

# Technical Memorandum

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**To:** Jessica Brownlee, City of Niagara Falls  
**From:** Cay-Yen Ang, Joy Liu, Alyssa Kochanski  
**cc:** Brian Kostuk, City of Niagara Falls  
**Date:** Thursday, October 2, 2025  
**Re:** 4873 & 4898 Kitchener Street  
**Project No.** 2402620

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## Project Scope

The City of Niagara Falls has retained GEI Consultants Canada Limited to assess the impacts of the proposed development on the City's existing water and wastewater systems. The proposed development would consist of an additional 50-storey hotel building on 4898 Kitchener Street development and the proposed 5-storey parking garage with an amphitheatre on 4873 Kitchener Street, on approximately 0.653 ha of land at 4873 and 4898 Kitchener Street, as shown in **Figure 1**.

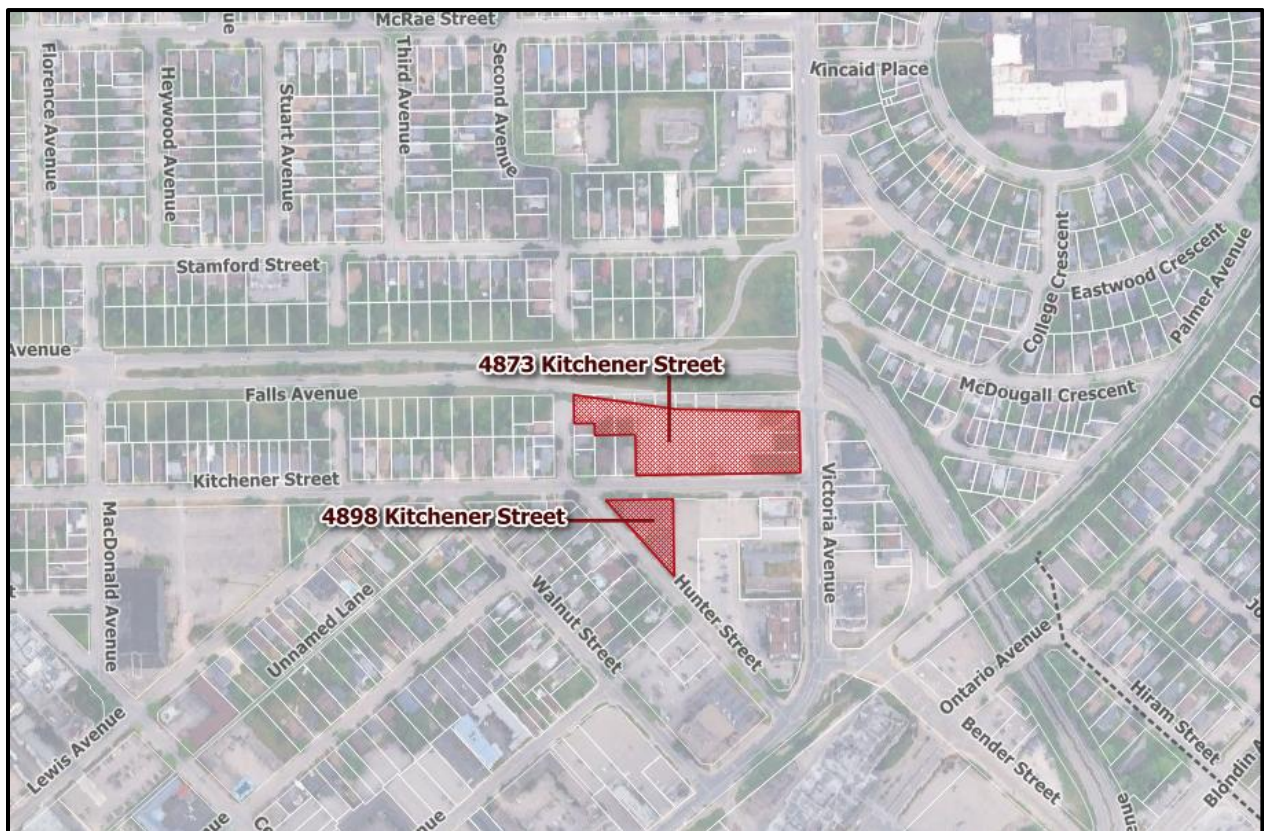


Figure 1 Study Area

## Analysis Tool

The water and wastewater systems were assessed using the City's existing water and wastewater model that were updated as part of the Region's Master Servicing Plan Update (MSPU) completed in 2021 and most recently updated and calibrated as part of the City's ongoing Master Servicing Plan and Wet Weather Management Strategy (MSP-WWMS).

## Water System Review

### Local Water System

The proposed development will be serviced by the existing City-owned 200 mm watermain on Kitchener Street. The watermain is serviced by Niagara Falls Water Treatment Plant (WTP) to the south. **Figure 2** presents the existing local system.

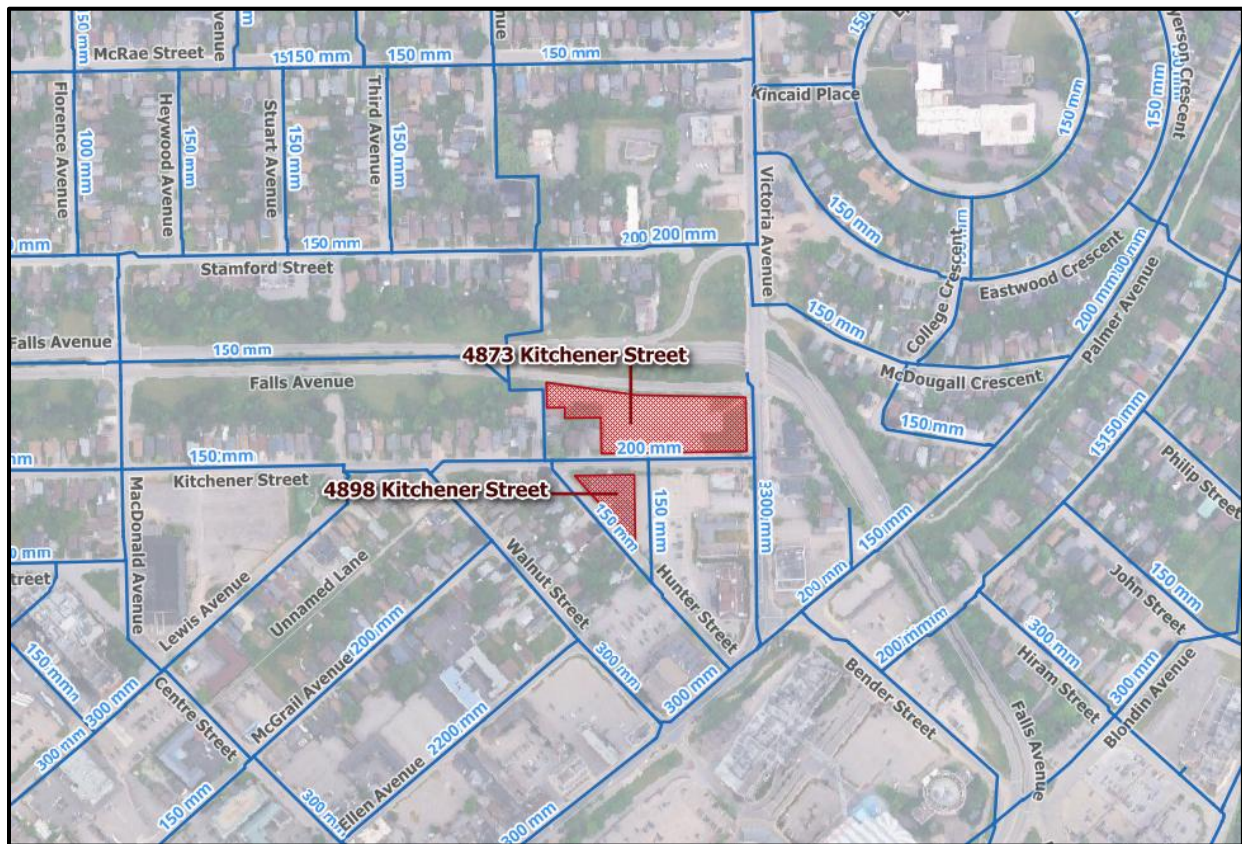


Figure 2 Existing Water System

### Water Demand Analysis

The system was evaluated with per capita rates from the MECP's Design Guidelines for Drinking-Water Systems. Hallex Engineering Limited estimated that projected water demands would total 1.36 L/s for average day demand, 3.81 L/s for maximum day demand, and 6.28 L/s for peak hour demand, with calculations supplied in their Functional Servicing Design Brief. The GEI water system review was completed using the Hallex Engineering Limited calculated water demands.

## ***Water Performance Objectives***

### **Fire Flow Analysis**

The Functional Servicing Report prepared by Hallex Engineering Limited completed a Fire Underwriters Survey (FUS) assessment of the proposed development, resulting in an estimated fire flow target of 5000 L/min (83.33 L/s) for the hotel building and 3000 L/min (50 L/s) for the amphitheatre. The provided fire flow target was validated against the City of Niagara Falls updated fire flow targets, confirmed as part of the ongoing 2023 MSP-WWMS. The FUS calculated fire flows are below the City's target of 300 L/s within the tourist area, as shown in **Table 1**. The GEI system review was completed using the 300 L/s tourist area target.

**Table 1 Fire Flow Target**

<b>Land Use Type</b>	<b>Fire Flow Target (L/s)</b>
Residential – Single Family Dead End	50
Residential – Single Family	75
Residential – Multi Family	150
Residential – Apartments/Stacked Townhouses	200
Commercial	175
Institutional	175
Industrial	250
<b>Tourist Area</b>	<b>300</b>

### ***Water System Impacts and Modelling Results***

**Table 2** presents the summary of the system capacity and impact analysis. Due to the location of the development and presence of transmission watermain, the local study area is limited to McRae Street, Macdonald Avenue, Centre Street, Eastwood Crescent, and Falls Avenue.

The following water analysis results were observed:

- Pressure
  - Local system has sufficient capacity to accommodate pressures between 40-100 psi at the property boundary of the development and within the local study area under both average day demands, and maximum day demands.
  - The proposed development is not expected to have significant impacts on the local study area under existing and 2051 conditions, maintaining pressures between 40-100 psi.
- Fire Flow
  - The fire flow requirement of 300 L/s for the proposed development is achieved under existing and 2051 buildout conditions when serviced by the existing 200 mm watermain on Kitchener Street.
  - The proposed development is not expected to have significant impacts on local study area fire flows under existing and 2051 conditions.

**Table 2 Local Water System Performance**

Scenario	Demand	Requirement	Property Boundary <sup>1</sup>	Study Area <sup>2</sup>	
				Average	Extreme
Fire Flow Target (L/s)			300	-	-
Existing (no development)	ADD	Max Pressure (psi)	95	97	120
	MDD	Min Pressure (psi)	76	77	72
	MDD+FF	Fire Flow (L/s)	>350	309	63
Existing + Development	ADD	Max Pressure (psi)	95	96	120
	MDD	Min Pressure (psi)	76	77	72
	MDD+FF	Fire Flow (L/s)	>350	305	63
2051 (no development) <sup>3</sup>	ADD	Max Pressure (psi)	85	86	109
	MDD	Min Pressure (psi)	71	73	68
	MDD+FF	Fire Flow (L/s)	>350	>350	65
2051 + Development <sup>3</sup>	ADD	Max Pressure (psi)	85	85	108
	MDD	Min Pressure (psi)	68	70	65
	MDD+FF	Fire Flow (L/s)	>350	>350	65

Notes:

1. Property service located on Kitchener Street.
2. Study Area is limited to McRae Street, Macdonald Avenue, Centre Street, Eastwood Crescent, and Falls Avenue.
3. Proposed upgrades as developed by the Region's 2021 MSPU and City's 2023 MSP-WWMS were incorporated in the 2051 analysis.

## Wastewater System Review

### Local Wastewater System

The proposed site will tie-in to the existing sewers on Kitchener Street, as shown in **Figure 3**

- 260m of 250mm City-owned sewer on Kitchener Street from the development to Victoria Avenue at Bender Street
- 40m of 375-450mm City-owned sewers on Bender Street between Palmer Avenue and Ontario Avenue
- 30m of 900mm City-owned sewer on Bender Street at Ontario Avenue
- 130m of 300-600mm City-owned sewers on Bender Street from Ontario Avenue to Falls Avenue
- 190m of 375-825mm City-owned sewers along Bender Street from Falls Avenue which discharges into the Bender Hill Sewage Pumping Station (SPS).

The sanitary flows originating at the proposed development contribute to the Bender Hill SPS. The scope of the servicing review will be limited to the City-owned sewers upstream of the SPS.

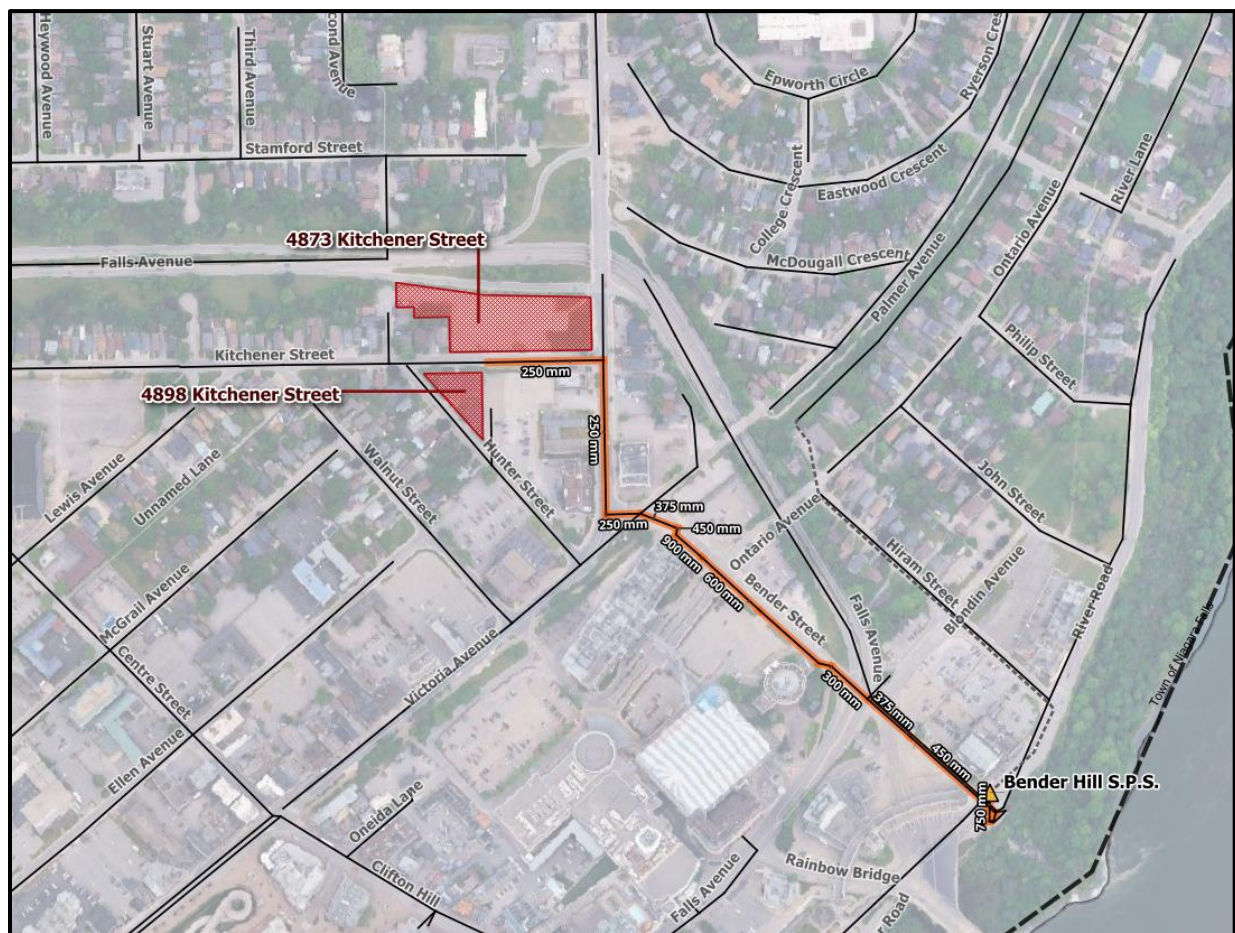


Figure 3 Wastewater Flow Route

## ***Wastewater Flow Analysis***

The system was evaluated under both existing and post-development conditions to gauge the development impact holistically on the sanitary system. Hallex Engineering Limited estimated that post-development sanitary flows would total 5.176 L/s without RDII contributions, as calculated in their Functional Servicing Design Brief.

## ***Wastewater System Impacts and Modelling Results***

### **Sewer System Capacity**

For existing sewer capacities, sewer performance criteria were assessed using the following conditions:

- Maintaining depth of flow in pipe equal to or less than obvert elevation ( $d/D \leq 1$ ); and, if failing to do so then,
- Maintain system hydraulic grade line (HGL) of a surcharging sewer below the basement protection freeboard of 2.1 meters below grade.

Under dry weather flow conditions, no downstream sewer surcharging, or system overflows are anticipated under both existing and post-development conditions.

The system performance was reviewed under a variety of design storm conditions under the 2-year, 5-year, and 10-year design storms using the City's existing wastewater model. **Table 3** summarizes the sewer system performance before and after development.

Modelling results summarized in **Table 3** show that:

- The existing sewers from the development tie-in on Kitchener Street to Bender Hill SPS surcharge beyond the 2.1m basement flood protection freeboard elevation under the 2-year, 5-year, and 10-year design storm, with and without development flows.
  - Sewer surcharging is due to insufficient pipe capacity to accommodate high system wet weather inflows (in excess of the Region's design allowance) caused by flows from combined sewer catchments upstream.
  - Shallow sewers along the proposed development flow path are more at risk of surface flooding under surcharging conditions.

To address the known local sewer system capacity constraints, the City is in the process of developing servicing solutions through the City's ongoing MSP-WWMS. This includes localized wet weather flow reduction interventions such as the sewer separation strategy and localized flow monitoring. The outcome of the MSP-WWMS in combination with the Region's 2021 MSPU sewage pumping station upgrade recommendations, to be confirmed under the ongoing Region's 2026 MSPU, is anticipated to alleviate sewer surcharging.

**Table 3 Downstream Gravity Sewer Performance**

Scenario		Peak Wet Weather Flow									
		Development on Kitchener St to Bender St at Victoria Av (250mm City sewer)		Bender St between Palmer Av and Ontario Av (375-450mm City sewers)		Bender St at Ontario Av (900mm City sewers)		Bender St from Ontario Av to Falls Av (300-600mm City sewers)		Bender St from Falls Av to Bender Hill SPS (375-825mm City Sewers)	
		d/D	Freeboard (m)	d/D	Freeboard (m)	d/D	Freeboard (m)	d/D	Freeboard (m)	d/D	Freeboard (m)
1:2 Year	Pre-Dev	≥ 1	< 0.3 – potential surface flooding risk	≥ 1	3.23	0.31	Within obvert	≥ 1	< 0.3 – potential surface flooding risk	≥ 1	0.55
	Post-Dev			≥ 1	3.23						0.31
1:5 Year	Pre-Dev	≥ 1	< 0.3 – potential surface flooding risk	≥ 1	2.97	0.33		≥ 1	< 0.3 – potential surface flooding risk	≥ 1	0.59
	Post-Dev			≥ 1	2.97						0.33
1:10 Year	Pre-Dev	≥ 1	< 0.3 – potential surface flooding risk	≥ 1	2.79	0.35		≥ 1	< 0.3 – potential surface flooding risk	≥ 1	0.56
	Post-Dev			≥ 1	2.79						0.35

## Summary

Based on the analysis, the impact of the additional 50-storey hotel building on 4898 Kitchener Street development and the proposed 5-storey parking garage with an amphitheatre on 4873 Kitchener Street development on the water and wastewater systems are as follows:

### *Water System Summary*

- Local system has sufficient capacity to accommodate pressures between 40-100 psi at the property boundary of the development and within the local study area under both average day demands, and peak hour demands.
- The proposed development is not expected to have significant impacts on the local study area under existing and 2051 conditions, maintaining pressures between 40-100 psi.
- The fire flow requirement of 300 L/s for the proposed development is achieved under existing and 2051 buildout conditions when serviced by the existing 200 mm watermain on Kitchener Street.
- The proposed development is not expected to have significant impacts on local study area fire flows under existing and 2051 conditions.

### *Wastewater System Summary*

- The existing sewers from the development tie-in on Kitchener Street to Bender Hill SPS surcharge beyond the 2.1m basement flood protection freeboard elevation under the 2-year, 5-year, and 10-year design storm, with and without development flows.
  - Sewer surcharging is due to insufficient pipe capacity to accommodate high system wet weather inflows (in excess of the Region's design allowance) caused by flows from combined sewer catchments upstream.
  - Shallow sewers along the proposed development flow path are more at risk of surface flooding under surcharging conditions.
- To address the known local sewer system capacity constraints, the City is in the process of developing servicing solutions through the City's ongoing MSP-WWMS. This includes localized wet weather flow reduction interventions such as the sewer separation strategy and localized flow monitoring. The outcome of the MSP-WWMS in combination with the Region's 2021 MSPU sewage pumping station upgrade recommendations, to be confirmed under the ongoing Region's 2026 MSPU, is anticipated to alleviate sewer surcharging.

Based on the above findings, portions of the existing wastewater sewers downstream of the proposed development do not meet the City's capacity and performance targets under existing conditions due to high wet weather inflows and shallow sewers. The proposed development results in negligible increase in wastewater flows from the proposed development site to the Bender Hill SPS. It is recommended that the applicant contact the Region regarding the development flow contribution to the Region-owned sewage pumping station.