Servicing Report

Brighton Secondary Plan

The Municipality of Brighton

D.M. Wills Project Number 21-81076

D.M. Wills Associates Limited

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Prepared for:
The Municipality of Brighton

Executive Summary

The Municipality of Brighton has engaged D.M. Wills Associates Limited (Wills), in collaboration with KMD Community Planning and Consulting Services (KMD) and Metroeconomics, to develop a Secondary Plan for greenfield lands within the urban settlement boundary. This Secondary Plan will be incorporated into the Municipality of Brighton's Official Plan and will provide detailed policies and land use designations for growth and development in identified Secondary Plan Areas.

This report, part of the larger secondary planning process, assesses existing servicing conditions and constraints related to sanitary servicing, water distribution, and stormwater management. This report also outlines considerations for future development in the proposed Secondary Plan areas, setting parameters in accordance with Provincial, County, and Municipal policies.

Formed in 2001, the Municipality of Brighton is located in Northumberland County along Lake Ontario. The Town of Brighton, the main urban center, experiences growth driven by its proximity to Highway 401 and Lake Ontario. With future development planned for greenfield areas, the Secondary Plan Project aims to establish a land use pattern aligned with the Municipality's vision.

This report analyzes the existing sanitary collection, water distribution, and stormwater management infrastructure. It provides an in-depth overview of the Brighton Water Pollution Control Plant, Harbour Street Sewage Pumping Station, and the sanitary collection system, highlighting capacities and constraints. The assessment of the water production wells, the Brighton Springs Drinking Water System, and the water distribution system is based on annual water system reporting and technical modelling developed by Greer Galloway Group in 2021. Stormwater management guidance is provided on the basis of applicable technical standards.

Considering projected population growth, the report evaluates the capacity and constraints of the sanitary collection and treatment, water servicing, and stormwater management systems. With a total estimated population increase of 4,800 people, the analysis indicates the need for upgrades and identifies potential constraints.

Key recommendations include monitoring growth rates, conducting detailed engineering studies for trunk sewer upgrades, and considering rerouting trunk sewers to optimize capacity. The drinking water system will benefit from a detailed study of the feasibility of twinning the existing 600 mm feeder main from the water treatment facility to the community. The water distribution network may require selective upgrades that will depend on the location and nature of watermain connections, which should be studied in detail as part of future development applications.

Overall, this report provides essential insights to guide the development of the Secondary Plan, ensuring sustainable growth and a cohesive community within the Municipality of Brighton.

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1.0 Introduction

The Municipality of Brighton has retained D.M. Wills Associates Limited (Wills) together with KMD Community Planning and Consulting Services (KMD) and Metroeconomics to assist in the development of a Secondary Plan for the greenfield lands within the urban settlement boundary of the Municipality of Brighton (Project). The Secondary Plan will form a part of the Municipality of Brighton Official Plan and will set forth more detailed policy and land use designations which will guide growth and development within the identified Secondary Plan Areas (SPAs).

This Servicing Report (Report) has been prepared as a part of the larger study process for the Project. The Report documents existing servicing conditions and constraints pertaining to stormwater management (SWM) and municipal servicing, as well as noting general considerations and constraints for future development of the proposed SPAs.

This Report provides a snapshot of existing servicing conditions and points to the opportunities and constraints facing the future development of the SPAs. Understanding the requirements of Provincial and County policy, as well as the Municipality of Brighton Official Plan, this Report will be used to set the servicing parameters of the Secondary Plans.

1.1 Background

The Municipality of Brighton was formed in 2001 through the amalgamation of the former Town of Brighton and Brighton Township. The Municipality is a lower-tier municipality located within Northumberland County (County), situated along the shores of Lake Ontario, and bordering the Municipality of Quinte West to the east and the Township of Cramahe to the west.

The Municipality is home to several rural hamlets, surrounded by vast agricultural and environmental lands. The Town of Brighton (Town) comprises the largest built-up area within the Municipality. The Town is located in the southern portion of the Municipality, between Lake Ontario to the south and Highway 401 to the north.

The proximity to Highway 401 has contributed in part to the recent and continuing growth of the Town, together with the draw of Lake Ontario and Presqu'ile Provincial Park. The Town continues to maintain its rural charm, while experiencing expanding residential and employment growth. Predominately, residential growth has been in the form of single-detached dwellings; however, more recent development proposals have contributed to the mix and range of housing options, including semi-detached and row dwellings. The employment of the Town also continues to grow, with increased interest in the industrial park, located on the east side of the Town's developed area.

As the Town continues to grow, opportunities for intensification within the built boundary are becoming more limited, and growth outside of the built boundary in designated greenfield areas has experienced increased interest and pressure for development.

While not intended for development until 2031, the Municipality recognizes the importance of proactive planning for these lands, to ensure that future development is appropriately designed and reflects the Municipality's overall vision for the Town. The Municipality has initiated the Secondary Plan Project to establish a desired land use pattern and governing policies for these greenfield areas.

1.2 Purpose and Objectives

The purpose of the Project is to implement, via an Official Plan Amendment (OPA) to the Municipality of Brighton Official Plan, a Secondary Plan which will ultimately provide direction for land use and development in the greenfield areas located between the existing built boundary and limits of the Brighton settlement area.

The greenfield areas of the Town are segmented into three distinct areas by location, existing development, and infrastructure. These areas are identified as Northeast (Area 1), Northwest (Areas 2a and 2b) and Southwest (Area 3). Due to the limited development potential of Area 3, it has not been considered specifically from a servicing perspective. Refer to **Figure 1**.

The purpose of this Report is to summarize the existing municipal servicing conditions and constraints related to sanitary collection, water distribution, and SWM in support of the secondary planning process. In addition, this Report considers the effect of future development demands on municipal servicing and SWM.

This analysis will create the framework for consideration of the increased demands resulting from future development of the SPAs. It includes identification of future system constraints and thresholds for infrastructure upgrades. This Report will provide context in which future growth and development in the SPAs can support the Municipality of Brighton in achieving sustainable growth and a complete community.

Figure 1 – Proposed Secondary Plan Areas

2.0 Existing System Capacity and Constraints

2.1 Existing Sanitary Collection and Treatment

2.1.1 Overview and Analysis

2.1.1.1 Brighton Water Pollution Control Plant

The 2022 Water Pollution Control Plant and Liftstation Annual Performance Report (Municipality of Brighton, 2023) documents Brighton's Water Pollution Control Plant (WPCP) as servicing a population of approximately 7,000, as well as Presqu'ile Provincial Park. The WPCP is classified as a Class 1 treatment facility that operates under amended Environmental Compliance Approval (ECA) Number 3644-BWXRNN, issued by the Ontario Ministry of the Environment, Conservation and Parks (MECP) on January 15, 2021, included in Appendix F.

The WPCP is located at 100 County Road 64. Wastewater collected from the serviced area of the Municipality passes through four treatment components at the WPCP, in the order listed below:

- A 0.7 ha aerated cell (Lagoon #1) with two mechanical surface aerators (15 hp), and five aspirating aerators (three 10 hp, and two 25 hp).
- A chemical mixing chamber where ferric chloride is added.
- A 5.44 ha waste stabilization pond (Lagoon #2) with three baffles.
- A two-celled constructed wetland having a total surface area of 6.2 ha. The effluent from the constructed wetland is discharged continuously into a natural wetland that borders Presqu'ile Bay, which is located off the northeast shore of Lake Ontario.

2.1.1.2 Harbour Street Pumping Station

The Harbour Street Sewage Pumping Station is located at 7 Harbour Street and is governed by ECA number A-500-1122249878 issued by the MECP on August 25, 2021, included in Appendix F. Wastewater collected from the serviced area of the Municipality passes through the Pumping Station and is pumped to the Lagoon System via 300 mm and 350 mm diameter forcemains.

2.1.1.3 Wastewater Collection System

The Wastewater Collection System (WWCS) is designated as Class II subsystem. The existing municipal Sanitary Sewer Model is contained in a Sanitary Sewer Design Sheet and Drainage Area Plan, provided by the Municipality of Brighton, included in **Appendix A**. The design sheets and plan identify:

- All manholes (approximate location only)
- All sewer runs, including length, diameter, pipe material and slope

- Estimated population and calculated sewage and infiltration flows based on set criteria established by the Municipality
- Flow and pipe capacity based on the foregoing

Measured flow data is not available, so the calculated flows have not been verified or calibrated based on actual system flows.

The design sheets provided by the Municipality did include additional flows for some potential development areas, and these were taken into consideration when the future flow analysis for the SPAs was completed.

The sanitary collection system includes three gravity trunk sewers that transport sewage flows either directly to the WPCP or to the Harbour Street Pumping Station. The three gravity trunk sewers have been identified on **Figure 2**Figure 2 as follows:

- The Prince Edward Street Trunk sewer
- The Pinnacle Street South Trunk sewer
- The Ontario Street Trunk sewer

The Prince Edward Street Trunk Sewer services the northern section of SPA 1 and conveys flows by gravity directly to the WPCP, as shown in **Figure 2**. Generally, the effluent flows southerly to Dundas Street, westerly to Alice Street, southerly on Prince Edward Street, under the CN/CP rail lines then easterly along Stephen Street to the WPCP.

The Pinnacle Street South Trunk Sewer services the southern section of SPA 1 and conveys flows by gravity directly to the WPCP, as shown in **Figure 2**. Generally, the effluent flows westerly on Dundas Street to Pinnacle Street / Terry Fox Drive, under the CN/CP rail lines then southerly to Stephen Street where it connects with the Prince Edward Street trunk and drains easterly along Stephen Street to the WPCP.

The Ontario Street Trunk Sewer services SPA 2a and SPA 2b and conveys flows by gravity to the Habour Street Pumping Station, as shown in **Figure 2**. Generally, the effluent flows easterly along Main Street to Ontario Street, under the CN/CP rail lines southerly to Raglan Street, then easterly to Harbour Street and outlets at the Harbour Street pumping station. From the Habour Street Pumping Station, flows are pumped to the WPCP via 300 mm and 350 mm diameter forcemains.

Flows from Lakehurst are pumped via a 50 mm diameter forcemain to the 150 mm diameter forcemain to the Harbour Street Pumping Station from the Presqu'ile Park Pumping Station.

Figure 2 - Existing Sanitary Infrastructure

The locations and diameters for each section of the three sanitary trunk sewers are summarized in **Table 1**.

Table 1 – Sanitary Trunk Sewers

Trunk Sewer Name	Street Name	Diameter (mm)
Prince Edward Street Trunk	Tackaberry Drive	200
	Harrier Run	200
	Singleton Street	200
	Pinnacle Street North	200
	Dundas Street (West of Pinnacle Street N.)	200, 250
	Alice Street	300, 400
	Prince Edward Street	300, 350, 400
	Stephan Street	400
	Lagoon Easement	685, 1050
Pinnacle Street South Trunk	Dundas Street (East of Pinnacle Street N.)	200
	Terry Fox Drive	300
	Pinnacle Street South	300, 350, 400
	Applewood Drive	300, 305, 400
	Lagoon Easement	685, 1050
Ontario Street Trunk	Main Street	200, 350
	Ontario Street	450, 600
	Raglan Street	600, 750
	Cedar Street	750
	Harbour Street	825

The existing sanitary model considers existing pipe characteristics such as pipe size and slope while making assumptions for flow volume, infiltration, and population density. **Table 2** summarizes the assumptions used in the Existing Sanitary Model to analyze the capacity of the network.

The conservative assumption for flow volume is 360 L/capita/day which is greater than the recommended flow volume for multi-family dwellings of 275 L/person/day per Table 8.2.1.3.A in the Ontario Building Code (The Building Code Commission, 2017) and within the range of 225 – 450 L/capita/day set out in section 5.5.2.1 of the MECP Design Guidelines for Sewage Works (Ministry of the Environment, Conservation and Parks, 2023). The calculated flows also include an allowance for infiltration.

Table 2 – Existing Sanitary Model Design Inputs

Design Input	Value	Units
Flow Volume	360	L/capita/day
Infiltration	0.28	L/s/ha
Population Density	Single = 2.8 Townhouse = 2.5 Apartment = 2	people/unit
Commercial Flow	2.25	L/ha/s
Industrial Flow	2.10	L/ha/s

2.1.2 Existing Capacity and Constraints

2.1.2.1 Brighton Water Pollution Control Plant

The 2022 WPCP and Liftstation Annual Report documents a Rated Capacity of 4,600 m^3/day for the WPCP. The Annual Average Daily Flow is calculated at 2,814 m^3/day, accounting for an average of 61% of the Rated Capacity. Throughout the reporting period, the highest daily flow recorded was in December at 8,395 m^3/day. The lowest flow occurred in February at 1661 m^3/day.

2.1.2.2 Harbour Street Sewage Pumping Station

An expansion of the Harbour Street SPS was completed in 2023 but no flow data was collected during construction. In absence of actual flow data, surplus capacity was calculated by comparing the estimated flow from the Sanitary Model to the most recently reported flows at the Harbour Street SPS. Based on the Existing Sanitary Model, the current flow to the Harbour Street SPS is approximately 87.84 L/s. The most recent capacity of the Harbour Street SPS is documented as 126 L/s in Technical Memorandum 3 of the Transportation and Servicing Study (Corporation of the Municipality of Brighton). From this data, the surplus capacity of the SPS is estimated to be 30.3%, excluding consideration of the completed expansion. Although surplus capacity exists, the exact amount cannot be established until flow monitoring data can be collected.

2.1.2.3 Wastewater Collection System

The Sanitary Model analysis shows that six pipes in the existing sanitary collection network are between 80% and 100% capacity, as shown in **Table 3**. The two pipes on Prince Edward Street and the four pipes on Stephen Street that are over 80% capacity are part of the Prince Edward Street Trunk Sewer, as shown in **Figure 3**. The Sanitary model analysis shows that the remaining pipes in the existing sanitary collection network are below 80% capacity.

Table 3 – Existing Sanitary Trunk Sewer Constraints

Trunk Sewer	Street	DSMH	USMH	Length (m)	Size (mm)	Type	Grade (%)	Used Capacity
Prince Edward Street	Prince Edward Street	MH178	MH179	63.1	300	AC	81%	81%
	Prince Edward Street	MH561	MH564	109.7	350	AC	93%	93%
	Easement	MH364	MH380C	95.1	400	AC	91%	91%
	Stephan Street	MH380C	MH380B	99.1	400	AC	91%	91%
	Stephan Street	MH380B	MH380A	91.4	400	AC	92%	92%
	Stephan Street	MH380A	MH380	97.5	400	AC	92%	92%

Figure 3 - Existing Sanitary Trunk Sewer Constraints

2.2 Existing Water Distribution

2.2.1 Overview and Analysis

Information regarding the Municipality of Brighton's existing drinking water systems is documented within the 2022 Annual Brighton Springs Drinking Water System Report (Municipality of Brighton, 2023) and the Municipality of Brighton Water Distribution Network Model Report (Greer Galloway Group, 2021).

The drinking water system is a Class III Water Distribution and Supply subsystem and is designated as a groundwater source. Water is pumped from three production wells to the Water Treatment Plant which houses primary and secondary chlorine disinfection systems. The Water Treatment Plant includes two interconnected reservoirs which serve as elevated tanks, given that the plant is located to the north and at a higher elevation than the greater Brighton community. Water is gravity fed from the Water Treatment Plant through a single 600 mm transmission watermain along County Road 26 and County Road 30, feeding the network of over 63 km of watermain pipes and serving approximately 7,000 users.

The distribution system functions primarily on the basis of the pressure head supplied via the connection to the Water Treatment Plant and associated reservoirs. The system includes five pressure zones, two of which are managed using pressure reducing valves, and two of which are managed using small pressure booster stations. The treatment of the drinking water is supplemented for Presqu'ile Park by means of a chlorine booster pump. Summary documentation of the existing Drinking Water System is included in **Appendix B**.

Production Wells

Drinking water for The Municipality of Brighton is provided by three production wells located near the Water Treatment Plant approximately 3.4 km north of County Road 2. According to the 2022 Drinking Water Report, the productions wells are drilled to a depth of 40 m and are permitted to produce 24.9 L/s at a total dynamic head of 18.5 m. The duty-pump is rotated each day, and three observation wells are used to monitor the ongoing hydraulic gradients.

The Productions Wells are authorized under the Ontario Water Resources Act, Permit to take Water #3210-9P3LCQ (exp. October 15, 2024), the Brighton Springs DWS, Drinking Water Permit #135-201 (Issue 4), and the Brighton Springs DWS, Municipal Drinking Water License #135-101 (Issue 5). Under the Permit to Take Water, the Production Wells are authorized to take water from all three wells at 24.9 L/s, for a total daily taking of 6,454 m^3/day.

Water Treatment Plant

The Municipality of Brighton Water Treatment Plant is located at 406 County Road 26 and serves a dual function: to provide primary and secondary treatment via chlorine disinfection and to provide reservoir storage to manage fluctuations in water demand.

The water storage consists of two concrete reservoirs which typically operate in series, but can be isolated to facilitate maintenance, with a combined capacity of 5,600 m^3.

Due to the location and elevation of the Water Treatment Plant, relative to the elevation of the serviced community, the reservoir also provides pressure via elevation head to the water distribution system in lieu of a standpipe or water tower. Water is conveyed from the Water Treatment Plant to the distribution system via a single, 600 mm transmission main on County Road 26 and County Road 30.

The Water Treatment Plant is authorized under the Brighton Springs DWS, Drinking Water Permit #135-201 (Issue 4), and the Brighton Springs DWS, Municipal Drinking Water License #135-101 (Issue 5).

Distribution System

The water distribution system for the Municipality of Brighton is characterized and described within the Municipality of Brighton Water Distribution Network Model Report (Greer Galloway Group, 2021). The report includes a description of the key features of the distribution system, the watermain network layout, water demands, pressure and fire flow performance, and recommended improvements. According to the report, the distribution system includes:

- A single 600 mm diameter feeder main that runs from the Water Treatment Plant along County Road 26 and County Road 30
- Five distinct pressure zones; one zone influenced exclusively by the head provided by the Water Treatment Plant, two zones influenced by pressure reducing valves, and another two zones influenced by local pressure booster stations
- Approximately 63 km of watermain pipes ranging in size from 50 mm to 600 mm
- A pressure monitoring station near Presqu'ile Park

Through the development of the Water Distribution Network Model Report, the Municipality of Brighton currently has a detailed water distribution model developed in WaterCAD, which represents both existing (2021) conditions and one theoretical future development scenario. The future scenario includes six new residential developments and one new commercial development (Ontario Street Condos, Brighton Meadows, Hamilton Woods, Bulter Creek Condos, Applewood Meadows, Tackaberry East, and Craft Commercial Development).

2.2.2 Existing Capacity and Constraints

Water Production and Treatment

In keeping with **Section 2.1.1.**, the anticipated capacities and constraints of the water distribution system are founded on various assumptions for water usage and community growth. In general, the values used to assess the water distribution system should be similar to the sanitary treatment system, although some level of discrepancy is

appropriate to account for losses from the system such as water used for irrigation, fire suppression, leakages (burst watermains), and for additional inflows into the sanitary system due to groundwater and stormwater inflow and infiltration.

The preferred methodology to determine water usage rates within a community is the Annual Drinking Water System Report, or an Annual Uncommitted Reserve Capacity Report. The 2022 Brighton Springs Drinking Water System Report provides both Average Annual Daily Flow (AADF) and Maximum Annual Daily Flow (MADF) for the years 2018 to 2022. Both AADF and MADF were fairly steady, with slight overall growth and a significant increase in 2020 only. The five-year average was selected as the appropriate value on which to base this assessment, as the results closely reflect the 2024 values.

The assumed rates used in **Section 2.1.1** for sanitary flow assessment, the rates used in the 2021 Water Distribution Model Report, and the rates calculated based on the 2022 Annual Brighton Springs Drinking Water System Report are all shown **Table 4.**

Table 4 – Existing Sanitary Model Design Inputs

Design Input	Section 2.1.1 Sanitary	2021 Water Model Report	2022 Annual Water Report	Units
Current Population	7,000	7,454	7,000	Persons
Average Annual Daily Flow (AADF)	-	2,347	2,427	m^3/day
Maximum Annual Daily Flow (MADF)	-	4,122	4,327	m^3/day
Per Capita Flow Volume	360	315	347	L/capita/day
Infiltration	0.28	-	-	L/s/ha
Population Density	Single: 2.8 Townhouse: 2.5 Apartment: 2.0	Single: 2.8 Townhouse: 2.5 Apartment: 2.0	Single: 2.8 Townhouse: 2.5 Apartment: 2.0	people/unit
Commercial Flow	2.25	-	-	L/ha/s
Industrial Flow	2.10	-	-	L/ha/s

Water Treatment systems are generally designed to accommodate the Maximum Annual Daily Flow; therefore, the **current water demand from the Municipality of Brighton represents approximately 67.0% of the current rated capacity of the water supply and treatment systems.**

Distribution System

The water distribution system is a complex network and generally deficiencies are made evident by localized zones of high or low pressure, or inadequate sustained flow rates. Individual pipe deficiencies are not easily identifiable, particularly in looped systems where significant friction losses are only evident when alternate flow route towards a given node are made unavailable.

The Water Distribution Network Model Report (Greer Galloway Group, 2021) includes a series of reported and identified concerns with respect to the existing system. The most notable potential deficiency is with regard to the 600 mm feeder main, given that there is no redundancy in this part of the network. That is to say that the entire community relies on the ongoing function of the feeder main, and that temporary shutdown for the purposes of maintenance is impractical.

In addition, the Water Distribution Network Model Report identified the following potential concerns:

- Localized pressure deficiencies in Zone 2 (Castle Ridge Development).
- High pressures in gravity fed areas.
- Low fire flow at various locations in the system.
- Land use conflicts due to the bulk water stations proximity to residential properties.
- Significant costs associated with system repair and maintenance.

Wills reviewed the water distribution model prepared by Greer Galloway and confirmed that high pressures are present in a significant portion of the system. The assessment of appropriate water pressure levels is based on the following key indicators:

- 20 psi – Minimum pressure anywhere in the system during fire flow conditions
- 40 psi – Minimum recommended normal operating conditions (1)
- 80 psi – Maximum recommended static pressure in occupied areas (2)
- 100 psi – Maximum sustained operating pressure (1)
- 125 psi – Approx. Maximum pressure observed in water distribution model

(1) – Brighton Design Guidelines, Page 47
(2) – Brighton Design Guidelines, Page 48, referencing the Ontario Building Code

The existing water pressures throughout the municipality are shown in **Figure 4**.

Figure 4 – Existing Water Distribution Pressure

Despite the fact that the water distribution system generally experiences appropriate or high pressures, it is possible for localized pipes to introduce significant pressure losses due to high flow volumes and limited cross sectional area (i.e. small pipes). Wills reviewed the results of the water distribution model to identify localized mains that exhibit unusually high friction losses, which can be an indication of undersized pipes. The pipes were sorted in order of friction loss during normal operating conditions, from highest to lowest, and the most significant friction losses are summarized in **Table 5.**

Table 5 - Existing Network Losses

Pipe ID	Start Node	End Node	Length (m)	Dia (in)	Friction Headloss (m)
1012	J-334	J-345	223	6	0.147
1063	J-345	J-436	370	6	0.119
848	J-333	J-338	161	10	0.094
1015	J-374	J-348	225	10	0.093
1011	J-331	J-333	55	10	0.051
1016	J-345	J-350	107	6	0.051
1013	J-348	J-338	82	10	0.047
1088	J-432	J-445	133	6	0.046
1010	J-416	J-331	1318	24	0.031
1268	J-482	J-522	72	6	0.03
1208	J-498	J-495	137	6	0.027
1281	J-495	J-528	245	6	0.027
1009	WTP	J-416	1510	24	0.026
1070	J-374	J-404	91	10	0.026
1084	J-400	J-403	287	6	0.024
1014	J-348	J-345	111	6	0.023
1366	J-566	J-568	347	10	0.023
927	J-379	J-377	110	6	0.021
1108	J-437	J-453	181	6	0.019
1075	J-374	J-379	85	6	0.018

A review of **Table 5** indicates that the majority of pipes introduce very modest friction losses (<0.05 m); there are only a small selection of pipes that are outliers and local improvements at these locations should be considered during future infrastructure rehabilitation projects.

2.3 Existing Stormwater Management

This section summarizes the background review of the drainage and SWM services opportunities and constraints within the SPA lands. The following documents were provided by the Municipality and reviewed as part of the drainage and SWM study:

- Brighton Official Plan, Approved by the County of Northumberland on September 23, 2020
- Municipality of Brighton Stormwater Master Plan, February 2019
- Engineering Design Guidelines for the Municipality of Brighton, May 29, 2018
- Lower Trent Region Conservation Authority Stormwater Management Technical Guidelines, December 2020

It is noted that the Stormwater Master Plan included an evaluation of the Municipality's existing storm sewer network, based on detailed hydrologic and hydraulic modelling. This modelling data was not available for review in the preparation of this background report. However, the analysis summary and recommendations provided within Stormwater Master Plan have been considered.

It is anticipated that all future storm servicing infrastructure should be designed in accordance with the regulations and guidelines published by the Ministry of the Environment, Conservation and Parks (MECP) the most current version of the Engineering Design Guidelines for the Municipality of Brighton and the Lower Trent Conservation Authority (LTC) Stormwater Management Technical Guidelines.

2.3.1 Stormwater Management Design Considerations

The objectives of SWM for development with the Municipality of Brighton are identified in Section 2.3.12 of the Brighton Official Plan:

"It is an objective of the Official Plan that stormwater management practices be introduced as part of any development or redevelopment plans so as to minimize resultant stormwater volumes and contaminant loading on area watercourses. Every effort will be made to maintain or increase the amount of vegetative cover and pervious surfaces within urban areas of the Municipality, to reduce surface runoff and protect both groundwater and surface water resources within the Municipality."

Furthermore, the SWM design criteria for development within the Lower Trent Conservation Watershed area are identified in Section 2.5 of the LTC SWM Technical Guidelines:

- For quantity control, the minimum requirement is that post-development flow is restricted to pre-development peaks.
- For erosion control, the minimum requirement is that runoff from a 25 mm storm is detained for 24 hours.

- For water quality control, outflow from SWM facilities should attempt to achieve enhanced level requirements (80% removal of total suspended solids).
- SWM facilities should incorporate measures to provide enhanced water quality control and reduce temperature of water discharging to sensitive receiving watercourses.
- In some cases, Water Balance assessments may be required and include mitigation measures, attempting to achieve pre-development water balance.
- Climate change impacts should also be considered.

Finally, utilization of a treatment train approach to stormwater management in conjunction with non-structural alternatives was recommended as the preferred alternative in the Brighton SWM Master Plan in order to:

- Reduce Flood Risk and Increase Resiliency to Climate Change
- Reduce Future Maintenance
- Protect Streams, Wetland, and Presqu'Ile Bay from Stormwater Impacts
- Improve Public Safety

Implementation of this approach is dependent on a number of feasibility constraints including shallow groundwater, high lake levels, limited space, lack of flat roofed buildings and clay soils, which will need to be confirmed within each SPA.

As such, the SWM policies established within the Municipality must provide consideration for the Municipality's overall stormwater objectives, the applicable watershed design criteria and use of a treatment train approach, where feasible.

2.3.2 Existing Stormwater and Drainage Features

According to the Brighton SWM Master Plan, the Municipality owns and maintains at least ten SWM Facilities and six Oil-Grit Separators. These SWM features have primarily been constructed to support recent land development projects and treat stormwater runoff for approximately 17% of the built-up portion of the Brighton Urban area. A summary of Brighton's current SWM features, as presented in the Brighton SWM Master Plan, is provided in **Table 6**.

Table 6 – Existing Drainage and Stormwater Features

Type	Quantity	Purpose
Wet Ponds	6*	Slow down runoff and remove pollutants
Dry Ponds	1*	
Constructed Wetland	1**	
Subsurface Infiltration/Storage	2	Maintain water balance, slow down runoff, and remove pollutants
Oil Grit Separators (Table 5)	6	Remove urban pollutants
Storm Sewer	36 km	Safely convey runoff away from roads and structures[2]
Manholes	243	
Inlets [1]	907	
Outfalls	37	
Culverts	5.8 km	
Ditches & Rear Yard Swales [3]	Unknown	
Roof Water Leader Connections	Unknown	
Foundation Drain Connections	Unknown	

[1] Includes catchbasins, double catchbasins, catchbasin manholes, and ditch inlets.

[2] The conveyance systems have been sized for minor and/or major events depending on their location.

[3] Includes constructed channel south and east of Tackaberry Ridge Pond.

*Tackaberry Ridge wet pond & Forest Hill (wet and dry) ponds have not yet been assumed by the Municipality.

**Brighton by the Bay Wetland.

There are four subwatershed boundaries identified within the Municipality as illustrated on Figure 17 of the Brighton SWM Master Plan. These subwatershed areas include Arena Creek, Butler Creek, Unnamed Creek and the Lakeshore watershed area. Based on existing topography, runoff from most of the SPAs is directed to more than one subwatershed; therefore, allowances for multiple outlet locations must be provided within each SPA. Stormwater runoff within the UFAs is also distributed across multiple subwatersheds, which may necessitate site specific outlet considerations.

An extensive storm sewer network conveys urban runoff within these subwatershed areas to main tributaries of each watercourse or directly to Presqui'le Bay. Figure 19 of the Brighton SWM Master Plan identifies stormwater quantity and quality control issues with the existing storm sewer network and overland conveyance system that should be considered in the development of the Secondary Plan polices to ensure that existing issues are not exacerbated.

Very limited hydrogeology information was available within the background information provided. The SWM Master Plan provides commentary on groundwater levels within developed watersheds and hydrogeology investigations for recent applications developments were provided by the Municipality, where available. However, extrapolating this information within developed areas to the SPAs and UFAs

should be done cautiously as groundwater characteristics can vary significantly from one location to another. In order to incorporate infiltration within a treatment train approach to SWM, a minimum separation of 1.0 m is required to the seasonally high groundwater level. As such, collecting additional hydrogeology information within the SPAs is recommended to inform specific SWM policies. Furthermore, future SWM policy should include requirements for conducting site specific hydrogeology investigations and consideration for both a preferred (low impact development) and acceptable (end-of-pipe) SWM designs, depending on whether sufficient groundwater separation can be provided.

2.3.3 Development Area Stormwater Characteristics

A summary of the stormwater characteristics, collected from available background information, is provided below to each Secondary Plan Area. Watershed boundaries were estimated based on LiDAR topography data and soil types were determined from the Ontario Agricultural Information Atlas.

Northeast Area (Area 1)

- Primarily drains to the Arena Creek subwatershed.
- Existing stormwater ponds are located within the Secondary Plan area, identified as the Forest Hill Dry Pond and Forest Hill Wet Pond.
- Existing Storm sewer servicing is provided along Dundas Street.
- Soil types are primarily Sandy Loam and Loam which are well draining soils that would be suitable for infiltration, with small pockets of clay loam near the middle of the SPA.
- Hydrogeology information was not available to confirm groundwater elevations.
- Quantity and Quality Controls are anticipated to be required.
- Additional storm servicing is anticipated within the proposed roadway network.

Northwest Area (Area 2a and Area 2b)

- Drainage is split between the Butler Creek and Unnamed Creek subwatersheds.
- Includes external area that is directed to the Orchard Gate Pond.
- Existing storm sewer servicing provided from Main Street to the Orchard Gate Pond.
- Soil types are primarily Sandy Loam which are well draining soils that would be suitable for infiltration.
- Hydrogeology information for the Orchard Gate subdivision did not identify high groundwater concerns; however, further investigations are recommended.
- Quantity and quality controls are anticipated to be required.
- Additional storm servicing is anticipated within the proposed roadway network.

Southwest Area (Area 3a)

- Drainage is primarily conveyed to the Unnamed Creek subwatershed.
- Development of this secondary plan should consider impact from the Brighton Meadows subdivision, north of Raglan Avenue. It is noted that this development application was submitted after the completion of the SWM Master Plan.
- Existing storm sewer servicing is not provided for this area.
- Soil types for the northern portion are primarily Sandy Loam which are well draining soils that would be suitable for infiltration. However, soil types at the southern portion are marsh/must which are poorly draining.
- Hydrogeology information was not available to confirm groundwater elevations; however, it is anticipated that high lake levels will have a significant impact on the type of SWM features that are appropriate.
- Quality controls are anticipated to be required; however, quantity controls may not be required based on the proximity to Lake Ontario.
- Additional storm servicing is anticipated within the proposed roadway network.

Other Urban Fringe Areas

- Drainage is conveyed to all subwatersheds.
- Existing storm sewer servicing is not provided for this area.
- Soil types vary widely from one UFA to another. Site specific hydrology and hydrogeology studies will be required to determine a suitable SWM approach.
- Quantity and quality controls are anticipated to be required.
- Additional storm servicing may be required based on the nature of the development and existing storm servicing provided.

Relevant excerpts from stormwater management reference material are included in **Appendix C.**

3.0 Future System Capacity and Constraints

In order to understand the future system capacity, the distribution and population of projected greenfield and infill development was estimated. The projected population increases were estimated based on historical development data from rural residential severance activity, gross development area of each SPA, and available residential land supply within the existing built boundary of the urban area of Brighton. Furthermore, the future population estimates are established from a range of development projections that respects both the County projection (Watson) and the McCormack population projection to the year 2051.

The total estimated population increase based on the County growth projections is 1,600 units. Using a population density of 3 people per unit, the total projected population increase is calculated as 4,800 people. As summarized in **Table 7** and directed by the Municipality, the total projected population increase is divided between rural areas, infill and intensification, the Northeast SPA (SPA 1), the Northwest SPA (SPA 2a and SPA 2b), and the Southwest SPA (SPA 3). The projected population increase for SPA 1 and SPA 2 are each based on 33% of the total projected growth for the Municipality, resulting in 1,584 people or 528 units for each SPA.

Table 7 – Projected Growth (County)

Area	Percent of Projected Population Increase	Projected Population Increase (people)	Projected Population Increase (units)
Total	100%	4,800	1,600
Rural Areas	10%	480	160
Infill & Intensification	10%	480	160
Northeast SPA (SPA 1)	33%	1,584	528
Northwest SPA (SPA 2)	33%	1,584	528
Southwest SPA (SPA 3)	14%	672	224

3.1 Sanitary Servicing for Future Development

3.1.1 Analysis

The sanitary network capacity analysis for future development is based on the projected population increase provided by the Municipality. This analysis considers the County projected population growth of 1,584 people for SPA 1, 1,584 people for SPA 2, and 480 people for infill and intensification of existing developed areas.

The Existing Sanitary Model provided by the Municipality formed the basis of a Future Sanitary Model by adjusting the population inputs to account for the projected increase of 1,584 people for SPA 1 and SPA 2, each. **Table 8** summarizes the assumptions used in the Future Sanitary Model to analyze the capacity of the network.

Table 8 – Future Sanitary Model Design Inputs

Design Input	Value	Units
Flow Volume	360	L/person/day
Infiltration	0.28	L/s/ha
Population Density	3	people/unit
Commercial Flow	2.25	L/ha/s
Industrial Flow	2.10	L/ha/s

Given that the projected population growth is applied generally over the SPA locations and through infill and intensification of existing development, the capacity analysis of the sanitary network takes the most conservative approach.

The future capacity analysis of the Harbour Street SPS accounts for the projected population increases of 1,584 people for SPA 2 and 480 people for infill and intensification. This projected population increase is added to the existing population used in the Existing Sanitary Model of 6,753 people for a total of 8,817 people. Using the Future Sanitary Model, the projected population flow into the Harbour Street SPS is calculated as 110.54 L/s.

The future capacity analysis of the Brighton WPCP accounts for the projected population increases of 1,584 people for SPA 1 in addition to 1,584 people for SPA 2 and 480 people for infill and intensification. The projected population increase is added to the existing population used in the Existing Sanitary Model of 10,128 people for a total of 13,776 people.

The future capacity analysis of the sanitary collection system applies the projected population increase to each SPA at the upstream end of each associated trunk sewer to provide the most conservative analysis of the overall system. Because the location of infill and intensification are not identified, this portion of projected population growth is not considered for the capacity analysis of the sanitary linear infrastructure.

The projected population growth for SPA 1 is modelled to consider the anticipated development for both the Prince Edward Street Trunk Sewer and the Pinnacle Street South Trunk Sewer, separately. The projected population growth for SPA 2 is modelled to consider the anticipated development for the Ontario Trunk Street Sewer. The updated municipal Sanitary Sewer Model is contained in a Sanitary Sewer Design Sheet and Drainage Area Plan included in **Appendix D.**

3.1.2 Future Capacity and Constraints

3.1.2.1 Brighton Water Pollution Control Plant

The existing capacity of the WPCP can adequately accommodate the projected population growth of 1,584 people for SPA 1, 1,584 people for SPA 2, and 480 people for infill and intensification. The total projected population of 13,776 people accounts for 82.97% of the Rated Capacity for the WPCP. Therefore, the WPCP is sufficient when considering the projected population growth provided by the Municipality.

3.1.2.2 Harbour Street Sewage Pumping Station

The existing surplus capacity of the Harbour Street SPS is sufficient to accommodate the projected population growth of 1,584 people for SPA 2 and 480 people for infill and intensification. The total projected population of 8,817 people that is to be serviced by the Harbour Street SPS accounts for 87.73% of the Rated Capacity, without considering the most recent upgrades. Therefore, there are no constraints from the Harbour Street SPS when considering the projected population growth provided by the Municipality.

3.1.2.3 Wastewater Collection System

The Future Sanitary Model identifies various pipes in the existing sanitary collection network that are projected to exceed 80% and 100% capacity when considering the projected population increase, as shown in **Figure 5**. To accommodate the projected population increase, approximately 2,228 m of trunk sewer upgrades will be required.

The Pinnacle Street South Trunk Sewer that services the southern portion of SPA 1 is adequate to service the projected population increase since no trunk sewers are projected to be over 80% or 100% capacity.

The Prince Edward Street Trunk Sewer that services the northern portion of SPA 1 has 13 pipes that are between 80% and 100% capacity and 10 pipes that are over 100% capacity, as shown in **Table 9**. To accommodate the projected population increase, the Prince Edward Street Trunk Sewer requires approximately 1771 m of upgrades.

The Ontario Street Trunk Sewer that services SPA 2 has four pipes that are over 100% capacity, as shown in **Table 9**. To accommodate the projected population increase, the Ontario Street Trunk Sewer requires approximately 457 m of upgrades.

Table 9 – Existing Sanitary Trunk Sewer Constraints (Projected Development)

Trunk Sewer	Street	DSMH	USMH	Length (m)	Size (mm)	Type	Grade (%)	Used Capacity
Prince Edward St.	Harrier Run	MH62E	MH62C	33.2	200	PVC	0.78	89%
	Singleton St.	MH62C	MH62B	33.0	200	PVC	0.97	83%
	Pinnacle St.	MH63	MH68	71.0	200	PVC	0.8	104%
	Pinnacle St.	MH68	MH66	37.0	200	PVC	0.8	109%
	Pinnacle St.	MH66	MH67	77.0	200	PVC	1	99%
	Pinnacle St.	MH67	MH545	24.0	200	PVC	1	99%
	Dundas St.	MH545	MH61	112.8	200	AC	1.06	97%
	Dundas St.	MH61	MH544	100.6	200	AC	0.73	118%
	Dundas St.	MH544	MH529	101.8	250	AC	0.33	107%
	Easement	MH107	MH107A	77.4	300	AC	0.41	85%
	Easement	MH107A	MH107B	46.3	300	AC	0.33	95%
	Easement	MH107B	MH525	125.9	300	AC	0.41	85%
	Prince Edward St.	MH524	MH178	112.5	300	AC	1.04	94%
	Prince Edward St.	MH178	MH179	63.1	300	AC	0.86	103%
	Prince Edward St.	MH179	MH562	35.7	300	AC	1.4	82%
	Prince Edward St.	MH562	MH563	87.8	300	AC	1.4	84%
	Prince Edward St.	MH563	MH181	35.7	300	AC	1.4	84%
	Prince Edward St.	MH181	MH561	103.6	300	AC	1.45	84%
	Prince Edward St.	MH561	MH564	109.7	350	AC	0.4	115%
	Easement	MH364	MH380C	95.1	400	AC	0.21	112%
	Stephen St.	MH380C	MH380B	99.1	400	AC	0.21	112%
	Stephen St.	MH380B	MH380A	91.4	400	AC	0.21	112%
	Stephen St.	MH380A	MH380	97.5	400	AC	0.21	113%
Ontario St.	Main St.	MH552	MH553	114.3	200	Conc	0.4	127%
	Main St.	MH553	MH554	114.3	200	Conc	0.4	129%
	Main St.	MH554	MH556	114.3	200	Conc	0.4	142%
	Main St.	MH556	MH555	114.3	200	Conc	0.4	146%

Figure 5 - Existing Sanitary Trunk Sewer Constraints (Projected Development)

The projected capacity analysis of the two trunk sewers servicing SPA 1 identifies multiple constraints in the Prince Edward Street Trunk Sewer and no constraints in the Pinnacle Street South Trunk Sewer. Since both trunk sewers flow through the intersection of Dundas Street and Pinnacle Street North, there is an opportunity to reroute the north section of the Prince Edward Trunk Sewer to join the Pinnacle Street South Trunk Sewer, as shown in **Figure 5**. Rerouting flows from the Pinnacle Street North Trunk Sewer to the Pinnacle Street South Trunk Sewer can decrease or eliminate the required upgrades to the Prince Edward Street Trunk Sewer, as shown in **Table 10**. Furthermore, the increased flows to the Pinnacle Street South Trunk Sewer due to rerouting would not significantly impact the capacity usage of the Pinnacle Street South Sewer, as shown in **Table 10**. Rerouting the trunk sewers to service the projected population increase would not impact the projected capacities of the Pinnacle Street North Trunk Sewer or the Ontario Street Trunk Sewer; therefore, upgrades are still required at these locations. Rerouting the trunk sewers at the Dundas Street and Pinnacle Street North intersection will require 1323 metres of upgrades in comparison to the 2228 metres of upgrades required without the rerouted trunk sewers.

Table 10 – Redirected Sanitary Trunk Sewer Constraints (Projected Development)

Trunk Sewer	Street	DSMH	USMH	Length (m)	Size (mm)	Type	Grade (%)	Used Capacity
Pinnacle St. North	Harrier Run	MH62E	MH62C	33.2	200	PVC	0.78	89%
	Singleton St.	MH62C	MH62B	33.0	200	PVC	0.97	83%
	Pinnacle St.	MH63	MH68	71.0	200	PVC	0.8	104%
	Pinnacle St.	MH68	MH66	37.0	200	PVC	0.8	109%
	Pinnacle St.	MH66	MH67	77.0	200	PVC	1	99%
	Pinnacle St.	MH67	MH89	24.0	200	PVC	1	99%
Pinnacle St. South	Easement	MH91	MH391B	97.8	300	AC	0.61	84%
Prince Edward St.	Prince Edward St.	MH561	MH564	109.7	350	AC	0.4	84%
	Easement	MH364	MH380C	95.1	400	AC	0.21	82%
	Stephen St.	MH380C	MH380B	99.1	400	AC	0.21	83%
	Stephen St.	MH380B	MH380A	91.4	400	AC	0.21	83%
	Stephen St.	MH380A	MH380	97.5	400	AC	0.21	84%
Ontario St.	Main St.	MH552	MH553	114.3	200	Conc	0.4	127%
	Main St.	MH553	MH554	114.3	200	Conc	0.4	129%
	Main St.	MH554	MH556	114.3	200	Conc	0.4	142%
	Main St.	MH556	MH555	114.3	200	Conc	0.4	146%

Figure 6 - Redirected Sanitary Trunk Sewer Constraints (Projected Development)

3.1.3 Future Capacity and Constraint Thresholds for Upgrades

The existing trunk sewers that service SPA 1 and SPA 2 currently have the capacity to collect only a portion of flows from the projected population increase. **Table 11** shows the population increase that each trunk sewer can accommodate before exceeding 80% and 100% capacity. The trunk sewers are categorized based on the street to illustrate the location of required upgrades based on the population threshold.

The Ontario Street Trunk Sewer can service 643 additional people before exceeding 80% capacity and 921 additional people before exceeding 100% capacity in at least one location. The trunk sewer located at Pinnacle Street North can service 974 additional people before exceeding 80% capacity and 1,395 additional people before exceeding 100% capacity in at least one location. In order to service the projected population increase of 1,584 people in both SPA 1 and SPA 2, upgrades may be required at the Main Street, Pinnacle Street North, and Prince Edward Street trunk sewer locations.

If the trunk sewer located at Pinnacle Steet North is rerouted to join the trunk sewer at Pinnacle Street South instead ot the trunk sewer at Dundas Street West, upgrades may no longer be required at the trunk sewers at Dundas Street West, Prince Edward Street, and Stephen Street.

Table 11 – Existing Trunk Sewer Population Increase Thresholds

Trunk Sewer	Street	Population Increase for 80% Capacity (No. of People)	Population Increase for 100% Capacity (No. of People)
Ontario Street	Main Street	643	921
	Ontario Street	7,452	10,312
	Raglan Street	19,839	28,059
	Harbour Street	32,529	46,657
Prince Edward Street	Pinnacle Street North	974	1,395
	Dundas Street West	824	1,222
	Prince Edward Street	N/A	517
	Stephen Street	N/A	624
Pinnacle Street	Dundas Street East	1717	2,369
	Pinnacle Street South	2008	3,200
Lagoon Easement	Lagoon Easement	6,077	11,260

3.1.4 Recommendations

1. **Monitor Growth Rate and Development:**

   It is recommended that the Municipality monitor the population growth rate while considering the population thresholds of the sanitary trunk sewers modelled in this report. Monitoring growth rate in the Municipality provides the opportunity to plan for location and timing of trunk sewer upgrades.

2. **Rerouting of Trunk Sewer at Pinnacle Street North:**

   It is strongly recommended to reroute the trunk sewer at Pinnacle Street North to outlet to the trunk sewer at Pinnacle Street South rather than the trunk sewer at Dundas Street West. This strategic adjustment will significantly reduce the required infrastructure upgrades and improve the capacity of the existing system.

3. **Consideration of Pumping Station Location South of Main Street:**

   Considering potential development south of Main Street, it is advised to evaluate the feasibility of adding a pumping station in this area. Alternatively, the option of up-sizing the local sewer to connect with the trunk sewer on Ontario Street could be explored, aiming to optimize the system efficiency and accommodate the projected growth.

4. **Consideration of Pumping Station Location South of Dundas Street East:**

   Similarly, for the southern section of Dundas Street East, it is recommended to evaluate the feasibility of adding a pumping station in this area to service new development. Alternatively, the addition of a trunk sewer connecting to Pinnacle Street South is recommended to service the projected development in this area.

5. **Capture Upgrades in Development Charges:**

   Once a clear understanding of proposed system upgrades is determined, it is recommended that the related projects be included in the next Development Charges Background Study. By identifying the timing and location of required upgrades in relation to planned development, there is potential to capture the cost of upgrades in development charges. Establishing, extending, or enlarging the sewage collection system and all necessary works to connect the system to an existing sewage outlet is considered an ECA Schedule A+ project.

3.2 Water Servicing for Future Development

3.2.1 Analysis

The water treatment and distribution network capacity analysis for future development is based on the projected population increase provided by the County. This analysis considers the County projected population growth of 1,584 people for SPA 1, 1,584 people for SPA 2, and 480 people for infill and intensification of existing developed areas.

The projected average day water demand was increased alongside population growth based on the observed per capita average day demand of 347 L/c/day, which is in keeping with the 2022 Annual Brighton Springs Drinking Water System Report. Furthermore, the current observed peaking factor of 1.78 was carried forward into future years. This is a slightly conservative assumption, noting that the current peaking factor would be expected to diminish slightly as the population increases.

3.2.2 Future Capacity and Constraints

Water Treatment System

The drinking water production wells and the Municipality of Brighton Water Treatment Plant are located at 406 County Road 26 and serve a dual function: to provide primary and secondary treatment via chlorine disinfection and to provide reservoir storage to manage fluctuations in water demand. Under the Permit to Take Water, the Production Wells are authorized to take water from all three wells at 24.9 L/s, for a total daily taking of 6,454 m^3/day.

The available residual capacity of water production and treatment systems is typically based on the Maximum Day water demand. Based on the population growth, peaking factor, and per capita water usage rates described in Section 3.2.1, the anticipated residual capacity and development pressures are as follows in **Table 12**. The detailed calculations are included in **Appendix B.**

Table 12 – Water Treatment Population Increase Thresholds

	80% Capacity Threshold	100% Capacity Threshold
Total Population	8313	10356
Population Growth	1313	3356
Population Growth (%)	119%	148%
Approximate Units (3.0 persons / unit)	438	1119

Water Distribution System

The water distribution network capacity analysis for future development is based on the projected population increase provided by the Municipality. This analysis considers the County projected population growth of 1,584 people for SPA 1, 1,584 people for SPA 2, and 480 people for infill and intensification of existing developed areas.

The projected water demands are based on the population growth, peaking factor, and per capita water usage rates described in Section 3.2.1. The additional demand was added to the water distribution model by adding four new nodes with looped connections at each of the four corners of the model. The northeast and northwest

nodes reflect the population growth within SPA 1 and SPA 2, and the remaining infill growth was reflected in the two remaining nodes in the southeast and southwest corners of the model. The location of the additional flow nodes is intended to reflect the anticipated placement of the new development within SPA 1 and SPA 2, while reflecting a conservative scenario for remaining development; noting that the placement of the infill flows will draw water throughout the full network.

Wills updated the water distribution model prepared by Greer Galloway and confirmed that high pressures are present in a significant portion of the system. The assessment of appropriate water pressure levels is based on the following key indicators:

- 20 psi – Minimum pressure anywhere in the system during fire flow conditions
- 40 psi – Minimum recommended normal operating conditions (1)
- 80 psi – Maximum recommended static pressure in occupied areas (2)
- 100 psi – Maximum sustained operating pressure (1)
- 125 psi – Approximate Maximum pressure observed in water distribution model

(1) – Brighton Design Guidelines, Page 47
(2) – Brighton Design Guidelines, Page 48, referencing the Ontario Building Code

Based on the results of the model, and with consideration to the projected water demands, **there is little impact to the water pressures throughout the Municipality**. The proposed water pressures throughout the Municipality are shown in **Figure 7**. A digital copy of the updated water distribution model is included in **Appendix E**.

Figure 7 – Proposed Water Distribution Pressure

Despite the fact that the water distribution system generally experiences appropriate or high pressures, it is possible for localized pipes to introduce significant pressure losses due to high flow volumes and limited cross-sectional area (i.e. small pipes). In order to further assess the potential impact to the capacity of the water distribution network, a selection of pipes that demonstrate the highest level of friction loss were identified and reviewed. The pipes were sorted in order of friction loss during normal operating conditions, from highest to lowest, and the most significant friction losses are summarized in **Table 13.**

Table 13 – Proposed Friction Losses

Pipe ID	Start Node	End Node	Length (m)	Dia (in)	Friction Headloss (m)
1281	J-495	J-528	245	6	0.463
1012	J-334	J-345	223	6	0.336
1063	J-345	J-436	370	6	0.286
1015	J-374	J-348	225	10	0.218
848	J-333	J-338	161	10	0.215
1282	J-528	J-525	91	6	0.147
1088	J-432	J-445	133	6	0.123
1011	J-331	J-333	55	10	0.116
1016	J-345	J-350	107	6	0.110
1013	J-348	J-338	82	10	0.108
2540	J-817	J-530	359	6	0.079
1208	J-498	J-495	137	6	0.077
2538	J-527	J-816	237	6	0.071
1010	J-416	J-331	1,318	24	0.070
1070	J-374	J-404	91	10	0.062
1009	WTP	J-416	1,510	24	0.059
1084	J-400	J-403	287	6	0.055
1268	J-482	J-522	72	6	0.054
1014	J-348	J-345	111	6	0.050
927	J-379	J-377	110	6	0.048

Based on a review of **Table 13**, there is a short list of pipes that may experience significant increases in local friction losses. This may be an indication that the water distribution network would benefit from increased pipe sizes in select locations. The exact location and nature of the improvements will depend on the final placement and layout of the additional nodes and pipe connections. It is recommended that the water distribution model be updated during each significant development in order to understand that potential impact that the anticipated increase in flow may have on the existing network.

3.2.3 Recommendations

Based on our review of the existing documents, technical modelling, and anticipated community growth, Wills recommends the following next steps and key development initiatives.

- Conduct the appropriate planning studies to investigate the expansion of the water treatment system once the demand has reached 80% of the residual capacity of the system. This is anticipated at a total population of approximately 8313 persons.
- Conduct planning and design initiatives to facilitate the twinning of the 600 mm feeder main to ensure that there is redundancy in this part of the network.
- Review the locations in which the model predicts localized high pressures throughout the network, including hydrant testing, and consider additional pressure reduction infrastructure as required.
- Review the community criteria for fire flow protection, including the adequacy of the storage reservoir at the treatment facility.
- Review the list of pipe segments that result in the greatest friction losses, as shown on **Table 13**, and perform modelling scenarios to determine the impact on local pipe improvements on the performance of the water distribution network, particularly with respect to potential fire flow needs.
- Update the water distribution model in keeping with future planned developments in order to understand the performance of local pipe networks based on detailed design.

4.0 Conclusions

This servicing report provides a comprehensive overview of the existing municipal servicing conditions, highlighting key constraints and opportunities for future development within the Secondary Plan Areas of the Municipality of Brighton. The analysis has been conducted in accordance with the projected population increases and the associated impact on the sanitary collection, water distribution, and stormwater management systems.

The following findings emphasize the importance of strategic adjustments in the existing sanitary collection and treatment infrastructure to ensure optimal capacity and efficiency:

- The WPCP currently has the capacity to collect and treat the increased sanitary flows generated from the projected population growth.
- The Harbour Street SPS currently has the capacity to collect and pump the increased sanitary flows generated from the projected population growth.
- The Pinnacle Street South Trunk Sewer that services the southern portion of SPA 1 currently has the capacity to service the increased sanitary flows generated from the projected population growth.
- The Prince Edward Street Trunk Sewer requires approximately 457 m of upgrades to accommodate the increased sanitary flows generated from the projected population growth.
- The Ontario Street Trunk Sewer requires approximately 1,771 m of upgrades to accommodate the increased sanitary flows generated from the projected population growth.
- Rerouting flows from the Pinnacle Street North Trunk Sewer to the Pinnacle Street South Trunk Sewer can decrease or eliminate the required upgrades to the Prince Edward Street Trunk Sewer. Rerouting the trunk sewers at the Dundas Street and Pinnacle Street North intersection will require 1,323 m of upgrades in comparison to the 2,228 m of upgrades required without the rerouted trunk sewers.
- The Brighton Springs Drinking Water System has the capacity to provide water for the increased demand associated with 92% of the planned population growth.
- Regardless of the planned community growth, the existing 600 mm feeder main provides no opportunity for maintenance or redundancy in the case of failure; planning feasibility studies should be completed to contemplate twinning the infrastructure.
- Select watermain improvements should be assessed as part of the planning and approval process of each proposed development.
- The community criteria for fire flow protection, including the adequacy of the storage reservoir at the treatment facility, should be reviewed.

- SWM infrastructure should be incorporated into all future development applications, in keeping with municipal, provincial standards and the technical guidance provided by the LTC.

It is imperative for the Municipality of Brighton to consider these recommendations in the planning and development phases of the Secondary Plan. By implementing these strategic adjustments, the Municipality will not only meet the demands of projected development but also lay the foundation for a sustainable and complete community.

This report serves as a reference document to guide the Municipality of Brighton in achieving its vision for the Town, aligning with Provincial, County, and municipal policies. The comprehensive analysis presented in this report is an asset in formulating policies and directives within the Secondary Plan, ensuring that growth and development proceed in a manner consistent with the Municipality's long-term objectives.

The collaborative efforts of D.M. Wills Associates Limited, KMD Community Planning and Consulting Services, and Metroeconomics in conducting this servicing report have provided a strong foundation for the Municipality of Brighton to proceed with the next phase of the Secondary Plan Project. Through proactive and strategic planning, the Municipality can achieve a sustainable, thriving, and cohesive urban landscape within the identified Secondary Plan Areas.

5.0 References

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Statement of Limitations

This Servicing Report has been prepared by D.M. Wills Associates Limited on behalf of the Municipality of Brighton to address the requirements of the Municipality of Brighton.

The conclusions and recommendations in this Servicing Report are based on available background documentation, discussions with applicable agencies and field investigations completed at the time of preparation.

The Servicing Report is applicable only to the Project as described in the text, interpreted substantially in accordance with the plans and details accompanying this submission.

Any use which a third party makes of this Servicing Report, other than for review by applicable agencies, is the responsibility of such third parties. D.M. Wills Associates Limited accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or action taken based on using this Servicing Report.

Appendix A

Existing Sanitary Design Sheet

Appendix B

Existing and Future Water Distribution Calculations

Appendix C

Stormwater Management References

Appendix D

Sanitary Design Sheet for Future Development

Appendix E

Digital Water Distribution Model

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Appendix F

Environmental Compliance Approvals