Region of Peel

Bolton Water and Wastewater Feasibility Study

Prepared by:

GM BluePlan Engineering Ltd.

GMBP Project No. 722010

February 2023

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List of Acronyms

Acronym	Description
2020 Master Plan (MP)	2020 Water and Wastewater Master Plan
ADWF	Average Dry Weather Flow
BRES	Bolton Residential Expansion Study
DC	Development Charge
ESA	Environmentally Sensitive Area
GM BluePlan	GM BluePlan Engineering Limited
I/I	Inflow and Infiltration
LOS	Level of Service
Class EA	Municipal Class Environmental Assessment
MDD	Maximum Day Demand
OMB	Ontario Municipal Board
OCWA	Ontario Clean Water Agency
PDWF	Peak Dry Weather Flow
PZ	Pressure Zone
PRV	Pressure Reducing Valve
Region	Region of Peel
ROPA	Regional Official Plan Amendment
SGU	Small Geographic Unit
SAR	Species at Risk
TWL	Top Water Level
TRCA	Toronto and Region Conservation Authority
WRRF	Water Resource Recovery Facilities

1 STUDY INTRODUCTION

1.1 Study Background

The Region of Peel continues to be one of the fastest growing Regions in Canada, with expanding population and employment within the City of Brampton, the City of Mississauga and the Town of Caledon. The Region's projected population and employment growth to 2041 was reviewed in the 2020 Water and Wastewater Master Plan for the Lake-Based Systems and a comprehensive list of capital projects were developed to support growth throughout the Region.

Further population and employment growth targets to 2051 has been established by the province with additional development proposed within both the intensification and greenfield growth areas in Peel. Greenfield growth pressures from 2021 to 2051 will continue to the north, extending into the northern corners of Brampton and into many areas of South Caledon including Bolton. There is already significant development occurring in Caledon with water and wastewater infrastructure continually being planned, designed, and constructed to support this growth.

Through ongoing Master Plans, stand alone servicing strategies, Class Environmental Assessments and feasibility studies, the Region has continued its proactive approach to water and wastewater servicing and has maintained high standards for levels of service. The following studies have led to the current Bolton Water and Wastewater Capacity Improvements study (additional information on the relevant studies is provided in **Section 3**):

- **June 2014** - Bolton Residential Expansion Study (BRES): Tow of Caledon led study that recommended water and wastewater servicing solutions to meet existing and future (2041) needs within Bolton.
- **June 2020** - Water and Wastewater Master Plan for the Lake-Based Systems: Region of Peel led study that recommended high level water and wastewater servicing solutions within the Region of Peel Lake-based systems, including Bolton, to support growth forecasts to 2041.
- **October 2020** – BRES: Region of Peel led study that recommended water and wastewater servicing solutions for the expanded settlement boundary of the Bolton Rural Service Centre submitted by the Town of Caledon through the BRES Regional Official Plan Amendment (ROPA) application.
- **November 2020** - Approved Region of Peel Official Plan Amendment 30 (ROPA30) for the Bolton Residential Expansion Area: The purpose of this Amendment was to establish an expansion to the Bolton Rural Service Centre, and identify areas assessed in the BRES. ROPA30 proposed increased growth to the Bolton settlement areas (245 ha) to accommodate short-term growth within those areas. ROPA30 was subject to several appeals. After extensive negotiations the parties reached a settlement, and a written decision was provided on April 30, 2021.

Although previous studies have made recommendations for water and wastewater infrastructure in the Bolton service area, the infrastructure needs, location, size, alignments, and timing/phasing were preliminary. Additionally, there is a strong desire by the development community to develop several different areas as soon as feasible; with many of these areas requiring significant investments in new infrastructure. As such, the Region of Peel (Region) retained GM BluePlan Engineering Limited (GM BluePlan) to complete the Bolton Water and Wastewater Capacity Improvements Study which consists of a Feasibility Study followed by a Schedule C Municipal Class Environmental Assessment (Class EA).

The Feasibility Study's objective is to fully investigate potential servicing alternatives and develop optimal water and wastewater servicing solutions to meet both short-term and long-term growth, while prioritizing solutions that align with long-term servicing versus interim objectives. The study identified water and wastewater infrastructure needs to support the additional lands (ROPA30) identified in the Local Planning Appeal Tribunal (LPAT) decision on April 2021, that were not included in the 2020 Master Plan. The LPAT decision resulted in a total of 245 hectares of developable lands to accommodate additional residential and employment population in the Bolton Residential Expansion Settlement Area. Portions of Option 1, Option 3, and Rounding Out Area B lands were added to the settlement boundary in addition to the Option 6 and Triangle Lands that were previously added (collectively known as ROPA30 lands).

The feasibility study has considered the future growth in the Settlement Area Boundary Expansion (SABE), or the "2051 New Urban Area", of the Peel 2051 Municipal Comprehensive Review and new Region of Peel Official Plan; however, the scope of the servicing study was limited to the ROPA30 lands as the detailed servicing needs for the SABE lands will be covered by the next Master Plan update. The Bolton Municipal Class EA is anticipated to be completed in 2024.

This report focuses on the Feasibility Study which has developed, evaluated, and selected water and wastewater servicing concepts for Bolton. The Feasibility Study will support early phasing opportunities, move forward exempt projects (formerly classified as Schedule A or A+) and will be used as the foundation for the Class EA study for any identified Schedule B and/or Schedule C projects.

1.2 Study and Servicing Area

1.2.1 Study Area

The Bolton study area is located in Caledon, within the Region of Peel. The study area is generally bounded by Albion-Vaughan Road to the east, about 100 meters south of Countryside Drive to the south, west of Centreville Creek Road to the west and about 100 meters north of Castlederg Street to the north. The study area falls within Ward 4 and a portion within Ward 5 (west and north) and Ward 10 (south). The majority of the study area is located within the West Humber watershed, and its various stream corridors which fall under the jurisdiction of the Toronto and Region Conservation Authority (TRCA). The study area is considerably larger than the service area (provided in **Section 1.2.2** below) to ensure all possible servicing solutions were assessed.

1.2.2 Service Area

The servicing area is deemed by the municipality as lands designated and approved for urban growth including the designated Bolton Rural Service Centre and the approved BRES area. Rural Service Centres are developed on full municipal water and wastewater services and provide a mix of land uses including residential, employment, commercial, recreational, institutional and community services. The focus of the Feasibility Study and subsequent Class EA will be on servicing strategies for the service area generally located east of the West Humber River and north of Mayfield Road.

The study and service areas are provided in **Figure 1-1**.

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Bolton Water and Wastewater Feasibility Study

Study Area Boundary
Regional 2051 Urban Boundary
ROPA 30 Expansion Area
Bolton Rural Service Centre

General Features
GTA West Corridor (Technically Preferred)
Rail
Waterbody and Watercourses
Wooded Area
Municipal Boundary

Study Area

BluePlan ENGINEERING

Figure 1-1
February, 2023
722010-G-001
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2 STUDY AREA CONDITIONS

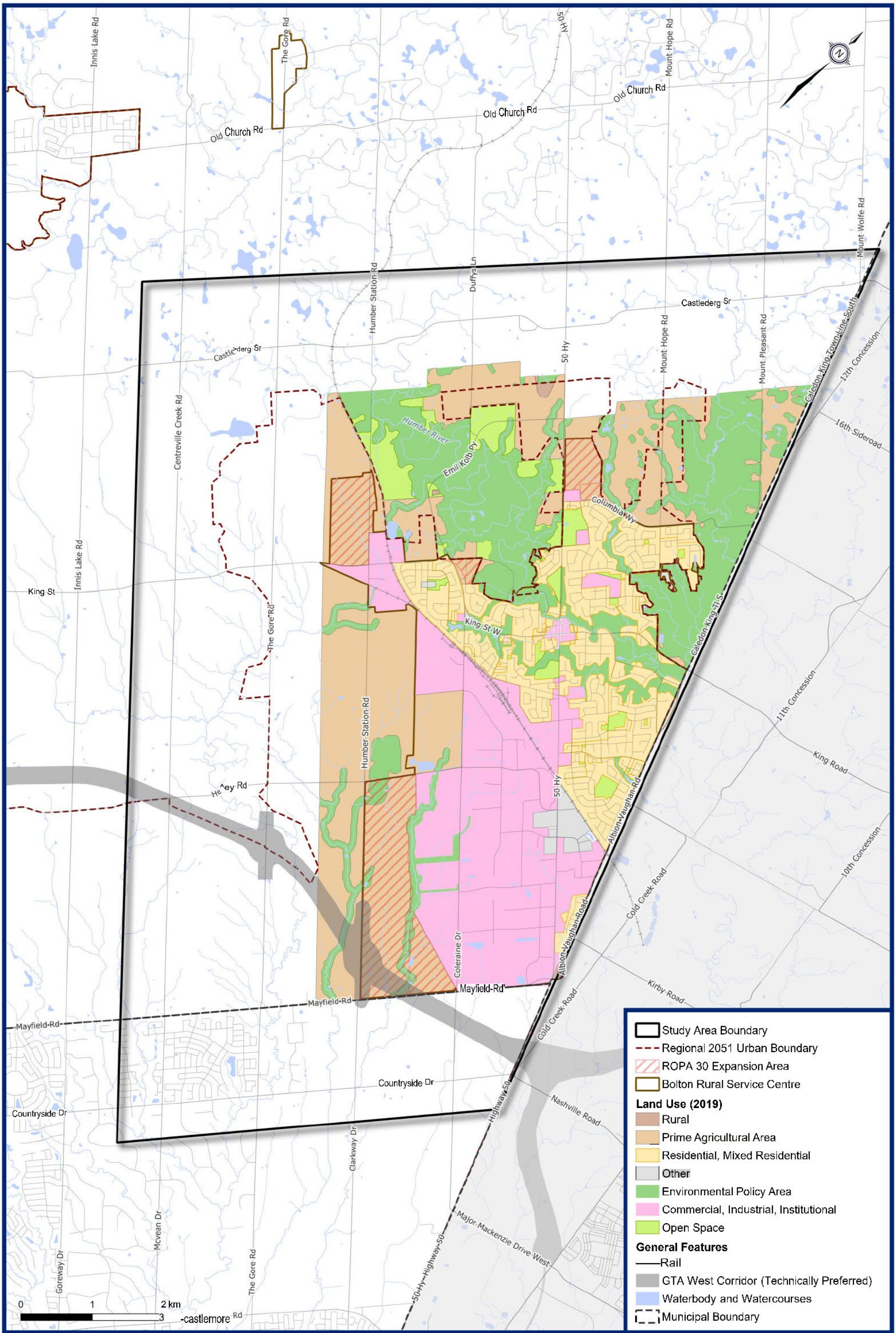
2.1 Existing Land Use

The study area includes various land uses. The northern section of the study area (north of the railway) includes mainly mixed density residential, agricultural, and open space/environmental policy areas, with some institutional and commercial. The southern section of the study area (south of the railway) includes mainly industrial and agricultural, with some commercial and environmental policy areas. **Figure 2-1** provides a map of the land uses within the study area.

2.2 Existing Natural Environment

The study area contains the Greenbelt Plan Area (Protected Countryside Area), Niagara Escarpment Plan and Oak Ridges Moraines Plan (Natural Linkage and Countryside Area) designated areas to the north. Much of the study area is located within the West Humber Watershed within the TRCA jurisdiction and includes various stream corridors.

The study area contains natural heritage features, including Areas of Natural and Scientific Interest (ANSI), Environmentally Sensitive Areas (ESA), wooded areas, and core natural lands and linkages. The study area includes large, forested blocks and riparian corridors, as well as an extensive array of natural habitats that support numerous Species at Risk (SAR). **Figure 2-2** provides a map of the existing natural features within the study area.



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Existing Land Use

Bolton Water and Wastewater Feasibility Study

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Figure 2-1
January, 2023
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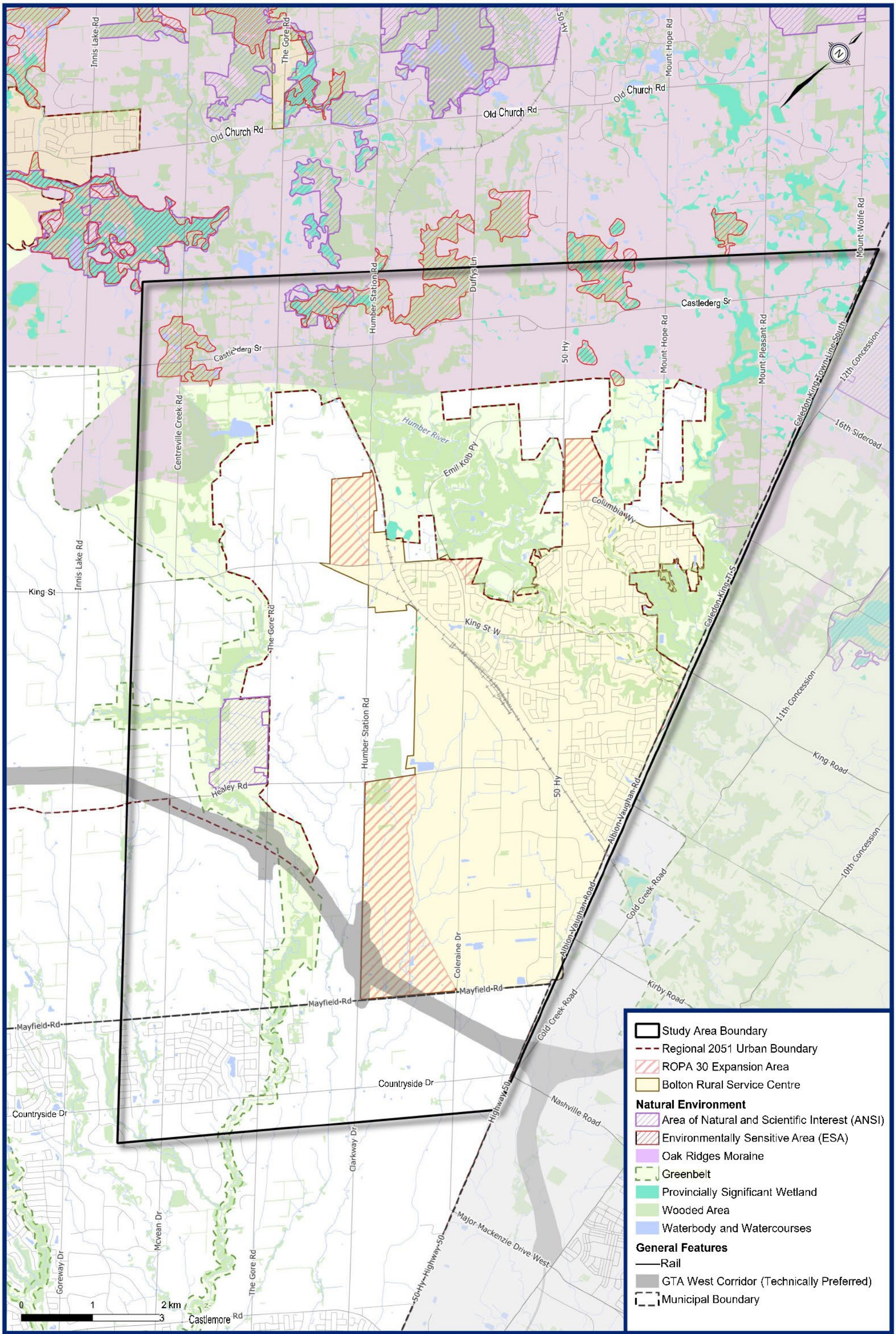

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Existing Natural Environment

Bolton Water and Wastewater Feasibility Study

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Figure 2-2
January, 2023
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2.3 Existing Water Infrastructure

2.3.1 Regional Water System

The Region of Peel's lake-based water system services the City of Mississauga, the City of Brampton, and parts of the Town of Caledon and York Region. Water is supplied from Lake Ontario by two large water treatment plants, A.P. Kennedy Water Treatment Plant and Lorne Park Water Treatment Plant, which are operated by the Ontario Clean Water Agency (OCWA) on behalf of the Region. Water is then conveyed by the transmission and distribution systems across the Region.

The transmission system consists of two (2) water treatment plants, transmission mains, water pumping stations, reservoirs, and elevated tanks. Due to the width of the Region's lake-based service area, the transmission system is divided into three (3) main trunk systems: West, Central, and East. The transmission system provides direct supply to the local water distribution system which consists of the watermains extending down to the water service level for each customer. Combined, all the components of the transmission and distribution systems deliver water to users through seven pressure zones separated by approximately 100-foot intervals of elevation.

The Region of Peel also maintains four (4) municipal groundwater systems servicing rural communities in the Town of Caledon. Bolton is serviced through the Region's lake-based water transmission system, specifically through the East Trunk System.

2.3.2 Bolton Water System

The lake-based water system currently supplies water to the "Bolton Rural Service Centre" lands, primarily by the Arthur P. Kennedy Water Treatment Plant. Water is pumped through the Central and Eastern Transmission system via a series of trunk transmission mains and water pumping stations (Hanlan Water Pumping Station, Beckett Sproule Water Pumping Station, Airport Water Pumping Station, and Tullamore Water Pumping Station) to service pressure zones 5 and 6 in Bolton. The Tullamore Pumping Station pumps water via a 750 mm diameter pressure zone 6 transmission main on Mayfield Road and Coleraine Drive to the Bolton Elevated Tanks.

Lower elevation area pressure zones 5B and 6A are supported by pressure reducing valves (PRV) from pressure zone 6. Pressure zone 5B is also supported by the Bolton Standpipes. The Bolton North Hill Water Pumping Station and Bolton Water Pumping Station are not typically operated but can draw some flow from the pressure zone 5B standpipes back to the pressure zone 6 system, if necessary.

Future potential settlement expansion lands north and west of Bolton are situated between the serviceable range of the existing pressure zone 6 and the future pressure zone 7. The existing areas in the northernmost part of Bolton currently experience low pressures and would benefit by being promoted to pressure zone 7. Currently, there is no pressure zone 7 infrastructure in Bolton, and the extension of pressure zone 6 watermains would result in very low pressures to the subject lands as well as a reduction in existing pressures in Bolton's North Hill community.

Table 2-1 provides a list of the existing Bolton storage facilities and **Table 2-2** provides a list of the existing Bolton pumping station facilities.

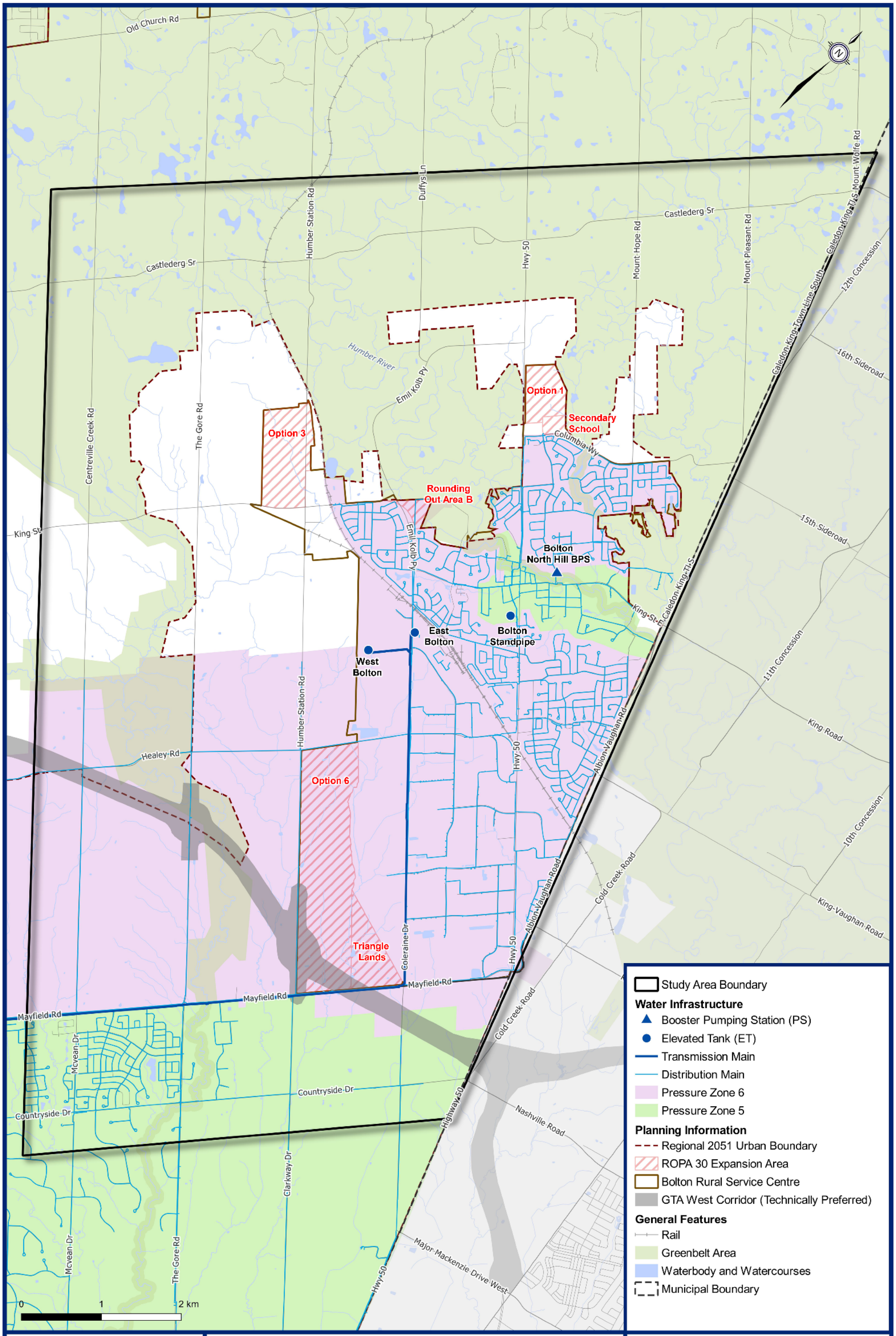
Table 2-1: Bolton Water Storage Facilities

Facility Name	Pressure Zone (PZ)	Top Water Level (TWL) (m)	Capacity (ML)
Bolton Elevated Tank	PZ6	297.2	4.5
Bolton Standpipes	PZ5	273.8	5.0
West Bolton Elevated Tank	PZ6	297.2	9.1

Table 2-2: Bolton Water Pumping Station Facilities

Facility Name	Pressure Zone (PZ)	No. Pumps	Firm Capacity (ML/d)
Bolton North Hill Water Pumping Station	PZ5B to PZ6B	3	9
South Water Pumping Station (at Standpipes)	PZ5B to PZ6B	3	7
Tullamore Water Pumping Station	PZ6	4	40

Figure 2-3 provides a map of the existing water infrastructure within the Bolton service area.



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Existing Water Infrastructure

Bolton Water and Wastewater Feasibility Study

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Figure 2-3
April, 2023
722010-W-001
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2.4 Existing Wastewater Infrastructure

2.4.1 Regional Wastewater System

The Region of Peel operates and maintains a lake-based wastewater system servicing the City of Mississauga, the City of Brampton, and parts of the Town of Caledon. The system consists of two (2) water resource recovery facilities (WRRF), 31 sewage pumping stations and three (3) main trunk sewer systems: McVean, East, and West. These systems convey flows through a network of pumping stations, forcemains, trunk, and local gravity sewers, to two (2) WRRF, G.E. Booth WRRF and the Clarkson WRRF, for final treatment and discharge to Lake Ontario.

The McVean trunk system connects to the East trunk system via the McVean sewage pumping station that discharges flow to the East Brampton wastewater trunk sewers. The East and West trunk sewer systems service areas are roughly divided by the watershed boundary between the Etobicoke Creek and the Credit River. The two (2) systems are connected via the west-to-east wastewater trunk sewer, which can be used to divert some flows from the west trunk system to the east trunk system at Highway 407.

Both trunk systems provide direct conveyance for the local wastewater collection system which consists of the sewers extending up to the wastewater service lines for each user.

2.4.2 Bolton Wastewater System

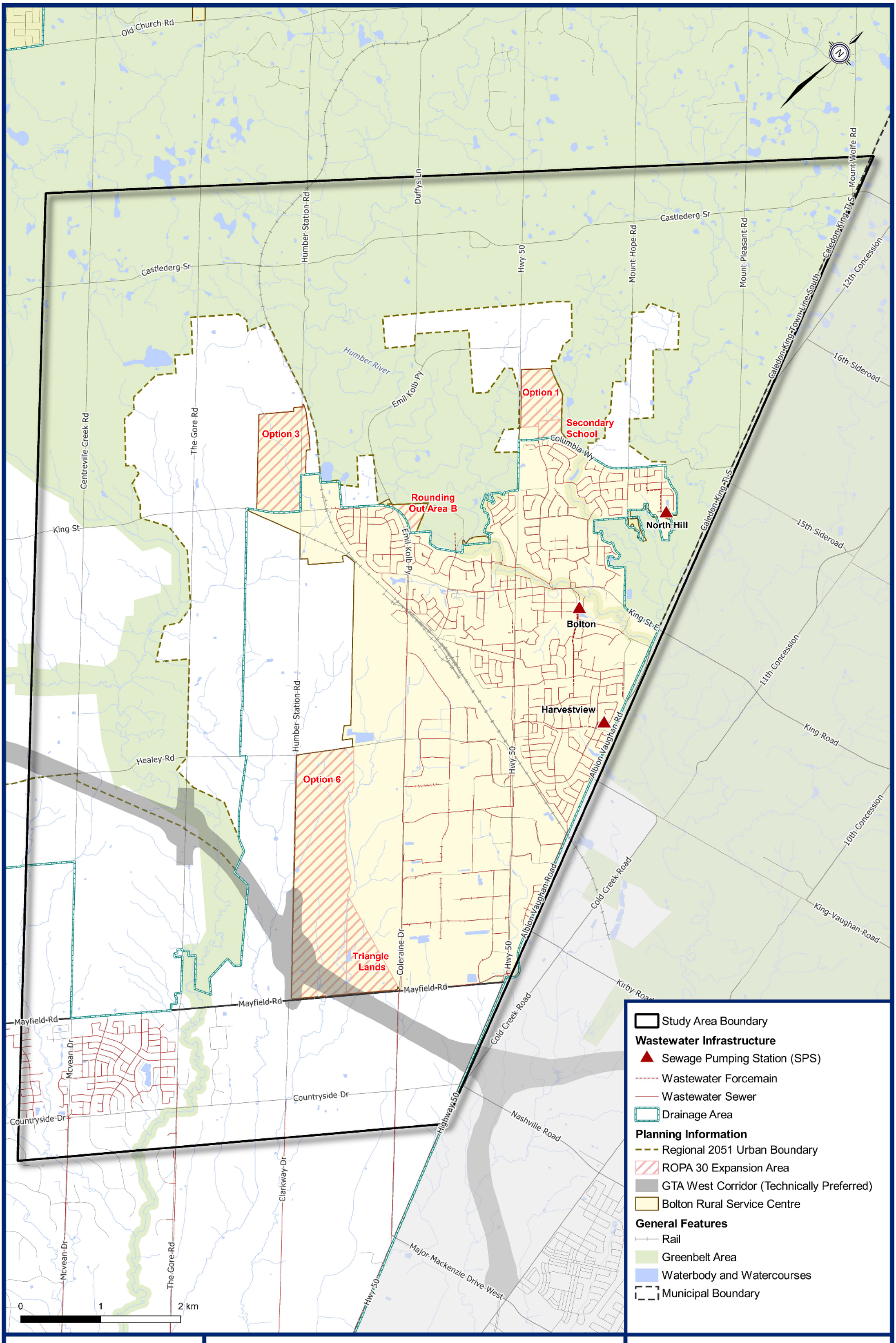
Wastewater flows are collected through local sewers and conveyed south via two (2) main trunk sewers on Coleraine Drive and Albion-Vaughan Road. North Bolton and the low-lying area in central Bolton are serviced by the Bolton Sewage Pumping Station (the largest sewage pumping station in the area) and is then pumped to a discharge point near the junction of Strawberry Hill Court and Allan Drive. The pumped flow and additional flow south of the sewage pumping station, as well as the north, west and south Bolton areas (drained by gravity), are then conveyed down Highway 50 and McEwan Drive, eventually connecting to the Coleraine Drive Trunk Sewer. There is a flow split between the Coleraine Drive and Albion Vaughan Road trunk sewer catchments. The Coleraine Trunk Sewer currently conveys the majority of Bolton's wastewater flows to the lake-based system. Ultimately, all wastewater flows generated in Bolton outlet downstream to the McVean Sewage Pumping Station and down through the east trunk system to the G.E. Booth WRRF.

Table 2-3 below provides a list of the existing Bolton sewage pumping station facilities.

Table 2-3: Bolton Sewage Pumping Station Facilities

Facility Name	No. Pumps	Capacity (L/s)	Planned Upgrades
Bolton Sewage Pumping Station	3	380 (rated) 325 (measured)	- 569 L/s with a 1 to 2-hour emergency storage - Relocation of the 3 existing forcemains
Bolton North Hill Sewage Pumping Station	2	26 (rated) 22 (measured)	- 30 L/s with a 2-hour emergency storage

Harvestview Sewage Pumping Station is planned to be decommissioned in the Fall 2023/Winter 2024 and therefore it will not be considered in this study. Current flows at the station will be diverted to the Albion-Vaughan Road trunk sewer. **Figure 2-4** provides a map of the existing wastewater infrastructure within the Bolton service area.



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Existing Wastewater Infrastructure

Bolton Water and Wastewater Feasibility Study

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Figure 2-4
April, 2023
722010-WW-001
Projection EPSG:26917

2.5 Bolton Service Area Growth

Growth is the key driver for the Feasibility Study and subsequent Class EA study. The Region of Peel population and employment targets to 2051 have been established by the province with additional development proposed within both the intensification and greenfield growth areas in Peel. In addition, the recent approval of the ROPA30 areas has proposed increased growth to the Bolton settlement areas (245 ha) to accommodate short term growth within those areas.

Table 2-4 and **Figure 2-5** provide the projected population and employment growth for the Bolton service area. **Figure 2-6** provides a map of the projected total growth for the Bolton service area.

Table 2-4: Projected Residential Population and Employment for Bolton Service Area

Forecast	2021	2041	2051	Buildout
Residential	31,540	73,780	111,460	122,480
Employment	19,580	36,360	46,470	49,370
Total	51,120	110,140	157,930	171,850

Rounded to the closest 10.
Source: Region of Peel Small Geographic Unity (SGUs) September 23, 2021

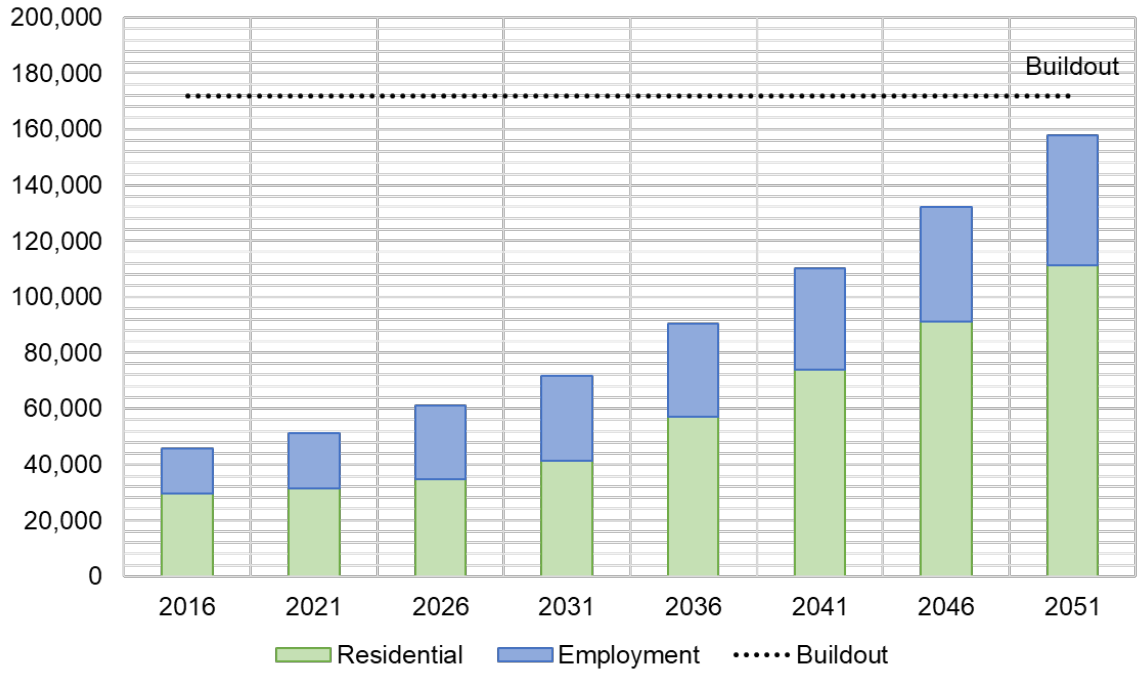
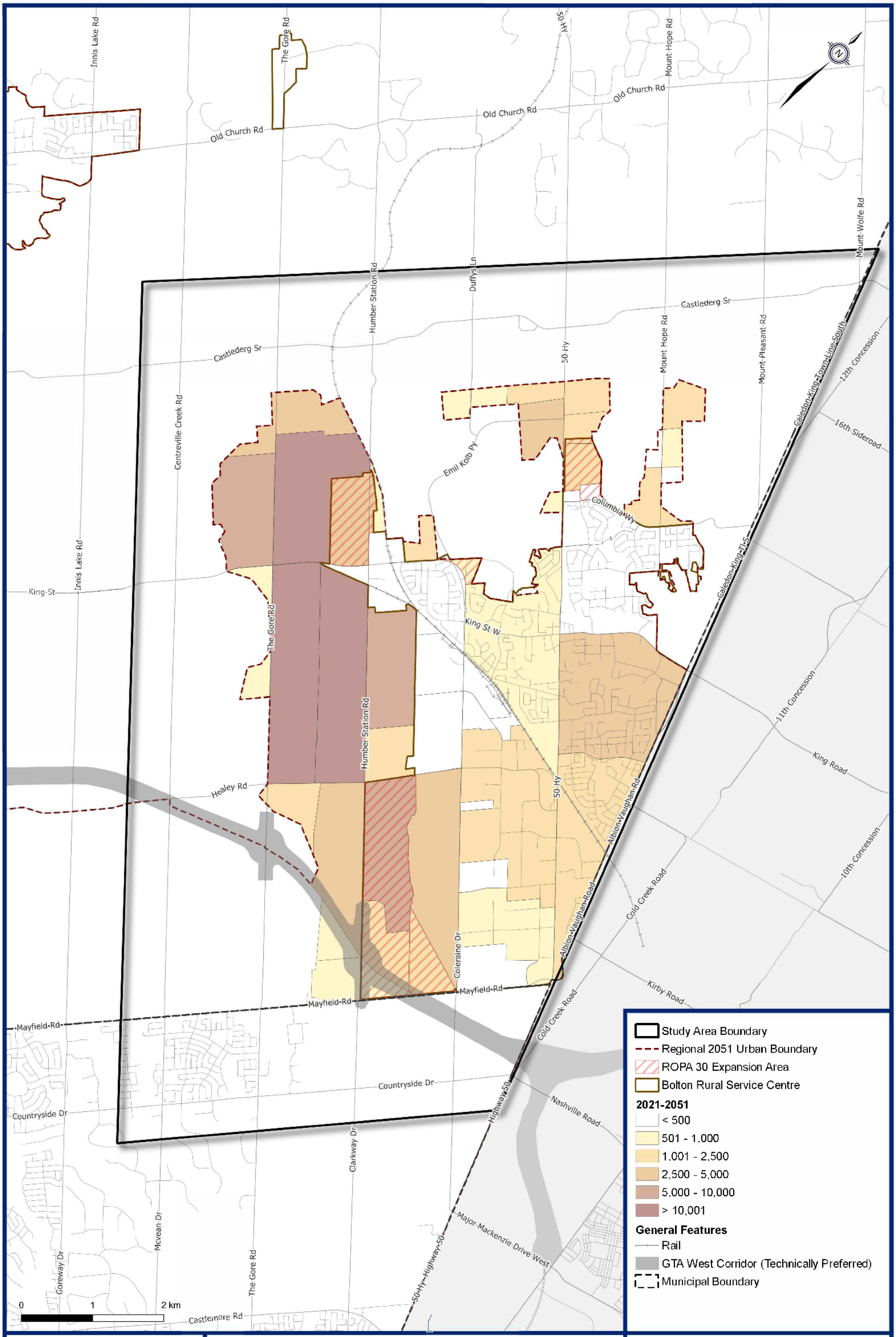


Figure 2-5: Projected Residential Population and Employment for Bolton Service Area



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Service Area Projected Total Growth (2021-2051)

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 2-6
January 2023
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Projection EPSG 26917

3 RELEVANT INFRASTRUCTURE STUDIES

3.1 Region of Peel Water and Wastewater Master Plan (2020)

The Water and Wastewater Master Plan for the Lake-Based Systems is a study intended to address the increasing demands on the Region's water and wastewater infrastructure. The 2020 Master Plan provided a review, evaluation, and development of water and wastewater servicing strategies for all servicing needs within the lake-based systems in the cities of Mississauga and Brampton and parts of the Town of Caledon. The 2020 Master Plan did not examine the groundwater-based systems or communal wastewater systems in Caledon as they are addressed separately by the Region. The preferred water and wastewater servicing strategies were developed to ensure that:

- Extension of the existing lake-based water and wastewater system is aligned with existing regional and local planning policies.
- Use of the existing water and wastewater system and facilities is maximized and used as the backbone for new infrastructure to meet the planned 2041 needs.
- Strategic oversizing of infrastructure, where justified, is planned to support growth beyond 2041.
- The Master Plan recommendations were developed by, and provided feedback to, the Region's Growth Management Strategy through an integrated process.

Based on the preferred water and wastewater servicing strategy, a detailed capital program was established to support the servicing needs of existing and future growth of the Region of Peel lake-based system to 2041.

The 2020 Master Plan was completed in June 2020 and included the Council approved ROPA30 Option 6 and Triangle Lands. The Master Plan did not include water and wastewater infrastructure projects to service Options 1, 2 and 3 lands as these were not approved by Regional Council as part of ROPA30 at the time.

3.2 Region of Peel Block Inflow and Infiltration Program – Bolton Block 35 (2020)

The Region of Peel has implemented a Block Inflow and Infiltration (I/I) Program which involves a multi-step approach to finding, categorizing, and solving I/I issues in the 40 sewersheds or "blocks" within the Region's wastewater system. The Region also has an ongoing wastewater flow monitoring program to collect data that is readily available for analysis. The first step involves analysis of the flow data to isolate I/I sources and then identify strategies to stop inflow and infiltration from entering the wastewater system. This can include downspout disconnections and cross-connection remediation (e.g., catchbasins, floor drains, sump pumps, etc.). The second step involves the acceptance of the I/I balance and assessment of the condition of the wastewater system to identify the best solution alternative. This process includes a Class EA, Preliminary Design, Detailed Design and Construction phases.

Block 35 is located within the Bolton study area. Flow monitor data was analyzed in 2020 and recommendations were made for field investigations. This balance of I/I after completing the reduction work was considered in the Feasibility Study and will be a consideration in the next step of the study, the Class EA.

3.3 Region of Peel Bolton Residential Expansion (2020)

The Region of Peel initiated a planning process to assess the Bolton Residential Expansion Study (BRES) Regional Official Plan Amendment (ROPA) application submitted by the Town of Caledon to expand the settlement boundary of the Bolton Rural Service Centre. The planning process resulted in Regional staff recommending to Regional Council

a ROPA to expand the settlement boundary of the Bolton Rural Service Centre to complete the implementation of the 2031 Growth Plan targets for Bolton.

The aim of this study was to review the existing and proposed water and wastewater systems to confirm whether there was sufficient capacity to satisfy the growth demands of the proposed Bolton Residential Expansion. The intent was also to present the detailed servicing analysis and evaluation of the proposed urban expansion undertaken as part of this study including:

- Establishing water and wastewater servicing requirements
- Identifying servicing alternatives if applicable
- Evaluating the water and wastewater servicing alternatives
- Identifying servicing strategies for each option including Rounding out areas and/or Triangle lands

Option 5 scored the highest in the evaluation. This option included:

- Water
    - New (Z6) 400 mm feedermain from the proposed 600 mm watermain on Coleraine/Holland to Option 5 distribution (1.3 km)
    - New (Z6) 300 mm watermain from the proposed 600 mm on Holland extension, north to Option 5 distribution (0.35 km)
- Wastewater
    - New 450 mm gravity sewer on Humber Station from Healey to Option 5 (0.6 km)
    - New 450 mm gravity sewer on Humber Station from Healey to Mayfield (3.1 km)

The Option 5 water and wastewater servicing strategies are presented in **Figure 3-1** and **Figure 3-2**, respectively, from the Bolton Residential Expansion Water and Wastewater Servicing Analysis 2020 Update Report.

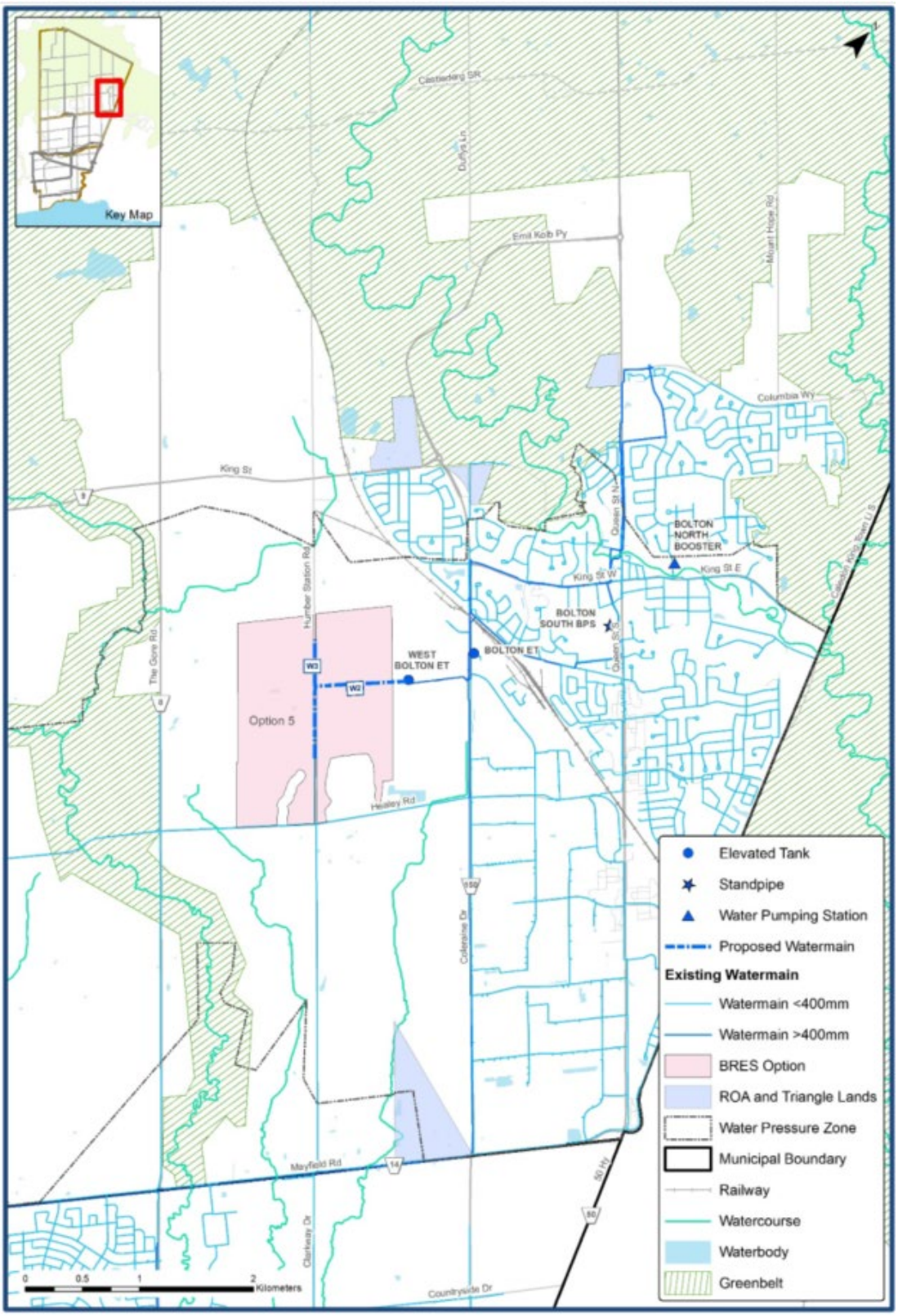


Figure 3-1: Water Servicing Option 5 (Bolton Residential Expansion, 2020 Update)

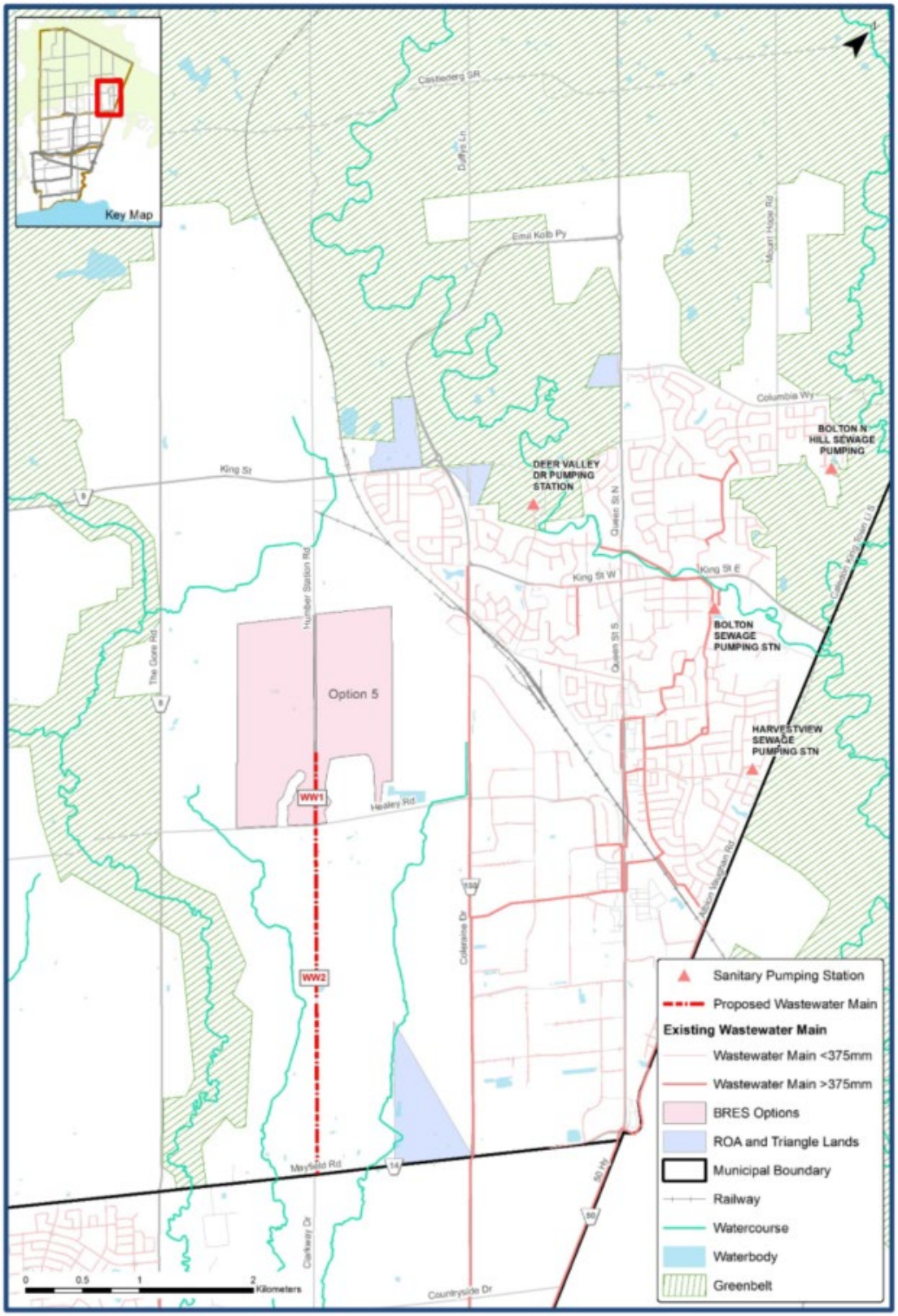


Figure 3-2: Wastewater Servicing Option 5 (Bolton Residential Expansion, 2020 Update)

3.4 Town of Caledon Bolton Queen Street Corridor Study (2019)

The Queen Street Corridor, centered in the village of Bolton, is a 10 km long area along Regional Road 50 and Queen Street (between Emil Kolb Parkway to Mayfield Road), and Regional Road 9 and King Street (between Coleraine Drive to the Humber Valley Trail). The project was delivered in three (3) separate phases.

- Phase 1: Focused on initiating the Bolton Queen Street East Corridor Study
- Phase 2: Scenario development and design refinement
- Phase 3: Refined design selection and presentation

A key objective of the Bolton Queen Street Corridor Study was to identify land use and design opportunities along the study area that could be developed within Bolton and accommodate changing demands for growth into 2041. The general findings of the overall study area established the importance of Queen Street becoming a much-improved corridor that supports economic development, active transportation, future transit improvements, housing options, celebrating cultural heritage, and creating community vibrancy.

Upon completion of the study, the primary recommendation was to conduct a Class EA of the downtown section of the Queen Street Corridor. The overall corridor would change dramatically therefore an EA would need to recognize a wider scoped project. It was recommended that the Class EA contain functional engineering and design, streetscape design options, engagement strategies, parking study of the downtown area, climate change analysis, servicing plan, bridge assessment and hydrological study and cost estimates.

3.5 Town of Caledon Bolton Special Policy Area Study (2017)

The Bolton Special Policy Area (SPA) Study was undertaken by the Town of Caledon in partnership with TRCA. This study conducted the requisite studies to update the SPA policies and a planning justification for those lands that may be added or removed from the SPA. The study guided the Town to reduce the health and safety risks resulting from flooding.

This report was amended in 2017 to update the policies pertaining to the Bolton SPA, to reflect recent flood plain mapping and reduce health and safety risks resulting from potential flooding within the Bolton Core, while allowing for development and/or redevelopment to proceed where appropriate mitigation measures have been applied.

3.6 Town of Caledon Bolton Transportation Master Plan (2015)

The Bolton Transportation Master Plan was developed in a collaborative effort between the Town of Caledon and Region of Peel. The study followed a comprehensive and consultative master planning approach consistent with the Class EA process. It identified transportation deficiencies and road network issues, while supporting municipal planning goals. Short-term road improvements recommended for implementation are listed below:

1. New Road Construction (0-2 Lanes) for Emil Kolb Parkway from King Street to Highway 50
2. Narrowing (4-2 Lanes) Queen Street (Highway 50) from South of King Street to Hickman Street
3. Extending (0-2 lanes) Simpson Road from Mayfield Road to George Bolton Parkway
4. Widening (2-4 lanes) Mayfield Road
5. Widening (2-4 lanes) Coleraine Drive from Albion Vaughn Road to Gore Road
6. New Road Construction (0-6 lanes) for Arterial Corridor A2 from Mayfield Road to Highway 50

Road improvements recommended for the 2031 horizon year are listed below:

1. Widening (2-4 lanes) Albion Vaughn Road from Mayfield Road to King Street
2. Widening (5-7 lanes) Highway 50 from Mayfield Road to Castlemore Road
3. Widening (4-6 lanes) Mayfield Road from Humber station Road to Airport Road
4. Extending (0-2 lanes) George Bolton Parkway Extension from Highway 50 to Industrial Road
5. New Road Construction (0-2 lanes) for King Street Realignment from King Street to Emil Kolb Parkway
6. New Road construction for Highway 427 from Highway 427 to GTA west corridor
7. New Road Construction for GTA West Corridor
8. New Road Construction for GTA West Corridor/ Highway 427 Extension Interchange
9. New Road Construction for GTA West Corridor/ Coleraine Drive Interchange

3.7 Town of Caledon Bolton Residential Expansion Study (2014)

The Bolton Residential Expansion Study (BRES) was initiated in 2012 to determine where to accommodate the 2031 population projected for Bolton. The goal of the study was to:

- Evaluate and select an area for residential development
- Ensure the study fulfills the requirements of the Planning Act and all provincial directions
- Provide the public with opportunities to provide input

The Region of Peel Official Plan Amendment (ROPA24) was introduced to bring the Region's Official Plan into conformity with recent updates to provincial planning policies. The growth management component of ROPA24 was approved in 2012 by the Ontario Municipal Board (OMB) with 2031 forecasts for the Town of Caledon and introducing a minimum greenfield density target of 42 residents and jobs per hectare.

Bolton was identified as a Rural Service Center in the Region's Official Plan, these centers are developed on full municipal water and sewer services and provide a range of residential, employment, commercial, recreational, and institutional and community services. The expansion of the current Bolton Rural Service Center boundary was a key component of Caledon's growth management strategy of directing majority of growth in the Town of Caledon to the rural settlements of Bolton, Caledon East, and Mayfield West. This expansion will accommodate approximately 11,100 people and 3,600 jobs and comprises approximately 245 hectares of developable lands.

The BRES identified six options for the areas of expansion and three options for smaller, rounding out areas for a settlement area expansion for Bolton. Option 3, at the northwest corner of Humber Station Road and King Street, and the Rounding Out Areas were the Town's preference for the settlement area expansion. The Town then applied for a ROPA on this basis. When considering the Town's application for an amendment to the ROPA, the Agency chose Option 6 and an area known as the Triangle Lands located at the south end of Bolton. These lands then became ROPA30, subsequently appealed to the LPAT.

The Town's endorsements of these lands and their subsequent submission of a ROPA application to the Region was based on the position that the Option 3 lands excel for the following reasons.

- It has potential for the development of a broader mix of residential forms that would integrate well with public transit.
- It is a more logical and contiguous growth area as it enhances growth potential for areas to the west of Bolton making efficient use of land, infrastructure, and public services.

- Provides strategic advantages by providing opportunities to service existing industrial lands and possible growth in the vicinity.
- It has the benefit of using available capacity of existing roadway in the short-term resulting in less disruption of the community as new settlement develops.
- It offers lower costs and less complexity in meeting infrastructure improvement requirements.

4 FUTURE SERVICING CONSIDERATIONS

Since the completion of the Region's 2020 Water and Wastewater Master Plan for the Lake-Based Systems, an expansion of the Bolton Rural Service Centre was established through ROPA30. In addition, the Region of Peel new Official Plan was prepared in accordance with the population and employment forecasts in Schedule 3 of the provincial planning document "A Place to Grow" and provides growth projections for the Region to 2051. Based on the 2051 growth forecast and the lands identified in ROPA30, the following sections identify key opportunities and constraints for future water and wastewater servicing within the Bolton service area.

4.1 Water Servicing Opportunities and Constraints

The BRES area is situated between the serviceable range of the existing pressure zone 6 and the future pressure zone 7. Development within growth areas north of Columbian Way would trigger a new pressure zone 7, as there are already low pressures experienced in Bolton's North Hill. A water service study was developed under the BRES study, last updated by the Region in late 2020.

An average day per capita rate of 270 L/cap was applied to the projected population to establish average day demands (ADD). A max peaking factor of 1.8 was applied to establish the maximum day demands (MDD). The MDD water demands for the Bolton pressure zones are summarized in **Table 4-1**.

Table 4-1: Summary of Future Water Demands

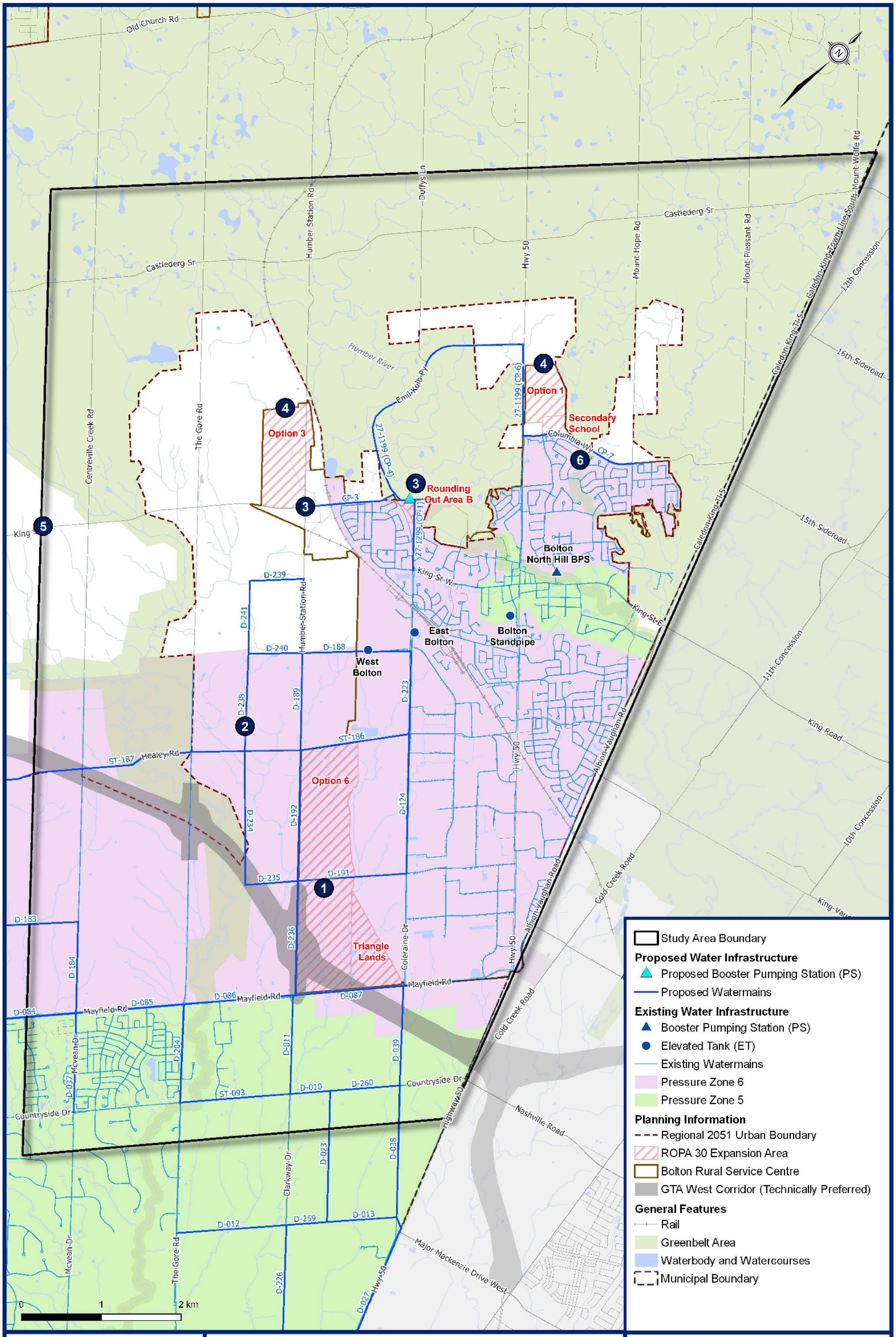
Growth Area	2051 MDD (ML/D)	Buildout MDD (ML/D)
Pressure Zone 7B	11.5	12
Pressure Zone 7E (Bolton Only)	16.5	20
Pressure Zone 6B	15	16
Pressure Zone 6E (Bolton Only)	20	21

*Note: "Bolton Only" refers to the area east of West Humber River

The following are the water servicing opportunities and constraints for the Bolton service area. **Figure 4-1** provides the location of the opportunities and constraints listed below.

1. Option 6 lands are a future growth area. Water servicing was partially covered through planned Master Plan projects. Most recent 2051 projections extend servicing needs well beyond ROPA30 areas.
2. Currently, there is no storage facility planned in pressure zone 6 east (existing 6B elevated tanks in West Bolton). All additional storage would be pumped from two facilities (future Sandhill pressure zone 5 reservoir and pressure zone 6 and 7 water pumping station and the existing Tullamore Zone 4 reservoir and pressure zone 5 and 6 water pumping station). Over the long-term, there may be operational challenges operating large Zone 6 area with minimal floating storage. There is an opportunity to investigate a dedicated pressure zone 6 east storage.
3. There is an opportunity to include an interim water pumping station solution to support growth in pressure zone 7B prior to implementation of a long-term solution.

4. There is an opportunity to extend servicing for new pressure zone 7. Pumping and potential storage needs are required, depending on the extents of the new service area, level of risk and operational considerations.
5. There is a potential need of pressure zone 5 east storage to help support growth in both pressure zone 6 and 7 and to reduce dependency on the Tullamore Pumping Station and Reservoir.
6. There is low pressure in the northern areas of the existing pressure zone 6.



Region of Peel working with you

Water Servicing Opportunities and Constraints

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 4-1
May, 2023
722010-W-001
Projection EPSG:26917

4.2 Wastewater Servicing Opportunities and Constraints

There are three main trunk sewers that will service existing and future growth areas in Bolton:

- Coleraine Drive
- Albion Vaughan Road
- Humber Station Road / Clarkway Drive (proposed new trunk sewer)

Table 4-2 provides a summary of additional Average Dry Weather Flow (ADWF) and Peak Dry Weather Flow (PDWF) based on the 2051 population and employment forecasts. The ADWF for collection system is the total of residential and employment ADWF as follows:

- Residential: 290 L/person/day
- Employment: 270 L/employee/day

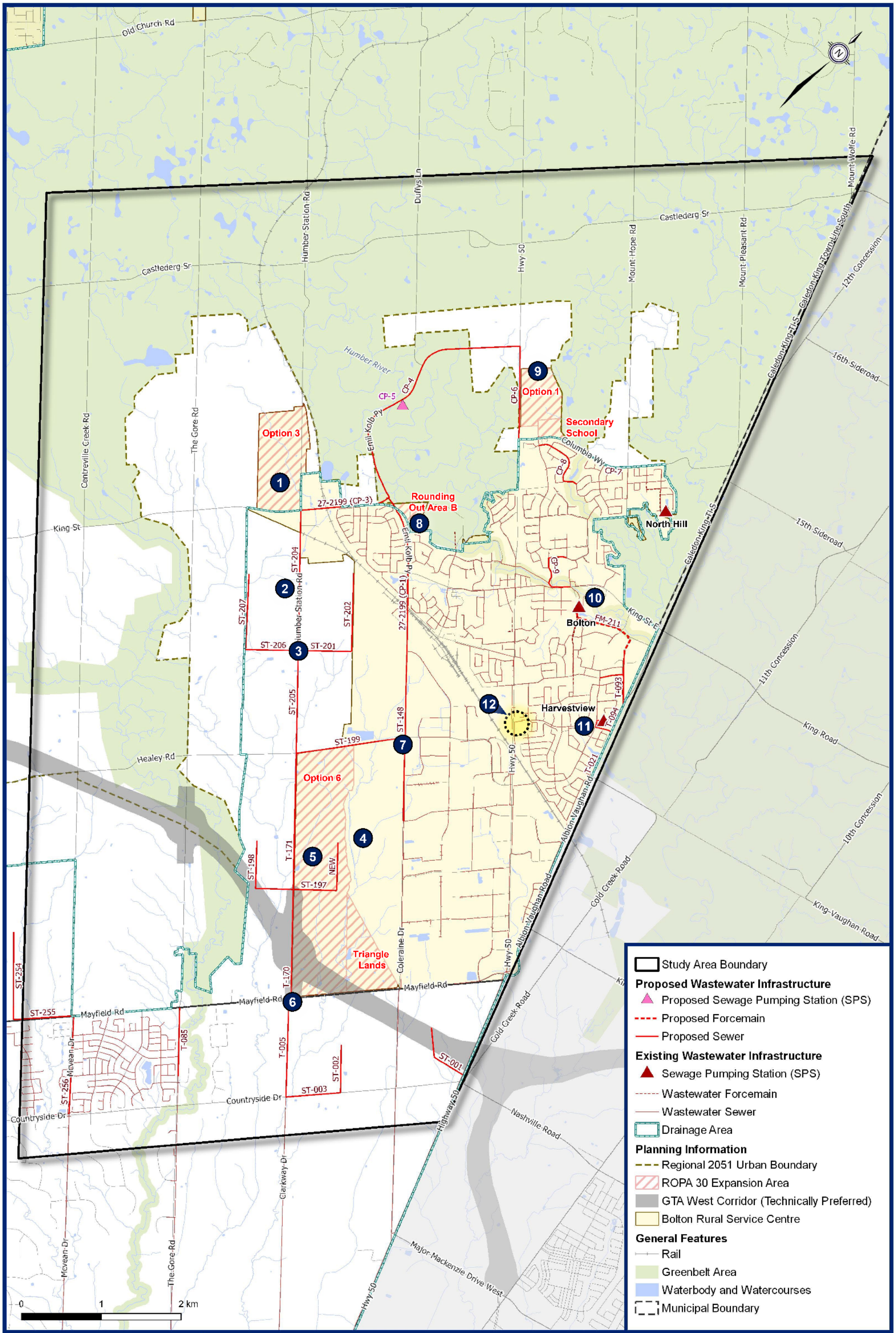
Table 4-2: Summary of Future Wastewater Flows

Service Area	ADWF (2051) (L/s)	PDWF (2051) (L/s)	ADWF (Buildout) (L/s)	PDWF (Buildout) (L/s)
Bolton (East of West Humber River)	519	1,039	565	1,131

The following are the wastewater servicing opportunities and constraints for the Bolton service area. **Figure 4-2** provides the location of the opportunities and constraints listed below.

1. For Option 1 lands, there is potential to integrate with servicing growth beyond the current approved servicing boundaries in ROPA30.
2. There is an opportunity to extend planned master plan infrastructure to service projected growth to 2051 north of King Street.
3. Future flow splits. There is an opportunity for real time controls to balance flows between proposed Humber Station Road trunk sewer and existing Coleraine Drive trunk sewer.
4. Direct servicing to existing shallow sewers on Coleraine Drive may be challenging for larger development sites due to ground elevations. A detailed review is required during the Bolton Water and Wastewater Capacity Improvement Class EA to ensure feasibility of connections and strategy.
5. There are new identified growth areas without existing adjacent or nearby wastewater infrastructure.
6. There is an opportunity to add a flow split for post-period growth at Clarkway Drive and Mayfield Road.
7. There are capacity constraints within Coleraine Drive sewer to service future growth in the catchment area.
8. There is an opportunity to extend servicing from existing adjacent and planned infrastructure.
9. An extension of servicing is required with an opportunity for strategic oversizing and/or integration with future growth in other areas.
10. There is an opportunity to better understand flows into Bolton Sewage Pumping Station prior to planned upgrades. There is also an opportunity to divert flows away from Coleraine Drive sewer and utilize capacity of the existing/extension of Albion-Vaughan trunk sewer.
11. Decommissioning of Harvestview Sewage Pumping Station in Fall 2022. Flows are to be diverted to the extended Albion-Vaughan trunk sewer.

12. Flow Split. There is an opportunity for real time controls to balance flows between Coleraine Drive and Albion-Vaughan sewers.



Region of Peel working with you

Wastewater Servicing Opportunities and Constraints

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 4-2
May, 2023
722010-WW-001
Projection EPSG:26917

5 SERVICING CONCEPT DEVELOPMENT AND EVALUATION

Water and wastewater servicing strategies were developed to meet interim growth and 2051 growth within the servicing area including the new ROPA30 lands. These servicing strategies were identified based on high-level technical analyses that considered the servicing area's existing and planned infrastructure, short- and long-term growth projections, approved ROPA30 lands, recommendations from past studies, as well as discussions with Region of Peel and Town of Caledon staff.

The water and wastewater servicing **concepts** focused on infrastructure needs within the short-term (next 5 years) and long-term (to 2051) timelines. Short-term servicing requirements focused on the approved ROPA30 lands, whereas the long-term requirements were based on the alignment of the strategies recommended in the 2020 Water and Wastewater Master Plan (2041 projections) as well as the preliminary 2051 strategies. Throughout the evaluation process, the hydraulic models were reviewed to identify and confirm servicing requirements. In addition, meetings were held with key stakeholders (Town of Caledon and Region of Peel) to understand development pressures, existing issues, constraints, and agreement on future servicing needs.

The concepts were developed and evaluated through the following steps, as seen in **Figure 5-1** below:

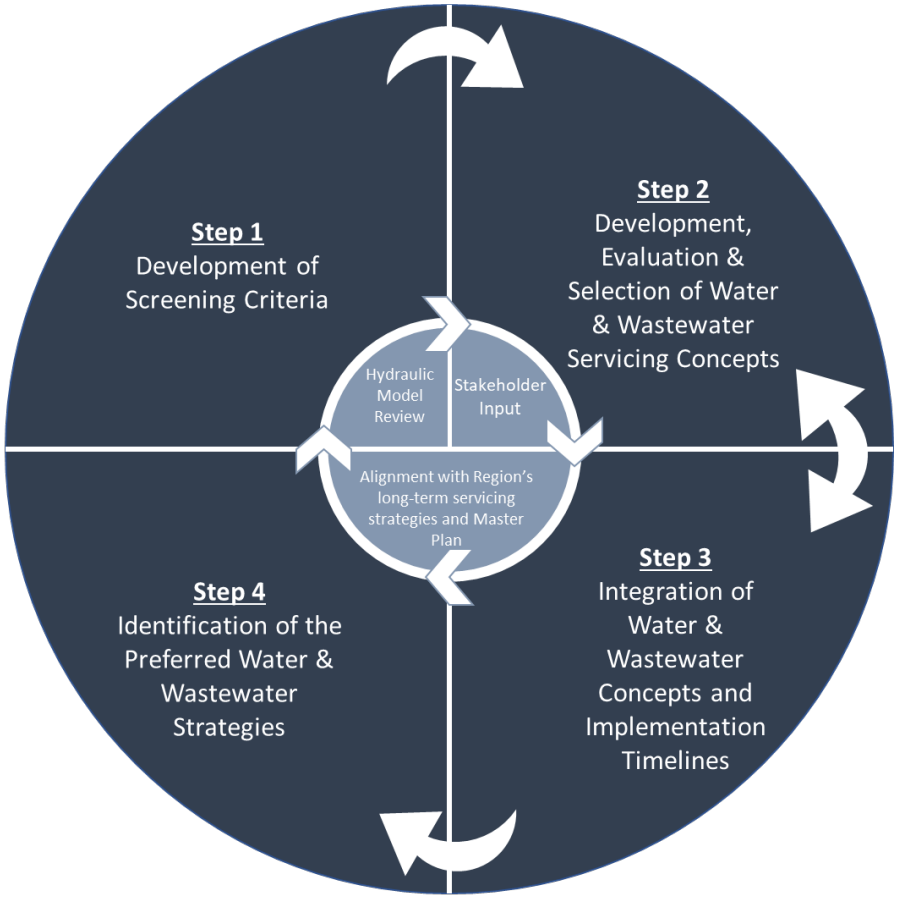


Figure 5-1: Servicing Strategy Development & Evaluation Process

1. Development of screening criteria
2. Development, evaluation and selection of water and wastewater servicing **concepts**:
    - Identification of localized servicing areas
    - Identification of short-term and long-term requirements for each servicing area
    - Development and evaluation of short-term servicing **concept** alternatives
    - Selection of the preferred short-term servicing **concepts**
3. Integration of water and wastewater concepts and implementation timeline
4. Identification of the preferred water and wastewater **strategies**

Steps 2 and Step 3 were completed in tandem as both steps impacted the results of the evaluation and selection of the preferred short-term servicing concepts, however, Step 4 was reviewed again once the preferred short-term concepts were selected.

The following sections detail the above evaluation process.

5.1 Hydraulic Model Review

The purpose of hydraulic model review was to ensure the available water and wastewater models were sufficient for use in the Bolton Water and Wastewater Feasibility Study. Newly calibrated models from the Region were used in combination with the existing 2020 Water and Wastewater Master model.

As part of the Feasibility Study, the following review was completed on both the recently received model and the 2020 Master Plan model:

- Engineering validation to check any errors in the network and model loading.
- Comparison of the model networks to the latest ePAL (External Peel Asset Locator) data to ensure the baseline model was up to date.
- Validation of the network to ensure the flows are representative of current flow conditions using the latest monitoring data.

More details on the water and wastewater model review and analysis are provided in **Appendix A**.

5.2 Stakeholder Input

During the feasibility study, the project team met with the broad Region of Peel team and Town of Caledon to provide project updates, review the servicing concept alternatives, evaluation, and selection of the preferred concepts, and receive feedback to support the study. **Table 5-1** provides a summary of the meetings for this study.

Table 5-1: Feasibility Study Stakeholder Meetings

Stakeholder	Date	Meeting Description
Town of Caledon	August 15, 2022	Meeting to discuss growth and development within the Community of Bolton and present the servicing concept alternatives
Town of Caledon	December 1, 2022	Meeting to discuss the evaluation and selection of the preferred servicing concepts

Town of Caledon meeting packages are provided in **Appendix B**.

5.3 Development of Screening Criteria

High-level screening criteria were developed to support the development and the evaluation of the servicing concept alternatives. The following high-level criteria were used:

- Ability of short-term concept to align with or support the broader Master Plan level strategy
- Maximize the use existing road right of way and/or Region easements
- Good opportunities for trenchless construction and availability for tunnel shaft sites
- Avoidance or mitigation of conflicts with existing infrastructure
- Avoidance or mitigation of significant impacts to residents/businesses and/or traffic disruption
- Ability of the water and wastewater short-term/long term concepts servicing implementation timeline to align within each servicing area (e.g., cannot service residents in an area without both water and wastewater servicing in place at the same time).

5.4 Water Servicing Concepts

5.4.1 Identification of Servicing Areas

Two service areas were identified for short-term and long-term water servicing needs:

- Pressure zone 7B & 7E: to service ROPA30 Option 1 and 3 Lands. These two new pressure zones were considered as one area.
- Pressure zone 6 to service ROPA30 Option 6 Lands, Triangle Lands, and Chickadee Lands

5.4.2 Identification of Short-term and Long-term Requirements

Each service area was reviewed to identify infrastructure needs for both short-term and long-term growth projections. The recommendations made in the 2020 Water and Wastewater Master Plan, Post 2041 Analysis and previous BRES studies, among others; informed the identification of the preliminary long-term requirements. **Table 5-2** provides the list of short and long-term infrastructure requirements for each of the water servicing areas.

Table 5-2: Water Short-Term and Long-Term Infrastructure Requirements by Service Area

Water Servicing Area	Short-term Infrastructure Requirements	Long-term Infrastructure Requirements
Pressure Zone 7B and 7E	• New Pressure Zone 7B Water Pumping Station • New Pressure Zone 7E Water Pumping Station	• New Pressure Zone 7B Storage • New Pressure Zone 7B Feedermains • New Pressure Zone 7E Storage • New Pressure Zone 7E Feedermains
Pressure Zone 6	• New Pressure Zone 6 Feedermains	• New Pressure Zone 6 Water Pumping Station • New Pressure Zone 6 Storage • New Pressure Zone 6 Feedermains

5.4.3 Development, Evaluation and Selection of Short-term Servicing Concept Alternatives

Based on the short-term requirements and the screening criteria, alternative servicing concepts were developed and evaluated to identify the preferred servicing concept for each servicing area.

The alternatives for each water servicing concept were screened against the high-level criteria to select the best overall alternative, considering both short-term and long-term needs.

5.4.3.1 Option 1 and 3 Lands (Pressure Zone 7B and 7E)

Table 5-3 provides the water servicing concept alternatives for pressure zone 7B and 7E. **Figure 5-2** and **Figure 5-3** provides a map of Concept 1 and Concept 2, respectively.

Table 5-3: Pressure Zone 7B Water Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Two (2) Water Pumping Stations • One (1) to service Pressure Zone 7B • One (1) to service Pressure Zone 7E	**Schedule B Class EA may be required** ✓ Improved resiliency with second station servicing 7B ✓ More flexibility for early phasing (independent construction – can build both water pumping stations prior to building the long-term feedermain); however, feedermain is ultimately required to service long-term ✓ Opportunity to service both Option 1 and 3 lands in short-term. × Does not align as well with/support the broader Master Plan level strategy × Increased long-term maintenance/operations requirements (two water pumping stations) × Increased environmental impacts compared to Concept 2 - two water pumping stations vs. single water pumping station (increased land use, greenhouse gas emissions) × Increased community/traffic impacts (two properties required) × Increased jurisdictional impacts (two properties required) × Short-term costs may be lower compared to Concept 2; however long-term costs may be higher compared to Concept 2 (two vs. one water pumping station)	**Screened out**
2	One (1) Water Pumping Station and one (1) feedermain	**Schedule B Class EA may be required** ✓ Efficiency in selecting the water pumping station site and feedermain location concurrently ✓ Better aligns with/supports the broader Master Plan level strategy ✓ Decreased long-term maintenance/operations requirements (only one water pumping station) ✓ Decreased environmental impacts compared to Concept 1 - one water pumping station has more efficiencies (decreased land use, greenhouse gas emissions) ✓ Decreased community/traffic impacts (only one property required) ✓ Decreased jurisdictional impacts (only one property required) × Reduced resiliency with only one water pumping station servicing Pressure Zone 7B and part of Pressure Zone 7E × Short-term costs may be higher compared to Concept 1; however long-term costs may be lower compared to Concept 1 (one vs. two water pumping station)	**Carried Forward** Better aligns with/ supports the broader Master Plan level strategy compared to Concept 1

Concept No.	Concept Description	Key Screening	Screening Results
		× Less flexibility for early phasing (need both the water pumping station and feedermain to service in short-term); however, feedermain is required to service long-term × Water pumping station only services local Option 3 lands in short-term; requires long-term feedermain to service Option 1 lands (single water pumping station and feedermain to 7B)	

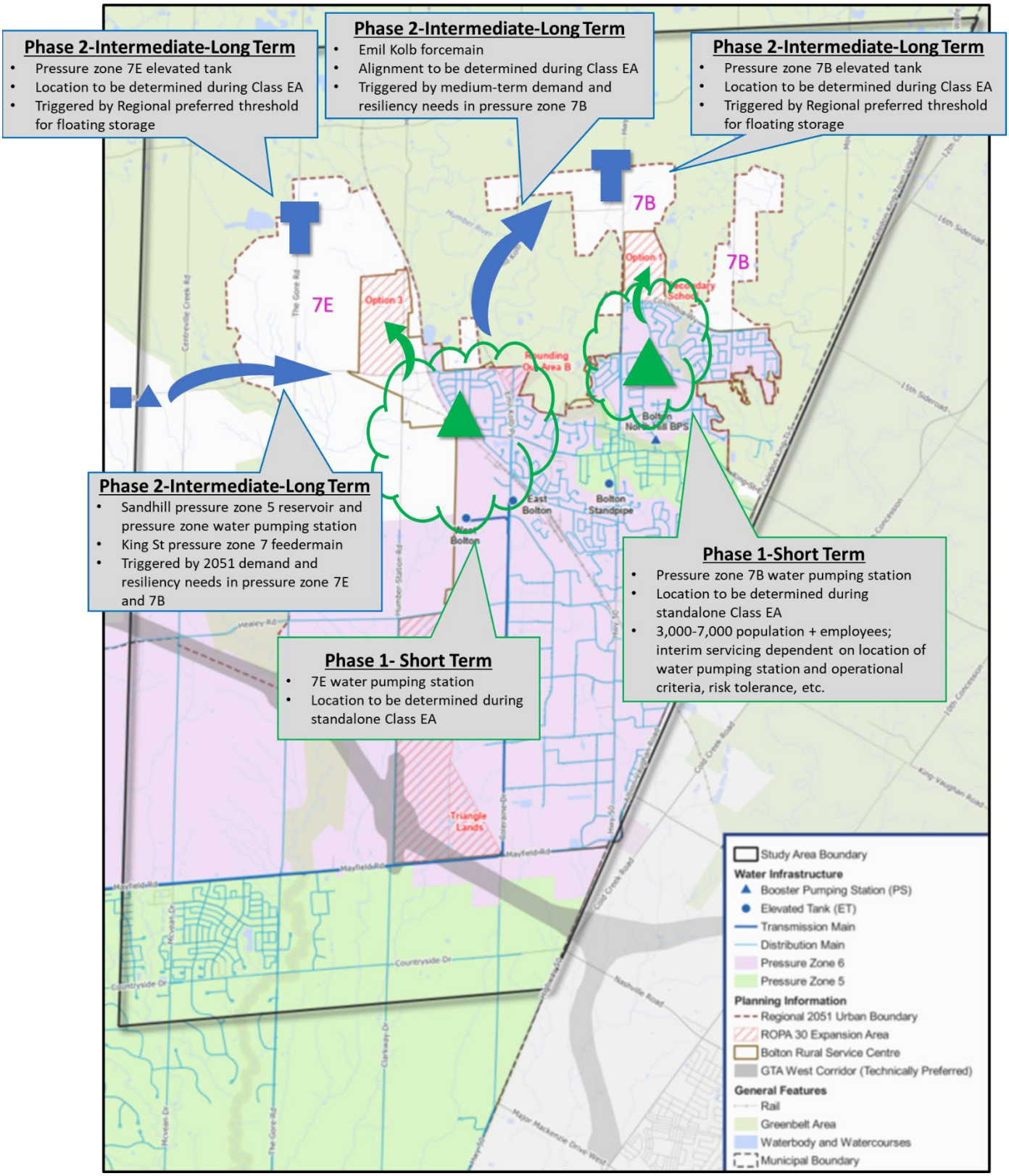


Figure 5-2: Option 1 and 3 Lands – Water Servicing Short-term Concept 1

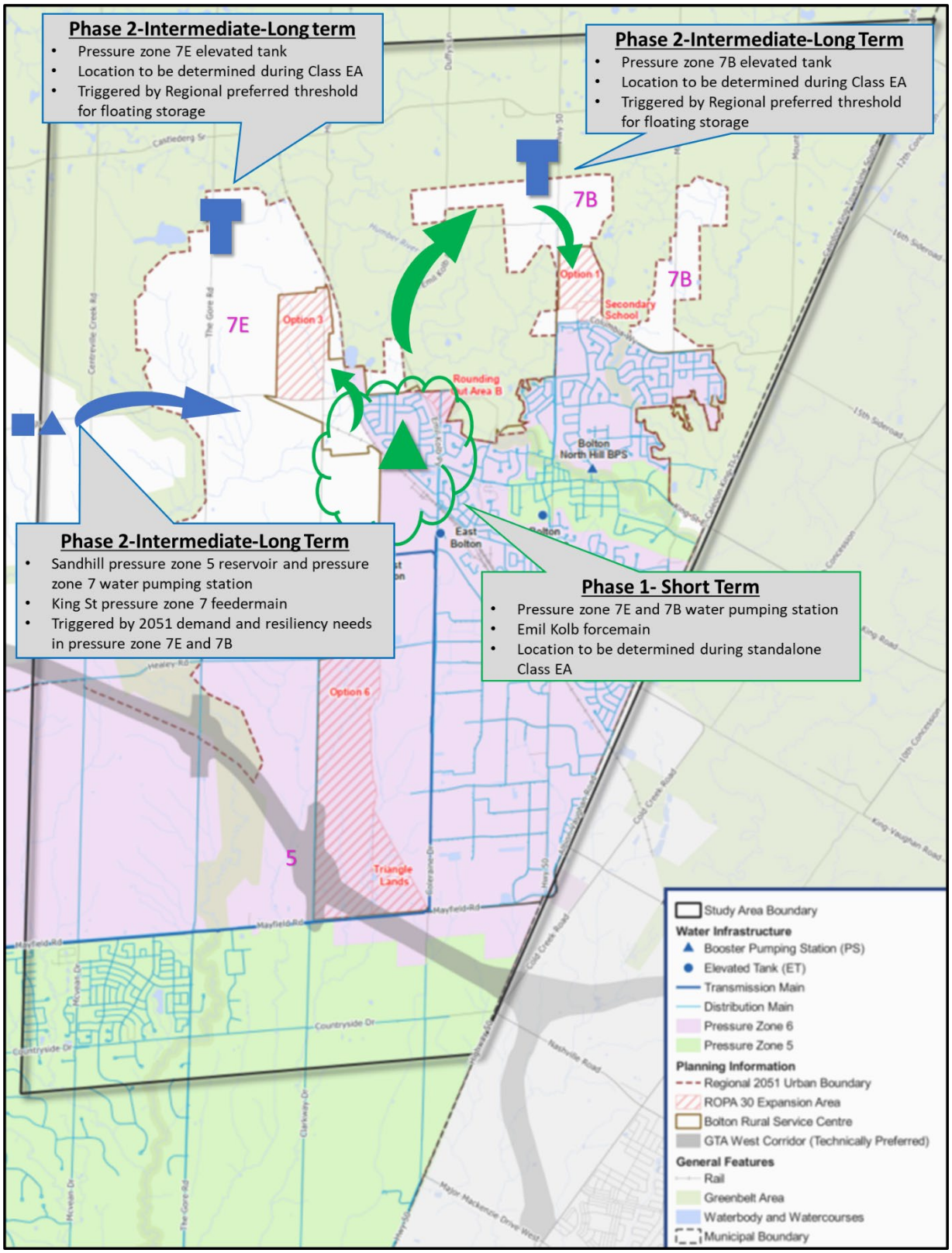


Figure 5-3: Option 1 and 3 Lands – Water Servicing Short-term Concept 2

5.4.3.2 Option 6 Lands (Pressure Zone 6)

To meet short-term needs, one alternative for Pressure Zone 6 servicing area was identified. **Table 5-4** provides the water servicing concept alternative for Pressure Zone 6. **Figure 5-4** provides a map of Concept 1.

Table 5-4: Pressure Zone 6 Water Servicing Concept Alternative

Concept No.	Concept Description	Key Screening	Screening Results
1	New feedermains along the road right of way	Depending on the type of crossings and tunnel depth (if required), may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

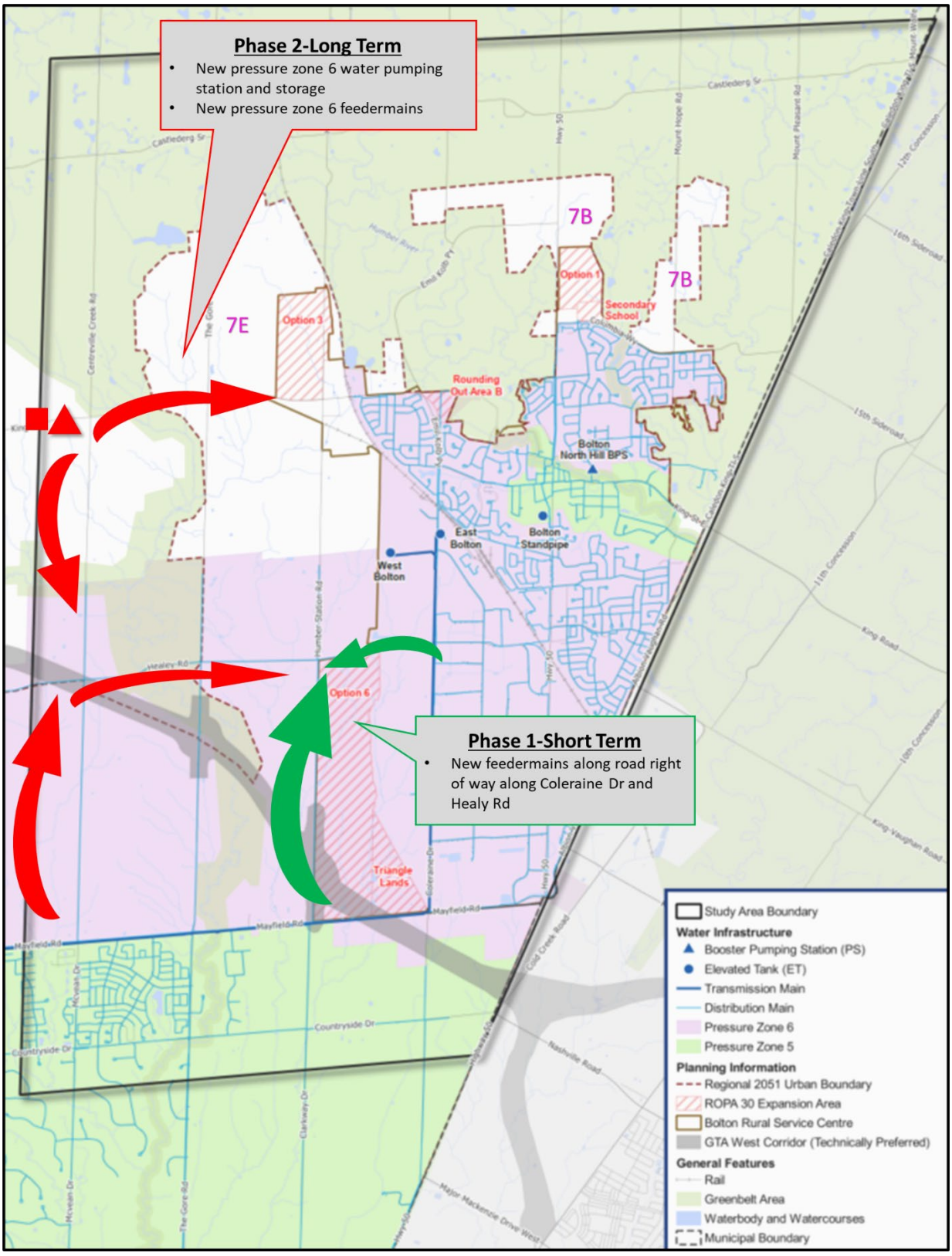


Figure 5-4: Option 6 Lands – Water Servicing Short-term Concept

5.5 Wastewater Servicing Concepts

5.5.1 Identification of Servicing Areas

Four service areas were identified for short-term and long-term wastewater servicing needs:

- Option 1 Lands – North of Columbia Way
- Option 3 Lands – North of King Road
- Chickadee Development Lands
- Option 6 Lands and Triangle Lands

5.5.2 Identification of Short-term and Long-term Requirements

Through a desktop model analysis, each service area was reviewed to identify infrastructure needs for both short-term and long-term growth projections. The recommendations made in the 2020 Water and Wastewater Master Plan, Peel Post 2041 Analysis and previous Bolton Residential Expansion Studies, among others; informed the identification of the preliminary long-term requirements. **Table 5-5** provides the list of short and long-term infrastructure requirements for each of the wastewater servicing areas.

Table 5-5: Wastewater Short-Term and Long-Term Infrastructure Requirements by Service Area

Wastewater Servicing Area	Short-term Infrastructure Requirements	Long-term Infrastructure Requirements
Option 1 Lands	• Extension of servicing via upgrades to existing sewers or new infrastructure and servicing strategy	• Extension of servicing via further upgrades to existing sewers and upgrades to Bolton sewage pumping station; and/or new Emil Kolb sewage pumping station and forcemain
Option 3 Lands	• Extension of servicing to Option 3 Lands	• Extension of servicing to all approved lands North of King Street
Chickadee Development Lands	• Extension of servicing	• Extension of servicing
Option 6 Lands & Triangle Lands	• Extension of servicing	• Extension of servicing

5.5.3 Development, Evaluation and Selection of Servicing Concept Alternatives

Based on the short-term requirements and screening criteria, alternative servicing concepts were developed and evaluated to identify the preferred wastewater servicing concept for each servicing area.

The alternatives for each wastewater servicing concept were screened against high-level criteria to select the best overall alternative, considering both short-term and long-term needs.

5.5.3.1 Option 1 Lands

Table 5-6 provides the wastewater servicing concept alternatives for Option 1 lands. **Figure 5-5** to **Figure 5-8** provides maps of Concept 1 to Concept 4, respectively.

Table 5-6: Option 1 Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity to existing Bolton Sewage Pumping Station via existing / upgraded sewers	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station ✓ Increased phasing flexibility; Phase 1 includes upgrading existing sewers (capacity issues with existing infrastructure) which can potentially service early phase of growth sooner, Phase 2 requires further upgrades of local sewers and Bolton Sewage Pumping Station × Triggers additional upgrades to existing infrastructure × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any upgrades to the pumping station would likely be within floodplain. × Short-term implementation schedule does not align with short-term water servicing implementation schedule × Increased construction challenges including constrained road right of way, construction between two houses at Maidstone Court and Humber River crossing × Potential need for property acquisition for Bolton Sewage Pumping Station upgrades × Potential environmental crossings (trails connecting subdivisions, Humber River crossing); however, majority of built-up area × Upgrades to existing sewers within local neighbourhoods; significant community disruption (residents, traffic) × Leads to a commitment to long-term Bolton Sewage Pumping Station strategy	**Screened out**
2	Gravity to existing Bolton Sewage Pumping Station via new Queen Street sewer	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station ✓ Wide road right of way has potential to decrease construction challenges × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any	**Screened out**

Concept No.	Concept Description	Key Screening	Screening Results
		upgrades to the pumping station would likely be within floodplain × No phasing flexibility; require full alignment to service Option 1 lands × Triggers additional upgrades to existing infrastructure × Does not align with preliminary long-term wastewater strategy × Potential need for property acquisition for Bolton Sewage Pumping Station upgrades × Potential natural environment impacts for construction along Humber River × Highly trafficked road; significant community disruption (businesses, traffic)	
3	Gravity to new Emil Kolb Sewage Pumping Station and Forcemain	**Schedule B Class EA may be required** ✓ Better aligns with/supports the broader Master Plan level strategy and water servicing implementation schedule ✓ Decrease in community impacts; majority of construction will be within rural area away from existing businesses/residents × Increased property easements and acquisition requirements; new Sewage Pumping Station × Triggers Coleraine Drive upgrades or diversion to new Humber Station Drive Sewer × Increased timeline for implementation × Increase in potential natural environment impacts; majority of construction will be within rural areas within natural area and will include environmental crossings	**Carried Forward** Better aligns with/ supports the broader Master Plan level strategy and water servicing implementation schedule
4	Gravity to existing Bolton Sewage Pumping Station via Queen Street or existing / upgraded sewers	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station × Does not align as well with/supports the broader Master Plan level strategy and water servicing implementation schedule × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any upgrades to the Sewage Pumping Station would likely be within floodplain × Requires upgrades to existing infrastructure upstream of Bolton Sewage Pumping Station and a new sewer	**Screened out**

Concept No.	Concept Description	Key Screening	Screening Results
		along Queen Street during the short-term. However, this concept will still require the new infrastructure along Emil Kolb Parkway during the medium term, which would trigger a Schedule B Class EA	

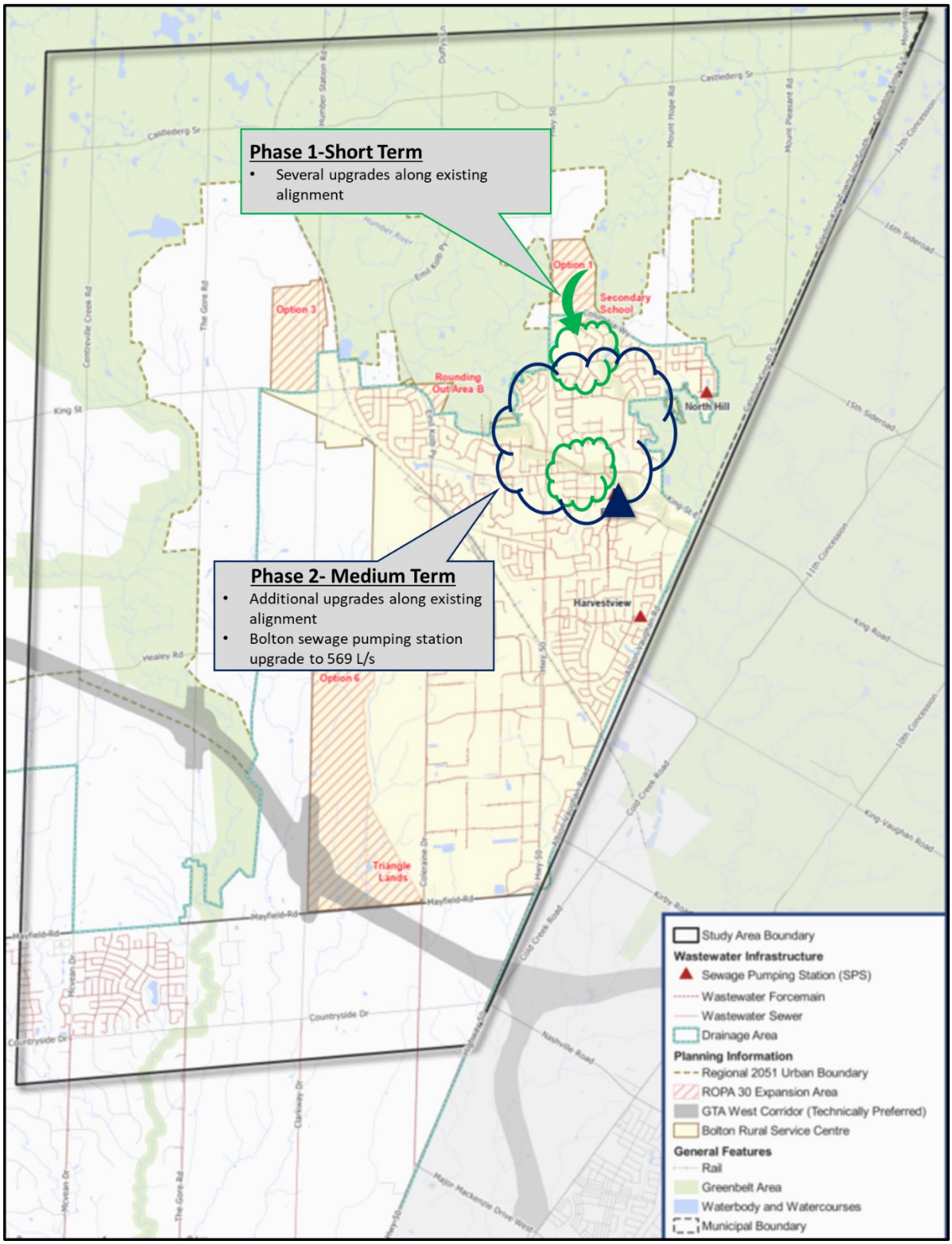


Figure 5-5: Option 1 Lands – Wastewater Servicing Short-term Concept 1

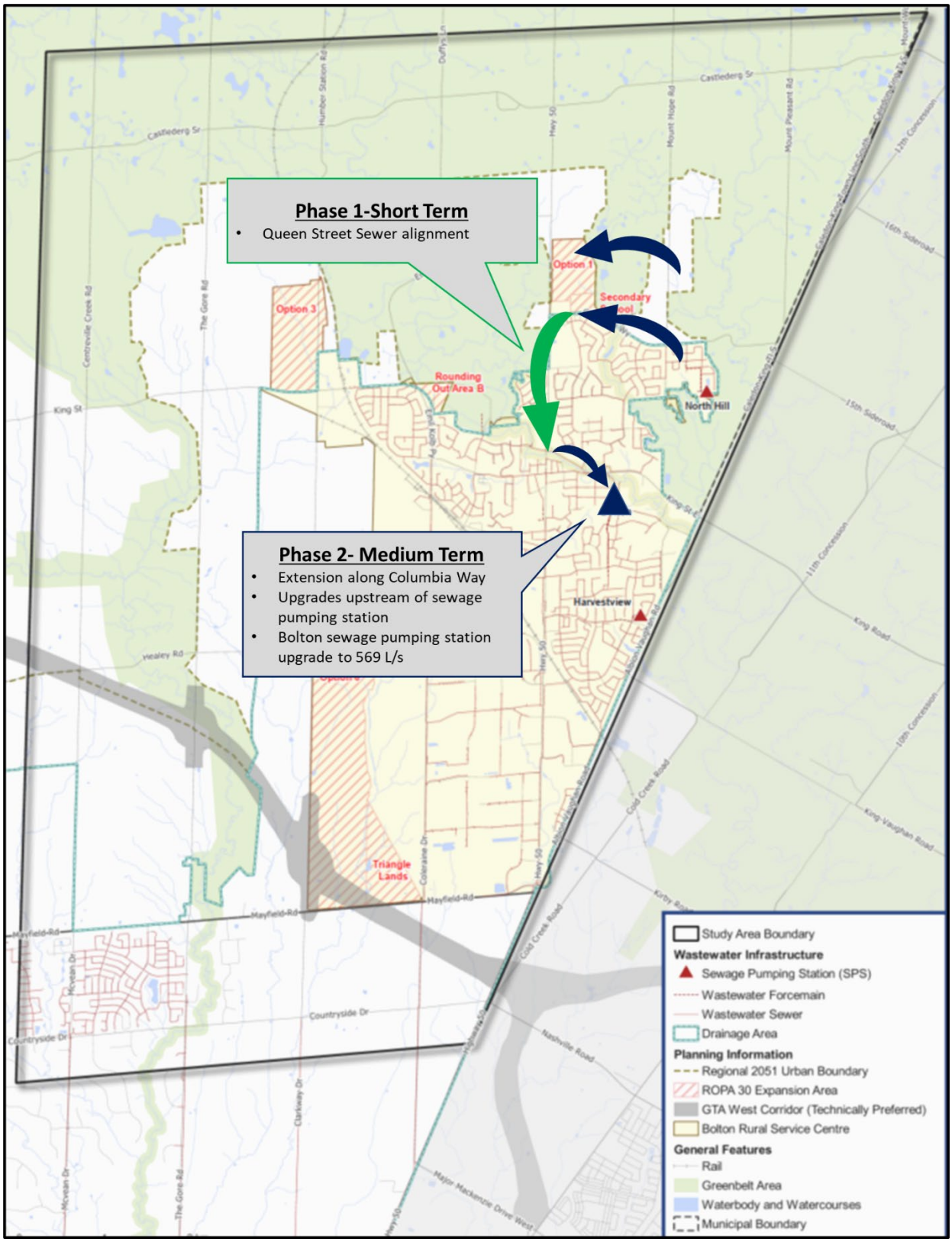


Figure 5-6: Option 1 Lands – Wastewater Servicing Short-term Concept 2

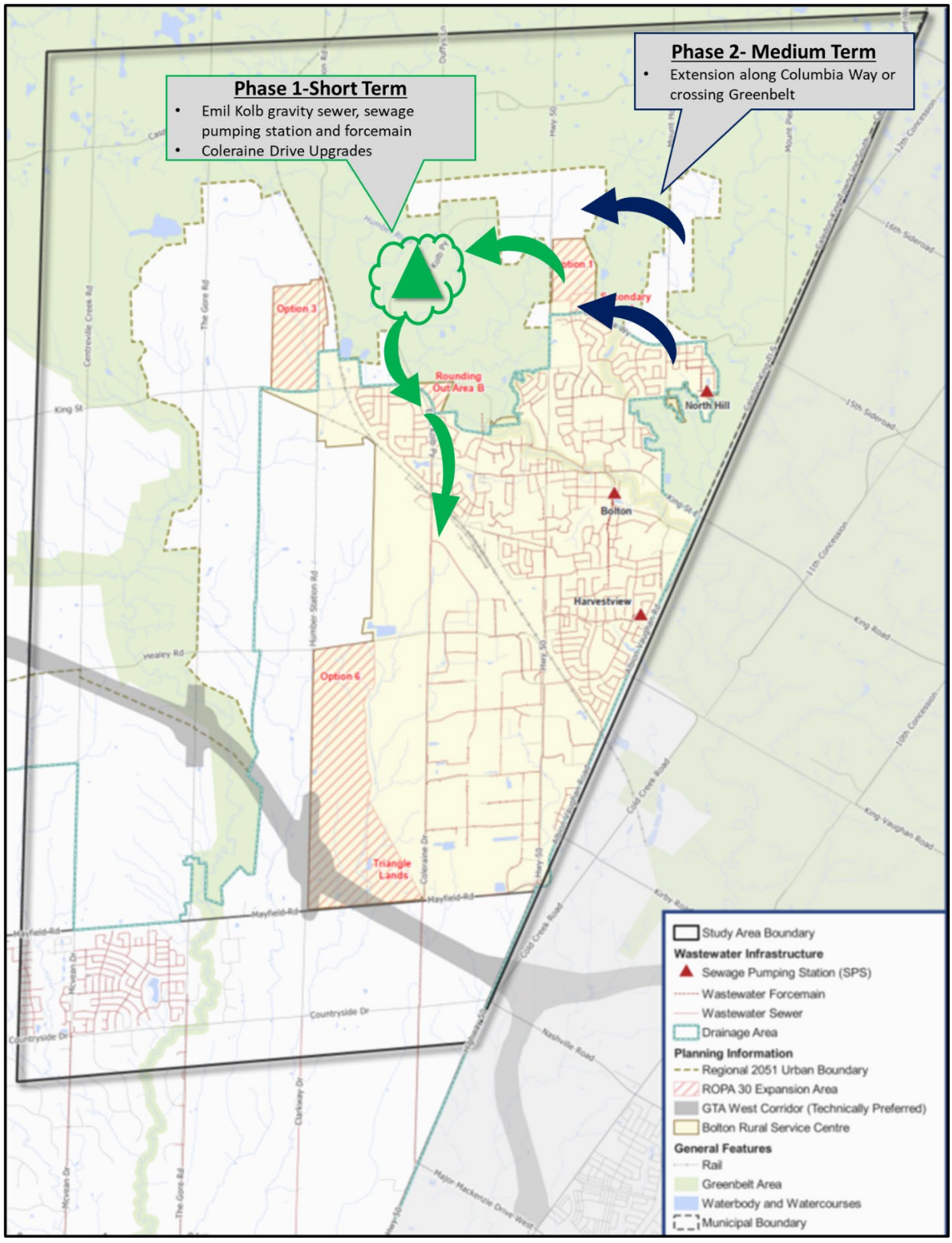


Figure 5-7: Option 1 Lands – Wastewater Servicing Short-term Concept 3

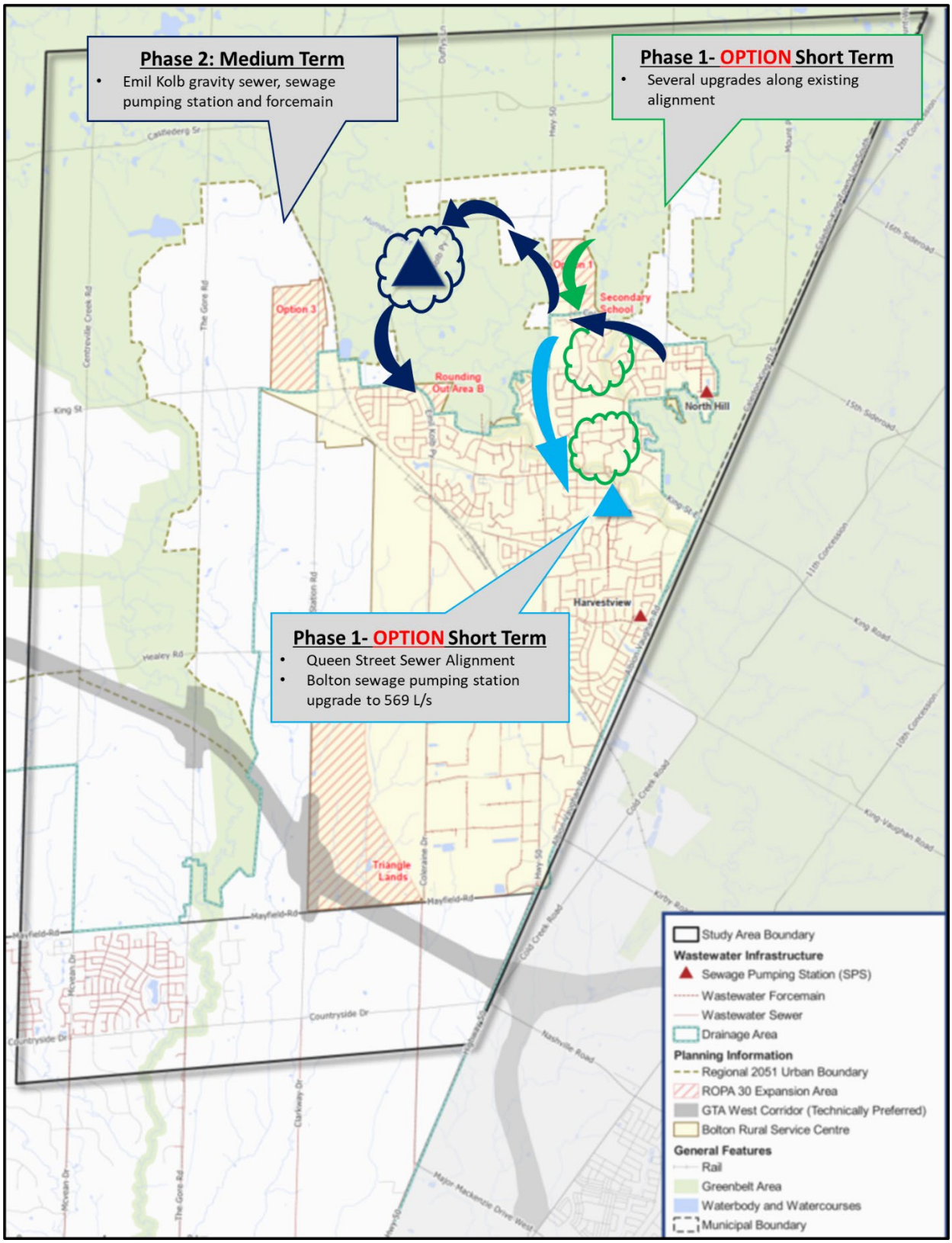


Figure 5-8: Option 1 Lands – Wastewater Servicing Short-term Concept 4

5.5.3.2 Option 3 Lands

Table 5-7 provides the wastewater servicing concept alternatives for Option 3 lands. **Figure 5-9** to **Figure 5-11** provides a map of Concept 1 to Concept 3, respectively.

Table 5-7: Option 3 Lands Water Servicing Concept Alternative

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity to Humber Station Road	**Schedule B Class EA may be required** ✓ Aligns with/supports the broader Master Plan level strategy. ✓ Decreased impacts to community/traffic; Humber Station Road is fully within rural area × Increased environmental crossing to Humber Station Road × Requires complete Humber Station sewer to service any growth × Humber Station Sewer may need to be deep at King Street in order to support western extent of Option 3 Lands	**Screened Out**
2	Gravity to Coleraine Drive	**Exempt Project** ✓ Aligns with/supports the broader Master Plan level strategy, while providing short-term servicing to Chickadee development (Humber Station Road requires a Schedule B therefore this route has a longer implementation timeline) ✓ Enables short-term servicing of Option 3 lands prior to complete Humber Station sewer × Increased impacts to community/traffic; Colerain Drive is within urban area with adjacent businesses	**Carried Forward** Aligns with long-term gravity sewer to Humber Station Road, while providing short-term servicing to Chickadee/Option 3 lands
3	Gravity to Gore Road	**Exempt Project** ✓ Can better support growth in western areas of Option 3 Lands × Sewer lies on western edge of growth areas × Duplication/twinning of Humber Station sewer × Farthest servicing option from existing wastewater infrastructure	**Screened Out**

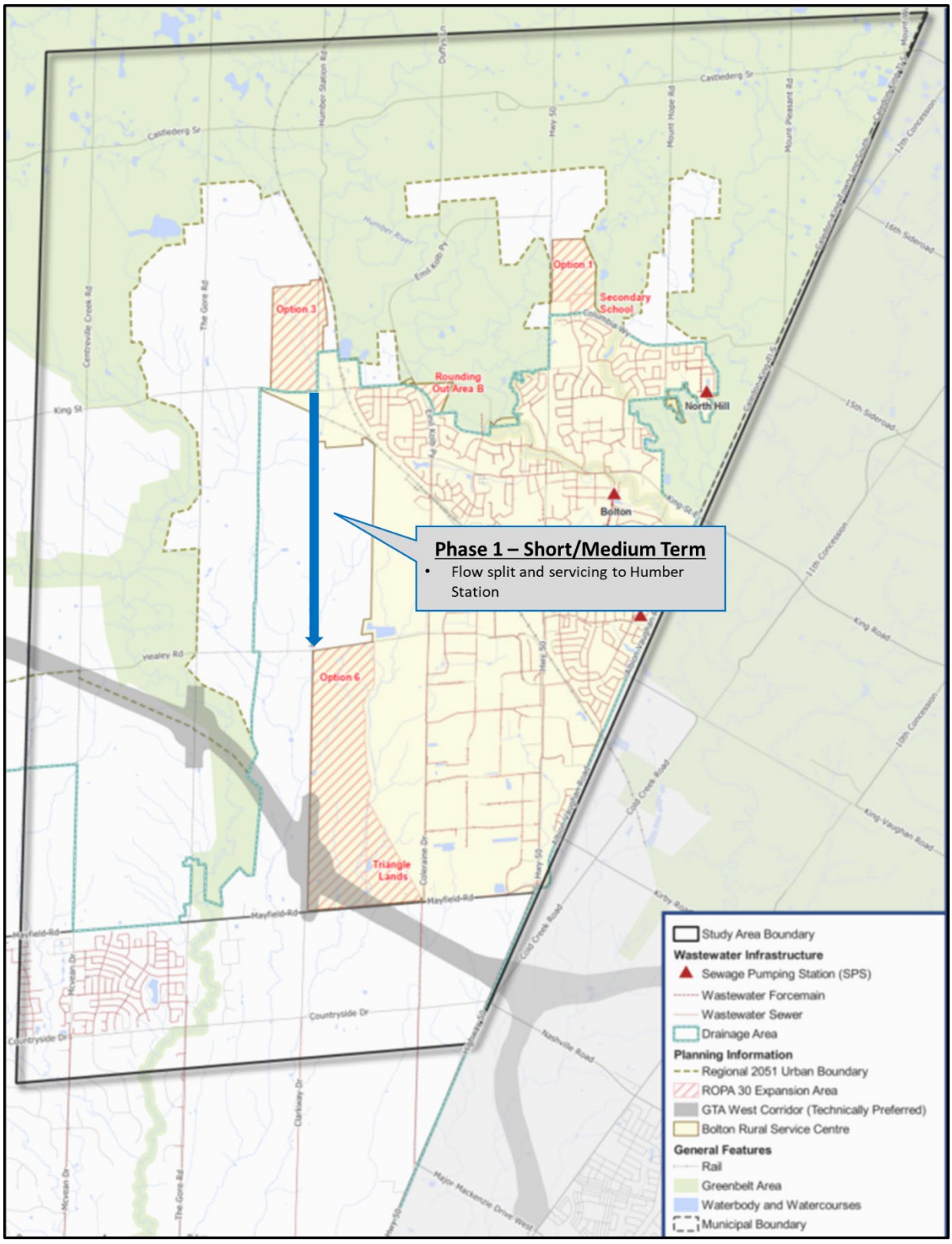


Figure 5-9: Option 3 Lands – Wastewater Servicing Short-term Concept 1

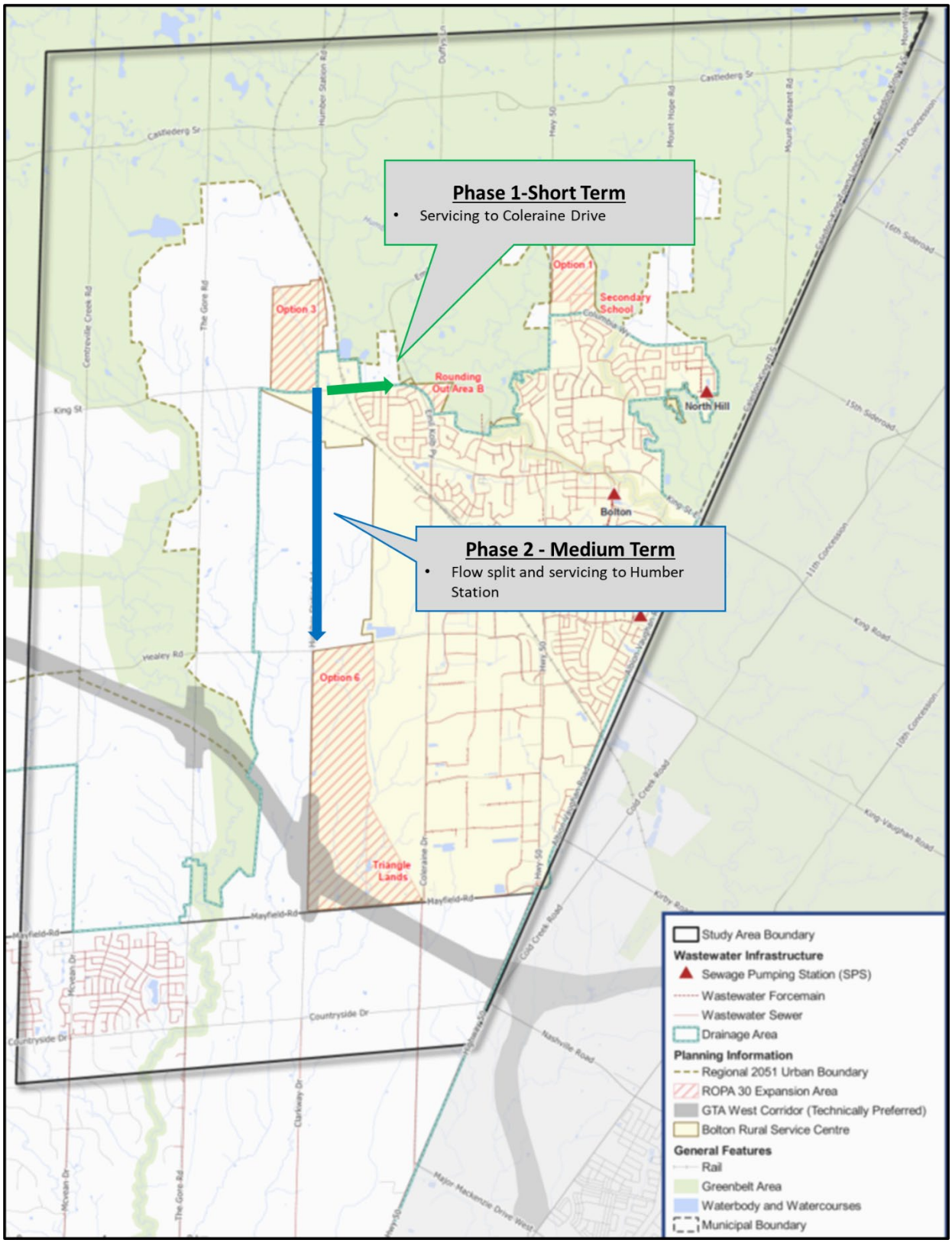


Figure 5-10: Option 3 Lands – Wastewater Servicing Short-term Concept 2

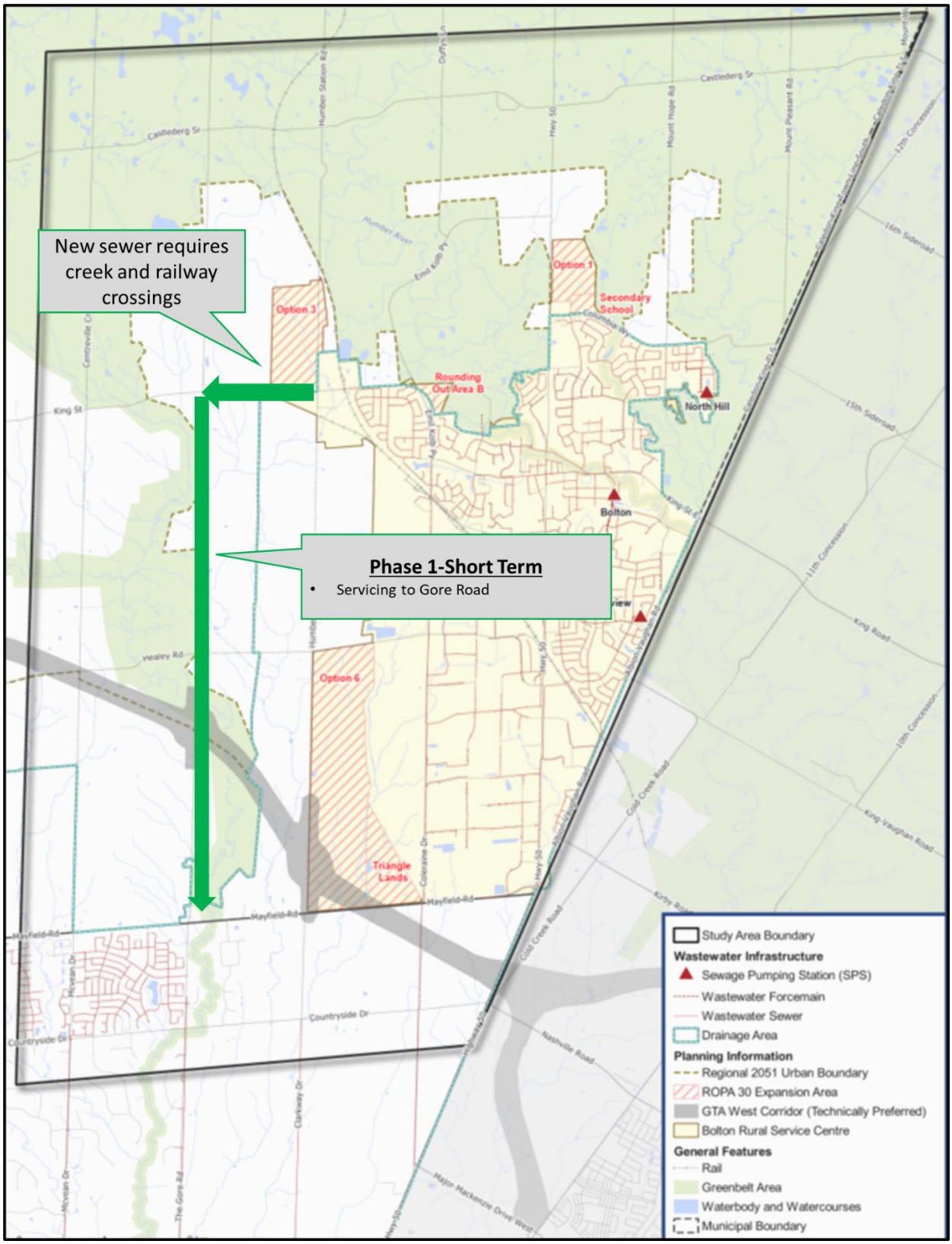


Figure 5-11: Option 3 Lands – Wastewater Servicing Short-term Concept 3

5.5.3.3 Chickadee Lands

To meet short-term needs, one alternative for the Chickadee Lands servicing area was identified. **Table 5-8** provides the wastewater servicing concept alternatives for Chickadee lands. **Figure 5-12** provides a map of the Chickadee Lands Concept.

Table 5-8: Chickadee Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening Results	Screening Results
1	Gravity to Coleraine Drive	Depending on the type of crossings and tunnel depth, may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

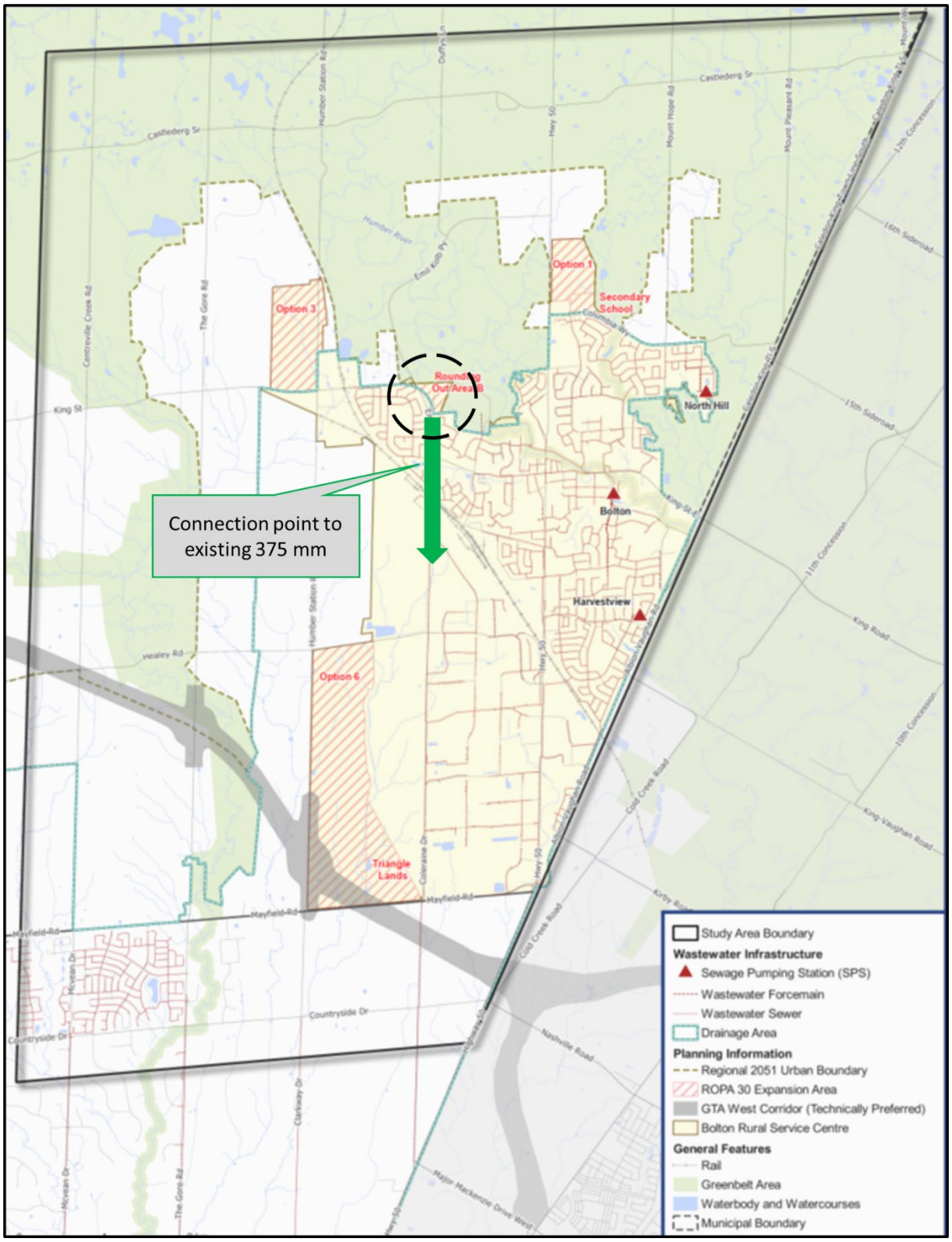


Figure 5-12: Chickadee Lands – Wastewater Servicing Short-term Concept

5.5.3.4 Option 6 and Triangle Lands

To meet short-term needs, one alternative for the Option 6 and Triangle Lands servicing area was identified. **Table 5-9** provides the wastewater servicing concept alternatives for Option 6 and Triangle Lands. **Figure 5-13** provides a map of the Option 6 and Triangle Lands Concept.

Table 5-9: Option 6/Triangle Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity servicing via new Humber Station Road trunk sewer and new Healey Road sewer	Depending on the type of crossings and tunnel depth, may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

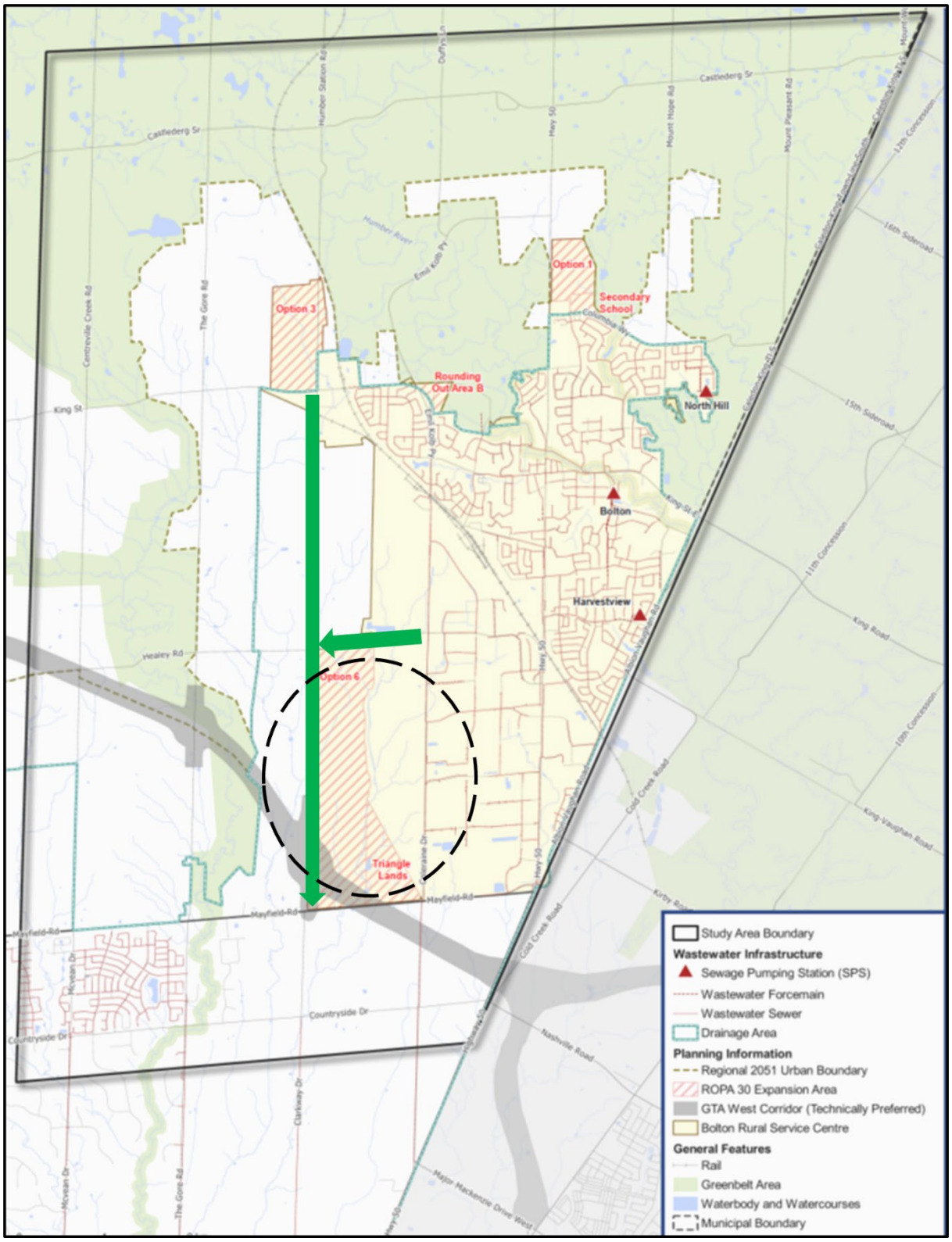


Figure 5-13: Option 6 and Triangle Lands – Wastewater Servicing Short-term Concept

5.6 Integration of Concepts and Implementation Timeline

An important consideration in the evaluation process was the timeline of each water and wastewater short-term concept's servicing implementation. Development is a trigger for accelerating implementation of water and wastewater servicing within an area, however both water and wastewater infrastructure are required to be in service concurrently for occupancy to occur. Each area was reviewed to estimate the timeline of implementation for both the water and wastewater upgrades.

In addition, to meet Region's long-term objectives and optimize the value of new infrastructure, water and wastewater short-term concepts that better aligned with preliminary long-term concepts were preferred.

5.6.1 Option 1 Lands

Table 5-10 provides a summary of the conceptual implementation timeline for all water and wastewater short-term concept alternatives within Option 1 Lands. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of the Class EA, detailed design, construction, and approval of funds.

Wastewater upgrades can occur relatively quickly (Concept 1, 2 and 4) to service minimal growth in the short-term with local sewer upgrades. However, water servicing for this area may trigger a Schedule B Class EA for the associated infrastructure required to create a brand-new pressure zone 7 and would push out development occupancy dates. The fastest way to service this area by water is likely Concept 1 which would build the dedicated pressure zone 7B water pumping station near the pressure zone 7B service area. This could likely be implemented slightly faster than Concept 2, which would require the construction of a feedermain along Emil Kolb Parkway. Both Concepts, however, may require Schedule B Class EAs. In summary, providing expedited wastewater servicing doesn't provide any benefit, since water servicing may require a Class EA study and more significant construction. Additionally, the preference of the Region is to construct a single pressure zone 7 water pumping station (Concept 2) as opposed to two pressure zone 7 water pumping stations (Concept 1).

For this reason, Water Concept 2 and Wastewater Concept 3 were selected:

- The route for the water and wastewater long-term concepts is Emil Kolb Parkway; the preferred concepts both follow this route.
- Wastewater Concept 3 avoids unnecessary infrastructure in other areas.
- The long-term concept for water may require a Schedule B Class EA and the infrastructure (e.g., elevated tank) will not be in service in the short-term. Therefore, a short-term concept for wastewater is unnecessary.

Table 5-10: Option 1 Lands Implementation Timeline

Option 1 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Water Servicing											
Concept 1	*Short Term* - Two BPS (7B BPS)	EA	EA/Design	Design /Const	Const	3,000 - 7,000					
	Long Term - Elevated Tank (7B ET)	EA	EA	EA	Design	Design	Design	Const	Const	16,000	*ET Timing dependent on Ops and Pace of Growth*
	Long Term - Emil Kolb Feedermain	EA	EA	EA	Design	Design	Const				
Concept 2	*Short Term* - Single 7E/B BPS and Emil Kolb Feedermain	EA	EA/Design	Design/Const	Const	~5,000					
	Long Term - Elevated Tank		EA	EA	Design	Design	Design	Const	Const	16,000	*ET Timing dependent on Ops and Pace of Growth*
Wastewater Servicing											
Concept 1	*Short Term* - Local Upgrades	EA/Design	Const	2,000		*Continuous local upgrades from Columbia Way to Bolton SPS required to meet 2051*					
	Medium Term - Additional Local Upgrades		EA	Design	Const	5,000					
	Long Term - Additional Local Upgrades		EA	Design	Design	Design	Const	16,000			
	Long Term - Bolton SPS Upgrade			EA	Design	Design	Const				
Concept 2	*Short Term* - Queen St Upgrade - Columbia to Humber River *Potential EA required depending on extents of upgrades, depth, tunelling, land needs*	*EA/Design	Const	2,000							
	Medium Term - Humber River Sewer Twinning	*Potential to accelerate*	EA	EA	Design	Const		16,000			
	Long Term - Bolton SPS Upgrade			EA	Design	Design	Const				
Concept 3	*Short Term* - Emil Kolb Sewer/SPS/FM	EA	EA/Design	Design/Const	Const	16,000					
Concept 4	*Short Term* - Queen St Upgrade - Columbia to Humber River	*EA/Design/Const	2,000								
	Long Term - Emil Kolb Sewer /SPS/FM	EA	EA/Design	Design/Const	Const	16,000					

**Potential EA required depending on extents of upgrades, depth, tunelling, land needs*

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 1 Lands*

5.6.2 Option 3 Lands

Table 5-11 provides a summary of the estimated implementation timeline for all water and wastewater short-term concept alternatives within Option 3 Lands. All water servicing concept alternatives may require a Schedule B Class EA. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of Class EA, detailed design, construction, and approval of funds.

Water Concept 1 and Wastewater Concept 2 were selected:

- The water servicing Concept 1 better aligns with the broader Master Plan level strategy for Option 3 lands.
- The Humber Station gravity sewer is required in the long-term and will require some time to be constructed up to this area. However, the Option 3 lands and the Chickadee lands can be serviced in the short-term (no Schedule B Class EA required) via new gravity sewers to Coleraine Drive.

Table 5-11: Option 3 Lands Implementation Timeline

Option 3 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Water Servicing											
Concept 1	*Short Term* - Single 7E BPS or 7E&7B BPS	EA	EA/Design	Design/Const	Const	TBD					
	Long Term - Elevated Tank (7E ET)	EA	EA	EA/Design	Design	Const	Const	TBD	*ET Timing dependent on Ops and Pace of Growth*		
	Long Term - Sandhill Res and Zone 7 PS				EA	EA	EA/Design	Design	Const	Const	TBD
Wastewater Servicing											
Concept 1	*Short Term* - Gravity to Humber Station	Design	Design	Const	Const	Ph1/Ph2					
	Medium Term - Flow split and servicing to Humber Station			Design	Const	Flow Split					
Concept 2	Short Term - Gravity to Coleraine	Design	Const	Ph 1							
	Medium Term - Flow split and servicing to Humber Station		Design	Design	Const	Const	Ph 2				

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 3 Lands*

5.6.3 Options 6 Lands

Table 5-12 provides a summary of the estimated implementation timeline for all water and wastewater short-term concepts within Option 6 Lands. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of Class EA, detailed design, construction, and approval of funds.

There were limited alternatives available for this servicing area since the servicing is considered to be straight forward with future infrastructure located along road right of ways. Water Concept 1 and Wastewater Concept 1 do not require a Schedule B Class EA and can move forward to detailed design.

Table 5-12: Option 6 Lands Implementation Timeline

Option 6 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2029	2030
Water Servicing											
Concept 1	*Short Term* - New feedermains along road right of way	Design	Const	Option 6							
Wastewater Servicing											
Concept 1	*Short Term* - Gravity servicing via new Humber Station Rd trunk sewer and new Healey Rd sewer	Design	Const	Option 6							

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 6 Lands*

5.7 Identification of the Preferred Water & Wastewater Strategies

Through the evaluation process and multiple workshops with the Region of Peel and feedback from the Town of Caledon, the preferred water and wastewater concepts were selected.

Detailed water and wastewater strategies were identified based on the preferred concepts. Each project's potential construction impacts were assessed to identify if projects may be exempt from the Schedule B Class EA process.

- If projects were recommended along existing road right of ways (no property requirements) and minimal impacts to the natural and socio-cultural environment, then the project may be exempt from the Schedule B Class EA process. The project could move forward to detailed design stage.
- If the project required property easements and/or could have moderate to significant impacts to the natural and socio-cultural environment, then the project may require a Schedule B Class EA. These projects should still be considered conceptual as they may be located on future road alignments and will be dependent on the Class EA evaluation process for the selection of the location of the alignment and/or sites prior to moving to detailed design.
- **Table 5-13** and

Table 5-14 provides the list of water and wastewater projects and associated next steps. Each project has been categorized below depending on their funding, servicing area and timeline.

- **Development Charge (DC) Funded**: These projects have been identified in the 2020 Water and Wastewater Master Plan (MP) (includes Master Plan Project ID) and have Region Council approved funding (DC funded).
- **ROPA30**: These projects service the ROPA30 lands and are pending Regional Council funding approval (not DC funded). They may be development driven and may be exempt from the Class EA process (project schedule and Class EA exemptions/requirements will be further assessed at the onset of the Class EA study).
- **ROPA30 (EA Study Required)**: These projects service the ROPA30 lands and are pending Regional Council funding approval (not DC funded). They may require a Class EA (project schedule and Class EA exemptions/requirements will be further assessed at the onset of the Class EA study).
- **Long-term Needs**: These projects have not been identified in the 2020 Water and Wastewater Master Plan (MP) (no Master Plan Project ID) and therefore are pending Regional Council funding approval (not DC funded). They will be included in the planned 2025 Water and Wastewater Master Plan (MP) Update.

Figure 5-14 and **Figure 5-15** provide maps of the preferred water and wastewater servicing project locations.

Table 5-13: Preferred Water Servicing Projects

ID	Project Description	2020 Master Plan ID	Project Category
W01	New Z6E & Z7E Pumping Station (Sandhill)	N/A	Long-term needs
W02	New Z5 Storage	N/A	Long-term needs
W03	Z6 600-mm sub-transmission main on Healy Road from Humber Station Road to Coleraine Drive	W-ST-186	DC funded
W04	Z6 400-mm watermain on Humber Station Road from future street north of Mayfield Road (potential George Bolton extension) to Healey Road	W-D-192	DC funded

ID	Project Description	2020 Master Plan ID	Project Category
W05	Z6 400-mm watermain on Humber Station Road from Mayfield Road to 1450m northerly to potential George Bolton extension	W-D-236	DC funded
W06	Z6 400-mm watermain on a future street north of Mayfield Road (potential George Bolton extension) from Humber Station Road to Coleraine Drive	W-D-191	DC funded
W07	Z6 750-mm sub-transmission main on Innis Lake Road from the Tullamore Pumping Station to Healey Road	W-ST-185	DC funded
W08	Z6 600-mm sub-transmission main on Healy Road from Innis Lake Road to Humber Station Road	W-ST-187	DC funded
W09	Z6 400-mm watermain on a future street north of Healey Road from West Bolton Elevated Tank to Humber Station Road	W-D-188	DC funded
W10	Z6 400-mm watermain on Humber Station Road from Healey Road to a future street northerly	W-D-189	DC funded
W11	Z6 400-mm watermain on Humber Station Road from a future street north of Healey Road to approximately 1200m northerly	W-D-190	DC funded
W12	Z6 400-mm watermain on a future street from Healy Road to approximately 1680m southerly, east of Humber Station Road	W-D-234	DC funded
W13	Z6 400-mm watermain on a future street from Humber Station Road to 660m westerly	W-D-235	DC funded
W14	Z6 400-mm watermain on a future street from Healey Road to 1220m northerly, west of Humber Station Road	W-D-238	DC funded
W15	Z6 400-mm watermain on a future street from Humber Station Road to 680m westerly, south of King Street	W-D-239	DC funded
W16	Z6 400-mm watermain on a future street from Humber Station Road to 680m westerly	W-D-240	DC funded
W17	Z6 400-mm watermain on a future street from future street north of Healey Road to 910m northerly, west of Humber Station Road	W-D-241	DC funded
W18	New Z7E Storage (East Caledon Elevated Tank)	N/A	Long-term needs
W19	New Z7E/7B Water Pumping Station (Chickadee)	N/A	ROPA30 (EA study required)
W20	Z7E watermain along King Street from Sandhill to Humber Station Road	N/A	Long-term needs
W21	Z7E watermain along King Street from Chickadee Lane to Humber Station Road	N/A	ROPA30
W22	Z5E 1200-mm transmission main from Tullamore to Sandhill	N/A	Long-term needs
W23	Z7 watermain from King Street to Z7E Storage	N/A	Long-term needs
W24	Z6 sub-transmission main from Z7 BPS to existing 1050-mm stub	N/A	ROPA30

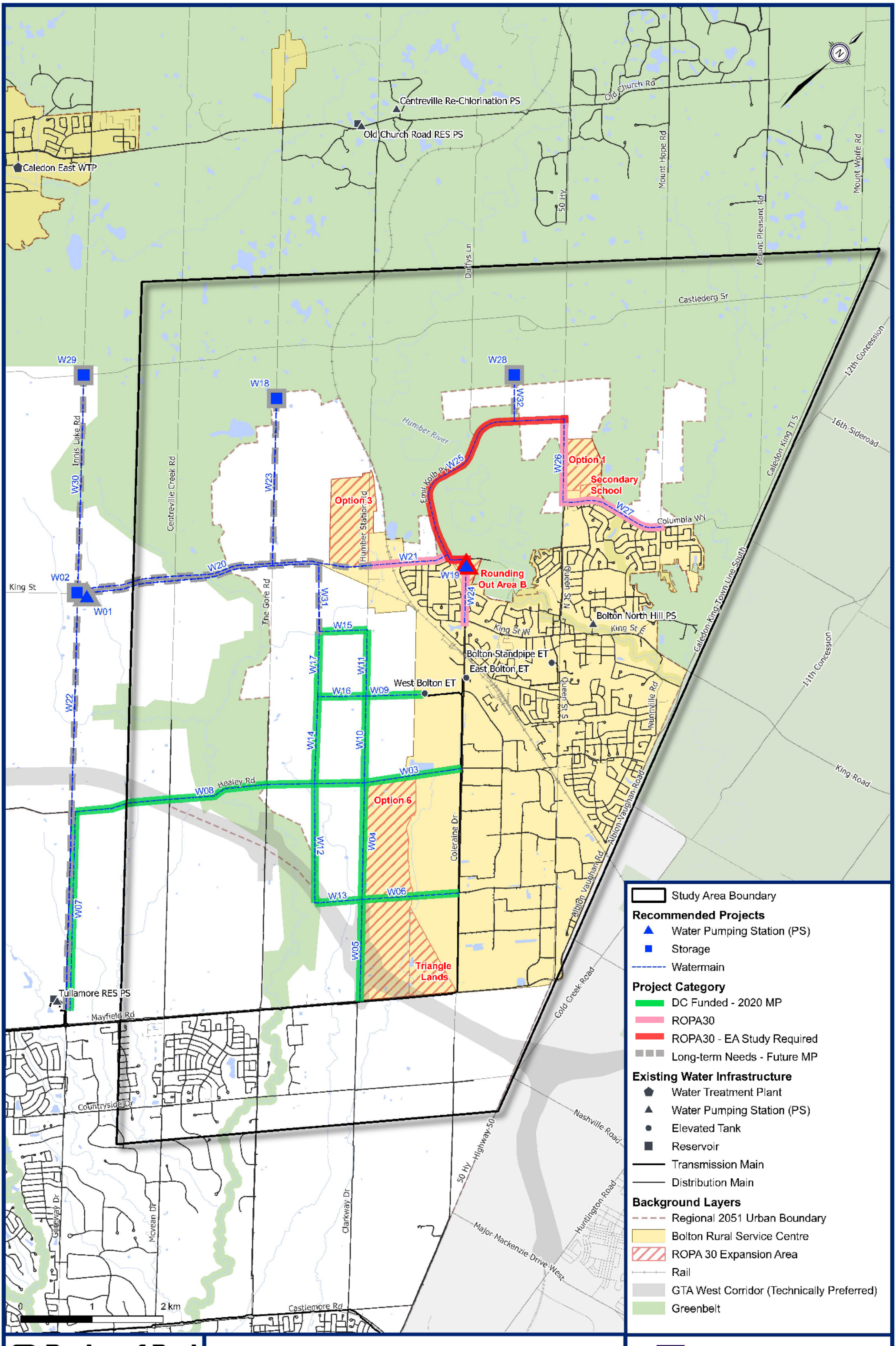
ID	Project Description	2020 Master Plan ID	Project Category
W25	Z7 watermain along Emil Kolb Parkway from King Street to Hwy 50	N/A	ROPA30 (EA study required)
W26	Z7 watermain along Highway 50 / Queen Street from Emil Kolb Parkway to Columbia Way	N/A	ROPA30
W27	Z7 watermain along Columbia Way from Highway 50 to Mount Hope Road	N/A	ROPA30
W28	New Z7B Storage	N/A	Long-term needs
W29	New Z6 Storage	N/A	Long-term needs
W30	Z6 750-mm watermain from Sandhill to South Albion Storage	N/A	Long-term needs
W31	Z6 600-mm watermain from Sandhill to Zone 6 distribution network	N/A	Long-term needs
W32	Z7 water main from Emil Kolb Parkway to Z7B Storage	N/A	Long-term needs

Table 5-14: Preferred Wastewater Servicing Projects

Project ID	Project Description	Master Plan ID	Project Category
WW01	750-mm sanitary sewer on Clarkway Drive from Countryside Drive to Mayfield Road	WW-T-005	DC funded
WW02	750-mm sanitary trunk sewer on Humber Station Road from Mayfield Road to 1600m northerly	WW-T-170	DC funded
WW03	750-mm sanitary trunk Sewer on Humber Station Road from Healey Road to 1500m southerly	WW-T-171	DC funded
WW04*	450-mm sanitary sewer on Healey Road from Coleraine Drive to Humber Station Road	WW-ST-199	DC funded
WW05*	450-mm sanitary sewer on a future street from Humber Station Road to 750m north-westerly	WW-ST-198	DC funded
WW06*	450-mm sanitary sewer on a future street from Humber Station Road to 960m north easterly	WW-ST-197	DC funded
WW07	375-mm sanitary sewer on Mayfield Road from Coleraine Drive to Humber Street Road	N/A	ROPA30
WW08	525-mm sanitary sewer on Emil Kolb from King Street to existing 450mm south of Harvest Moon Drive.	N/A	ROPA30
WW09*	525-mm sanitary sewer on Humber Station Road from Healey Road to King Street	WW-ST-204	DC funded
WW10*	450-mm sanitary sewer on a future street from Humber Station Road to 670m westerly	WW-ST-206	DC funded
WW11*	375-mm sanitary sewer on a future street from a future street 890m north of Healey Road to 800m northerly	WW-ST-207	DC funded
WW12*	375-mm sanitary sewer on a future street from a future street east of Humber Station Road to 780m northerly	WW-ST-202	DC funded

Project ID	Project Description	Master Plan ID	Project Category
WW13*	450-mm sanitary sewer on a future street from Humber Station Road to 690m easterly, north of Healey Road	WW-ST-201	DC funded
WW14	525-mm sanitary sewer on King Street from Humber Station Road to Emil Kolb Parkway	N/A	ROPA30
WW15	New Humber sewage pump station (SPS)	N/A	ROPA30 (EA study required)
WW16	300-mm twin sanitary forcemains from Humber SPS to King Street	N/A	ROPA30 (EA study required)
WW17	525-mm sanitary sewer on Emil Kolb Parkway from Highway 50 to Humber SPS	N/A	ROPA30 (EA study required)
WW18	525-mm sanitary sewer on Highway 50 from Columbia Way to Emil Kolb Parkway	N/A	ROPA30 (EA study required)
WW19	375-mm sanitary sewer on Columbia Way from Mount Hope Road to Highway 50	N/A	ROPA30
WW20	525-mm sanitary sewer on King Street from Emil Kolb Parkway to Humber Station Road	N/A	Long-term needs
WW21	525-mm sanitary sewer on King Street from Humber Station to future street to the West	N/A	Long-term needs
WW22	Sanitary sewer on the Gore Road from north of King St to Mayfield	N/A	Long-term needs
WW23	750-mm sanitary sewer on The Gore Road from Mayfield Road to just north of Countryside Drive	WW-T-085	DC funded

*Indicate project has been modified from the Master Plan alignment.



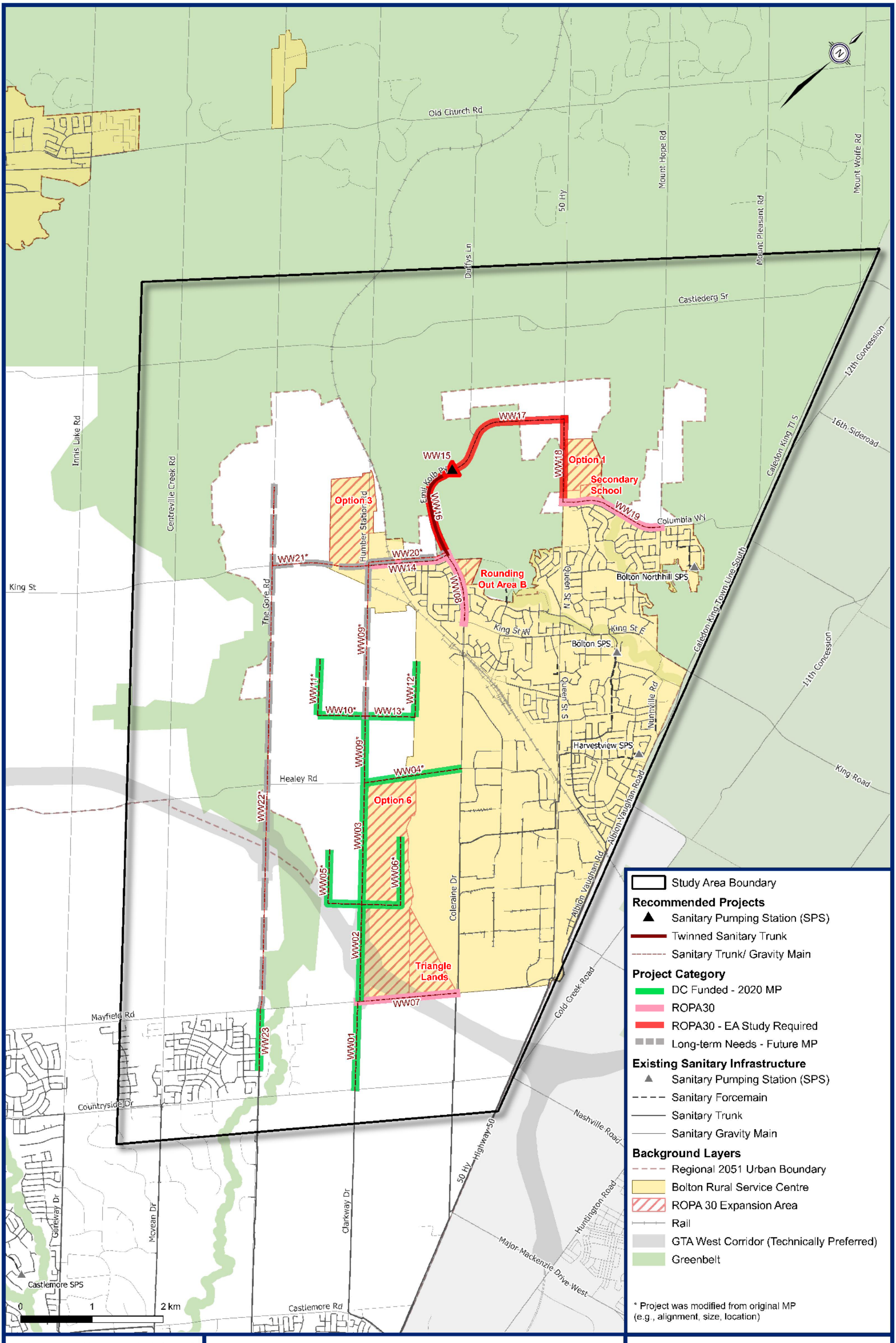
Region of Peel working with you

Preliminary Recommended Water Project Categories

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 5-14
June, 2023
722010-W-004
Projection EPSG:26917



Region of Peel
working with you

Preliminary Recommended Wastewater Project Categories

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 5-15
June, 2023
722010-WW-004
Projection EPSG:26917

5.8 Conceptual Cost Estimates

The conceptual cost estimates for the preferred Water and Wastewater Concepts are reported at the Master Plan level (Class 5 and Class 4 estimates) and follow a similar methodology as the 2020 Water and Wastewater Master Plan based on an overall project unit cost approach. Project costs are generated from unit rates with added contingencies. In the preparation of the project costing, the Region has also considered other factors including the rate of inflation and a high-level review of recent Region project costing. Projects categorized as "long-term needs" have been costed, however, they will be evaluated in more detail during the planned 2025 Water and Wastewater Master Plan.

The cost estimate approach used a classification system to categorize cost estimates. These classes represent different phases of planning and design resulting in different methods of estimation and levels of accuracy. For the purpose of this Feasibility Study, the cost estimates follow a **Class 5 Estimate** for newly proposed capital projects and a **Class 4 Estimate** for projects previously estimated in the 2020 Water and Wastewater Master Plan for the Lake-Based Systems.

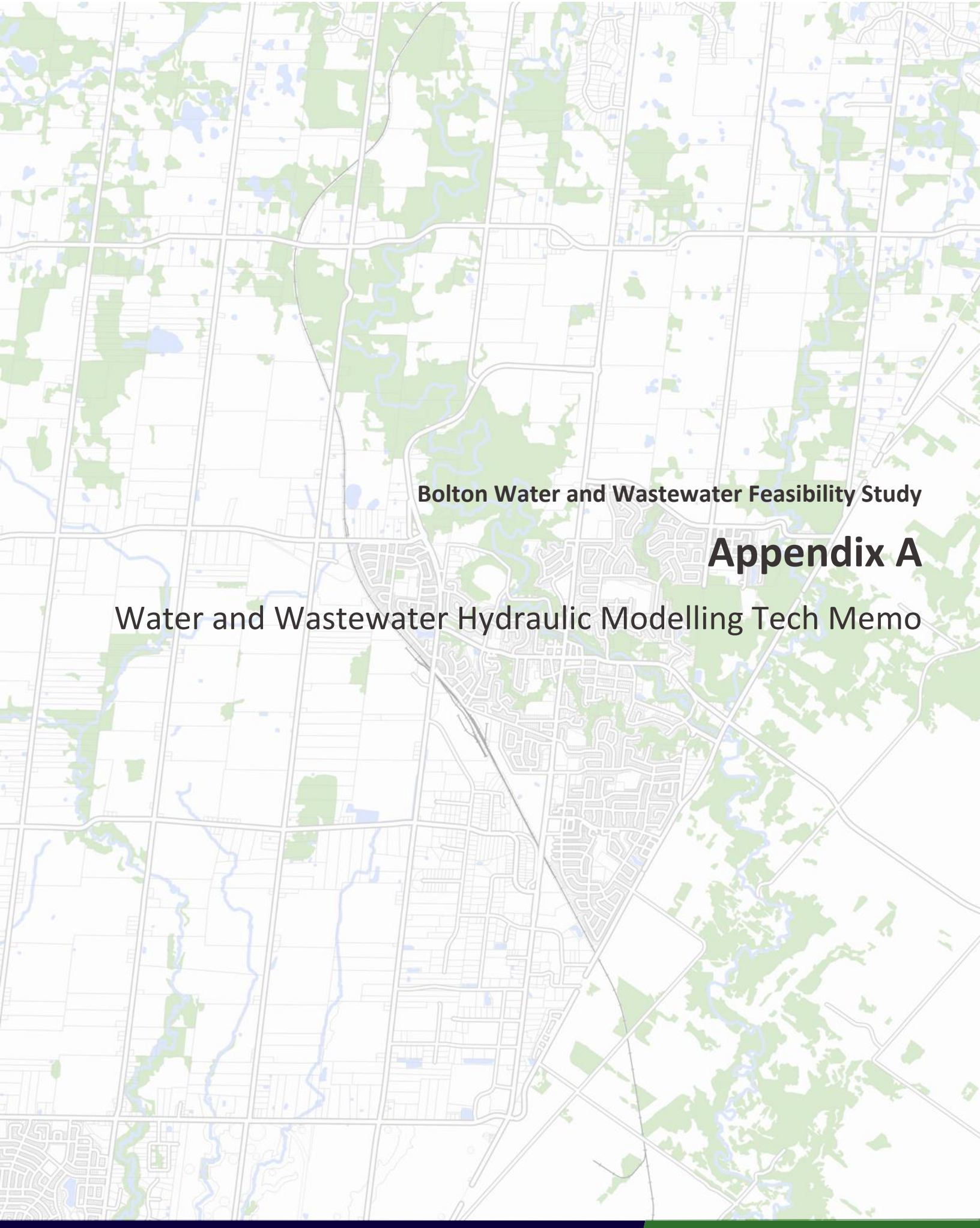
The Class 5 Estimate Costing Methodology is a high-level cost estimate with a long-term project horizon for Master Plans, Infrastructure Plans and Capital Budgeting and is used at an early stage in absence of better information. It is a desktop level analysis based on similar projects and engineers informed approximation formed on limited available information. The estimation methods involved in a Class 5 estimate include experience and judgement, historical values, "rules of thumb", factor estimating based on similar projects and other basic calculations. Class 5 Estimates typically have an accuracy range of +/-40% - +/-70%.

The Class 4 cost estimate is similar to the Class 5 Estimate but is more useful for planning purposes in preparation for project pre-design and is included in the Capital Projects List. It is an approximate method of estimating using inclusive "all in" unit rates, typically based on intensive research of historic data. Class 4 Estimates typically have an accuracy range of +/-20% - +/-40%.

The total estimated costs for the recommended water and wastewater projects are approximately $502.4 million and $190.4 million, respectively. Costing details for each individual project can be found in **Appendix C**.

6 NEXT STEPS

The feasibility study has identified recommended water and wastewater short-term and long-term servicing projects to service Bolton. The water and wastewater projects that are exempt from the Class EA process can move forward to detailed design. The water and wastewater projects that may require a Schedule B Class EA will require further review through the Class EA assessment. The Class EA will develop, evaluate, and select the preferred routes/sites for the identified Schedule B projects prior to moving forward to detailed design.



Bolton Water and Wastewater Feasibility Study

Appendix A

Water and Wastewater Hydraulic Modelling Tech Memo

Bolton Water and Wastewater Capacity Improvements Feasibility Study

Tech Memo – Hydraulic Analysis

GMBP Project No. 722010

January 2023

TABLE OF CONTENTS

1 INTRODUCTION

The purpose of this technical memorandum is to provide an overview of the hydraulic modelling activities that took place as part of the Bolton Water and Wastewater Capacity Improvements Feasibility Study (Bolton Feasibility Study).

The Region of Peel provided water and wastewater hydraulics models for use in the Bolton Feasibility Study. The hydraulic models were reviewed and validated to ensure they were fit for use as part of this study. In addition, in collaboration with the Region several updates were performed where applicable to both water and wastewater hydraulic models.

The following sections outline the hydraulic models review and validations, model updates and recommendations, and provide an overview of modelling activities that informed the development and evaluation of water and wastewater servicing concepts for the feasibility study.

2 WATER HYDRAULIC MODELLING

2.1 Water Hydraulic Model Review

A screenshot of the provided InfoWater model is shown in Figure 1, which also demonstrates the overall study area and the current and future (2051) servicing areas. The figure highlights the watermain network along with key facilities that service the existing Bolton area:

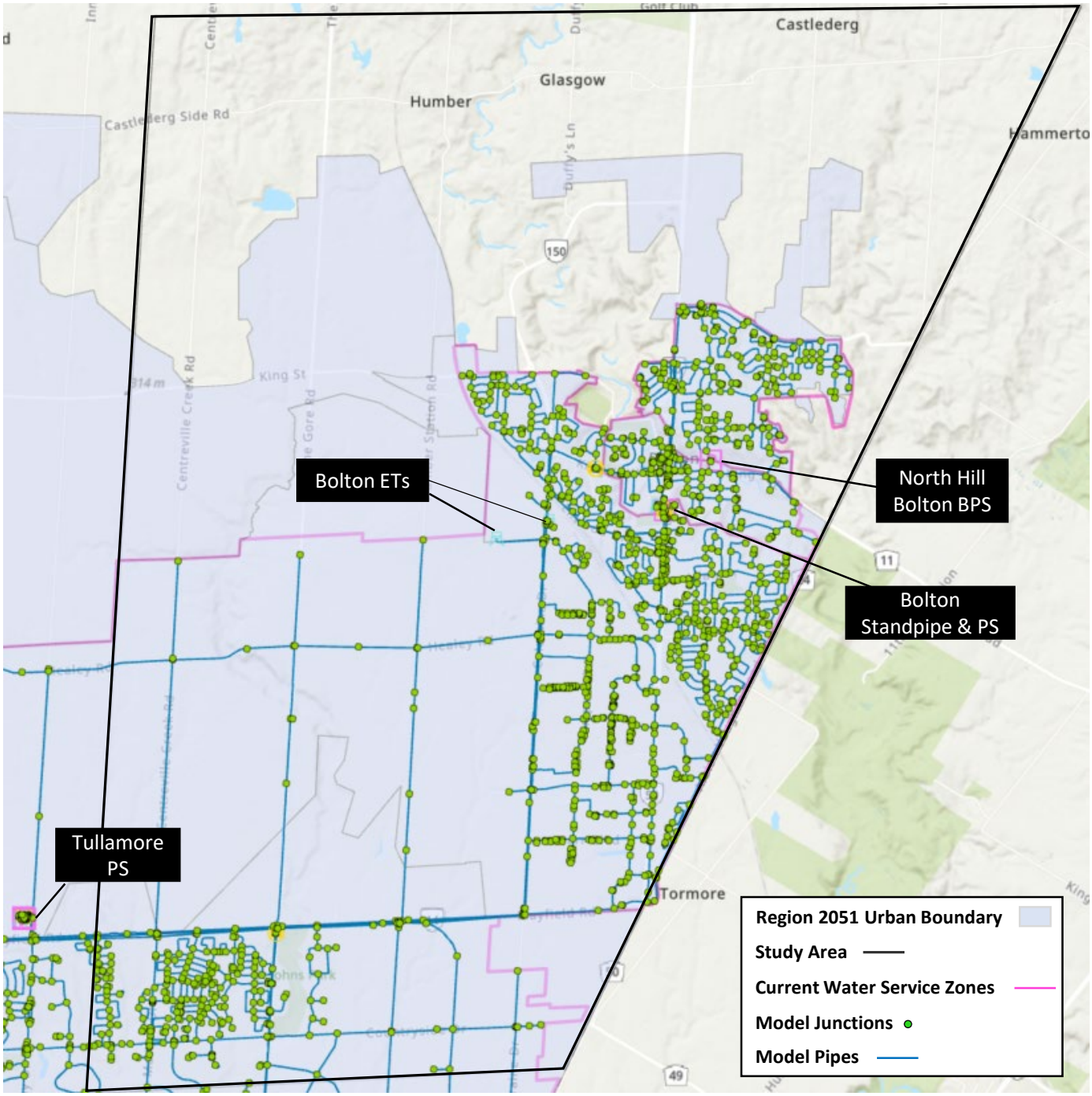


Figure 1 Water Model Screenshot

As part of the model review process, it was noted by the Region that the model provided previously to GM BluePlan in July 2021 would be suitable for this project. The only items that would need additional focus during the review (to confirm accuracy) were:

- Tullamore Pump Station would need to be shifted to an adjacent parcel since it was spatially in the wrong location from the prior model update;
- The alignment and status of PRVs and check valves in the Bolton Pressure Zone 6A would need to be verified;
- General QC of the watermain network in Bolton (comparison between ePAL and model).

2.1.1 Model Updates

During the model review, it was confirmed that the Tullamore PS was spatially in the wrong location. Overall, the impact of this on the model accuracy appeared reasonably small, since it ultimately just caused the incoming Zone 4 pipe and the Zone 5 / Zone 6 discharge watermains along Innis Lake Road to be greater in length than actual. As such, the physical network for the pump station was shifted south to closely align with the known building footprint. Otherwise, the layout/connectivity of the pump station was unchanged, as shown in the below screenshot of the facility.

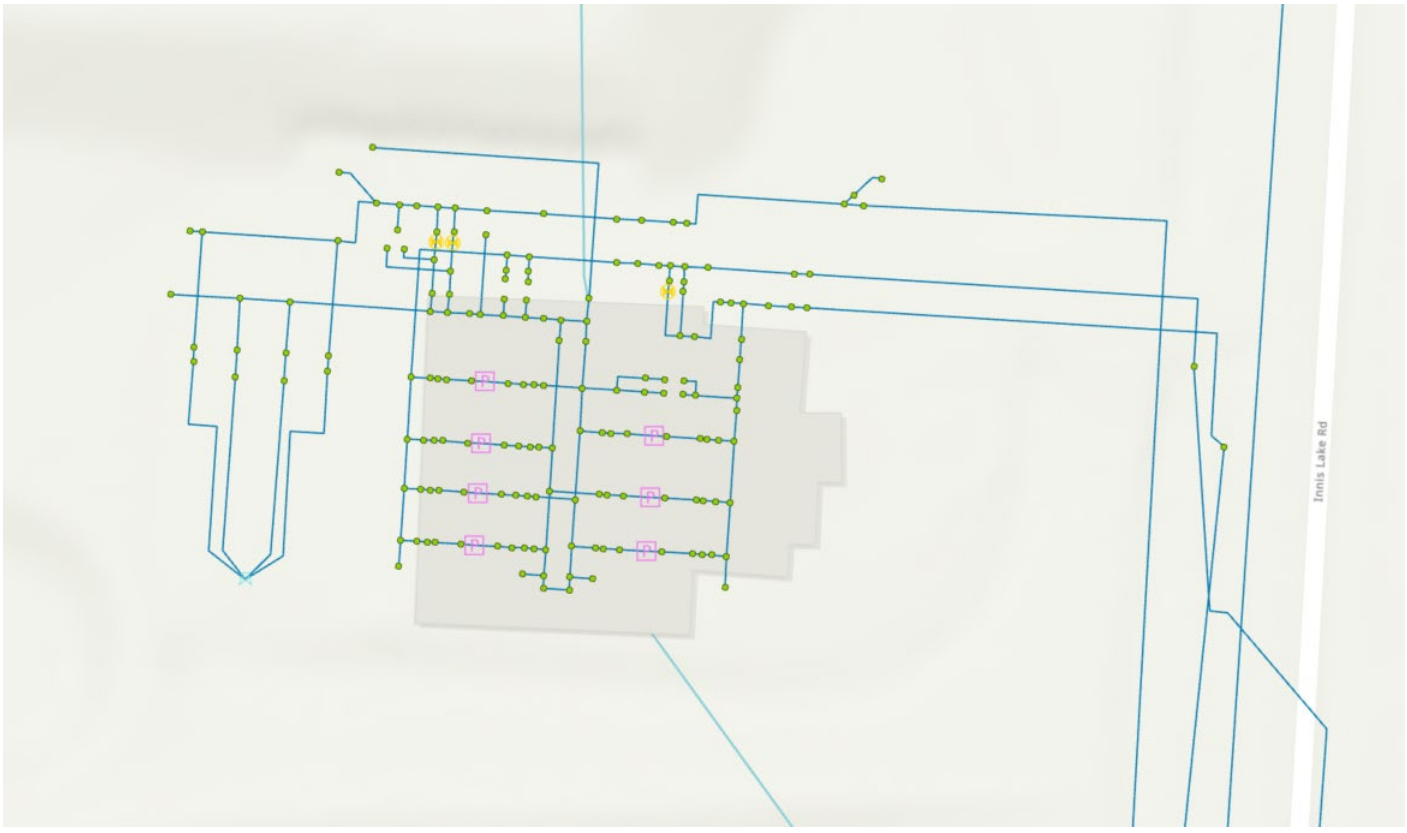


Figure 2 Tullamore PS Screenshot - Water Model Update

The watermain network within Bolton and the valve statuses related to Pressure Zone 6A were confirmed to be up-to-date and in alignment with recent as-builts/GIS in ePAL.

2.2 Water Hydraulic Model Results

2.2.1 Baseline Model Results Review

As part of the base model review, analyses were conducted on both the existing (2021) average day demand scenario and maximum day demand scenario. These analyses were used to help establish the baseline conditions in the model (for subsequent comparisons) and also to confirm that the general results were in alignment with the known conditions from Region of Peel staff.

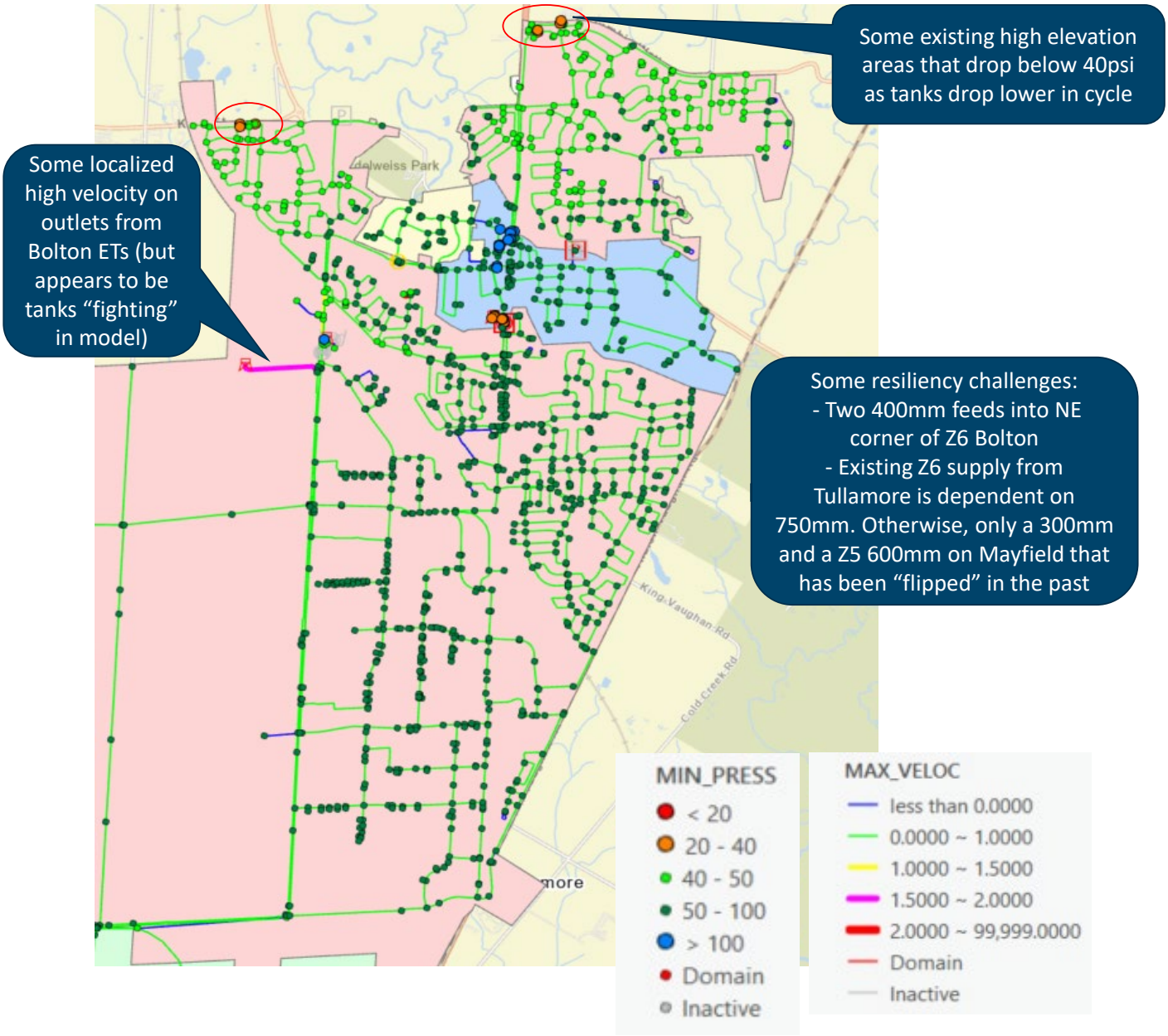


Figure 3 Baseline 2021 MDD Model Results– Minimum Pressure & Maximum Velocity

The analysis of the baseline scenarios (ADD & MDD) ultimately led to the following conclusions:

- Overall, there is reasonable pressure maintained (both minimum and maximum) across the majority of the study area, with maximum pressures generally kept below 100psi and minimum pressures largely maintained above 40psi.
- However, as seen in Figure 3, towards the top of the current Bolton service area in Zone 6, the elevations are high enough that the pressure can drop below 40psi during high demand hours and when the tanks drop lower in their operating cycle. This low pressure at the top of Zone 6, has been further verified based on feedback from Region of Peel staff. This system limitation is one of the main reasons why a new booster station for a Pressure Zone 7 Bolton is considered to be required for any growth further north in Bolton.
- Generally, the velocity along the watermains in the study area are reasonable (<1m/s). The only apparent exception shown is the inlet/outlet pipes for the Bolton Elevated Tanks. This is not unexpected since during moments of high filling from Tullamore PS, these facilities can receive a larger amount of inflow, thereby increasing velocity on the watermain. The other cause of this high velocity is that with two tanks very close by in the model, there can occasionally be some “fighting’ in the model where flow moves back and forth between the two tanks. This would not be seen to the same degree in real life and is often considered to be a slight model instability, rather than a real concern.
- A few resiliency concerns were also noted in terms of supply to this study area:
    - Only two 400mm feeds are available to send water to the Northeast corner of Zone 6 Bolton. This is considered a slight resiliency concern and is a factor in estimating how much additional capacity could be managed by the northern expansion areas (“fingers”) without a new watermain feed to improve resiliency of supply.
    - Also, for the overall Zone 6 area, Zone 6 Bolton is dependent on the 750m from Tullamore PS. Other than the 750mm watermain, there is only a 300mm watermain and a Zone 5 600mm watermain on Mayfield Rd. The Zone 5 600mm is mentioned because it has been ‘flipped” in the past to operate as a Zone 6 watermain with certain valve status changes.
- Generally, fire flow availability was shown to be quite reasonable (typically >100L/s), except along certain smaller diameter or single feed (dead-end) areas, which can sometimes drop to below 75 L/s in availability. The most notable area with reduced fire flow is the eastern edge of Zone 5B.

2.2.2 Feasibility Study Modelling Analyses (Interim/Spare Capacity Review)

As part of the initial modelling analyses, the focus was to identify what kind of residual (spare) capacity existed in the eastern part of the Zone 6B system and to see whether that side of the system (near King Street / Columbia Way) could potentially handle a Z7B booster station without compromising the rest of that Zone 6B area. The key questions considered to answer this were:

- Could a booster station on the east side (towards the fingers in Z7B) be added to support interim growth?
- What degree of interim growth above existing demands could be handled while maximizing the existing network?
- Are there any impacts on the Zone 6B system, with a particular focus on the two 400mm pipes to this area? Note that one of the 400mm watermains originates from the 600mm along King Street and Ann Street, bringing water from the Bolton ETs. The other 400mm watermain comes from the 400mm that bypasses the Standpipe and Booster Pump Station at Queen Street South, so it has worse connectivity to the Bolton ETs. The figure below graphically shows the concept being considered and highlights the two watermains that are considered a potential bottleneck to be reviewed.
- What is the tipping point (approximate population) when more than a new BPS and PZ realignment would be needed? (i.e., when would a new watermain be needed to cross the river and supply this area)

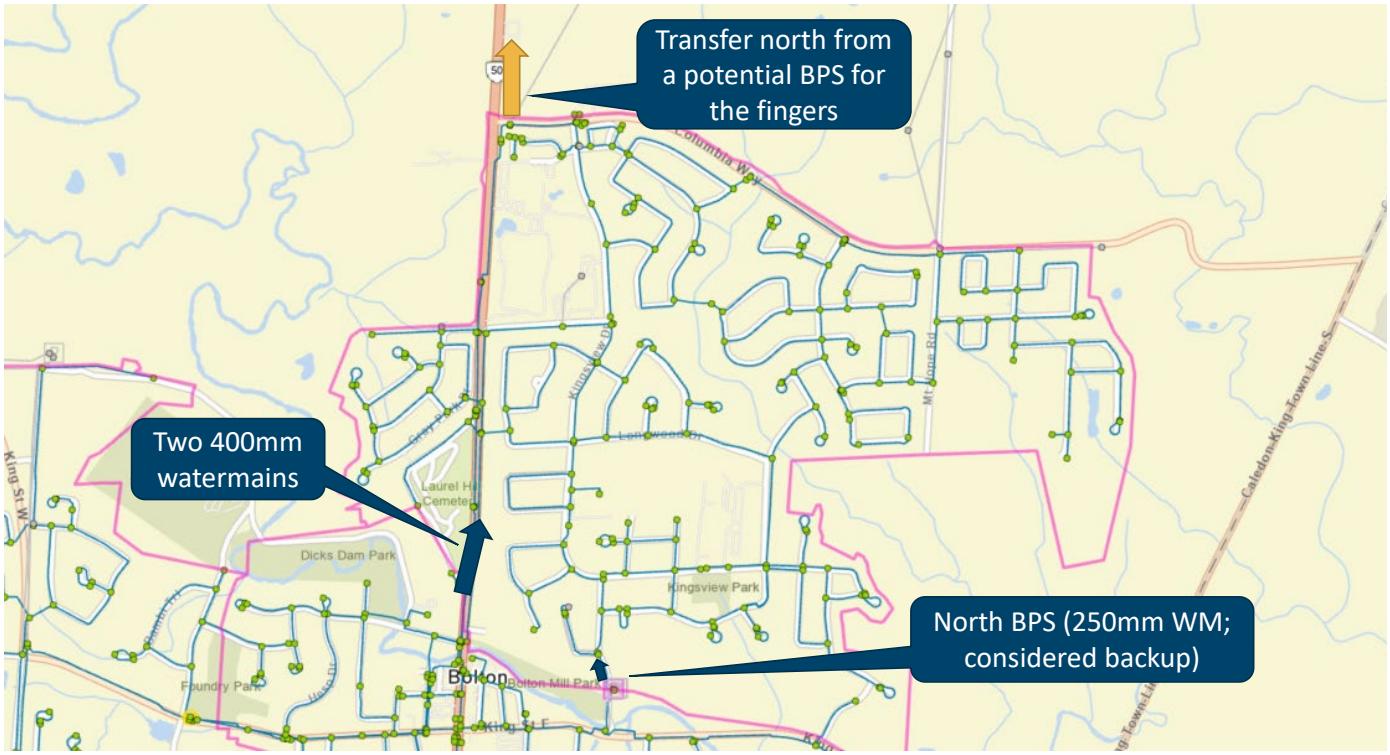


Figure 4 Feasibility Concept Diagram

Based on the initial review of the SGUs that make up the two “Fingers” in Zone 7B, the following growth could be expected:

- To 2031: Approximately 3,000 population. In this interim scenario, this population would be supported via the Bolton Z6 area that is fed by the two 400mm watermains. It would then be subsequently boosted to Z7B via an interim booster station. For the purposes of the feasibility modelling, the booster station location is considered to be along King Street, but the exact location and the exact areas that may be realigned from Z6 into Z7 are not identified.
    - With existing maximum day demand of ~3.3ML/D in this part of Z6 (which could largely be transferred to Z7) plus an additional ~1.5ML/D from the growth, the total demand would be ~5ML/D in the area and up to ~9ML/D as a peak hour demand.
- To 2051: Approximately 16,500 population.
    - As before, with the potential transfer of Zone 6B areas plus the growth within 7B, this 2051 demand could reach ~ 12ML/D for maximum day demand and ~20ML/D peak hour. Therefore, the difference between short term and long-term needs in this area are significant.

To help identify the approximate “tipping point” (when the increased demands would be too much to be supported by the existing 400mm watermains that transfer flows across to the existing northeast part of Z6B and any future growth in the “fingers”), an iterative process was used to assess various different added demands/populations in the model.

2.2.2.1 Baseline Plus ~3,000 Population Growth

A feasibility scenario was first conducted using the baseline maximum day demand scenario plus the added demands from an additional ~3,000 population. The following bullets and subsequent figures summarize the outcomes of this level of population increase:

- With an additional ~1.5ML/D added, the 400mm feed (via the 600mm King Street) does increase in flow transfer and velocity from highs of ~0.6m/s to ~0.8m/s. The other 400mm feed that travels from the Standpipes/BPS varies more noticeably in flow depending on the operation at the facility.
- In terms of minimum pressure, there is a slight negative impact with the increased demands, since it leads to increased headlosses. However, overall, the difference is quite marginal and could be managed if it was conducted along with a pressure zone realignment in the northern parts of this area. Figure 5 shows the minimum pressure results for this iteration.
- Fire flow results are negligibly impacted with the additional demands.
- Additionally, we conducted a resiliency scenario, where the primary 400mm watermain was out of service during the maximum day demand scenario. This was conducted to see if the area can adequately be supported in the event of an unplanned isolation/outage. During this condition, flow to the northeast is forced to travel with the remaining 400mm that passes by the standpipe facility and Queen Street. This scenario does lead to a number of higher velocity segments of watermain and a wider area of the system that drops below 40psi and even

below 20psi in the northern most area. These results are quite similar to the baseline scenario (before growth), so it is important to understand that further growth is most risky in terms of the limited resiliency that already exists in this area of the system.

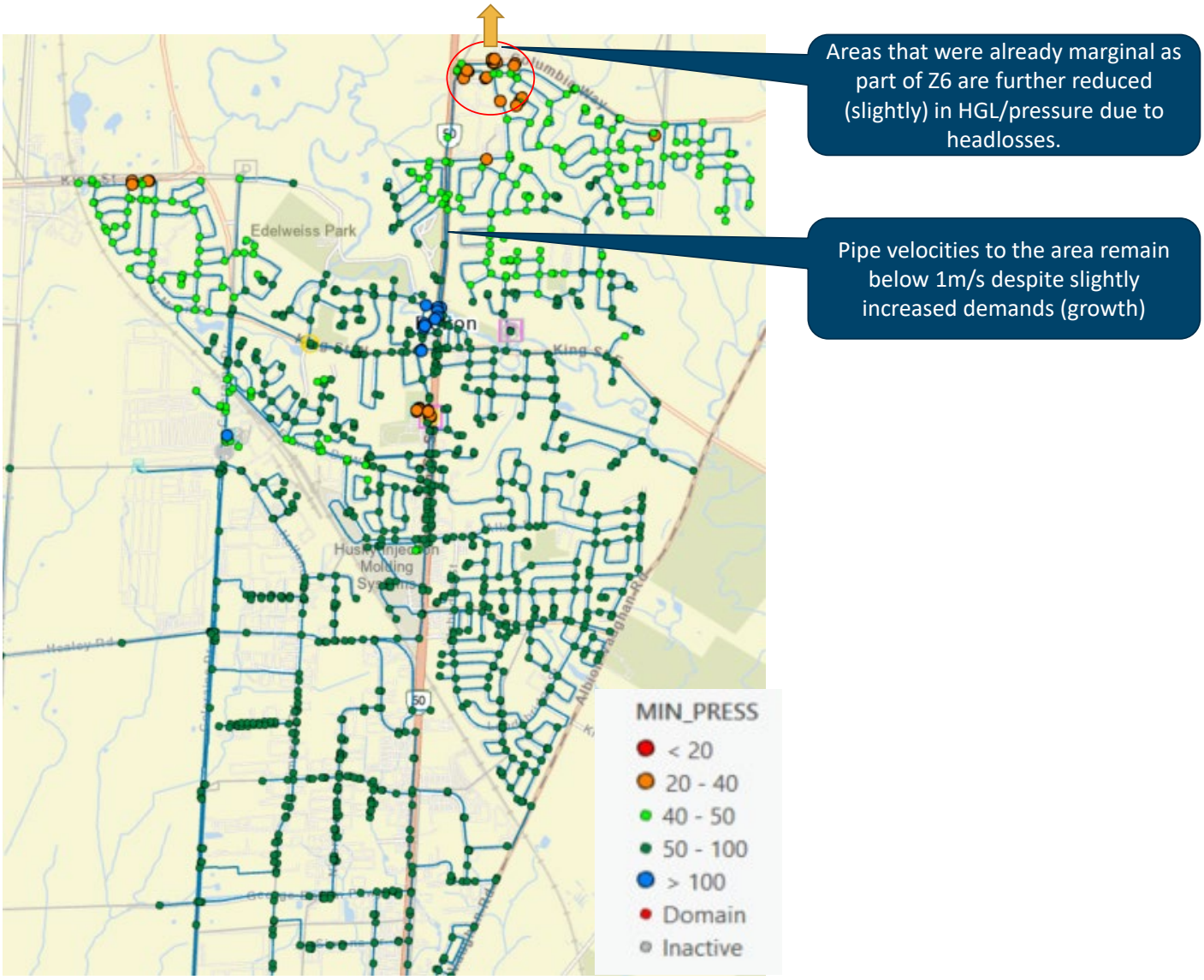


Figure 5 – 2021 MDD + 3,000 Growth Results– Minimum Pressure

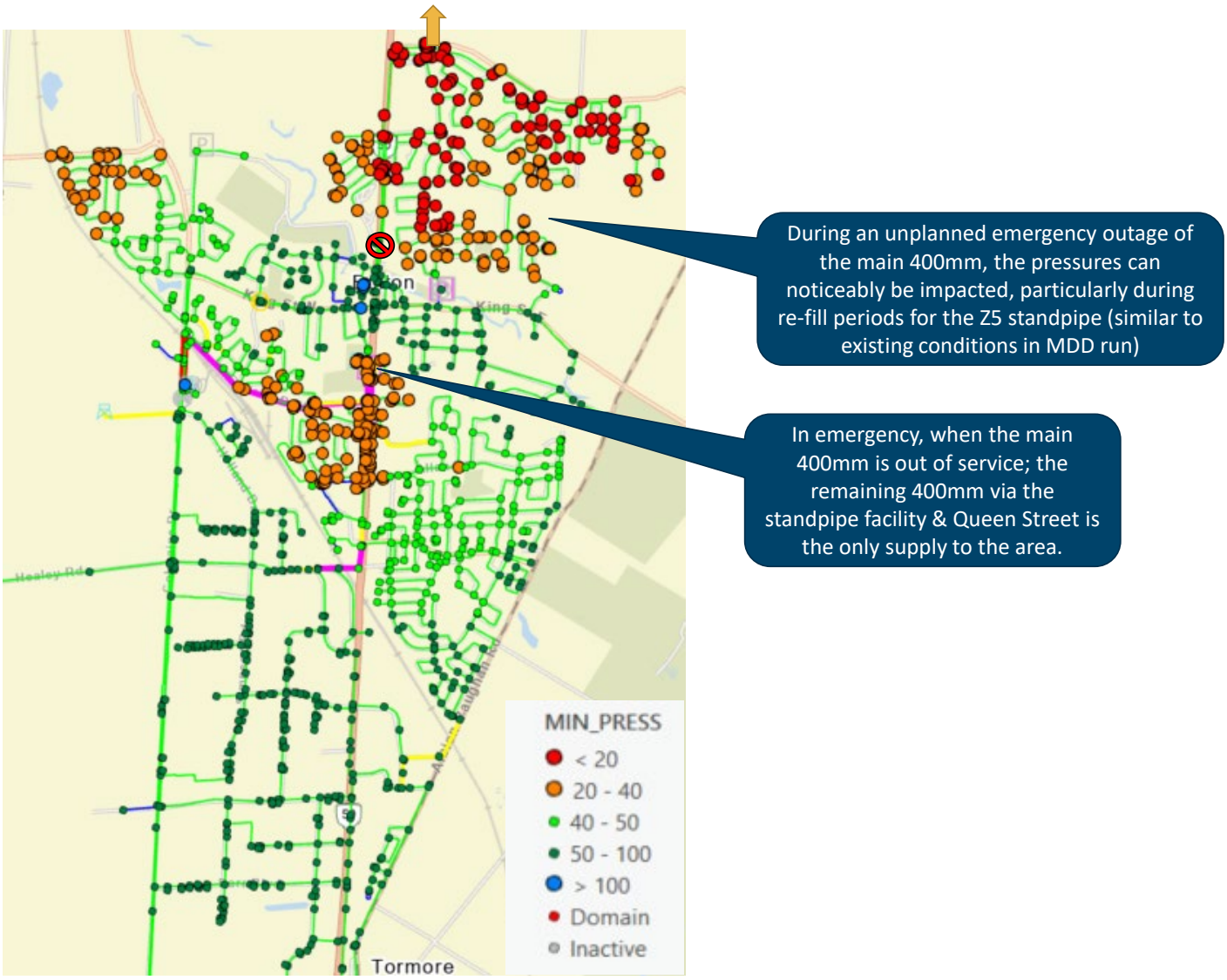


Figure 6 – 2021 MDD + 3,000 Growth Results with Critical Isolation – Minimum Pressure

Overall, this scenario with an additional growth of 3,000 has a largely minimal impact under normal operating conditions since the 400mm have sufficient spare capacity to handle the increased flow. However, slightly higher losses do mean that a pressure zone realignment should be considered with an interim growth solution. The main concerns with the existing scenario and this small growth scenario are:

- Limited resiliency. System is heavily dependent on the 600mm/400mm feed from King and Queen Street. Without this, system pressures are impacted noticeably during high demand conditions.
- High elevation in the existing PD6 areas; so, any interim solution should consider at least a partial realignment of Z6B areas into Z7B.

2.2.2.2 Baseline Plus ~5,000 Population Growth

A further feasibility scenario with additional 5,000 population growth above the baseline 2021 scenario was also assessed. The following bullets and subsequent figures summarize the outcomes of this level of population increase:

- With an additional ~2.5ML/D added, the 400mm feed (via the 600mm King Street) further increases in flow transfer and velocity can now at times exceed 1m/s.
- In terms of minimum pressure, there is a further negative impact with the increased demands since it leads to increased headlosses. However, overall, areas impacted could still be considered for re-alignment, minimizing the impact of the low pressure. Figure 7 shows the minimum pressure results for this iteration.

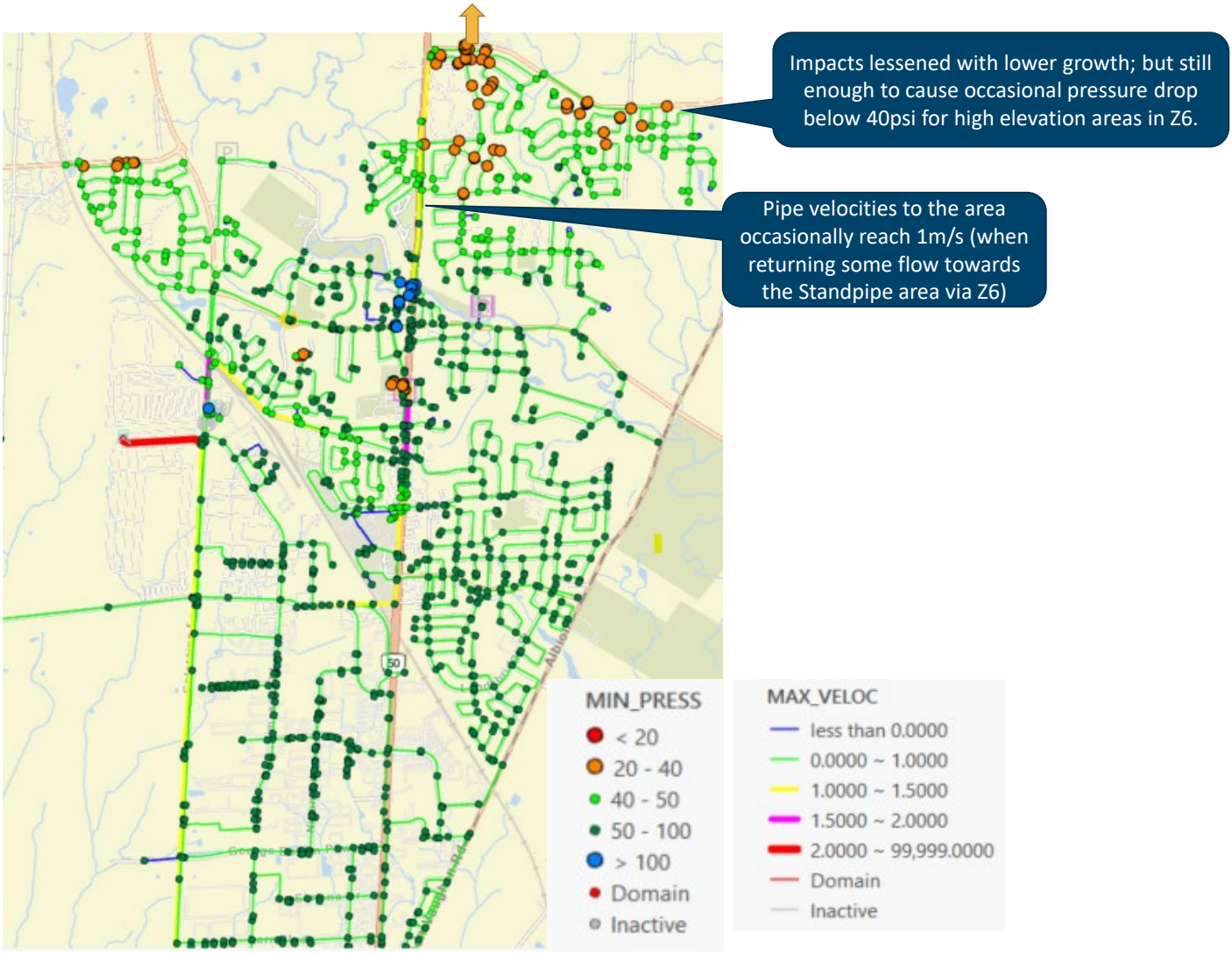


Figure 7 – 2021 MDD + 5,000 Growth Results– Minimum Pressure

Overall, this scenario with an additional growth of 5,000 has a larger impact than the 3,000 growth scenario. Although the impacts to pressure are moderately small, the impacts are highly cumulative. So, as the population continues to increase, a larger area of the system would need to be converted to Z7B. Even more importantly, the system resiliency will continue to worsen as the growth magnitude increases. Th resiliency scenario (400mm outage) was already shown to be problematic during an isolation in the baseline scenario, and this continues to become riskier as population increases.

Since the 400mm watermain now exceeds 1m/s velocity in the 5,000 population scenario, this is being used as a “tipping point” suggestion since that demonstrates that reduced surplus capacity is now available in these critical watermains. As such, a population growth of ~3000, but less ~5000, is expected to be manageable on an interim basis when only a booster pump station and some zone realignment is considered for upgrades.

3 WASTEWATER HYDRAULIC MODELLING

3.1 Wastewater Hydraulic Model Review

3.1.1 Model Network Review

The provided model is shown in Figure 8, which included catchment area and wastewater network upstream of Bolton Sanitary Pumping Station (SPS). The following map also include the required network from the 2016 MSP model:

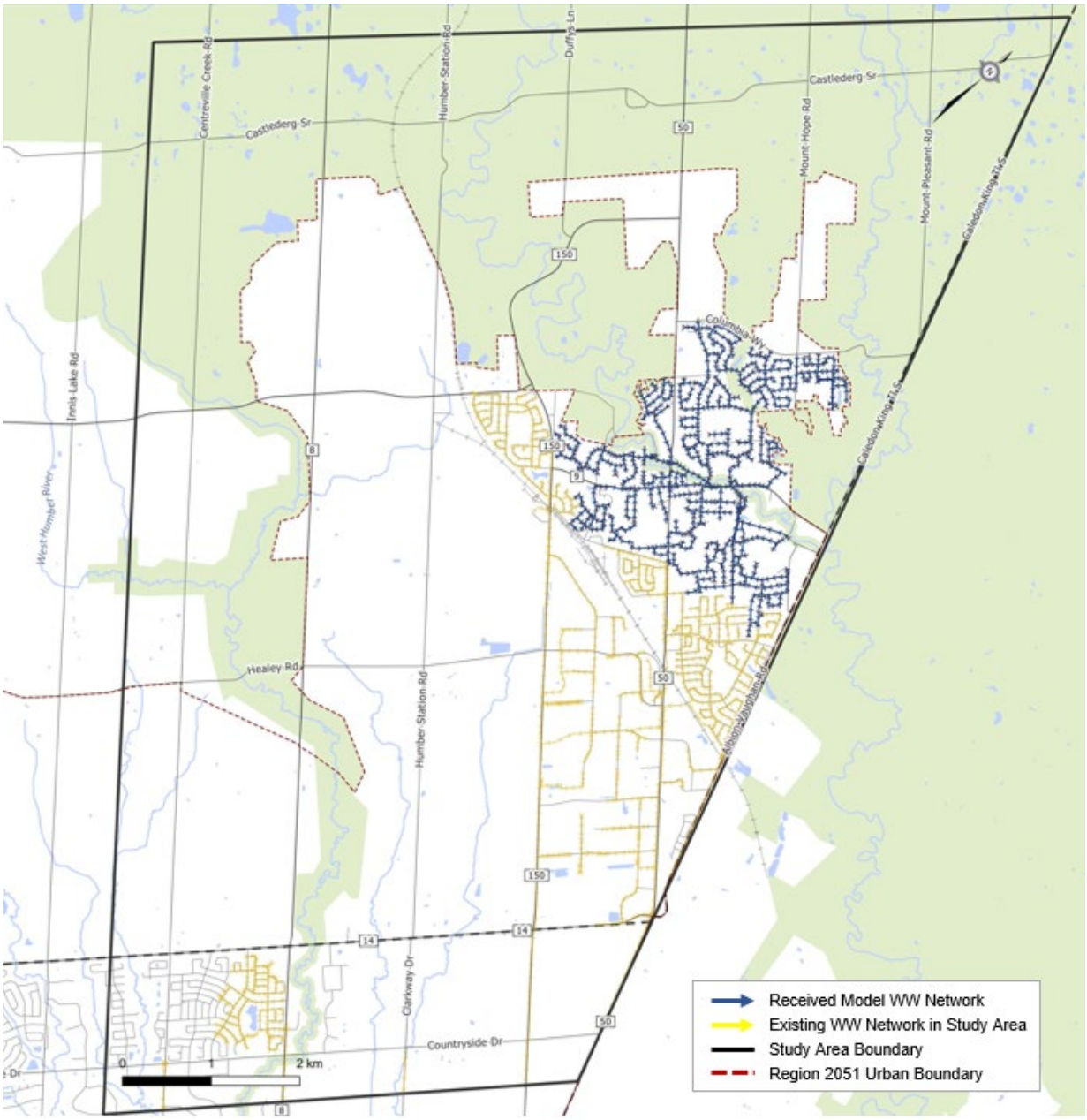


Figure 8 Existing vs. Proposed Wastewater Model

To assess if the model is fit for purpose, an engineering validation was carried out and the validation results are summarized in Appendix A. The following summarizes the key findings within the engineering validation results.

(1) The break points along the forcemain downstream of Bolton SPS are not assigned with a ground level (BFM_DU_001.1, BFM_DU_002.2, and BFM_DU_003.3).
(2) There is a discrepancy between the Epal GIS data and model data between nodes SMH-6575677 to SMH-1651088. The model shows 200mm sewer segments and the Epal GIS data shows the 200mm sewers were abandoned. GMBP suggests updating to align the GIS data.
(3) Multiple locations are identified with pipes of large diameters draining into pipes with smaller diameters, leading to potential hydraulic constraints in the upstream networks. It is recommended to review these locations in the later stages to verify the surcharge conditions.

Three existing pumping stations are located within the study area, including Bolton North SPS, Bolton SPS, and Harvestview SPS, however, Harvestview is due to be decommissioned by the end of the year. As indicated previously, the received model covered a smaller area when compared to the project study area. Only Bolton North SPS and Bolton SPS were included in the received model. The newly calibrated model from Peel will be integrated with the existing MSP model to carry out the evaluation.

To verify the pumping station performance, key modelling parameters for SPS modelling (wet wells, pumps, break nodes, inlet sewer pipes, outlet forcemain, and emergency overflows) were reviewed against the received data. The comparison between the key modelled parameters are summarized in Appendix B.

Differences are identified in pump operation details and forcemain inverts. However, the differences may not have a significant impact on the hydraulic performance of the pumps. The review, in this case, did not compare the pump operation to SCADA. If the Region wishes to undertake a detailed review of the accuracy of the pumping stations, it is recommended that the inflow and levels in the wet well are validated to the Region's SCADA data.

3.1.2 Population Review

The model subcatchments are set up using the Scenario 16 population 2016 census data. The received model included population of 17,218, while the scenario 16 parcels provided a total population of 18,243 in the same area, featuring a 5.9% difference. A summary table is included in Appendix B, which concludes the received model with large population differences

The summary table indicates that the received model is set up with reasonable population loadings for each subcatchment.

It should be noted that the latest baseline growth interval is 2021, so the Region may wish to update the population loadings to bring the model up to date. However, this may impact the calibration, particularly if the latest calibrated model extract utilized 2016 population data.

3.1.3 Calibration Review

For the purposes of the calibration review, the Region provided a table of results to determine if the calibration met the Region's criteria or not. The calibration sheets indicated that the calibrated model was based on a week of DWF data in July 2019. For WWF calibration, three events were selected, including events on July 5th, 2018, August 16th, 2018, and June 24th, 2019. It should be noted that the rainfall file for the calibration WWF events were not received by GMBP to be able to compare how well the observed and predicted data matches.

Table 1 Calibration Review Comments

Flow Monitor (FM) ID	Manhole ID	Comment
SAN-1	SMH-309053	The flow monitor is located just upstream of a smaller pipe with large slopes. DWF and WWF calibration criteria shows the observed data matches with modelled data.
SAN-2	SMH-308934	The scatter graph shows erroneous depth and flow measurements from August to September 2018, where the recorded depth does not follow the Manning's n design pattern. Most recorded depths show velocities close to 0, indicating the possibility of a blockage at the flow monitor site. DWF and WWF calibration shows the observed data matches with modelled data in other events.
SAN-3	SMH-308931	The scatter graph shows evidence of sediment accumulation or backwater effects from downstream. DWF and WWF calibration shows the observed data matches with modelled data.
SAN-4	SMH-309243	This flow monitor is located just upstream of Bolton North pumping station. The flow monitor receives flows from SMH-309238 (FM SAN-6). The flow pattern shows abnormal data was observed on July 5, 2018. The recorded depth indicates that the pipe was up to 75% full on July 5, 2018, possibly due to the impact of backwater from the pumping station's operation. Received calibration sheets indicated that level boundary was applied at node FAC-SCADA-049A based on observed depth at SMH-309243. GMBP did not received the level boundary file in the icmt file.
SAN-5	SMH-309248	The received calibration sheets showed that a level boundary was applied at node FAC-SCADA-049A based on observed depth at SMH-309243, GMBP did not receive the level boundary file in the icmt file. Large discrepancies were identified between the observed and model depth in WWF calibration. The modelled depth is approximately 45% of the observed depth at SAN-5.
SAN-6	SMH-309238	The scatter graph revealed clusters of outliers in flow data with velocities ranging from 0.05 to 0.1 m/s. The DWF calibration results also suggested the existence of outliers in low flow recordings. The data outlier is likely attributed to the low flow at this flow monitor.

The summary in Table 1 indicates that FM SAN-1, SAN-2 and SAN-3 show a good match between observed and predicted data for DWF and WWF calibration.

However, the FM SAN-4, SAN-5 and SAN-6 show a large discrepancy in WWF calibration. The provided calibration sheets indicate that WWF calibration at SAN-4 and SAN-5 incorporated level boundary files that affect the upstream network model calibration by increasing the flow depth at the pumping station (Node FAC-SCADA-049A), in an attempt to simulate the assumed backwater effect. However, it cannot be verified by the scatter graph. GMBP did not receive any level boundary files in the received model package.

The as-built drawings for the existing model were reviewed and confirm that the wet well sizes modelled are consistent with the drawing sizes. It is recommended to conduct an on-site inspection to confirm operation, particularly of the grit chamber.

3.1.4 Validation of Model

As mentioned in Section 1, the received model did not cover the entire study area. As a result, the updated catchment was combined with the existing 2016 MSP model. To determine the accuracy of the combination replicated current flow data, flow monitors capturing the entire catchment flows and significant rainfall events were selected to validate the model. This would then be compared to the accuracy of the 2016 MSP model.

Because GMBP did not receive any rainfall files and flow survey files, the verification scenario was developed based on the following assumptions:

- The rainfall data was developed using the 2021 Gauge Adjusted Rainfall Radar (GARR) data, which included grids of 1 km^2 each to provided spatial distribution of rainfall. There are 91 GARR grids included in the Bolton model area.
- The verification event was chosen to be August 22nd to August 30th, 2021, which features a local peak rainfall intensity exceeding the 100-year return period intensity.
- The observed flow data was obtained from the AMG website.
- The observed flows are compared to modelled flows at flow monitor stations just upstream of McVean SPS, including 6047618-EB-McVean-SPS 2-P and 1777361-EB-Ebenezer Rd, and 1066908-BOL-Hwy 50, which located just downstream of the project study area.

The locations of the verification FM are shown in Figure 9.

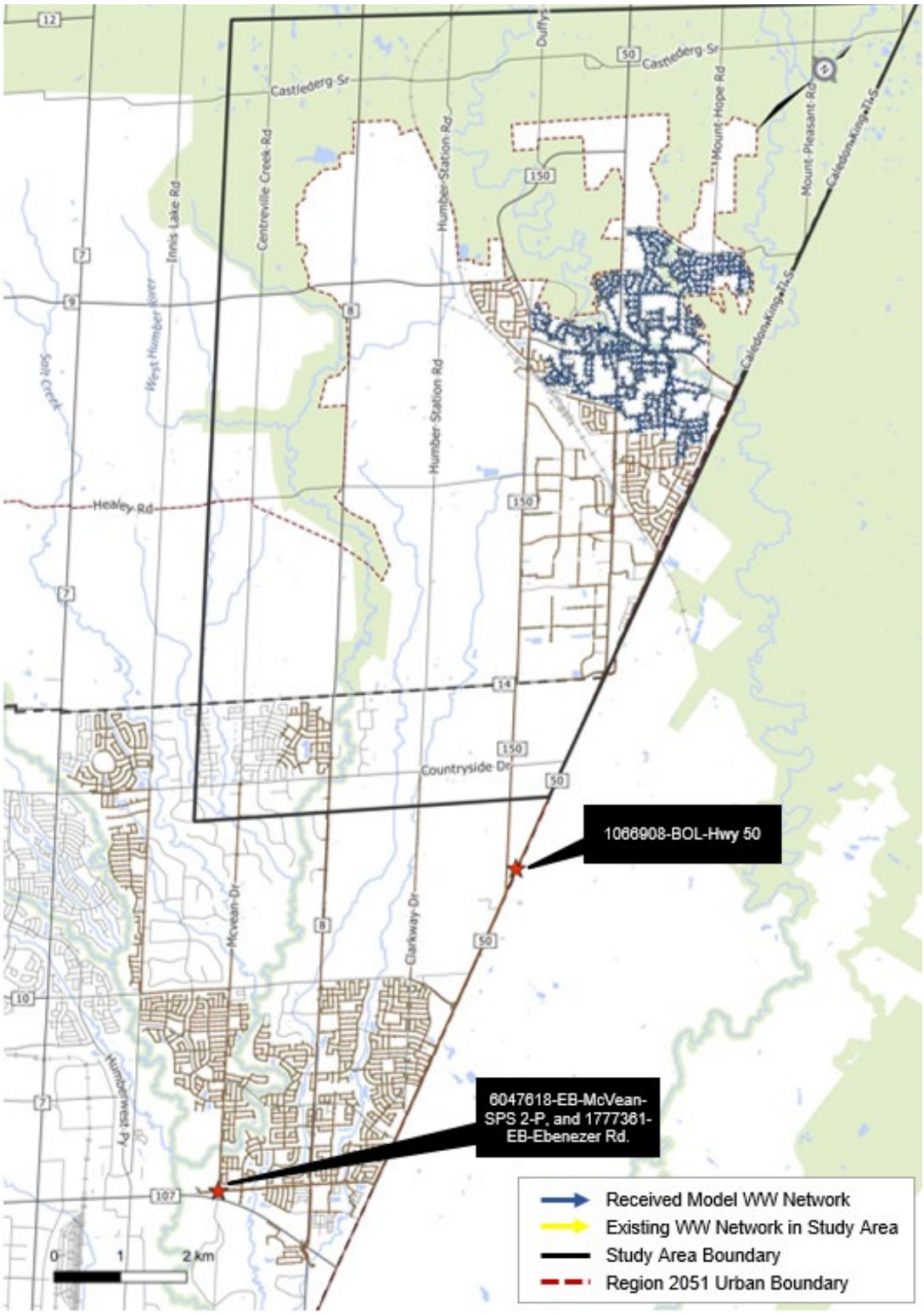
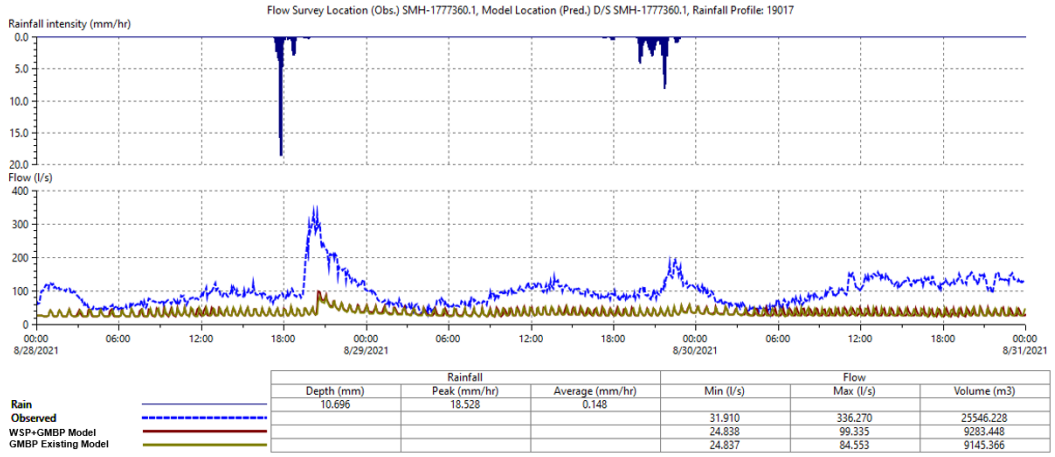
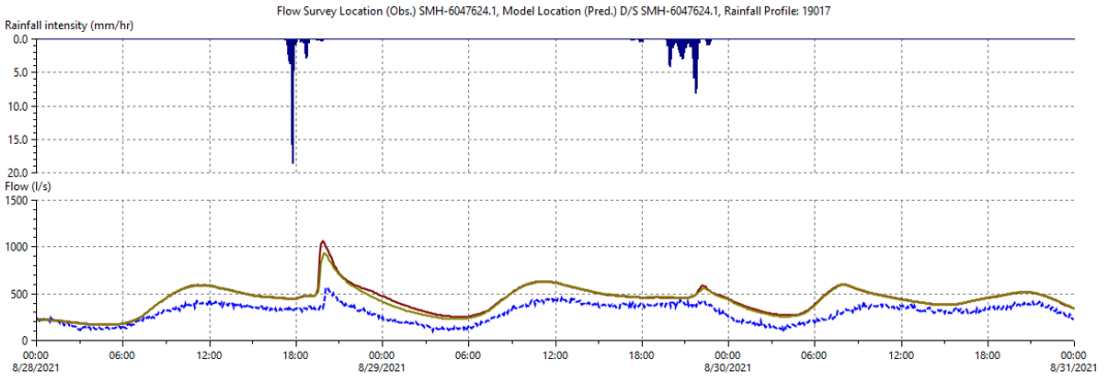


Figure 9 Verification Flow Monitor Locations



	Rainfall			Flow		
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (l/s)	Max (l/s)	Volume (m3)
Rain	10.696	18.528	0.148			
Observed				31.910	336.270	25546.228
WSP+GMBP Model				24.838	99.335	9283.448
GMBP Existing Model				24.837	84.553	9145.366

Figure 10 Verification Model Result – 1777361-EB-Ebenezer Rd.



	Rainfall			Flow		
	Depth (mm)	Peak (mm/hr)	Average (mm/hr)	Min (l/s)	Max (l/s)	Volume (m3)
Rain	10.696	18.528	0.148			
Observed				105.240	567.800	77953.452
WSP+GMBP Model				169.498	1059.674	113725.185
GMBP Existing Model				168.931	931.957	111437.940

Figure 11 Verification Model Result – 6047618-McVean-SPS 2-P

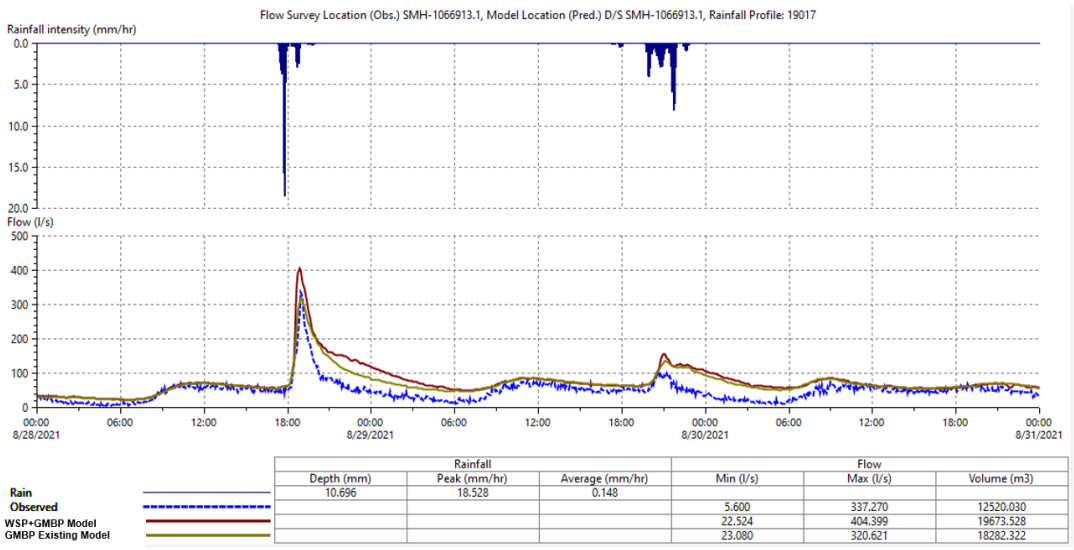


Figure 12 Verification Model Result – 1066908-BOL-Hwy 50

The hydrograph is well matched in FM 1066908-BOL-Hwy 50 (see Figure 12). In addition, Figure 10 and Figure 11 indicate model results with higher observed flow in FM 6047618-EB-McVean SPS 2-P and lower observed flow in FM 1777361-EB-Ebenezer Rd. The large discrepancy between observed and modelled data is attributed to the differences in population and potential network upgrade between 2021 and 2016.

The loading to subcatchments in both model scenarios is from 2016 population data, the model was verified using the 2021 data. In addition, network upgrades were conducted in multiple locations within the network, therefore changing the flow patterns observed in flow monitors upstream of McVean SPS.

For example, it is noted that the 1500mm sanitary trunk sewers near the intersection of Hwy 50 and Major Mackenzie Dr. was upgraded in 2020 (Figure 13 and Figure 14). It is anticipated that the upgrade partly contributed to the significant discrepancy in the verification results in Figure 10 and Figure 11.

Figure 13 Trunk Sewer at Hwy50/Major Mackenzie Dr. (2016 Model)

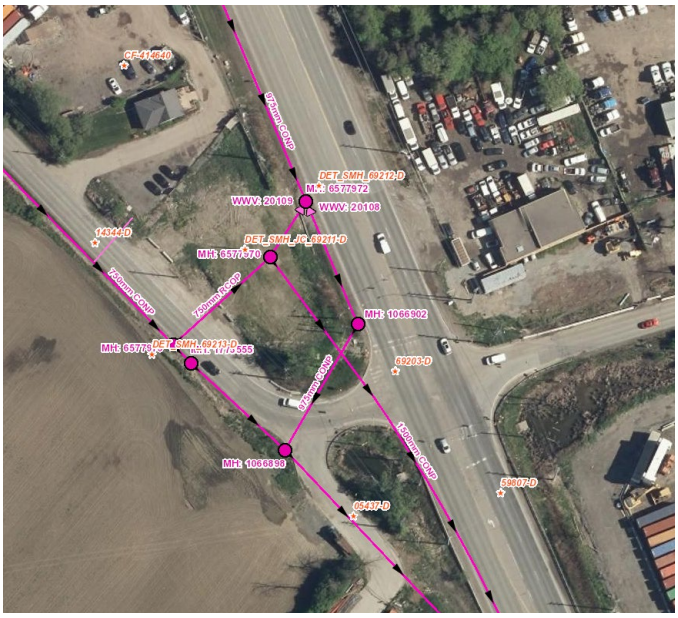


Figure 14 Trunk Sewer at Hwy50/Major Mackenzie Dr. (2020 Epal GIS Data)

The comparisons in Figure 12 demonstrate that the current MSP model is more representative of current flow monitoring data than the recently calibrated model. The existing MSP model shows a better match of peak flows and flow volumes between model flows and observed flows. Although the MSP model is more representative of the current flow monitoring data, the newly received model is recently calibrated and shows a more conservative result.

It is recommended that the recently calibrated model is used, combined with the existing MSP model. This includes more recent GIS network data and is conservatively estimates peak flows.

3.1.5 Summary and Recommendations

GMBP undertook a detailed review of the provided model and the existing 2016 MSP model to assess suitability for this EA. A number of the issues found are relatively minor and should, upon approval by the Region, be simple to update. However, some issues require further investigation and agreement on the approach with the Region.

Based on the analysis completed in this memo, the following recommendations are made:

- Combine the newly calibrated model with the 2016 MSP model. Even though the validation shows a worse fit when validated to 2021 flow data in comparison to the 2016 MSP model, it presents a conservative result.
- Discussion with operations is recommended to confirm what causes the backwater effect to occur within the Bolton SPS station.
- The validation of the flows upstream of McVean SPS was not successful. It is believed that this is because the network has changed upstream of the pumping station at Hwy 50 and Major Mackenzie Drive. Our recommendations are:

- It is noted that area is currently being updated as part of the all-pipe model update. If available, we request that the Region provides the network for this area as this should include the latest connectivity along Hwy 50.
- If the model network can't be provided, it is recommended to review drawings, CCTV and operational information to assess the updated connectivity in the network.

3.2 Wastewater Hydraulic Model Results

3.2.1 Feasibility Study Modelling Analyses (Interim/Short-term Capacity Review)

As part of the feasibility study modelling analyses, the focus was to identify if the existing system has capacity to accommodate growth proposed within the ROPA 30 lands. The following sections outline the hydraulic modelling results for the options explored.

3.2.1.1 Option 3 Lands and Chickadee Development

- The total population analyzed for the areas was approximately 5,000 people+ jobs which would generate approximately 63 L/s of peak weather flow.
- The servicing concept explored included a new a sewer along King St and Emil Kolb Pkwy to connect the existing 375 mm as shown conceptually on Figure 15.
- The model results showed that the connection is feasible, and no capacity constraints were flagged when looking at this area in isolation.

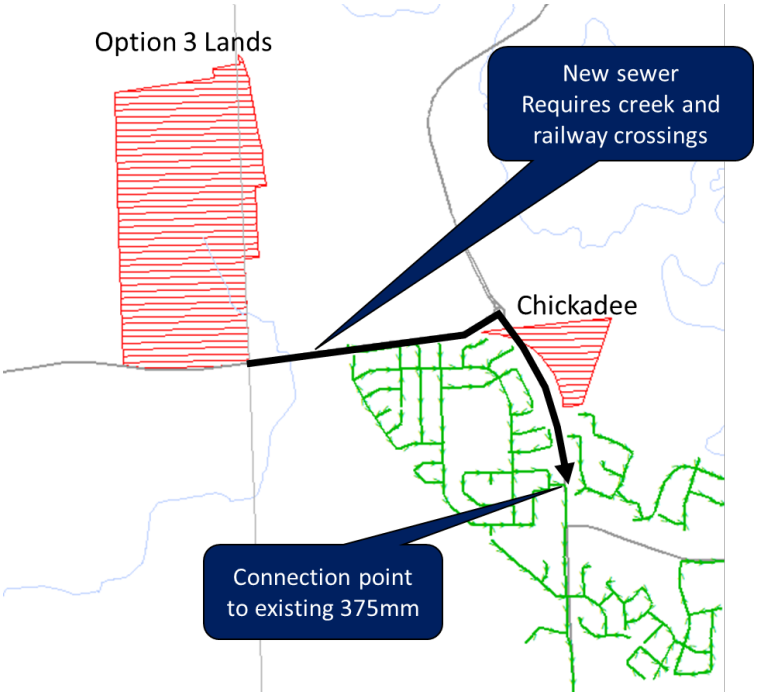


Figure 15 – Wastewater Modelling Option 3 Lands and Chickadee Development

3.2.1.2 Option 6 Lands and Triangle Lands

- The total population analyzed for the areas was approximately 10,000 people+ jobs which would generate approximately 150 L/s of peak weather flow.

- The servicing concept explored included directing new growth flows to a proposed sewer along Humber Station Rd connecting to existing sewer along Clarkway Dr.
- The model results showed that the connection is feasible and no capacity constraints downstream were flagged when looking at this area in isolation.

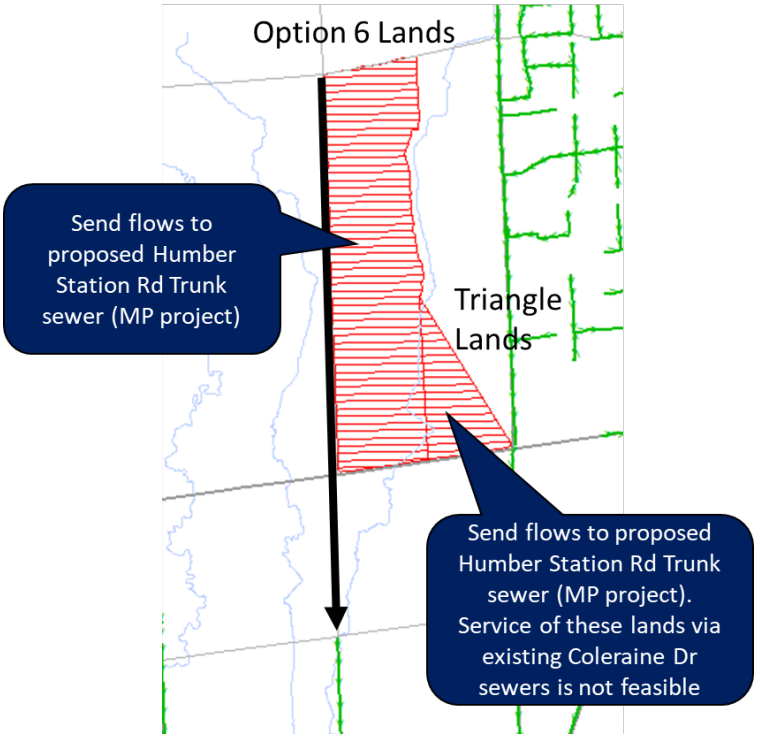


Figure 16 – Wastewater Modelling Option 6 Lands and Triangle Lands

3.2.1.3 Option 1 Lands

- The total population analyzed for the areas was approximately 2,000 people+ jobs which would generate approximately 30 L/s of peak weather flow.
- Four servicing alternatives were explored for servicing the approved ROPA 30 lands.

<u>Alternative 1 – Connection point at Columbia Way and Kingsview Dr.</u>

- This alternative consisted of a gravity connection from the Option 1 lands directly to the existing on Kingsview Dr.
- The model results showed surcharge issues in existing sewers at various locations, including a bottleneck by a 250mm pipe Maidstone Ct between two houses as shown in Figure 18.

Figure 17 – Wastewater Modelling Option 1 Lands – Alternative 1

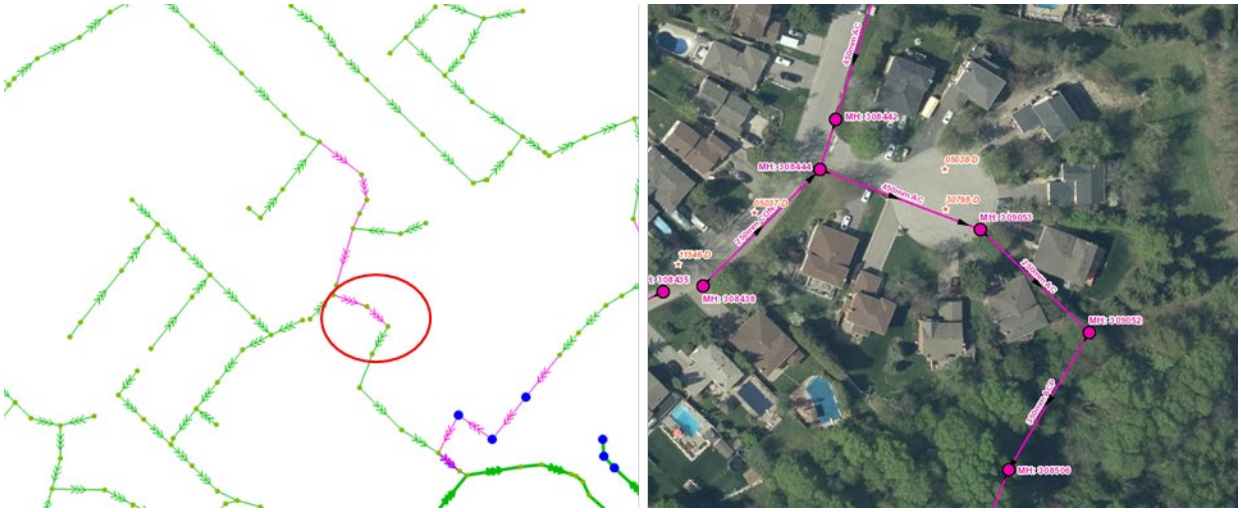


Figure 18 – Wastewater Modelling Option 1 Lands – 250 mm bottleneck at Maidstone Ct

<u>Alternative 2 – Connection point at Columbia Way and Westchester Blvd.</u>

- This alternative consisted of a new gravity sewer along Columbia from the Option 1 lands to the existing sewers on Westchester Blvd.
- The model results showed surcharge issues in existing sewers at various locations, including a bottleneck by a 250mm pipe Maidstone Ct between two houses as shown in Figure 18.
- In addition, there is a creek crossing requirement along Columbia Way that impacts the feasibility of a direct gravity only solution (e.g., no use of syphon or pumping station) towards Westchester Blvd.

Figure 19 – Wastewater Modelling Option 1 Lands – Alternative 2

Alternative 3 – New sewer along Hwy 50 / Queen St.

- This alternative involved constructing a new gravity sewer from the Option 1 lands along Hwy50/Queen St to connect to the existing sewers north of the Humber River as shown in Figure 20.
- The model results did not show surcharge issues in the existing sewers downstream of the connection point at Queen St north of the Humber River that were previously flagged through a desktop exercise as having potential for surcharge issues under these conditions.

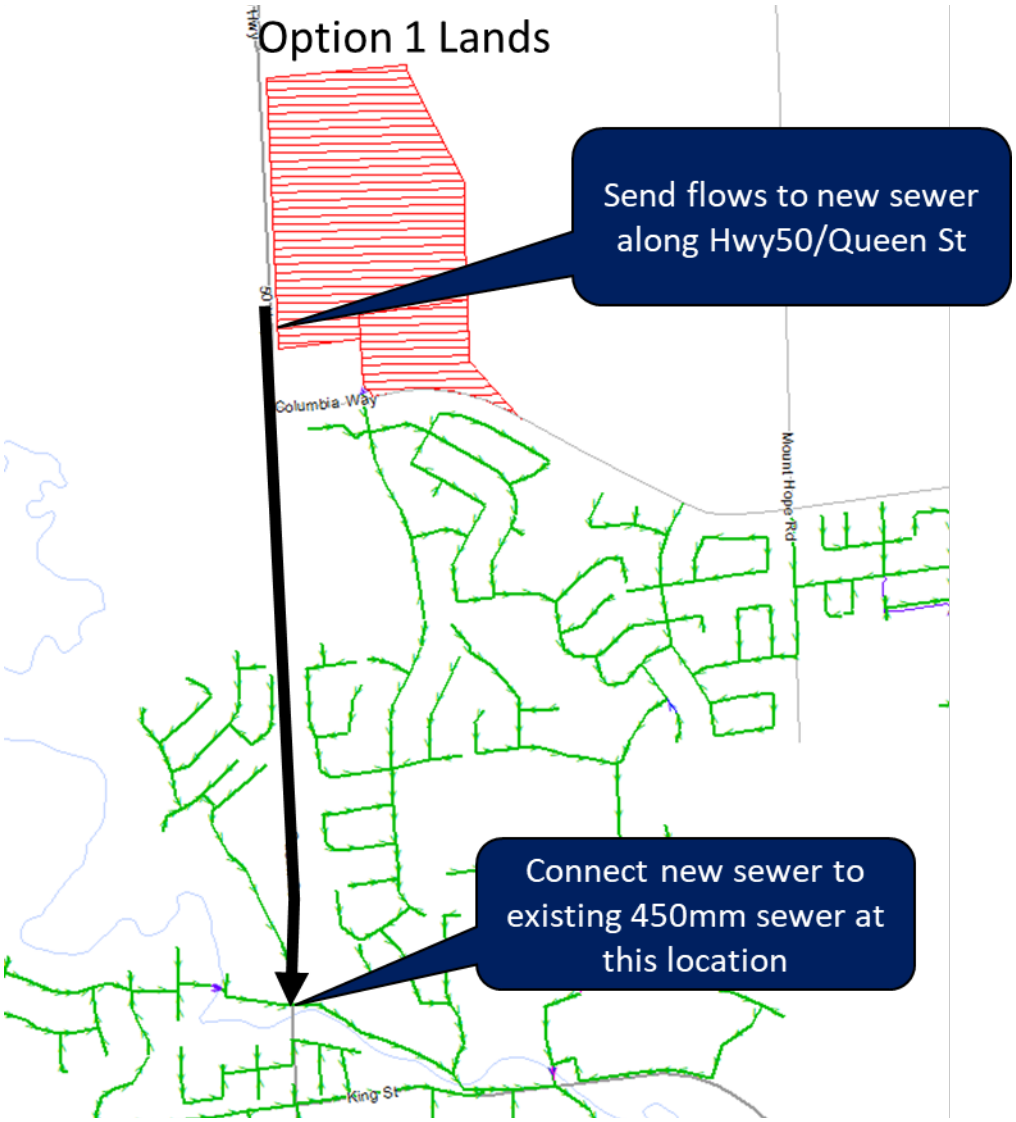


Figure 20 – Wastewater Modelling Option 1 Lands – Alternative 3

Alternative 4 – New servicing west towards Emil Kolb Pwy

- This alternative involved constructing a new gravity sewer from the Option 1 lands along Hwy50 north to new sewer, sewage pumping station and forcemain along Emil Kolb Pwy as shown in Figure 21.
- The model results did not show surcharge issues in the existing sewers downstream of the connection point at Emil Kolb including the addition of the Option 3 lands and Chickadee development explored in section 3.2.1.1.

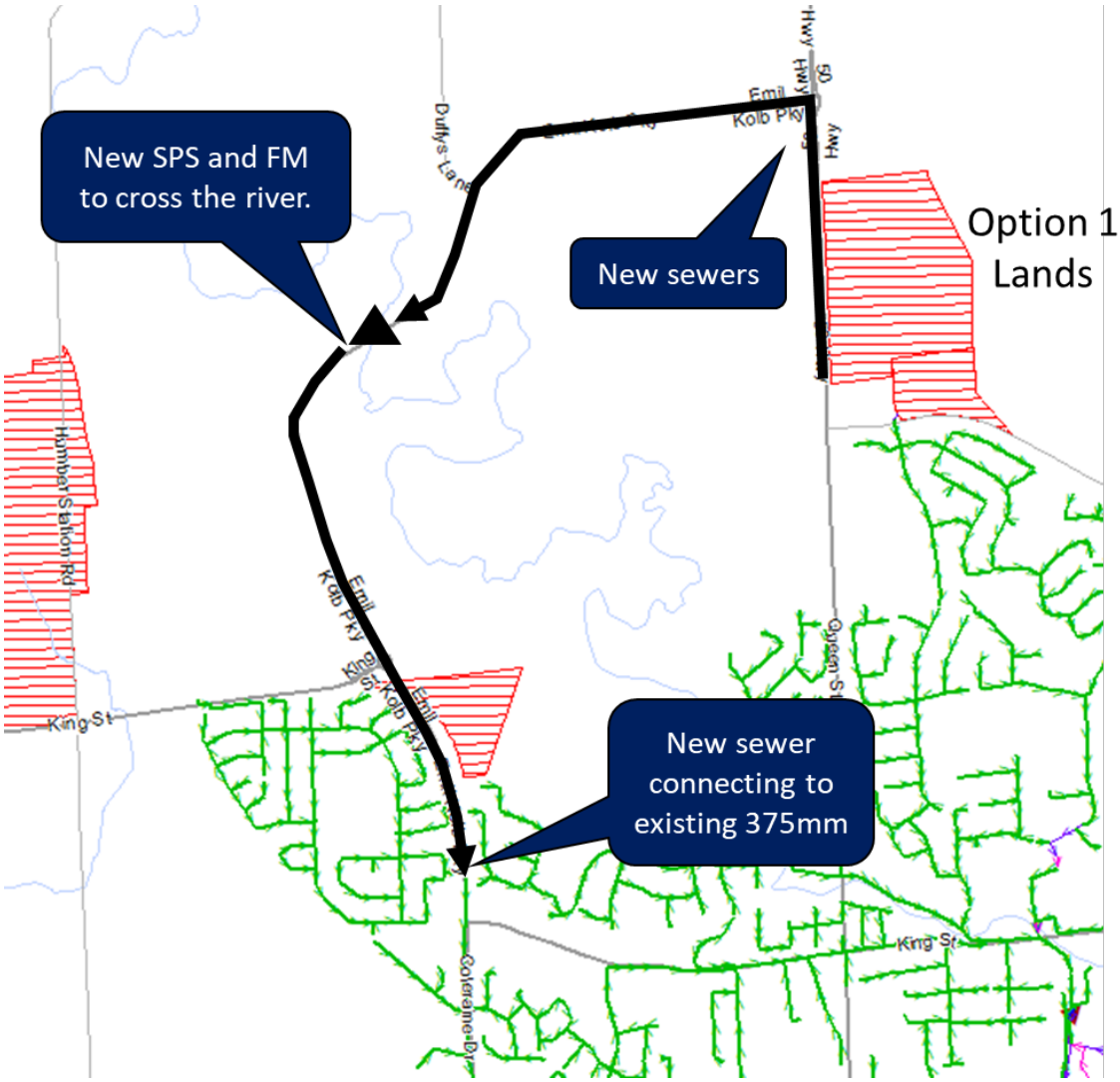


Figure 21 – Wastewater Modelling Option 1 Lands – Alternative 4

4 SUMMARY AND CLOSING

A part of the Bolton Water and Wastewater Capacity Improvements Feasibility Study a series of modelling activities were undertaken to inform the development and evaluation of water and wastewater servicing concepts.

Water Modelling

The Region provided an InfoWater hydraulic model to support the water modelling exercise. As part of the review of the water model the following items required additional focus and updates:

- Tullamore Pump Station needed to be shifted to an adjacent parcel since it was spatially in the wrong location from the prior model update;
- The alignment and status of PRVs and check valves in the Bolton Pressure Zone 6A needed to be verified;
- General QC of the watermain network in Bolton (comparison between ePAL and model).

A review of the water model baseline scenario concluded:

- Overall, there is reasonable pressure maintained (both minimum and maximum) across the majority of the study area.
- Towards the top of the current Bolton service area in Zone 6 the pressure can drop below 40psi during high demand hours and when the tanks drop lower in their operating cycle. This has been further verified based on feedback from Region of Peel staff. This system limitation is one of the main reasons why a new booster station for a Pressure Zone 7 Bolton is considered to be required for any growth further north in Bolton.
- Velocity along the watermains in the study area are reasonable (<1m/s). The only apparent exception shown is the inlet/outlet pipes for the Bolton Elevated Tanks.
- A few resiliency concerns were also noted in terms of supply to this study area:
    - Only two 400mm feeds are available to send water to the Northeast corner of Zone 6 Bolton.
    - Zone 6 Bolton is dependent on the 750m from Tullamore PS. Other than the 750mm watermain, there is only a 300mm watermain and a Zone 5 600mm watermain on Mayfield Rd.
- Fire flow availability was shown to be quite reasonable (typically >100L/s), except along certain smaller diameter or single feed (dead-end) areas, which can sometimes drop to below 75 L/s in availability.

A water modelling exercise was carried out to identify existing spare capacity in the system in the eastern part of the Zone 6B system and to see whether that side of the system (near King Street / Columbia Way) could potentially handle a Z7B booster station without compromising the rest of that Zone 6B area. To help identify the approximate “tipping point” (when the increased demands would be too much to be supported by the existing 400mm watermains that transfer flows across to the existing northeast part of Z6B and any future growth in the “fingers”), an iterative process was used to assess various different added demands/populations in the model.

The analysis concluded that a population growth of ~3000, but less ~5000 people + jobs, is expected to be manageable on an interim basis when only a booster pump station and some zone realignment is considered for upgrades.

Wastewater Modelling

The Region provided s wastewater model for the catchment area upstream of the Bolton SPS. This model was incorporated into the Master Servicing Plan model for the purpose of this analysis. The review of the wastewater hydraulic model included:

- Review of the wastewater network including the three sewage pumping stations in the study area.
- Review of population and model subcatchments.
- Review of the calibration of the model area upstream of the Bolton SPS (as provided by the Region).
- Model validation for the updated combined area (Upstream Bolton SPS + MSP model).

After review and validation of the wastewater hydraulic model it was concluded that a number of the issues found are relatively minor and should, upon approval by the Region, be simple to update. However, some issues require further investigation and agreement on the approach with the Region.

A wastewater modelling exercise was carried out to support the development of wastewater servicing concepts in the short-term. The focus of this exercise was to identify if the existing system has capacity to accommodate growth proposed within the approved ROPA 30 lands.

Some of the observations from this analysis include:

- The model results showed a feasible connection via new sewer along King St to Emil Kolb to service the option 3 land and Chickadee development. The new sewer will require creek and railway crossings.
- Options 6 lands and triangled lands are proposed be serviced by the proposed master plan trunk sewer along Humber Station Rd. Model results did not show capacity constraints downstream of the connection point to the existing sewer along Clarkway Dr.
- For the option 1 lands four (4) servicing alternatives were explored:
    - Alternative 1 – Connection point at Columbia Way and Kingsview Dr. – show significant capacity constraints in the existing system including a 250mm sewer bottleneck at Maidstone Ct.
    - Alternative 2 – Connection point at Columbia Way and Westchester Blvd. – also show capacity constraints in the existing system including a 250mm sewer bottleneck at Maidstone Ct.
    - Alternative 3 – New sewer along Hwy 50 / Queen St. – requires the construction of a new sewer along Hwy 50 / Queen St. Model results did not show surcharge issues in the existing sewers downstream of the connection point at Queen St north of the Humber River.

- Alternative 4 – New servicing west towards Emil Kolb Pwy. – requires the construction of new gravity sewer Hwy50 north to new sewer, sewage pumping station and forcemain along Emil Kolb Pwy. Model results did not show surcharge issues in the existing sewers downstream of the connection point at Emil Kolb including the addition of the Option 3 lands and Chickadee development.

The analysis and results outlined in this memorandum were used to inform the development and evaluation of servicing concepts for the Bolton Water and Wastewater Capacity Improvements. It is expected that more detailed analysis and modelling will be undertaken as part of the subsequent Class Environmental Assessment that would look into finalize the servicing strategies for various components of the conceptual water and wastewater solutions.

APPENDIX A
ENGINEERING VALIDATION

ITEM	DETAILS
Project Number	722010
Project Name	on Expansion Servicing Feasibility Study
Hydraulic Model Name	Bolton EA Feasibility Study Short Term
InfoWorks Version	v2021.2
IWM File Name	N/A
Network Name	N/A
Network Check in Date & Time	validated on 12/16/2021
Model Reviewer	Julia Zhu
Model Build Project Manager	Spenser Carey
Model Purpose	Capacity, I/I, and planning analysis

General Comments
Pipes longer than 500m and shorter than 5m can cause instabilities, these will be reviewed if there are issues with model validation
Check that any inverted siphons are set to "Pressure" solution_model and have "Sealed" manhole flood types
Pumping station wetwells are modelled as manhole instead of storage. This will be reviewed during the detailed modelling of the pumping station as user-defined storage will provide great accuracy for the larger pumping station.
Recommend in depth review of overflows to model accurately, confirm risk of downstream restriction, and risk of SW spill back into sanitary. We understand that some of these were modelled as part of separate assignment.
Steps were found in a few locations with newly imported infrastructure.
Forcemains are currently simplified in GIS. For increased accuracy these could be updated from drawings.
Duplicates are removed from the Shape Tab, Headloss Curve Tab, Sediment Grading Tab, Head Discharge Tab in the Links Table
Ensure all forcemains are set to HW with a C Factor of 120 (see asset ID 1179440 as an example)

Key

Region to review and provide response
GMBP reviewed and updated
Comment to be aware of but no action required unless it causes issues further in the process

Code	Priority	Object	Object2	Field	Message	Comment
I2040	2	Node	FAC-SCADA-088	Shaft plan area	This manhole (and possibly others) has shaft area below minimum in Simulation Parameters	Recommend to update to 7.07m2 to match SPS report
I2040	2	Node	SMH-162185S	Chamber plan area	This manhole (and possibly others) has chamber area below minimum in Simulation Parameters	do nothing
W2053	2	Conduit	BFM_DU_001.1	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
W2055	2	Conduit	FAC-SCADA-049-21	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
W2053	2	Conduit	BFM_DU_002.2	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
W2055	2	Conduit	FAC-SCADA-049-22	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
W2053	2	Conduit	BFM_DU_003.3	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
W2055	2	Conduit	FAC-SCADA-049-23	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1001	3	Conduit	BFM_DU_001.1	Length	Length S14.3 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1003	3	Conduit	BFM_DU_001.1	Length	Length S14.3 m > S05.6 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	BFM_DU_001.1	Gradient	Gradient -4.708 % < 0.000 % > 300000.000 % (absolute range)	forcemain, do nothing
I1009	3	Conduit	BFM_DU_001.1	DS invert level	Pipe backdrop 24.216 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	BFM_DU_001.1	US invert level	Invert depth -227.184 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	BFM_DU_001.1	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	BFM_DU_001.1	US invert level	Soffit depth -227.534 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	BFM_DU_001.1	US invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1001	3	Conduit	BFM_DU_002.2	Length	Length S13.9 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1003	3	Conduit	BFM_DU_002.2	Length	Length S13.9 m > S05.4 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	BFM_DU_002.2	Gradient	Gradient -4.708 % < 0.000 % > 300000.000 % (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1009	3	Conduit	BFM_DU_002.2	DS invert level	Pipe backdrop 24.197 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	BFM_DU_002.2	US invert level	Invert depth -227.203 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	BFM_DU_002.2	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	BFM_DU_002.2	US invert level	Soffit depth -227.553 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	BFM_DU_002.2	US invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1001	3	Conduit	BFM_DU_003.3	Length	Length S12.6 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1003	3	Conduit	BFM_DU_003.3	Length	Length S12.6 m > S04.9 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	BFM_DU_003.3	Gradient	Gradient -4.769 % < 0.000 % > 300000.000 % (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1009	3	Conduit	BFM_DU_003.3	DS invert level	Pipe backdrop 24.444 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	BFM_DU_003.3	US invert level	Invert depth -227.556 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	BFM_DU_003.3	US invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	BFM_DU_003.3	US invert level	Soffit depth -228.006 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	BFM_DU_003.3	US invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1003	3	Conduit	FAC-SCADA-049-21	Length	Length 472.7 m > 465.0 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	FAC-SCADA-049-21	Gradient	Gradient -4.708 % < 0.000 % > 300000.000 % (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1009	3	Conduit	FAC-SCADA-049-21	DS invert level	Pipe backdrop 22.254 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	FAC-SCADA-049-21	DS invert level	Invert depth -227.184 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	FAC-SCADA-049-21	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	FAC-SCADA-049-21	DS invert level	Soffit depth -227.534 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	FAC-SCADA-049-21	DS invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1003	3	Conduit	FAC-SCADA-049-22	Length	Length 473.1 m > 465.6 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	FAC-SCADA-049-22	Gradient	Gradient -4.708 % < 0.000 % > 300000.000 % (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1009	3	Conduit	FAC-SCADA-049-22	DS invert level	Pipe backdrop 22.273 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	FAC-SCADA-049-22	DS invert level	Invert depth -227.203 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	FAC-SCADA-049-22	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	FAC-SCADA-049-22	DS invert level	Soffit depth -227.553 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	FAC-SCADA-049-22	DS invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1003	3	Conduit	FAC-SCADA-049-23	Length	Length 474.4 m > 467.8 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	FAC-SCADA-049-23	Gradient	Gradient -4.769 % < 0.000 % > 300000.000 % (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1009	3	Conduit	FAC-SCADA-049-23	DS invert level	Pipe backdrop 22.626 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1010	3	Conduit	FAC-SCADA-049-23	DS invert level	Invert depth -227.556 m below ground < 0.300 m or > 20.000 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1011	3	Conduit	FAC-SCADA-049-23	DS invert level	Invert above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1012	3	Conduit	FAC-SCADA-049-23	DS invert level	Soffit depth -228.006 m below ground < 0.100 m (absolute range)	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1013	3	Conduit	FAC-SCADA-049-23	DS invert level	Soffit above ground level	No ground level at break points along forcemain downstream of Bolton SPS, recommend to model the forcemain in details
I1001	3	Conduit	FAC-SCADA-088-21	Length	Length 605.0 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1003	3	Conduit	FAC-SCADA-088-21	Length	Length 605.0 m > 597.9 m (distance between nodes + tolerance)	do nothing
I1007	3	Conduit	FAC-SCADA-088-21	Gradient	Gradient -0.610 % < 0.000 % > 300000.000 % (absolute range)	forcemain, do nothing
I1009	3	Conduit	FAC-SCADA-088-21	DS invert level	Pipe backdrop 3.691 m > 3.000 m (maximum difference between d/s & u/s pipe invert levels)	forcemain, do nothing
I1004	3	Conduit	SMH-308444.1	Length	Length S1.3 m < S4.0 m (distance between nodes - tolerance)	good
I1007	3	Conduit	SMH-308792-IS-S.1	Gradient	Gradient -16.127 % < 0.000 % > 300000.000 % (absolute range)	Siphon structure, do nothing.
I1007	3	Conduit	SMH-308792-IS-6.2	Gradient	Gradient -16.162 % < 0.000 % > 300000.000 % (absolute range)	Siphon structure, do nothing.
I1007	3	Conduit	SMH-308792-IS-7.3	Gradient	Gradient -16.404 % < 0.000 % > 300000.000 % (absolute range)	Siphon structure, do nothing.
I1001	3	Conduit	SMH-308792.1	Length	Length 3.8 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1001	3	Conduit	SMH-308792.2	Length	Length 3.7 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1001	3	Conduit	SMH-308792.3	Length	Length 3.7 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1004	3	Conduit	SMH-308926.1	Length	Length 42.2 m < 47.2 m (distance between nodes - tolerance)	good
I1004	3	Conduit	SMH-309226.1	Length	Length 96.0 m < 96.4 m (distance between nodes - tolerance)	good
I1004	3	Conduit	SMH-309239.1	Length	Length 86.6 m < 86.8 m (distance between nodes - tolerance)	good
I1001	3	Conduit	SMH-309497.1	Length	Length 4.5 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1001	3	Conduit	SMH-308.1	Length	Length 4.3 m < S.0 m or > S00.0 m (absolute range)	do nothing
I1001	3	Conduit	SMH-6541716.1	Length	Length 4.9 m < S.0 m or > S00.0 m (absolute range)	GIS data and model discrepancy. The 200mm is abandoned
I2006	3	Node	SMH-1650931	conduit_height	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	GIS data and model discrepancy. The 200mm is abandoned
I2006	3	Node	SMH-1650931	conduit_width	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	GIS data and model discrepancy. The 200mm is abandoned
I2006	3	Node	SMH-308203	conduit_height	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308203	conduit_width	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308289	conduit_height	Link dimension u/s 300.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308289	conduit_width	Link dimension u/s 300.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308398	conduit_height	Link dimension u/s 450.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308398	conduit_width	Link dimension u/s 450.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308504	conduit_height	Link dimension u/s 450.0 mm > 150.0 mm (link dimension d/s + tolerance)	Siphon structure, reviewed inverts against Epal, do nothing.
I2006	3	Node	SMH-308504	conduit_width	Link dimension u/s 450.0 mm > 150.0 mm (link dimension d/s + tolerance)	Siphon structure, reviewed inverts against Epal, do nothing.
I2006	3	Node	SMH-308513	conduit_height	Link dimension u/s 200.0 mm > 150.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 150mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-308513	conduit_width	Link dimension u/s 200.0 mm > 150.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 150mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-308541	conduit_height	Link dimension u/s 500.0 mm > 300.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 300mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-308541	conduit_width	Link dimension u/s 500.0 mm > 300.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 300mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-308792	conduit_height	Link dimension u/s 375.0 mm > 150.0 mm (link dimension d/s + tolerance)	Siphon structure, reviewed inverts against Epal, do nothing.
I2006	3	Node	SMH-308792	conduit_width	Link dimension u/s 375.0 mm > 150.0 mm (link dimension d/s + tolerance)	Siphon structure, reviewed inverts against Epal, do nothing.
I2006	3	Node	SMH-308845	conduit_height	Link dimension u/s 300.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-308845	conduit_width	Link dimension u/s 300.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309053	conduit_height	Link dimension u/s 450.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 300mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-309053	conduit_width	Link dimension u/s 450.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Very steep slope along 300mm sewer. Large pipe in ds to accommodate high velocity flow from upstream.
I2006	3	Node	SMH-309189	conduit_height	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309189	conduit_width	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309198	conduit_height	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309198	conduit_width	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309243	conduit_height	Link dimension u/s 675.0 mm > 600.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Manhole upstream of Bolton SPS, connecting overflow pipe
I2006	3	Node	SMH-309243	conduit_width	Link dimension u/s 675.0 mm > 600.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Manhole upstream of Bolton SPS, connecting overflow pipe
I2006	3	Node	SMH-309312	conduit_height	Link dimension u/s 300.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309312	conduit_width	Link dimension u/s 300.0 mm > 250.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309366	conduit_height	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-309366	conduit_width	Link dimension u/s 250.0 mm > 200.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-6554295	conduit_height	Link dimension u/s 450.0 mm > 400.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2006	3	Node	SMH-6554295	conduit_width	Link dimension u/s 450.0 mm > 400.0 mm (link dimension d/s + tolerance)	Confirmed with Epal data. Potential hydraulic constraint at this location.
I2002	3	Node	SND-1697647	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-1697647	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6019154	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6019154	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6324968	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6324968	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6324983	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6324983	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6514545	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6514545	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6519272	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6519272	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6519394	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6519394	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6522044	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6522044	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6522745	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6522745	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2002	3	Node	SND-6522924	Chamber plan area	Manhole chamber area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.
I2009	3	Node	SND-6522924	Shaft plan area	Shaft area 0.0 m2 < 0.5 m2 or > 20.0 m2 (absolute range)	Manhole with 0 shaft plan area. The 0 area in the mh shaft may lead to higher surcharge state at nodes. Recommend to convert to default.

APPENDIX B
PUMPING STATION AND POPULATION REVIEW

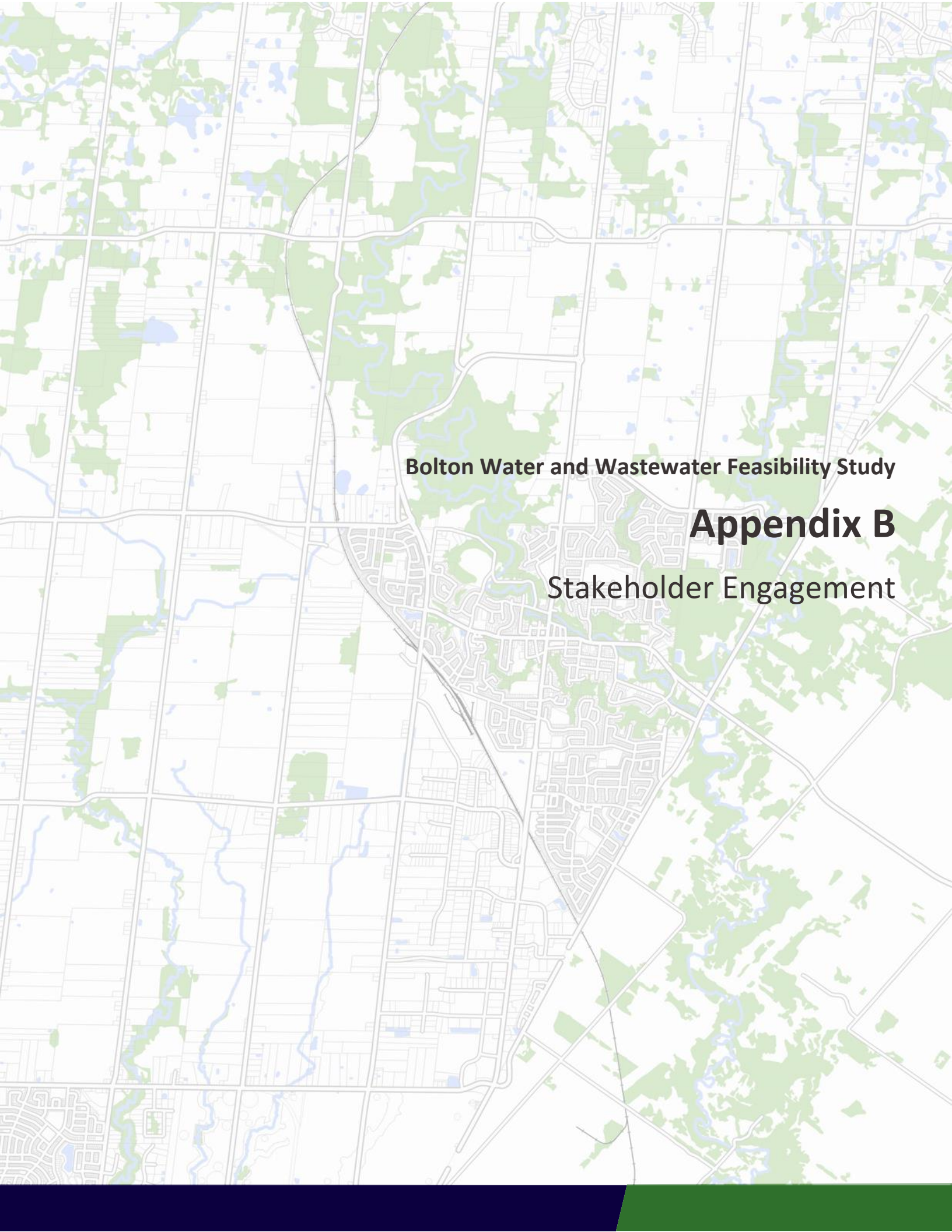
The pumping stations modelled data are compared against the received SPS report.

Key Model Parameters		Bolton North SPS		Bolton SPS	
		Model	SPS Report	Model	SPS Report
Wet Well					
Number of Wet Wells		1	1	2 (modelled as twin wet well, connected with sluice gate)	3
Top of Wet Well		255.25	248.90	211.30	211.30
Bottom of Wet Well		245.32	245.32	204.00	204.00
Shaft Area (m^2)		7.07	7.07	18.36/9.18	18.36/9.18
Pump Operation Details					
Pump 1 (Lead)	On level	246.37	246.67	207.10	207.50
	Off level	246.02	246.04	206.70	206.70
Pump 2 (Lag)	On level	246.47	246.75	207.30	207.70
	Off level	246.02	246.04	206.70	206.70
Pump 3 (Standby)	On level	-	-	208.00	211.00
	Off level	-	-	206.70	206.70
Forcemain					
Upstream Invert		253.25	253.72	204.93	211.07
Downstream Invert		256.94	257.20	251.4/251.4/252.0	251.1/251.1/251.4
Overflows					
Overflow location		N/A		Outlet to MH 309243, ultimately to Humber River, flood level at model outlet set to 210.90 (equivalent to 50yr flood level)	
Overflow elevation		N/A	N/A	210.54	210.54

The subcatchments with large population differences are summarized in the table below:

Subcatchment ID	Model Population	Scn 16 2016 Res Population	Scn 16 2016 ICI Population	Scn 16 Total	% Diff	Comment
297902	25.2	1.11	0.00	1.11	96%	
299480	1.1	0.00	0.00	0.00	100%	
299461	38.2	153.57	0.00	153.57	-302%	Residential home from google map. No high-rise condo building identified. Agree with model updates.
299447	38.5	285.28	0.00	285.28	-641%	Residential home from google map. No high-rise condo building identified. Agree with model updates.
298898	11.61	0.00	0.00	0.00	100%	
298896	42	387.55	0.00	387.55	-823%	Residential home from google map. No high-rise condo building identified. Agree with model updates.
298853	10.35	21.07	0.00	21.07	-104%	
297067	26.32	0.00	31.91	31.91	-21%	
297576	17.5	310.30	0.00	310.30	-1673%	Residential home from google map. No high-rise condo building identified. Agree with model updates.

Subcatchment ID	Model Population	Scn 16 2016 Res Population	Scn 16 2016 ICI Population	Scn 16 Total	% Diff	Comment
295581	46.97	29.50	0.00	29.50	37%	
295226	0.55	0.00	0.00	0.00	100%	WSP maintained the population as building sighted from aerial view.
295246	58.08	30.84	59.82	90.66	-56%	
295394	29.32	0.00	1.65	1.65	94%	The population updated by WSP to ensure average per capital wastewater flow for FM area.
295373	2.84	0.00	0.00	0.00	100%	
295995	3.58	0.00	0.16	0.16	95%	The population updated by WSP to ensure average per capital wastewater flow for FM area. Commercial lightning electronic company from Google map
296054	4.81	4.80	2.76	7.55	-57%	
300106	1.75	0.00	0.12	0.12	93%	The population updated by WSP to ensure average per capital wastewater flow for FM area. Commercial Law Firm from Google map.
299762	1.15	0.00	0.00	0.00	100%	
305591	38.51	0.00	10.04	10.04	74%	



Bolton Water and Wastewater Feasibility Study

Appendix B

Stakeholder Engagement

Region of Peel working with you

Bolton Water and Wastewater Capacity Improvements Schedule C Class Environmental Assessment

Planning Meeting

—

August 12, 2022

Agenda

Region of Peel working with you

1. Project Background
2. Servicing Comments
3. Region Planning vs Caledon Planning (Long Term)
4. Region Planning vs Caledon Planning (Short Term)
5. Next Steps

Meeting Objective

Confirm and agree on the short- and long-term planning projections for Bolton for use in the feasibility study and subsequent Environmental Assessment Study

Project Background

Region of Peel working with you

Today's Focus

Inputs:
- ✓ Planning numbers
- ✓ Design criteria
- ✓ Hydraulic modelling

Inputs:
- ✓ Stakeholder & Indigenous Communities communications & engagement
- ✓ Study area existing conditions
- ✓ Hydraulic modelling
- ✓ Discipline studies & investigations

Feasibility Study → ***Class Environmental Assessment Process***

- Project Initiation & Visioning
- Feasibility Study
- Class EA Phase 1: Problem and Opportunity
- Class EA Phase 2: Identification and Evaluation of Alternative Solutions
- Class EA Phase 3: Alternative Design Concepts for Preferred Solution
- Class EA Phase 4: Environmental Study Report (ESR)

Key Decisions / Outcome:
- List of Preliminary Technical Servicing Solutions
- Solution that can proceed to implementation (e.g., Schedule A/A+) to facilitate immediate growth needs
- Solutions required to move forward into the EA Process.

Summer 2022

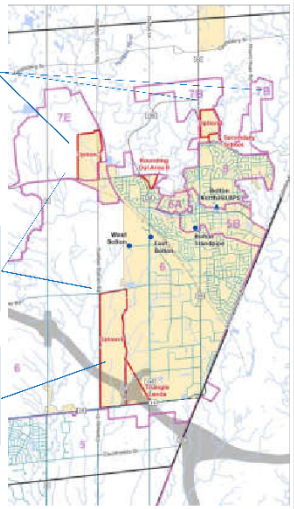
Key Decisions / Outcome:
- Select Preliminary Preferred Alternative Solutions
- Multi-Stage Servicing Strategy (Interim, Ultimate)
- Select Preferred Design Concept (Construction method, design details)
- Environmental Study Report

Spring 2023 **Winter 2024**

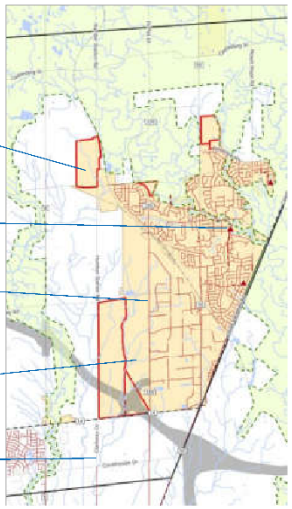
Servicing Comments

Region of Peel working with you

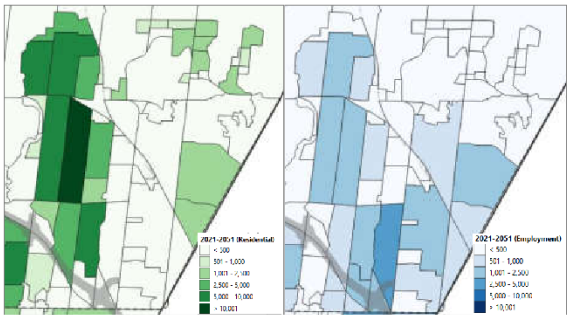
- New Pressure Zone 7 required
- Potential interim strategy required to move towards these growth areas prior to implementation of long-term sizing / solutions
- Significant growth in Zone 7 and Zone 6 both in Bolton area and in areas further west. Hydraulically connected, so can't look at one area in isolation
- Water servicing partially covered through planned Master Plan projects. Most recent 2051 projections extend servicing needs well beyond ROPA 30 Areas.

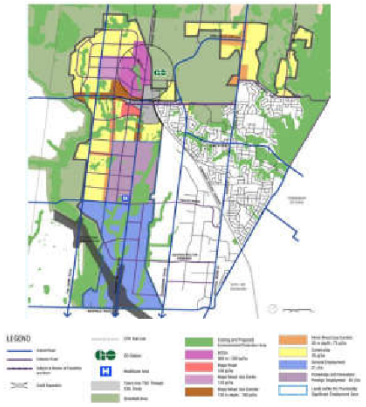


- Potential for extension of existing sewer system or extension of trunk sewer along Humber St Rd required
- Opportunity to better understand flows into Bolton SPS prior to planned upgrades
- Coleraine Drive sewer capacity constraints to service future growth in the catchment area
- Direct servicing to existing shallow sewers on Coleraine Drive may be challenging for larger development sites due to ground elevations.
- Extension of trunk sewer to the north required.



Region Planning vs Caledon Planning (Long Term)

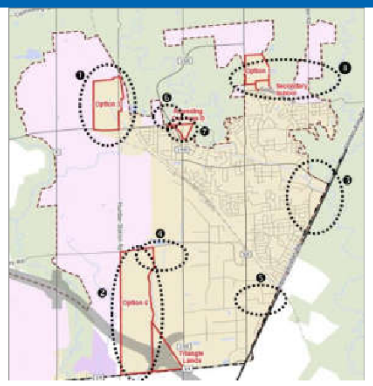


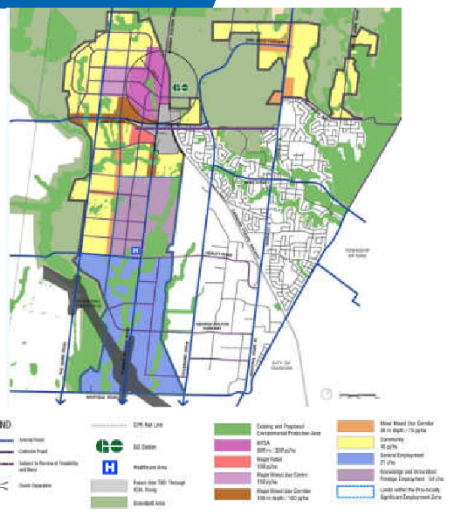


Observations
Option 3 Lands – Region mainly residential. Town MTSA (mainly residential) and mix uses
Option 6 Lands – Region residential & employment 60/40. Town general employment area

Total Population 2051 = ~111K
Total Employment 2051 = ~46K

Region Planning vs Caledon Planning (Short Term)





Priority Areas for Short-Term Analysis

Area	Pop 2051	Emp 2051
1 Option 3 Lands Macville Community Lands	3,600	650
2 Option 6 Lands	5,300	3,200
Triangle lands	-	1,260
7 Chickadee Development	480	200
8 Option 1 Lands North of Columbia Way	1,600	340

Next Steps

- Summary of Planning Estimates and Phasing for Feasibility Study
- Water and Wastewater Hydraulic Modelling (Step Approach)
  - Baseline (no additional growth added)
  - Baseline + Priority Areas
  - Future 2051
- Servicing Solutions
  - List of Preliminary Technical Servicing Solutions
  - Solution that can proceed to implementation (e.g., Schedule A/A+) to facilitate immediate growth needs
  - Solutions required to move forward into the EA Process.

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Meeting Minutes

Project:	Bolton Water and Wastewater Capacity Improvements MCEA Schedule 'C'	Project No.: 722010
Meeting:	Planning Meeting with Town of Caledon	
Date:	August 15, 2022	Time: 2:00 pm – 3:00 pm
Location:	MS Teams	

Attendees:

Region of Peel (Region)	**Town of Caledon (Town)**	**GM BluePlan (GM BluePlan)**
Italia Ponce Vanelli	Andrew Pearce	Mark Zamojc
Miriam Polga	Drew Haines	Sandy Naime
Justin Lee	Rita Juliao	Sandra Anastasio
Sogol Bandehali	Carmine Caruso	
	Patrick Rees	
	Steven Burke	
	Tom Darlow	

These meeting minutes should be considered supplement to the meeting slides and attached summary map.

Item

1. Study Objectives and Considerations

1. The feasibility study will focus on the immediate/short term water and wastewater needs and will move Schedule A/A+ projects forward to design.
2. The Class EA will focus on long-term strategies and will complete a detailed evaluation process of any identified Schedule B/C projects.
3. The EA will look to optimize the flow and capacity within the Coleraine sewer, the Albion-Vaughan sewer and the proposed Humber Station Rd sewer (identified in the Master Plan).
    a. The existing Coleraine trunk sewer does not have the capacity to take flows from the whitebelt lands.
    b. Looking to divert flows to Albion-Vaughan to increase capacity within Coleraine and New Humber Station Rd sewer.
4. The Feasibility Study and Class EA will consider the full lake based water and wastewater systems; however, the studies will focus on water and wastewater strategies within the Bolton study area.
5. Planning numbers presented at the meeting are the latest available version from the Region.
6. There are 3 key development areas in Bolton: Option 1 lands, Option 3 lands (including GO Station) and Option 6 lands

2. Option 1 Lands

1. Lands north of Colombia Way – North Hills Lands
    a. The Expanding Bolton Roadmap identified this as a priority area for development (Secondary Plan to be prepared for this area).
    b. Town to provide information to date to the Region and GMBP team.
2. Tom Darlow (Town) provided information on the Work Yards 3 building (owned by the Town of Caledon)
    a. Located adjacent (west) to Option 1 lands.
    b. Building currently not connected to municipal water or wastewater system (Town requested to the Region to add municipal connection).

c. Proposal includes the construction of a new facility which will be significantly larger than the original building.
d. New building will hold approximately 50 employees.

3. Option 3 Lands (including GO Station)

1. Option 3 Lands - Macville East
   a. This development has been approved and is moving forward.
   b. Landowners summitted an application requesting expansion of lands to Gore Rd.
   c. Immediate pressures to develop Option 3 lands. The area to the west to Gore Rd is not immediate, but the Town is expecting landowners will pressure to proceed asap.
   d. A Macville Secondary Plan (MVSP) and Functional Servicing Report were prepared for the Macville community area (2021). The projected population in the servicing plan is 24,400 (residential and non-residential)
   e. The Town is proceeding with Town-led Secondary Plans for the surrounding areas.
2. ARGO Secondary Plan to be prepared for the Caledon Go Station.
   a. The Town expressed concerns about low density projection surrounding the GO MTSA.

4. Option 6 Lands

1. Option 6 lands originally categorizes as residential and employment; however, they have recently been approved as employment lands.
   - Regional SGUs currently have residential population in Option 6 lands.
2. Residential population originally allocated to Option 6 lands have now been shifted to Option 3 lands and surrounding areas.
   - Region to follow with planning with regards to shift of the residential population.

5. Other Areas

<u>Intensification</u>

1. Industrial Rd and Highway 50 corridor – 5 towers. Map has been corrected to show right location of Industrial Rd development.

<u>Greenfield</u>

2. Chickadee Development on Chickadee Lane - only development within this area. Draft Plan of Subdivision approved.

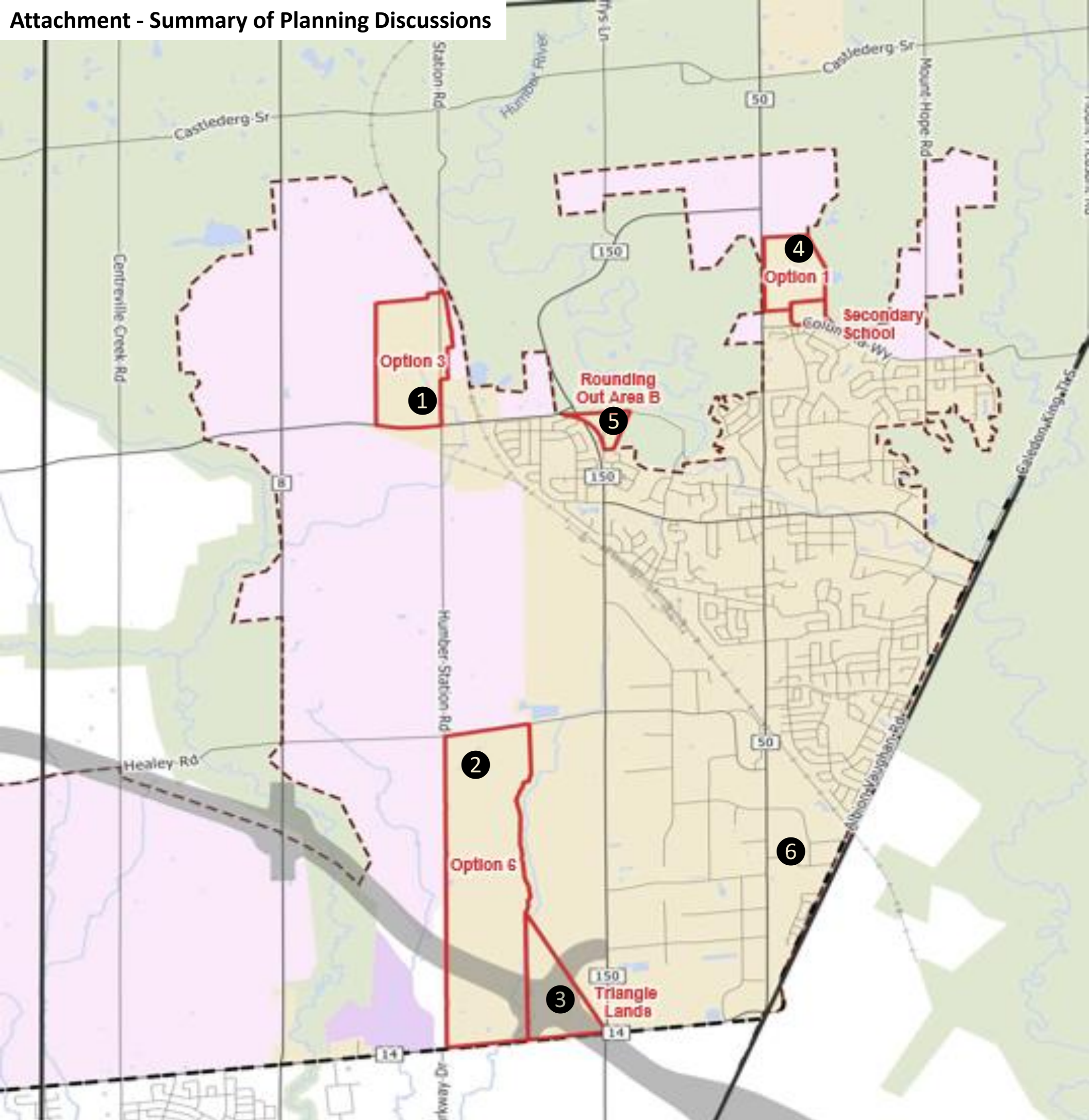
6. Action Items and Next Steps

1. Town to prepare information package for Region/GM BluePlan review.
2. GM BluePlan to update maps with the move of the GTA West Interchange from Coleraine Dr to Humber Station Rd.
3. Region to follow up with Regional Planning about latest planning numbers and shift of population from Option 6 lands to lands north of King Rd.
4. Region/GM BluePlan will hold another meeting in Fall 2022 to discuss the recommendations of the feasibility study before finalizing study.

These minutes have been prepared by Sandra Anastasio and reviewed by the undersigned. If there are any errors or omissions in these minutes, please contact the author as soon as possible.

GM BLUEPLAN ENGINEERING LIMITED

Attachment - Summary of Planning Discussions



Area	SGUs		Comments
	Pop 2051	Emp 2051	
❶ Option 3 Lands - Macville Community Lands	3,600	650	Population may be low. Macville FSR shows 24,400 p+j for lands north of King Rd and ~11,000 p+j for Option 3 lands.
❷ Option 6 Lands	5,300	3,200	Town has defined this as Employment Lands. Residential population moved to Option 3 Lands. Currently, Region SGUs do not seem consistent with this approach.
❸ Triangle lands	-	1,260	Interchange moved to Humber Station Rd.
❹ Option 1 Lands North of Columbia Way	1,600	340	Identified as a priority area for development.
❺ Chickadee Development	480	200	Draft of Subdivision approved for 154 units.
❻ Industrial Rd Development			Condo Towers. Region/Town to provide information about projected population.

Region of Peel
working with you

Bolton Water and Wastewater Capacity Improvements Schedule C Class Environmental Assessment - Feasibility Study

Town of Caledon
Preferred Servicing Concepts

—

December 1, 2022

Agenda

Region of Peel
working with you

1. Meeting Objectives & Recap
2. Option 6 & Triangle Lands
   - Water Short & Long-term Preferred Strategy
   - Wastewater Short & Long-term Preferred Strategy
3. Rounding Out Area B – Chickadee Lands
   - Water Short & Long-term Preferred Strategy
   - Wastewater Short & Long-term Preferred Strategy
4. Option 3 Lands
   - Water Short & Long-term Preferred Strategy
   - Wastewater Short & Long-term Preferred Strategy
5. Option 1 Lands
   - Water Short & Long Preferred Strategy
   - Wastewater Short & Long-term Preferred Strategy
6. Preferred Concept Summary & Next Steps

Meeting Objectives

- Provide a project recap
- Present the preliminary preferred water and wastewater short-term & long-term servicing concepts for each area
- Obtain feedback from the Town

Summary of Key Tasks Completed Since Last Meeting

Region of Peel
working with you

Feasibility Study Objective

- Identify the preferred long-term strategies that are required for each servicing area
- Select the preferred water and wastewater short-term concepts that best align with the identified long-term strategy and water servicing timeline
- Identify which short-term concepts can be expedited (Schedule A+) to detailed design

WHAT HAVE WE DONE?

- ✓ Met with the Region and Town Staff to discuss short and long-term concepts
- ✓ Reviewed high level technical feasibility/constructability for each concept
- ✓ Reviewed alignment of water and wastewater servicing implementation
- ✓ Determined which concepts could most likely move forward to Detailed Design and which concepts would require a Schedule B/C EA

Timeline for Implementation

Region of Peel
working with you

Water and wastewater servicing concepts have been categorized based on their need:

- **Short-term**: imminent ~ 5 years
- **Medium-term**: beyond 5 years
- **Long-term**: 2051 planning estimates, however accelerated growth can reach 2051 targets sooner

Region of Peel working with you

Option 6 & Triangle Lands

Option 6 & Triangle Lands - WATER

Region of Peel working with you

LONG-TERM REQUIREMENTS

- New Pressure Zone 6 Pumping Station
- New Pressure Zone 6 Storage
- New Pressure Zone 6 Feedermains

SHORT-TERM REQUIREMENTS

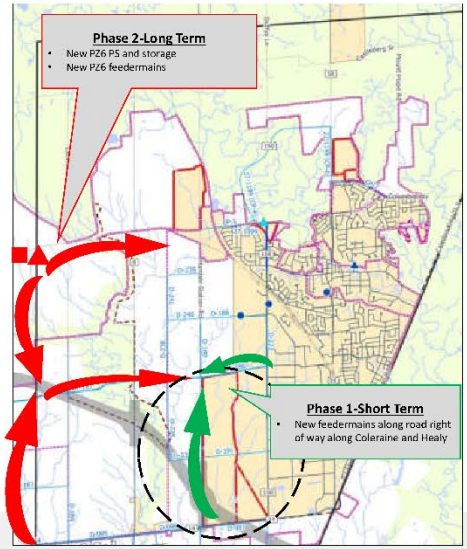
- New Pressure Zone 6 Distribution mains

PREFERRED SHORT-TERM CONCEPT

- New feedermains along road right of way along Humber Station and Healy Road

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Schedule A+ EA for short-term concept – dependent on the type of crossings and tunnel depth
- Likely to move forward to detailed design



Option 6 & Triangle Lands - WASTEWATER

Region of Peel working with you

SHORT & LONG-TERM REQUIREMENTS

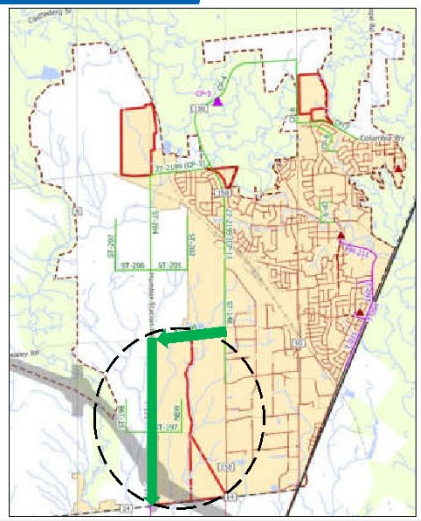
- Extension of servicing from existing sewer collection system south of Mayfield Road

PREFERRED SHORT-TERM CONCEPT

- Gravity servicing via new Humber Station Road trunk sewer and new Healey Road sewer

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Schedule A+ EA for short-term concept – dependent on the type of crossings and tunnel depth
- Likely to move forward to detailed design



Region of Peel working with you

Rounding Out Area B - Chickadee

Rounding Out Area B (Chickadee) – WATER

SHORT & LONG-TERM REQUIREMENTS

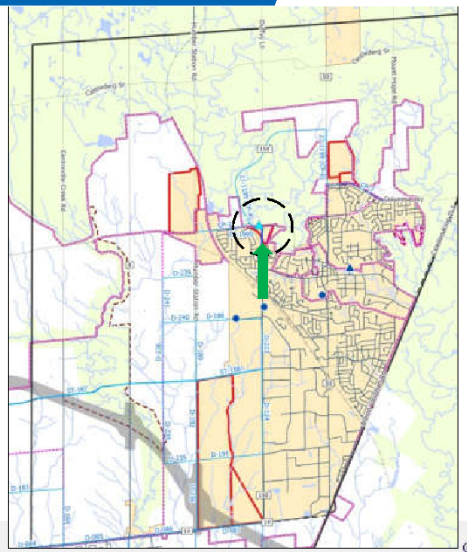
- Extension of servicing along Coleraine Drive

PREFERRED SHORT-TERM CONCEPT

- New watermains along Coleraine Drive road right of way

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Schedule A+ EA for short-term concept – dependent on the type of crossings and tunnel depth
- Likely to move forward to detailed design



Rounding Out Area B – Chickadee – WASTEWATER

SHORT & LONG-TERM REQUIREMENTS

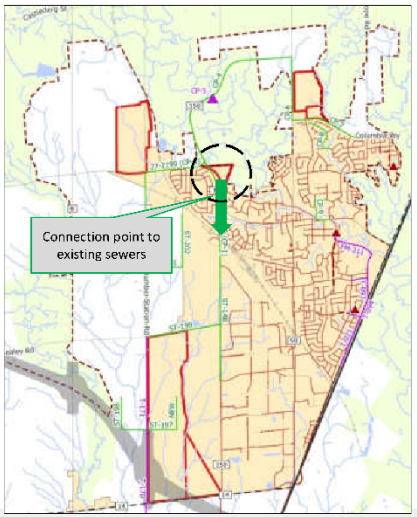
- Extension of servicing from existing sewers on Coleraine Drive

PREFERRED SHORT-TERM CONCEPT

- Gravity to Coleraine Drive

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Schedule A+ EA for short-term concept – dependent on the type of crossings and tunnel depth
- Likely to move forward to detailed design



Option 3 Lands

Option 3 Lands - WATER

LONG-TERM REQUIREMENTS

- New Pressure Zone 7E Pumping
- New Pressure Zone 7E Storage
- New Pressure Zone 7E Feedermains

SHORT-TERM REQUIREMENTS

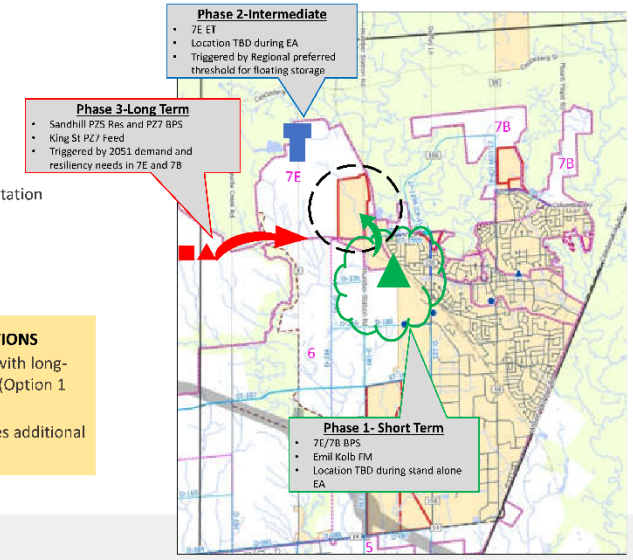
- New Pressure Zone 7E Booster Pumping Station

PREFERRED SHORT-TERM CONCEPT

- Booster Pumping Station & Feedermain

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Preferred short-term concept aligns best with long-term water strategy for Pressure Zone 7B (Option 1 Lands) and 7E (Option 3 Lands)
- Class EA (Schedule B/C) required – requires additional work prior to detailed design



Option 3 Lands – WASTEWATER

Region of Peel working with you

LONG-TERM REQUIREMENTS

- Extension of servicing to all approved lands North of King Street

SHORT-TERM REQUIREMENTS

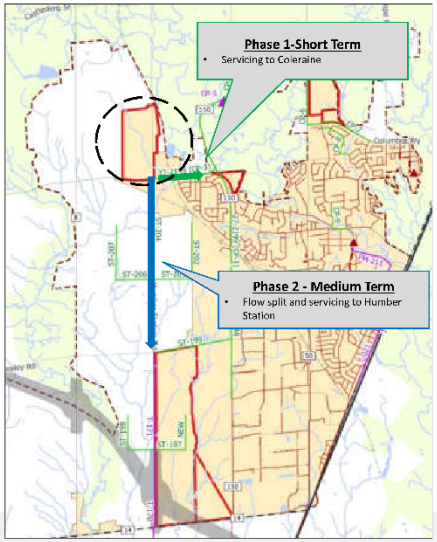
- Extension of servicing to Option 3 Lands

PREFERRED SHORT-TERM CONCEPT

- Gravity to Coleraine Drive in the short-term
- Gravity to Humber Station Rd in the medium & long-term

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Preferred short-term concept aligns best with long-term water strategy
- Class EA (Schedule B/C) required – requires additional work prior to detailed design



Region of Peel working with you

BluePlan

Option 1 Lands

Pressure Zone 7B – WATER

Region of Peel working with you

LONG-TERM REQUIREMENTS

- New Pressure Zone 7B Pumping
- New Pressure Zone 7B Storage
- New Pressure Zone 7B Feedermains

SHORT-TERM REQUIREMENTS

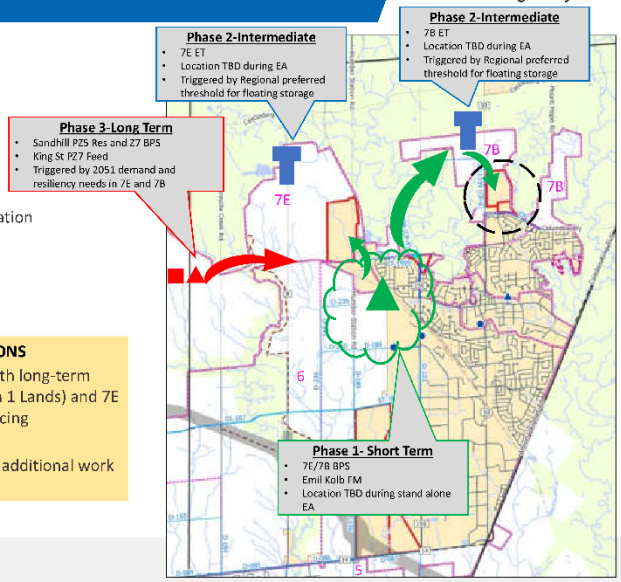
- New Pressure Zone 7B Booster Pumping Station

PREFERRED SHORT-TERM CONCEPT

- Booster Pumping Station & Feedermain

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Preferred short-term concept aligns best with long-term water strategy for Pressure Zone 7B (Option 1 Lands) and 7E (Option 3 Lands) and with wastewater servicing implementation timeline
- Class EA (Schedule B/C) required – requires additional work prior to detailed design



Option 1 Lands – WASTEWATER

Region of Peel working with you

LONG-TERM REQUIREMENTS

- Extension of servicing to both lands north of Columbia Way

SHORT-TERM REQUIREMENTS

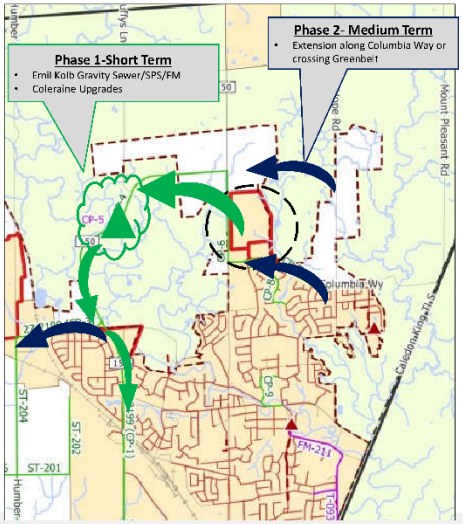
- Extension of servicing to Option 1 Lands

PREFERRED SHORT-TERM CONCEPT

- Gravity to new Emil Kolb SPS and FM

CONCEPT IMPLEMENTATION & CONSIDERATIONS

- Preferred short-term concept aligns best with long-term water strategy and with wastewater servicing implementation timeline
- Class EA (Schedule B/C) required – requires additional work prior to detailed design



Region of Peel working with you

Preferred Concept Summary

Preferred Concept Summary

Region of Peel working with you

Move Forward

The following concepts can move forward to Detailed Design – assuming no property will be required.

- **Option 6 & Triangle Lands**
  - New water feedermains along Coleraine Drive & Healey Road
  - New wastewater gravity sewers via new Humber Station Road trunk sewer and new Healy Road sewer
- **Chickadee Lands**
  - New wastewater gravity sewer to Coleraine Drive
  - New watermain along Coleraine Drive
- **Option 3 Lands***
  - New gravity wastewater sewer to Coleraine Drive (short-term) *However, Water Servicing Requires Sch B

More Work Required

The following concepts require a Class EA Schedule B or C prior to detailed design

- **Option 3 Lands**
  - No existing infrastructure for Pressure Zone 7E
    - New Booster Pumping Station and feedermain
  - New gravity wastewater sewer to Humber Station Road (medium to long-term)
- **Option 1 Lands**
  - No existing infrastructure for Pressure Zone 7B
    - New Booster Pumping Station and feedermain – Pressure Zone 7B
  - New gravity wastewater sewer to new Emil Kolb Sanitary Pumping Station and forcemain

Additional work is required prior to moving forward with development

Region of Peel working with you

Next Steps

Next Steps

Region of Peel working with you

- Confirm preferred long-term and short-term concepts
- Confirm project schedules and scope for Class EA stage
  - Option 1 & 3 Lands projects to move forward to Class EA stage
    - ❖ EA expected to commence in January/February 2023
  - Option 6 and Chickadee Lands projects to move forward to detailed design
    - ❖ Detailed Design expected to commence in January/February 2023

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Meeting Minutes

Project:	Bolton Water and Wastewater Capacity Improvements MCEA Schedule 'C'	Project No.: 722010
Meeting:	Ex-TAC Preferred Concepts – Town of Caledon	
Date:	December 1, 2022	Time: 11:00 am – 12:30 pm
Location:	MS Teams	

Attendees:

Region of Peel (Region)	**Town of Caledon (Town)**	**GM BluePlan (GMBP)**
Italia Ponce Vanelli	Andrew Pearce	Mark Zamojc
Mariam Polga	Drew Haines	Sandy Naime
Elvis Oliveira	Rita Juliao	Sandra Anastasio
Alberino Scarpato		

*These meeting minutes should be considered **supplement to the meeting slides**.*

Item	Action
1. Project Approach	
1.1. The feasibility study has identified preliminary long-term strategies and evaluated short-term concepts, selecting the short-term concepts that best align with the long-term strategy for each servicing area.	
1.2. An important consideration in the evaluation of concepts is the need to balance the timeline of water and wastewater servicing implementation.	
1.3. The feasibility study will identify the EA Schedule for each short-term concept to determine which projects can move forward to detailed design and which projects will move forward to the Class EA stage.	
1.4. Water and wastewater concepts are categorized based on their need: long-term (2051 planning estimates**,** however accelerated growth can reach 2051 targets sooner), medium-term (beyond 5 years), short term (imminent, ~ 5 years).	
2. Servicing Boundary	
2.1. ROPA30 was approved after the completion of the Water/Wastewater Master Plan.	
2.2. SABE lands include all boundary expansions within the Town.	
2.3. The feasibility study short-term analysis has not included all the SABE lands. However, it does include the 2051 projection for the ROPA30 lands. The Class EA / long-term strategy will include additional future lands as required, including the SABE lands within and adjacent to Bolton.	
2.4. The feasibility study will identify the necessary water and wastewater infrastructure required for the Bolton area. The subsequent Class EA will confirm servicing strategies and location, alignments, capacity, etc., of the proposed capital projects.	
2.5. Town will provide additional planning information related to the Bolton servicing area to support the feasibility study and Class EA.	2.5 Town

3. Option 6 Lands 3.1. It is recognized that both the preferred water and wastewater concepts have the potential to move forward to detailed design without Schedule B/C Class EA. 3.2. Initially, the Option 6 lands were designated as residential, however these lands are now considered employment lands under the latest Region of Peel Official Plan. The SGUs currently do not reflect the change in land use from residential to employment. The Region is continuing to refine the planning numbers at the SGU level that will support infrastructure sizing in this area. 3.3. Town will begin Secondary Plans for Option 1, 3 and 6 lands as a priority in 2023 (timeline to completion is approximately one year). 3.4. During the W/WW Master Plan, population and employment estimates were available for Option 6 lands up to Humber Station Rd since growth in the Option 6 lands was endorsed by Council prior to LPAT. 3.5. Water – Only one concept available for new feedermains on road right of way along Humber Station Rd and Healy Rd. 3.6. Wastewater – Only one concept available for gravity servicing via new Humber Station Rd trunk sewer and new Healey Rd sewer.	
4. Chickadee Lands 4.1. It is recognized that both the preferred water and wastewater concepts have the potential to move forward to detailed design without Schedule B/C Class EA. 4.2. Water – Only one concept available for new watermains along Coleraine Dr. 4.3. Wastewater – Only one concept available for gravity service via Coleraine Dr.	
5. Option 3 Lands 5.1. Water – It is recognized that the preferred water concept will require a Schedule B Class EA (e.g., new booster pumping station (BPS). – The preferred short-term concept leverages existing infrastructure near Option 3 lands; while the preferred long-term concept moves further west (e.g., building east to west as growth occurs). – The preferred short-term concept (Phase 1) would include the Booster Pumping Station (BPS) in the Class EA stage. – The intermediate concept (Phase 2) trigger includes geography and the ability to service the closed zone within the one BPS in the short-term. An elevated tank for water servicing will be needed in the long-term to have full servicing to the area. 5.2. Wastewater – It is recognized that the preferred wastewater concept has the potential to move forward to detailed design without Schedule B/C Class EA. – The Humber Station Rd trunk sewer will be needed in the medium to long-term. – Coleraine Dr. wastewater flow split strategy is a key aspect of the long-term strategy.	

6. Option 1 Lands 6.1. It is recognized that both preferred water and wastewater concepts will require a Schedule B Class EA, at a minimum. 6.2. <u>Water</u> – New pressure zone 7B booster pumping station and feedermain are required in the short-term and long-term. The preferred servicing concept is to move forward with a combined pressure zone 7 BPS that would service both Zones 7E and 7B. 6.3. <u>Wastewater</u> – This concept best aligns with long-term strategy and water servicing implementation timeline. – This concept would still require minor upgrades/new infrastructure along Coleraine Dr.	
7. Summary & Next Steps 7.1. Town in agreement with preferred long-term and short-term concepts. 7.2. Town brought forward concerns regarding the implementation timing of the Option 3 Lands water and wastewater servicing. 7.3. <u>Option 3 Lands</u> – The Town pointed out that there is a disconnect between the timing of developer's anticipated "move in" year versus when there will be water and wastewater servicing for Option 3 Lands. They also mentioned that developers have expressed their plans to start developing the lands west of the Option 3 lands (outside of the ROPA 30 approved lands) with low density housing. – It is recognized that a Class EA is required (cannot be avoided) for the required water pressure zone 7 BPS (MEA Schedule B requirement for construction of new pumping stations). – The Town mentioned that developers may be willing to front end all costs for Option 3 lands including all infrastructure requirements. – The following is an estimated project timeline for Option 3 water and wastewater short-term concepts: • EA completed ~ 2024-Q2 • Detailed Design ~ 2025-Q2 (there may be some overlap between EA and Detailed Design to expediate the projects) • Construction completed ~ 2027-Q2 – These timelines are based on the feasibility being completed in Jan 2023 and the EA starting in Q1 2023. 7.4. The Draft Feasibility Study Report is expected to be completed by end of January 2023 7.5. Town to provide feedback as soon as possible to ensure that input is included in the feasibility study.	

These minutes have been prepared by Sandra Anastasio and reviewed by the undersigned. If there are any errors or omissions in these minutes, please contact the author as soon as possible.

GM BLUEPLAN ENGINEERING LIMITED

Bolton Water and Wastewater Feasibility Study

Appendix C

Project Cost Estimates

Project ID	Project Description	Project Category	Diameter / Capacity	Length (m)	2020 Master Plan Project ID	Cost (2023$)
Water Projects						
W1	New Z6E & Z7E Booster Pumping Station (Sandhill)	Long-term Needs	95 ML/d	N/A	N/A	$ 27,444,300
W2	New Z5 Storage	Long-term Needs	30 ML	N/A	N/A	$ 62,566,400
W3	Z6 600-mm sub-transmission main on Healy Road from Humber Station Road to Coleraine Drive	DC Funded	600 mm	1350	W-ST-186	$ 6,438,900
W4	Z6 400-mm water main on Humber Station Road from a future street north of Mayfield Road to Healey Road	DC Funded	400 mm	1650	W-D-192	$ 5,434,000
W5	Z6 400-mm water main on Humber Station Road from Mayfield Road to 1450m northerly	DC Funded	400 mm	1450	W-D-236	$ 11,648,000
W6	Z6 400-mm water main on a future street north of Mayfield Road from Humber Station Road to Coleraine Drive	DC Funded	400 mm	1350	W-D-191	$ 3,495,700
W7	Z6 750-mm sub-transmission main on Innis Lake Road from the Tullamore Pumping Station to Healey Road	DC Funded	750 mm	3000	W-ST-185	$ 14,656,200
W8	Z6 600-mm sub-transmission main on Healy Road from Innis Lake Road to Humber Station Road	DC Funded	600 mm	4160	W-ST-187	$ 25,123,800
W9	Z6 400-mm water main on a future street north of Healey Road from West Bolton Elevated Tank to Humber Station Road	DC Funded	400 mm	810	W-D-188	$ 1,794,000
W10	Z6 400-mm water main on Humber Station Road from Healey Road to a future street northerly	DC Funded	400 mm	1220	W-D-189	$ 3,477,500
W11	Z6 400-mm water main on Humber Station Road from a future street north of Healey Road to approximately 1200m northerly	DC Funded	400 mm	1200	W-D-190	$ 3,129,100
W12	Z6 400-mm water main on a future street from Healy Road to approximately 1680m southerly, east of Humber Station Road	DC Funded	400 mm	1680	W-D-234	$ 4,158,700
W13	Z6 400-mm water main on a future street from Humber Station Road to 660m westerly	DC Funded	400 mm	660	W-D-235	$ 5,127,200
W14	Z6 400-mm water main on a future street from Healey Road to 1220m northerly, west of Humber Station Road	DC Funded	400 mm	1220	W-D-238	$ 2,619,500
W15	Z6 400-mm water main on a future street from Humber Station Road to 680m westerly, south of King Street	DC Funded	400 mm	680	W-D-239	$ 1,530,100
W16	Z6 400-mm water main on a future street from Humber Station Road to 680m westerly	DC Funded	400 mm	680	W-D-240	$ 1,530,100
W17	Z6 400-mm water main on a future street from future street north of Healey Road to 910m northerly, west of Humber Station Road	DC Funded	400 mm	910	W-D-241	$ 1,992,900
W18	New Z7E Storage (East Caledon ET)	Long-term Needs	10 ML	N/A	N/A	$ 20,855,900
W19	New Z7E/7B Booster Pumping Station (Chickadee)	ROPA30 (EA Study Required)	15 ML/d	N/A	N/A	$ 5,337,800
W20	Z7E water main along King Street from Sandhill to Humber Station Road	Long-term Needs	600 mm	4000	N/A	$ 15,407,600
W21	Z7E water main along King Street from Chickadee Lane to Humber Station Road	ROPA30	600 mm	1400	N/A	$ 9,692,800
W22	Z5E 1200-mm transmission main from Tullamore to Sandhill	Long-term Needs	1200 mm	6000	N/A	$ 111,464,600
W23	Z7 water main from King Street to Z7E Storage	Long-term Needs	750 mm	3000	N/A	$ 20,274,800
W24	Z6 sub-transmission main from Z7 BPS to existing 1050-mm stub	ROPA30	1050 mm	600	N/A	$ 4,573,400
W25	Z7 water main along Emil Kolb Parkway from King Street to Highway 50	ROPA30 (EA Study Required)	600 mm	3400	N/A	$ 16,646,500
W26	Z7 water main along Highway 50 / Queen Street from Emil Kolb Parkway to Columbia Way	ROPA30	600 mm	1100	N/A	$ 5,489,900
W27	Z7 water main along Columbia Way from Highway 50 to Mount Hope Road	ROPA30	400 mm	1500	N/A	$ 5,033,600
W28	New Z7B Storage	Long-term Needs	8.5 ML	N/A	N/A	$ 18,458,700
W29	New Z6 Storage	Long-term Needs	10 ML	N/A	N/A	$ 29,667,300
W30	Z6 750-mm water main from Sandhill to South Albion Storage	Long-term Needs	750 mm	3300	N/A	$ 20,134,400
W31	Z6 600-mm water main from Sandhill to Zone 6 distribution network	Long-term Needs	600 mm	4400	N/A	$ 30,556,500
W32	Z7 water main from Emil Kolb Parkway to Z7B Storage	Long-term Needs	600 mm	1000	N/A	$ 6,592,300
Total						**$ 502,352,500**

Project ID	Project Description	Project Category	Diameter / Capacity	Length (m)	2020 Master Plan Project ID	Cost (2023$)
Wastewater Projects						
WW1	750-mm sanitary sewer on Clarkway Drive from Countryside Drive to Mayfield Road	DC Funded	750 mm	1230	WW-T-005	$ 15,107,300
WW2	750-mm sanitary trunk sewer on Humber Station Rd from Mayfield Road to 1600m northerly	DC Funded	750 mm	1600	WW-T-170	$ 7,971,600
WW3	750-mm sanitary trunk sewer on Humber Station Rd from Healey Rd to 1500m southerly	DC Funded	750 mm	1500	WW-T-171	$ 7,528,300
WW4	450-mm sanitary sewer on Healey Road from Coleraine Drive to Humber Station Road	DC Funded	450 mm	1400	WW-ST-199	$ 3,530,800
WW5	450-mm sanitary sewer on a future street from Humber Station Road to 750m north-westerly	DC Funded	450 mm	750	WW-ST-198	$ 1,773,200
WW6	450-mm sanitary sewer on a future street from Humber Station Road to 960m north easterly	DC Funded	450 mm	960	WW-ST-197	$ 1,682,200
WW7	375-mm sanitary sewer on Mayfield Road from Coleraine Drive to Humber Station Road	ROPA30	375 mm	1400	N/A	$ 3,659,500
WW8	525-mm sanitary sewer on Emil Kolb Parkway from King Street to existing 450mm south of Harvest Moon Drive	ROPA30	525 mm	1000	N/A	$ 2,527,200
WW9	525-mm sanitary sewer on Humber Station Road from Healey Road to King Street	DC Funded	525 mm	3000	WW-ST-204	$ 8,568,300
WW10	450-mm sanitary sewer on a future street from Humber Station Road to 670 meters westerly	DC Funded	450 mm	670	WW-ST-206	$ 1,173,900
WW11	375-mm sanitary sewer on a future street from a future street 890m north of Healey Road to 800m northerly	DC Funded	375 mm	800	WW-ST-207	$ 1,285,700
WW12	375-mm sanitary sewer on a future street from a future street east of Humber Station Road to 780m northerly	DC Funded	375 mm	780	WW-ST-202	$ 1,253,200
WW13	450-mm sanitary sewer on a future street from Humber Station Road to 690m easterly, north of Healey Road	DC Funded	450 mm	690	WW-ST-201	$ 2,574,000
WW14	525-mm sanitary sewer on King Street from Humber Station Road to Emil Kolb Parkway	ROPA30	525 mm	1100	N/A	$ 3,395,600
WW15	New Humber Sewage Pumping Station (SPS)	ROPA30 (EA Study Required)	210 L/s	N/A	N/A	$ 8,489,000
WW16	300-mm twin sanitary forcemains from Humber SPS to King Street	ROPA30 (EA Study Required)	300 mm	1400	N/A	$ 10,371,400
WW17	525-mm sanitary sewer on Emil Kolb Parkway from Highway 50 to Humber SPS	ROPA30 (EA Study Required)	525 mm	2000	N/A	$ 34,938,800
WW18	525-mm sanitary sewer on Highway 50 from Columbia Way to Emil Kolb Parkway	ROPA30 (EA Study Required)	525 mm	1100	N/A	$ 20,016,100
WW19	375-mm sanitary sewer on Columbia Way from Mount Hope Road to Highway 50	ROPA30	375 mm	1500	N/A	$ 12,035,400
WW20	525-mm sanitary sewer on King Street from Emil Kolb Parkway to Humber Station Road	Long-term Needs	525 mm	1100	N/A	$ 3,395,600
WW21	525-mm sanitary sewer on King Street from Humber Station to future street to the west	Long-term Needs	525 mm	2400	N/A	$ 6,071,000
WW22	Sanitary sewer on the Gore Road from north of King St to Mayfield	Long-term Needs	600 mm	6200	N/A	$ 24,027,900
WW23	750-mm sanitary sewer on The Gore Road from Mayfield Road to just north of Countryside Drive	DC Funded	750 mm	860	WW-T-085	$ 9,045,400
Total						**$ 190,421,400**