 400 mm to 750 mm on King George Road from Tollgate PS to the proposed east-west collector road in the North Expansion Lands or the new PD2/3 ET.
- **Oak Park Road Trunk Watermain (W-M-002):** New 600 mm trunk watermain extending from Oak Park Road watermain limit to Powerline Road in PD4.
- **Powerline Road Trunk Watermain (W-M-003):** New 600 mm trunk watermain in PD4 along Powerline Road from new Oak Park Road watermain to the proposed east-west collector road.
- **North-South Collector Road Trunk Watermain (W-M-004):** New 600 mm trunk watermain in PD4 along proposed north-south collector road from Powerline Road to proposed east-west Collector Road
- **North-South Collector Road Local Watermain (W-M-005):** New 300 mm local watermain in PD4 along proposed north-south collector road from proposed east-west collector road to North expansion limit.
- **Paris Road Trunk Watermain (W-M-006):** New 600 mm watermain in PD4 along Paris Road from Tollgate Road to proposed north-south collector road at Powerline Road.
- **Powerline Road Distribution Watermain (W-M-007/W-M-008):** New 300 mm distribution watermain in PD4 along Powerline Road from proposed north-south collector road to Balmoral Drive extension.
- **Pressure District 4 East-West Collector Road Trunk Watermain (W-M-009):** New 400 mm trunk watermain in PD4 along east-west collector road from north-south collector road to PD4 boundary at Balmoral Drive Road extension.
- **Pressure District 2/3 East-West Collector Road Trunk Watermain (W-M-011/W-M-012)**: New 600 mm trunk watermain in PD2/3 along east-west collector road from PD4 boundary trunk watermain to Park Road North.

- **Pressure District 2/3 East-West Collector Road Trunk Watermain (W-M-010):** New 400 mm trunk watermain in PD2/3 along east-west collector road from Park Road North to Brantwood Park Road.
- **Brantwood Park Road Trunk Watermain (W-M-014):** New 400 mm trunk watermain in PD2/3 along Brantwood Park Road from Powerline Road to east-west collector road.
- **Park Road North Trunk Watermain (W-M-015):** New 600 mm trunk watermain in PD2/3 along Park Road North from Powerline Road to east-west collector road.
- **Powerline Road Local Watermain (W-M-016):** New 300 mm local watermain in PD2/3 along Powerline Road from Brantwood Park Road to east-west collector road eastern limit.
- **East-West Collector Road Local Watermain (W-M-017):** New 300 mm local watermain in PD2/3 along east-west collector road from Powerline Road eastern limit to Brantwood Park Road.

9.2.3. East Expansion Lands

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

- **Lynden Road Trunk Watermain (W-M-018):** Upgrade existing watermain to 400 mm on Lynden Road from Brantwood Park Road to eastern limit for East Expansion Lands.
- **Lynden Road Distribution Watermain Extension (W-M-019):** New 300 mm local watermain in PD2/3 along Lynden Road from Lynden Road trunk watermain to East Expansion Lands limit.
- **East Expansion Lands Residential Loop (W-M-020):** New 300 mm local watermain in East Expansion Lands along proposed collector road north of Lynden Road.
- **East Expansion Lands Employment Loop (W-M-021):** New 300 mm local watermain in East Expansion Lands along employment lands collector road from Lynden Road watermain extension to Sinclair Road connection including two (2) new PRVs from PD2/3 to the East Expansion Lands at Lynden Road and Sinclair Road.

9.2.4. Tutela Heights

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

- **Mount Pleasant Road Watermain Upgrades (W-M-022):** Upsize existing 200 mm watermain on Mount Pleasant Road in Tutela Heights to 300 mm, including automatic flushers at the dead ends.
- **Conklin Road Watermain Upgrades (W-M-023):** Upsize existing 200 mm watermain on Conklin Road from Blackburn Drive to Mount Pleasant Road to 300 mm.
- **Tutela Heights Road Upgrades (W-M-024):** Upsize existing 200 mm watermain on Tutela Heights from Mount Pleasant Road to Davern Road to 300 mm.
- **Tutela Heights Collector Road Distribution Watermain (W-M-025):** New 300 mm distribution watermain along collector road from Mount Pleasant Road to Phelps Road in Tutela Heights, including automatic flushers at the dead ends.
- **Davern Road Distribution Watermain (W-M-026):** New 300 mm distribution watermain along Davern Road from Mount Pleasant Road southern limit to collector road.

9.3. Capital Program & Implementation Plan

The preferred water 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 **Volume II**. These projects are listed according to their project number. Detailed project sheets are included in **Appendix F**.

9.3.1. Project Costing

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

9.3.2. Development Charge Contributions

For each identified water project, the project's estimated growth/benefit to existing related contributions were identified. **Table 43** summarizes the Development Charges (DC) Benefit To Existing (BTE) classifications

Table 43: Development Charges Benefit to Existing Classifications

Development Charges Benefit to Existing Class	Description	BTE (%)
A	Solely supporting new development area	0%
B	Triggered by growth but also services existing users	20%
C	Triggered by growth but also provides some operational improvement	40%
D	Supports both growth and existing users equally	50%
E	Primarily to address existing operational issues but also supports growth	Custom
F	Sole benefit to existing users	100%

9.3.3. Project Timing and Triggers

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

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

The estimated project timeline was based on individual capacity triggers for each project. These capacity triggers are based on the growth within the system which can be accommodated before the identified project is required.

9.4. Operational and Maintenance Impacts

The proposed water system upgrades represent a 40% increase in value of the City's trunk watermain network and includes a 30% increase in treatment plant capacity upgrades, and an increase in one (1) storage facility; while eliminating one (1) existing pumping station.

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 increases, will need to be factored into the City's long-term water system financial planning and operational needs.

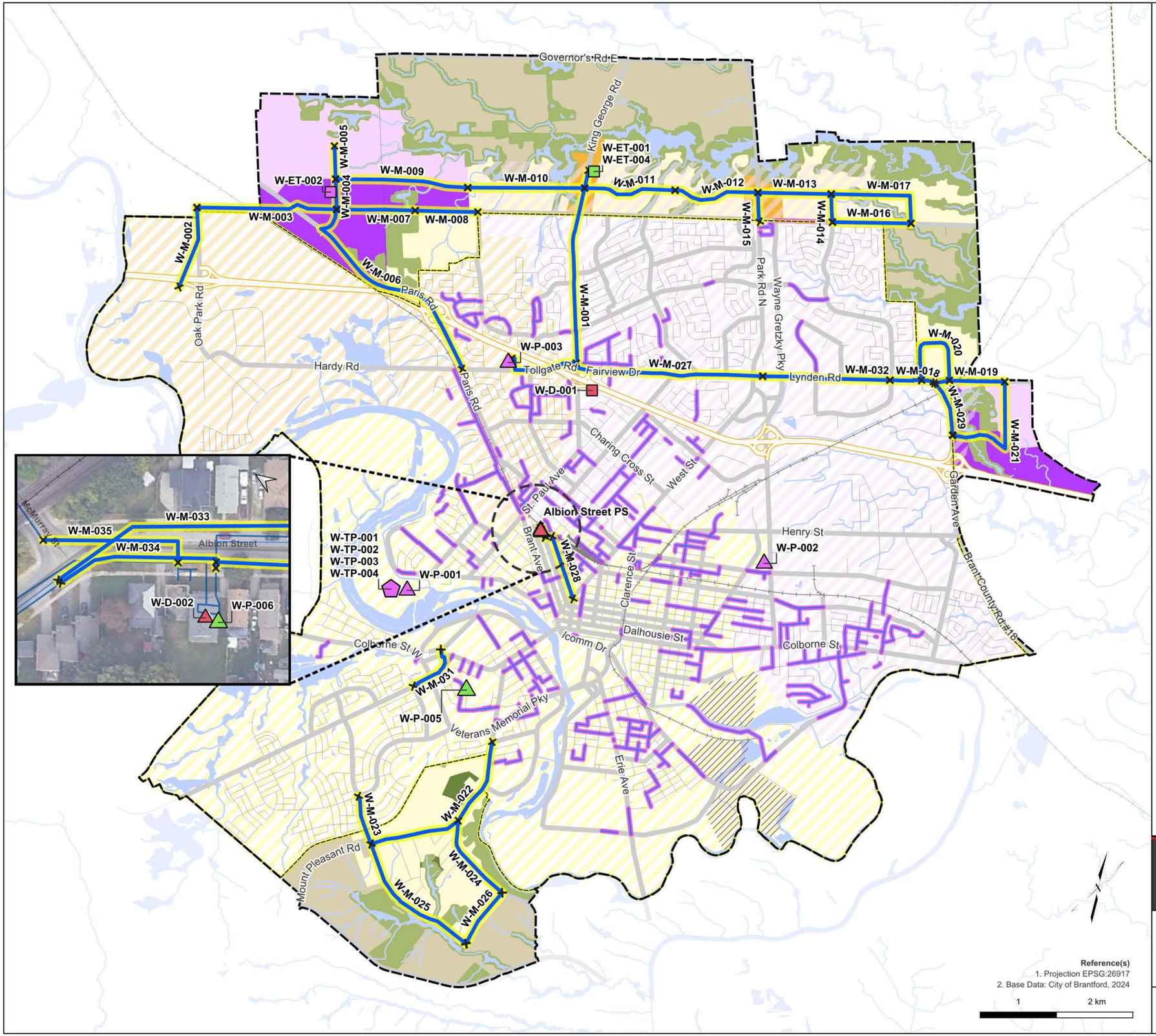
9.4.1. Capital Program Summary

The capital program table, shown in **Table 44** and **Figure 11**, contains project descriptions, dimensions, proposed timing, and estimate total project cost.

Table 44: Capital Program Summary

Capital Program ID	Name	Required Studies	Class EA Schedule	Size/ Capacity	Total Estimated Cost (2025$)	Timeline	DC Benefit to Existing Class
W-M-001	King George Road Watermain	-	Eligible for Screening	750 mm	$25,564,000	0-5 Years	C
W-M-002	Oak Park Road Trunk Watermain	Municipal Class EA	B	600 mm	$20,006,000	0-5 Years	A
W-M-003	Powerline Road Trunk Watermain	Municipal Class EA	B	600 mm	$11,257,000	0-5 Years	A
W-M-004	North-South Collector Road Trunk Watermain	-	Exempt	600 mm	$1,602,000	10-20 Years	A
W-M-005	North-South Collector Road Local Watermain	-	Exempt	300 mm	$779,000	10-20 Years	A
W-M-006	Paris Road Trunk Watermain	Municipal Class EA	B	600 mm	$15,834,000	5-10 Years	C
W-M-007	Powerline Road Distribution Watermain	-	Eligible for Screening	300 mm	$2,020,000	5-10 Years	A
W-M-008	Powerline Road Distribution Watermain	-	Eligible for Screening	300 mm	$2,152,000	5-10 Years	A
W-M-009	Pressure District 4 East-West Collector Road Trunk Watermain	-	Exempt	400 mm	$4,892,000	10-20 Years	A
W-M-010	Pressure District 2/3 East-West Collector Road Trunk Watermain	-	Exempt	400 mm	$3,994,000	10-20 Years	A
W-M-011	Pressure District 2/3 East-West Collector Road Trunk Watermain	-	Exempt	600 mm	$4,988,000	10-20 Years	A
W-M-012	Pressure District 2/3 East-West Collector Road Trunk Watermain	-	Exempt	600 mm	$4,720,000	10-20 Years	A
W-M-013	East-West Collector Road Trunk Watermain	-	Exempt	400 mm	$2,238,000	0-5 Years	A
W-M-014	Brantwood Park Road Trunk Watermain	-	Exempt	400 mm	$959,000	0-5 Years	A
W-M-015	Park Road North Trunk Watermain	-	Eligible for Screening	600 mm	$1,657,000	0-5 Years	A
W-M-016	Powerline Road Local Watermain	-	Eligible for Screening	300 mm	$2,127,000	0-5 Years	A
W-M-017	East-West Collector Road Local Watermain	-	Exempt	300 mm	$2,499,000	0-5 Years	A
W-M-018	Lynden Road Trunk Watermain Upgrades	-	Eligible for Screening	300 mm	$1,306,000	5-10 Years	B
W-M-019	Lynden Road Distribution Main Extension	-	Eligible for Screening	300 mm	$4,388,000	0-5 Years	A
W-M-020	East Expansion Lands Residential Loop	-	Exempt	300 mm	$2,286,000	0-5 Years	A
W-M-021	East Expansion Lands Employment Loop	-	Exempt	300 mm	$3,698,000	5-10 Years	A
W-M-022	Mount Pleasant Road Watermain Upgrades	-	Eligible for Screening	300 mm	$5,089,000	0-5 Years	D
W-M-023	Conklin Road Watermain Upgrades	-	Eligible for Screening	300 mm	$1,295,000	0-5 Years	D

Capital Program ID	Name	Required Studies	Class EA Schedule	Size/ Capacity	Total Estimated Cost (2025$)	Timeline	DC Benefit to Existing Class
W-M-024	Tutela Heights Road Upgrades	-	Eligible for Screening	300 mm	$2,544,000	5-10 Years	B
W-M-025	Tutela Heights Collector Road Distribution Watermain	-	Exempt	300 mm	$3,447,000	10-20 Years	A
W-M-026	Davern Road Distribution Watermain	-	Eligible for Screening	300 mm	$1,650,000	10-20 Years	A
W-M-027	Upsize Fairview Drive/Lynden Road Trunk Watermain	-	Eligible for Screening	600 mm	$10,977,000	0-5 Years	B
W-M-028	Downtown Trunk Watermain	-	Eligible for Screening	400 mm	$2,628,000	5-10 Years	D
W-M-029	Garden Avenue Watermain Upgrade	-	Eligible for Screening	300 mm	$1,700,000	5-10 Years	B
W-M-030	Fire Flow Watermain Upgrades	-	Eligible for Screening	300 mm	$14,545,000	0-5 Years	D
W-M-031	Shellard Lane Watermain Upgrade	-	Eligible for Screening	600 mm	$8,733,000	0-5 Years	C
W-M-032	Upsize Lynden Road Trunk Watermain	-	Eligible for Screening	600 mm	$7,683,000	5-10 Years	B
W-M-034	Albion Street Trunk Watermain	-	Eligible for Screening	400 mm	$1,020,000	0-10 Years	C
W-M-035	McMurray Street Trunk Watermain	-	Eligible for Screening	300 mm	$204,000	0-10 Years	C
W-ET-001	Pressure District 2/3 Elevated Tank (Phase 1)	Municipal Class EA	B	6.0 ML	$29,627,000	0-5 Years	C
W-ET-002	Pressure District 4 Elevated Tank	Municipal Class EA	B	9.0 ML	$37,098,000	10-20 Years	C
W-ET-003	Pressure District 1 Elevated Tank	Municipal Class EA	B	6.0 ML	--	Completed in 2021	C
W-ET-004	Pressure District 2/3 Elevated Tank (Phase 2)	Municipal Class EA	Exempt	11.0 ML	$27,025,000	5-10 Years	C
W-D-001	Decommissioning of King George Elevated Tank	-	Eligible for Screening	-	$1,337,000	5-10 Years	C
W-P-001	Holmedale Water Treatment Plant High Lift Pump Upgrades	-	Eligible for Screening	-	$3,779,000	0-5 Years	C
W-P-002	Wayne Gretzky Pump Upgrades	-	Eligible for Screening	-	$9,355,000	5-10 Years	C
W-P-003	Tollgate Pump Upgrades	-	Eligible for Screening	-	$10,691,000	5-10 Years	C
W-P-004	Colborne Street West Booster Pumping Station	Municipal Class EA	Exempt	11.1 MLD	--	Completed in 2025	B
W-P-005	Strawberry Hill Booster Pumping Station	Municipal Class EA	B	0.9 MLD	$13,744,000	10-20 Years	B
W-P-006	Albion Booster Pumping Station Upgrades	-	Eligible for Screening	25.9 MLD	$5,213,000	0-10 Years	C
W-TP-001	Water Treatment Plant Upgrades - 0-5 Years	-	Eligible for Screening	-	$126,507,000	0-5 Years	D
W-TP-002	Water Treatment Plant Upgrades - 5-10 Years	-	Eligible for Screening	-	$8,840,000	5-10 Years	A
W-TP-003	Water Treatment Plant Upgrades - 10-20 Years	-	Eligible for Screening	-	$151,490,000	10-20 Years	A
W-TP-004	New Intake Canel to Holmedale WTP	-	Eligible for Screening	-	$80,250,000	10-20 Years	A
				TOTAL	**$685,437,000**		



Capital Program Projects

- Decommission Elevated Tank
- Decommission Pumping Station
- New Elevated Tank
- New Pumping Station
- Existing Elevated Tank Upgrade
- Existing Pumping Station Upgrade
- Existing Water Treatment Plant Upgrade
- Proposed Watermains
- Proposed Fire Flow Upgrades

Water Network

- Water Treatment Plant (WTP)
- Pumping Station (PS)
- Elevated Tank (ET) / Reservoir
- Pressure Reducing Valve (PRVs)
- Transmission Watermains (>250 mm)
- Watermains (≤250 mm)

Water Pressure Districts

- Pressure District 1
- Pressure District 2/3
- Pressure District 4

General Features

- Expressway / Highway
- Arterial and Collector
- Local Roads
- Railway
- Six Nations of the Grand River Territory
- Current City Municipal Boundary
- 2016 Municipal Boundary
- Outside Municipalities
- Waterbody and Watercourses

Proposed Preferred Land Use Options

- Agricultural Designation
- Core Natural Areas
- Downtown Urban Growth Centre
- General Employment
- Intensification Corridor
- Major Commercial Centre
- Major Institutional
- Parks and Open Space
- Prestige Employment
- Residential

Reference(s)
1. Projection EPSG:26917
2. Base Data: City of Brantford, 2024

1 2 km

Figure 11
Water - Capital Program

Project Name:
Water and Wastewater Master Servicing Plan – Development Charges Update 2025 Amendment

Client Name:
City of Brantford
(Ontario, Canada)

GEI Consultants Canada

Last Updated: August 2026
Document ID: 2404322-W-005-Water Capital Program

Document Path: B:\Working\BRANTFORD ON, CITY OF\2404322 Master Servicing Plan - 2025 Development Charges Update\05_GIS\6_Final Report\2404322-W-005-Water Capital Program.qgz

10. Implementation Plan

As outlined in **Section 2** of **Volume II**, the 2025 MSP Amendment set 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 Water 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 Water 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 studies prior to design and construction. The Preferred Water 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.

During the next steps of the implementation program, primarily during 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, etc.);
- Review and mitigation of potential construction related impacts; and,
- Satisfying all provincial, municipal and conservation authority approval requirements.

With respect to the City's planning and budgeting, this program will be used 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 water program's projected scheduling has also been cross-referenced with the wastewater and stormwater programs to ensure project coordination along common alignments.

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

The following subsections outline the proposed implementation for water infrastructure.

10.1. Holmedale Water Treatment Plant

Upgrade triggers at the Holmedale WTP are outlined in **Table 45**. Based on the existing MDD supply firm capacity of 100 MLD and existing MDD of 50.9 MLD, there is approximately 49.1 MLD of available treatment capacity to support growth; corresponding to an equivalent population of approximately 95,000 people and jobs. The following criteria should be referenced as facility upgrade triggers, as outlined in **Section 2.4.2.1**:

- Planning and design process will begin at 80% utilization of the facility's capacity. There is approximately 29.1 MLD of available treatment capacity to reach 80% utilization; corresponding to an equivalent population of approximately 60,000 people and jobs due to an expediated schedule discussed and preferred by the City
- Construction process will begin at 90% utilization of the facility's capacity. There is approximately 39.1 MLD of available treatment capacity to reach 90% utilization; corresponding to an equivalent population of approximately 80,000 people and jobs due to an expediated schedule discussed and preferred by the City

Table 45: Holmedale WTP Upgrade Triggers

	MDD Rated Capacity (MLD)	Existing MDD (MLD)	Upgrade Trigger	
			Additional Capacity before Trigger (MLD)	People & Jobs
80% Capacity	80.0	50.9	29.1	60,000
90% Capacity	90.0		39.1	80,000
100% Capacity	100.0		49.1	95,000

Upgrades are classified into two sets of upgrades, based on expedited timeline and are as follows:

- **0-5 Years:**
  - Construct permanent Reverse Osmosis system (not included in alternative costing as already decided)
  - Complete study on preferred method for treatment of taste and odour
- **5-10 Years:**
  - Optimize the existing Actiflo process or replace existing system as required.
  - Dredge Holmedale Canal
- **10-20 Years:**
  - Increase Holmedale Canal Capacity
  - Low Lift Pump Station Upgrade
  - Twin 900mm header

- Convert Ozonation to additional Actiflo.
- Filtration upgrades
- Clearwell and chlorine dosing upgrades
- Residual Management Upgrades

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.

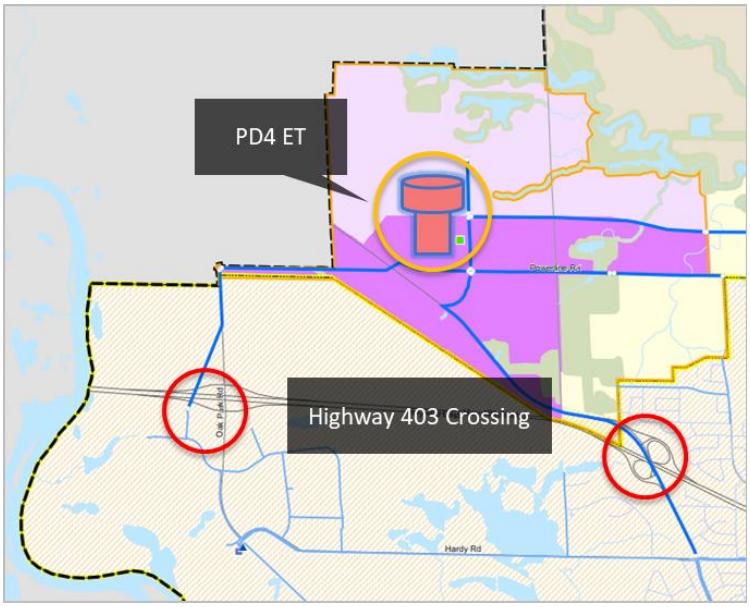
10.2.1. North Expansion Employment Lands

Within the North Expansion Lands, the timing was broken into two categories: Pressure District 2/3 and Pressure District 4. For the North Expansion Employment Lands, the Oak Park Road trunk watermain will need to be extended north to Powerline Road, requiring both a Highway 403 crossing and railway crossing. This trunk watermain is required to service any growth north of Highway 403.

To support storage needs for the North Expansion Employment Lands, a new PD4 Elevated Tank will be required. Timing for the new ET will be dependent on the North Expansion Lands buildout timing; however, based on the identified growth, it will be required before 2041 buildout.

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

Table 46: North Expansion Employment Lands Implementation

North Expansion Employment Lands (Pressure District 4)	
Overview • Triggered by any growth north of Highway 403 **Key Projects** • Highway 403 watermain crossing: **Immediate** (to service any growth) • Pressure District 4 ET: **Later;** to service further growth **Other Comments** • Oak Park Road to be completed first over Paris Road due to opportunity for shared alignment with wastewater trunk sewer • Remaining trunks related to local development	

	W-M-002: Oak Park Road Trunk Watermain	W-ET-002: Pressure District 4 Elevated Tanks
Why	• Trunk watermain crossing Highway 403 • Railway crossing and overhead powerlines • Optimize through local development • Coordinate with wastewater sewer	• Requirements for a new ET • Determine preferred location
Study	Schedule 'B' EA	Schedule 'B' EA
Trigger	Any growth north of Highway 403	Future growth (before 2041 buildout)
Timing	0-5 Years **Ongoing**	10-20 Years

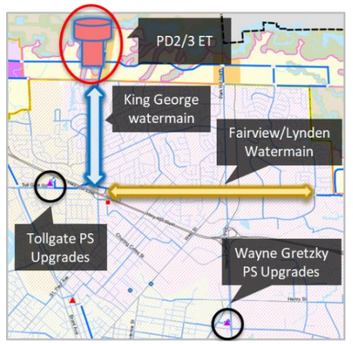
10.2.2. North Expansion Residential Lands

Water will be supplied to the North Expansion Lands in PD2/3 through a trunk connection at King George Road. To accommodate additional growth in PD2/3, a new ET is required and should be initiated immediately. The existing King George Road watermain from Tollgate PS to the new PD2/3 ET will also need to be upsized to accommodate the new ET requirements.

Additionally, upgrades at the existing Wayne Gretzky PS and Tollgate PS will be required support the new PD2/3 ET with timing dependent on the ET strategy. In PD2/3, the Fairview/Lynden Road watermain will also require upgrades to support growth, with flexible timing as it will be required before approximately 50% of all growth in PD2/3.

An overview of the projects required to service the North Expansion Residential Lands, including timing and triggers are presented in **Table 47**.

Table 47: North Expansion Residential Lands Implementation

North Expansion Residential Lands (Pressure District 2/3)					
Overview • Triggered by growth **Key Projects** • Pressure District 2/3 Twinned Elevated Tanks: **Phased** ○ 1st ET immediate, 2nd ET in 5 to 10 years • King George Road Watermain: **With ET** • Wayne Gretzky Pump Upgrades: To support PD2/3 ET • Tollgate Pump Upgrades: To support PD2/3 ET • Fairview Drive/Lynden Road Trunk Watermain: **Later;** to support additional growth					
	W-ET-001 & W-ET-003: Pressure District 2/3 Twinned Elevated Tanks	**W-M-001:** King George Road Watermain	**W-P-002** & **W-P-003:** Wayne Gretzky & Tollgate Pump Upgrades	**W-M-027:** Fairview Drive Trunk Watermain	**W-M-032:** Lynden Road Trunk Watermain
Why	• Requirements for a new PD2/3 ET • Determine the preferred location • Optimization of PD2/3	• Provide capacity for new PD2/3 ET	• Improve operational capacity • Support new HGL in PD2/3	• Support growth in PD2/3, including east-west conveyance	• Support growth in the east lands in PD2/3 and east expansion lands
Study	Schedule 'B' EA	Group with ET Schedule 'B' EA	No further study required	No further study required	No further study required
Trigger	1st ET: Immediately 2nd ET: As intensification occurs in PD1 and PD2/3	Dependent on PD2/3 ET construction	Dependent on PD2/3 ET strategy	Flexible; before 50% of PD2/3 buildout	Flexible; before 50% of PD2/3 buildout
Timing	1st ET: 0-5 Years **Currently in Detailed Design** 2nd ET: 5-10 Years	0-5 Years **Currently in Detailed Design**	5-10 Years **Potential to advance dependent on EA outcome**	0-5 Years	5-10 Years

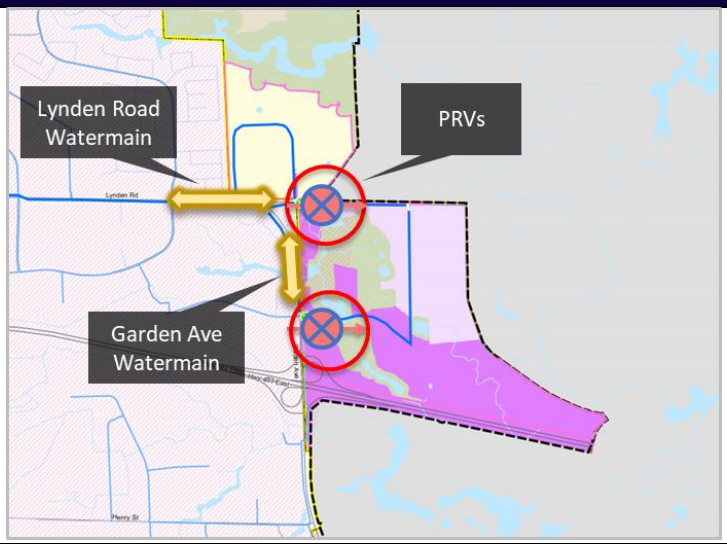
10.2.3. East Expansion Lands

Servicing for the East Expansion Lands is triggered by growth east of Garden Avenue. To service, a connection to PD2/3 can be made at either Lynden Road or Sinclair Boulevard, both require a PRV to create a new sub-zone due to the decreased elevations in the East Expansion Lands.

Upgrades are required for the existing Lynden Road Trunk Watermain, with timing dependent on growth and fire flow requirements in the East Expansion Lands. Additionally, a watermain upgrade along Garden Avenue will be required to create a looped system within PD2/3, with flexible timing as it will be required before approximately 50% of all growth in PD2/3.

An overview of the projects required to service the East Expansion Lands, including timing and triggers are presented in **Table 48**.

Table 48: East Expansion Lands Implementation

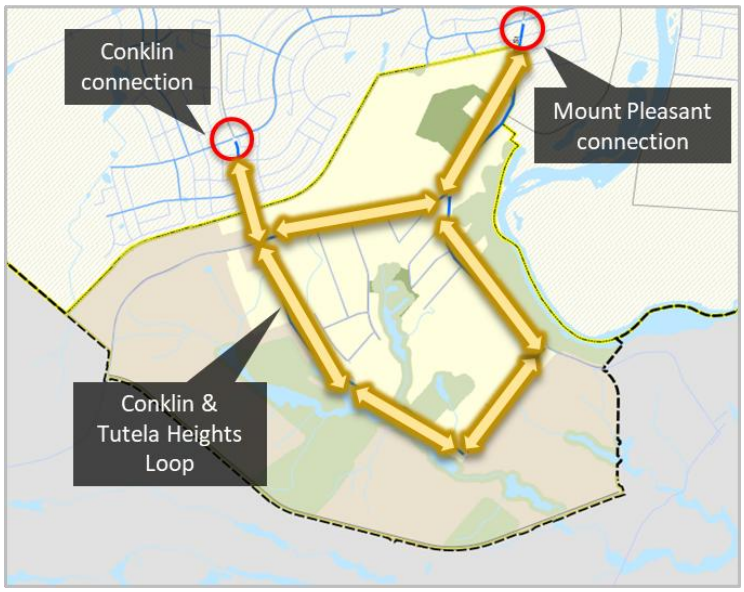
East Expansion Lands			
Overview • Triggered by growth east of Garden Avenue **Key Projects** • PRVs located on Garden Avenue and Sinclair Boulevard: Timing dependent on growth • Lynden Road Trunk Watermain Upgrades: **Later;** to support further growth • Garden Avenue Watermain Upgrade: **Later;** to loop PD2/3			
	W-M-019 & W-M-021: Pressure Reducing Valves	**W-M-018:** Lynden Road Trunk Watermain Upgrades	**W-M-029:** Garden Avenue Watermain Upgrades
Why	• High pressures due to low elevations	• Upsize existing watermain to accommodate growth	• Upsize to create loop within PD2/3 • New PRVs will create sub-zone
Study	No further study required	No further study required	No further study required
Trigger	Any growth east of Garden Avenue	Dependent on growth and fire flow requirement	Provide benefits now; before 50% of PD2/3 buildout
Timing	0-5 Years	5-10 Years	5-10 Years

10.2.4. Tutela Heights

To integrate Tutela Heights into the City's existing PD1 system, a connection at either Mount Pleasant Road or Conklin Road is required. The timing for this connection is as soon as the City is to supply Tutela Heights. To support growth, the trunk watermains along Tutela Heights and Conklin Road will need to be upsized to increase or maintain existing fire flows. Timing for these upgrades will be dependent on local growth in Tutela Heights.

An overview of the projects required to service Tutela Heights by integrating into the City's system, including timing and triggers are presented in **Table 49**.

Table 49: Tutela Heights Implementation

Tutela Heights	
Overview • Triggered by County/City agreement (before 2026) • Existing watermain upsizing needed to support fire flow and growth • Connection to Brantford PD1 is complete and has disconnected from the Brant system **Key Projects** • Mount Pleasant or Conklin Road connection: to integrate into City's system • Conklin & Tutela Heights Loop: **Later;** to support growth **Other Comments** • Watermain loop may trigger EA; loop is adjacent to Phelps Creek, which is part of the recommended NHS and along an unopened road allowance	

	W-M-022 & **W-M-023:** Conklin & Mount Pleasant Connection	**W-M-024, W-M-025** & **W-M-026:** Conklin & Tutela Heights Loop
Why	• Integrates existing Tutela Heights into the City's water system • Increases or maintains existing fire flows • Accommodates future growth area	• Increases or maintains existing fire flows • Accommodates future growth areas
Study	No further study required	Possible Schedule 'B' EA
Trigger	Tutela Heights integration into City system; needed to meet City level of service (Fire Flow)	Local growth
Timing	0-5 Years	5-20 Years

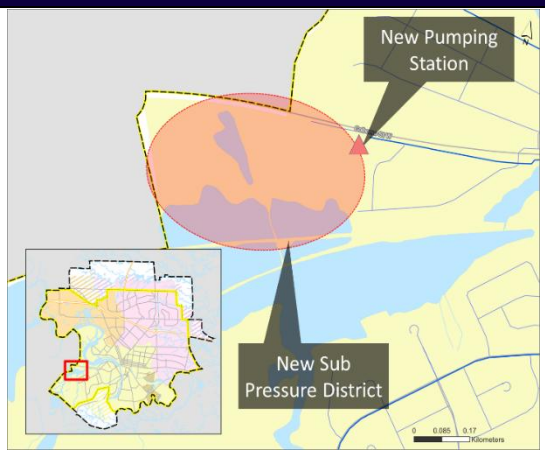
10.3. Local Servicing Needs

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. Colborne Street West BPS

A new BPS is required to service the proposed development on Colborne Street West extending west to the municipal boundary in PD1. The BPS is triggered by growth and will align with the timing of the local development. An overview of the project is presented in **Table 50**.

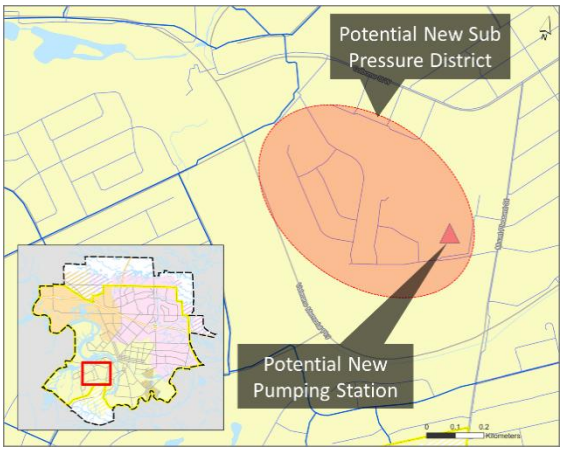
Table 50: Colborne Street West BPS Implementation

W-P-004: Colborne Street West Booster Pumping Station		
Why	• New BPS to service development • To service low pressures (<40 psi)	
Study	Developer-led study	
Trigger	Local Development	
Timing	Completed in 2025	

10.3.2. Strawberry Hill BPS

A BPS is required in the existing Strawberry Hill area to service additional growth. The BPS will be triggered by growth and will align with the timing of the local development. An overview of the project is presented in **Table 51**.

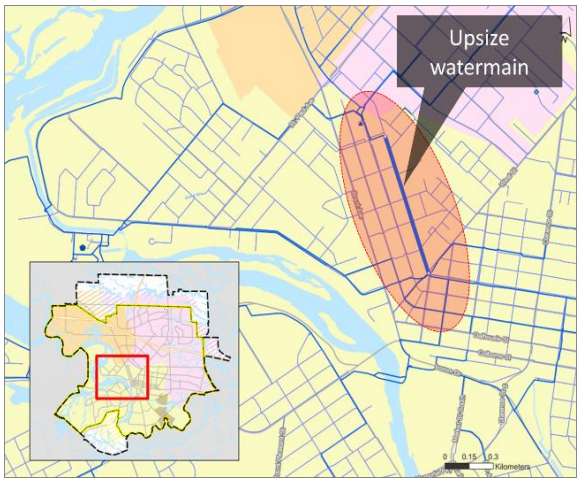
Table 51: Strawberry Hill BPS Implementation

W-P-005: Strawberry Hill Booster Pumping Station		
Why	• New BPS to service development • To service low pressures (<40 psi)	
Study	Schedule 'B' EA (likely City lead)	
Trigger	Local Development	
Timing	Based on developers	

10.3.3. Downtown Trunk Watermain

Upgrading the existing watermain along Pearl Street will create a loop to support intensification in the downtown core to maintain the current level of service. This watermain would provide benefits to the City's existing system; however, isn't required until further growth in the downtown occurs. An overview of the project is presented in **Table 52**.

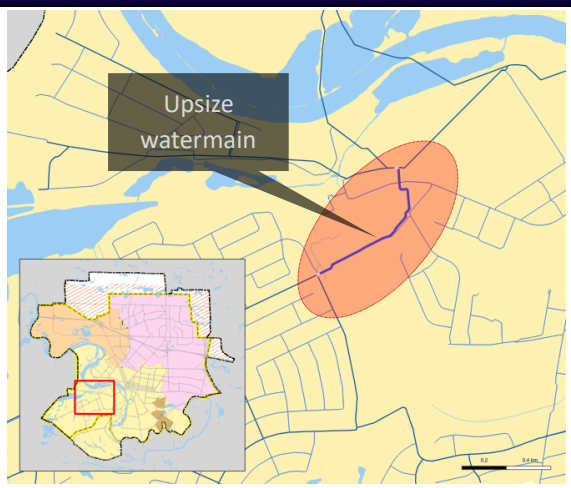
Table 52: Downtown Trunk Watermain Implementation

W-M-028: Downtown Trunk Watermain		
Why	• To support intensification • Maintain current level of service • Create loop in downtown core	
Study	No further study required	
Trigger	Provides benefits to the existing system	
Timing	5-10 Years	

10.3.4. Shellard Lane Watermain

Upgrading the existing watermain along Shellard Lane from Diana Avenue to Spalding Drive will provide relief in velocities to support projected growth in the area. An overview of the project is presented in **Table 53**.

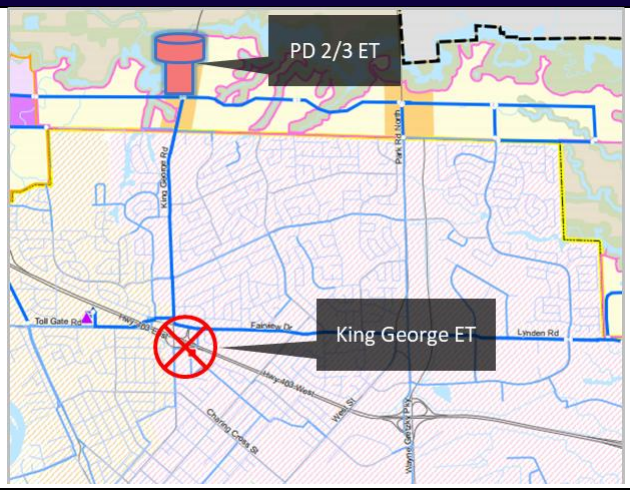
Table 53: Shellard Lane Watermain Implementation

W-M-031: Shellard Lane Watermain		
Why	• To provide relief in velocities • To support growth	
Study	No further study required	
Trigger	Provides benefits to the existing system	
Timing	0-5 Years	

10.4. Facility Decommissioning

Once the new PD2/3 ET is constructed, the existing King George ET can be decommissioned. Timing for the decommissioning will be dependent on the construction of the new PD2/3 ET as new capacity will be needed first. An overview of the projects is presented in **Table 54**.

Table 54: Facility Decommissioning

W-D-001: King George Elevated Tank		
Why	• Old infrastructure • Capacity not needed	
Study	No further study required	
Trigger	Once new PD2/3 ET is constructed	
Timing	5-10 Years	

10.5. Fire Flow Watermain Upgrades

A fire flow program has been developed to include the replacement of watermains less than or equal to 100mm, replacing Cast Iron watermains, replacing Asbestos Cement/Ductile Iron watermains (installed before 1990) and upsizing and looping to strengthen local trunk network to improve existing and future system fire flows. All watermains that are flagged, detailed in **Table 55**, to be upsized have been provided to the City and should be monitored when completing local work through the SOGR program or identified as local development occurs.

Table 55: Fire Flow Watermain Upgrades Implementation

Fire Flow Watermain Upgrades	
Overview • **Ongoing;** no specific timeline **Trigger** • As local development occurs • Align existing deficiencies with SOGR program or corridor works **Why** • Fire flow deficiencies under existing conditions • Growth development deficiencies within areas of infill/intensification • Strengthen local trunk network	