

FUNCTIONAL SERVICING REPORT

PROJECT:

BELLEVILLE 1 NORTH FRONT STREET PHASE 2

CITY OF BELLEVILLE

DATED: February 10 2026

PREPARED FOR:

Belleville Affordable Housing GP Corp.
51 Victoria Avenue
Belleville, ON K8N 1Z8

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1.0 INTRODUCTION

This Report has been prepared in support of planning approvals through an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) for redevelopment of 1 North Front Street, located in the City of Belleville, Ontario. The property area is 0.23 hectares.

The subject property currently contains an existing low-rise mixed-use building with residential and commercial uses, as well as an existing underground parking structure and surface parking area. The proposed development includes the conversion of the existing commercial space into residential units and the construction of a new nine-storey residential building to replace the existing surface parking lot.

Property Location Map



The purpose of this Report is to demonstrate how the existing municipal water and wastewater systems will support the proposed increase in residential density at a functional level, consistent with OPA and ZBA requirements. It is assumed that the municipal system has available capacity to accommodate the proposed development. This will be verified during the detailed design process under Site Plan Control.

1.1 Background Studies

This Report has been prepared with consideration of the Planning Justification Report for the proposed redevelopment at 1 North Front Street, dated November 2025, prepared by BLVD Group. The Report outlines the planning, development concept, and approval framework for the proposal, including the requirement for an Official Plan Amendment and Zoning By-law Amendment.

The City's Technical Memorandum 8, Conveyance System Assessment and Alternatives, Belleville Wet Weather and Wastewater Servicing Master Plan, prepared by JLRichards dated Nov 26, 2019, was reviewed.

2.0 DESIGN GUIDELINES

Servicing design for the proposed development has considered the following Guidelines:

- City of Belleville Development Manual and Design Guidelines
- City of Belleville Water Standards & Specs
- City of Belleville Site Plan Control Guidelines
- Fire Underwriters Survey, 2020
- Integrated Accessibility Standards
- Ontario Building Code (OBC)

3.0 EXISTING SERVICES

Based on our review of available background information, including municipal mapping, record drawings of North Front Street and Moira Street East, municipal and public services are readily available to service the proposed development. The existing services are illustrated on the attached Preliminary Servicing Plan, including the following:

- A 200mm dia watermain along North Front Street and 200mm dia watermain on Moira Street East
- A 300mm dia sanitary sewer North Front Street and 375mm dia on Moira Street East

Other public utilities, including electrical power, natural gas, telecommunications, and waste collection services, are available in the vicinity of the site and are typically designed, installed, and maintained by the respective utility providers.

The existing services described are based on information available at the time of preparation and will be field verified for detailed design in support of Site Plan approval and Building Permit.

4.0 WATER SUPPLY

Domestic water supply and fire protection for the proposed development will be provided by the existing City of Belleville municipal water distribution system. These existing water and sanitary sewer services are expected to adequately support the proposed redevelopment, subject to confirmation of availability capacity through this Report. Layout of the proposed water services is illustrated on the attached Preliminary Servicing Plan.

No upgrades or extensions to the municipal water distribution system are anticipated at this stage. Final servicing configuration, watermain connections, and fire protection measures will be confirmed during detailed design in support of Site Plan approval and Building Permit, subject to City review and approval.

4.1 System Pressure Requirements

In accordance with MECP and municipal guidelines, the system should be designed to maintain a minimum pressure of 140 kPa (20 psi) under maximum day demand plus fire flow conditions.

- The normal operating pressure in the distribution system should be 350 to 480 kPa (50 to 70 psi) and not less than 275 kPa (40 psi).
- Components associated with a fire system shall be designed for a minimum internal working pressure of 1400kPa (200psi) or as otherwise required by O. Reg. 213/07.

4.2 Fire Flow Requirements

Fire protection requirements have been assessed in accordance with City of Belleville standards and the Ontario Building Code. Available fire flow capacity will be reviewed using municipal hydrant flow test data during the detailed design phase under Site Plan Control, to confirm that minimum fire flow requirements can be met using the existing system.

In accordance with MECP and municipal guidelines, fire flow requirement calculations shall be based on the Fire Underwriters Survey (FUS) document Water Supply for Public Protection 2000, unless otherwise designed by the building mechanical engineer. The estimated amount of water required for fire protection in a building has been calculated using the Fire Underwriters Survey Formula for Required Fire Flow (RFF), and is provided in *Appendix A*.

$RFF (l/s) = 220 C \sqrt{A}$, where:

C = Construction Coefficient

A (sqm) = total effective floor area

4.3 Domestic Water Demand

Estimated domestic water demands have been calculated using standard per-unit consumption rates and applicable municipal design criteria.

The domestic water demand calculations are provided in *Appendix A*. The domestic water demand has been calculated in accordance with MECP Design Guidelines for Drinking-Water Systems Peaking Factors Table 3-1, based on the population of the City of Belleville of 50,000.

- Maximum Day Factor: 1.8
- Peak Hour Factor 2.7

The water demand for the proposed building has been calculated using the average day per capita as litres per bed-space day, in accordance with the MOE Water Design Guidelines.

4.4 Building Design Requirements

To confirm the municipal water system is adequate to meet the proposed development's flow demands and pressure requirements, the building team will design the fire protection system including the sprinkler systems and possible booster pump at the detailed design phase based on the fire hydrant flows results to be made available.

Final confirmation of building servicing requirements will be completed in support of Site Plan Approval and Building Permit and will be subject to review and approval by the City of Belleville and the local fire authority. Any additional on-site measures identified through detailed design will be incorporated into the building design without reliance on off-site municipal water system upgrades.

5.0 WASTEWATER

5.1 Design Criteria

The Rational Method calculation was used to design the proposed sewage flow rates with the following municipal parameters:

- Residential (q) : average daily per capita flow (L/day/person) = 350
- Extraneous (i) : Unit of peak extraneous flow (L/s/ha) = 0.28
- Population density: Person per unit:
High Density: one bedrm: 1.4 PPU, two bedrm: 2.1 PPU

The sanitary system is designed to meet the following Guidelines:

- Minimum depth of cover of 1.5m
- Minimum pipe slope: 2% for service laterals
- Pipe material specification PVC DR35 for mainline and PVC SDR 28 for service laterals

5.2 Sewage Flow Rates and Downstream Capacity Assessment

The proposed flows for apartment buildings are provided on the sanitary sewer design sheet in *Appendix B*.

Sanitary services for the proposed development will be provided by the existing municipal wastewater collection system operated by the City of Belleville. As illustrated on the attached Preliminary Servicing Plan, a service connection from the proposed buildings will discharge to the existing 300mm dia sanitary sewer on North Front Street fronting the property.

For the purposes of this Report, sanitary flows associated with the proposed redevelopment have been estimated at a functional level using standard per-unit flow rates and municipal design criteria. The analysis is intended to confirm that the expected increase in sanitary loading can be accommodated within the existing municipal system without the need for new or upgraded off-site infrastructure.

Based on our overview of the 2019 Assessment, the existing sewer system on Coleman Street have hydraulic grade line (HGL) exceedances, surcharging, and flood risk. Coleman Street is part of the gravity trunk system flowing toward the Moira River crossing and ultimately the Front Street Pump Station. Moira Street conveys flows via a pressure sewer which also has issues. Both the Coleman St sewer system and the Moira Street pressure system have major downstream bottlenecks constrained by the undersized Moira River crossing (gravity trunk) and the Front Street Pump Station. Recommendations for upgrades to alleviate capacity issued were provided in the 2019 Assessment.

The existing capacity constraints will be addressed through a holding symbol (-H) to be lifted upon satisfying the City's conditions. Final confirmation of sanitary connection details will be undertaken during detailed design in support of Site Plan approval and Building Permit.

6.0 PUBLIC UTILITIES

The proposed development will be serviced with public utilities including Canada Post, electrical power, natural gas, and telecommunications. The required utility infrastructure will be designed and implemented by the respective service providers in accordance with their standards and requirements.

7.0 CONCLUSIONS

1. This project includes the redevelopment of 1 North Front Street in the City of Belleville, consisting of the conversion of existing commercial space to residential use and the construction of a new mid-rise residential building on the site.
2. The proposed development is intended to be serviced by the existing 200mm watermain located on North Front Street. No new off-site watermain infrastructure is anticipated to be required to service the development.
3. Sanitary servicing for the proposed development will be provided through a direct connection to the existing municipal sanitary sewer system located within the adjacent roadway.
4. The existing capacity constraints indicated in the 2019 Assessment will be addressed through a holding symbol (-H) to be lifted upon satisfying the City's conditions. Final confirmation of sanitary connection details will be undertaken during detailed design in support of Site Plan approval and Building Permit.
5. New sanitary and water connections will be proposed to service the residential block. The existing service connections to the existing building will be removed.
6. To confirm the municipal water system is adequate to meet the proposed development's flow demands and pressure requirements, the building design team will design the internal water supply and fire protection systems based on available fire hydrant flow test results, including sprinkler systems and a booster pump, if required.
7. Public utility providers will design subdivision servicing for Canada Post, electrical power, natural gas, and telecommunications.

8.0 REPORT LIMITATIONS

General content, findings and results included in this report are based on information made available by the client, municipality, and external parties at the time of its writing. It has been assumed that the information provided is accurate and reliable, unless expressly noted otherwise. INSITE will not be held responsible or accountable for any errors, omissions or misleading information provided by others. Any changes in material following the provision of services and submission of the Report that may

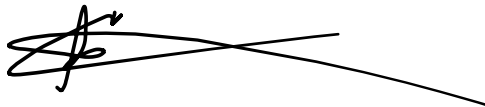
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This Report has been prepared by:



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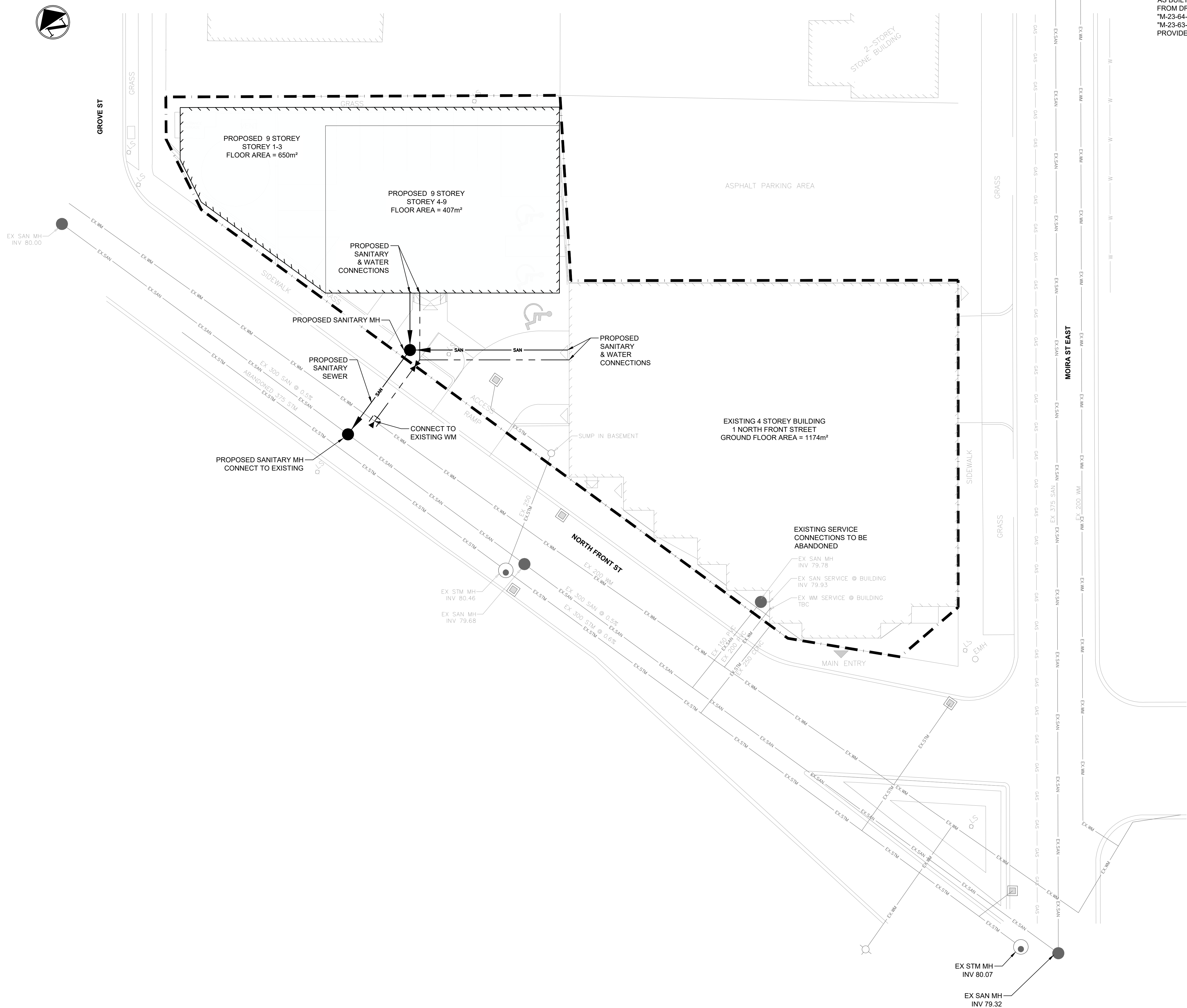
This Report has been reviewed by:



Nancy Dionne, P. Eng,
nancy.dionne@insiteconsulting.ca

DRAWINGS

DWG-1: PRELIMINARY SERVICING PLAN



NOTES:

PROPERTY BOUNDARY AND CONCEPT PLAN OBTAINED FROM ALEXANDER WILSON ARCHITECT DEC 2025

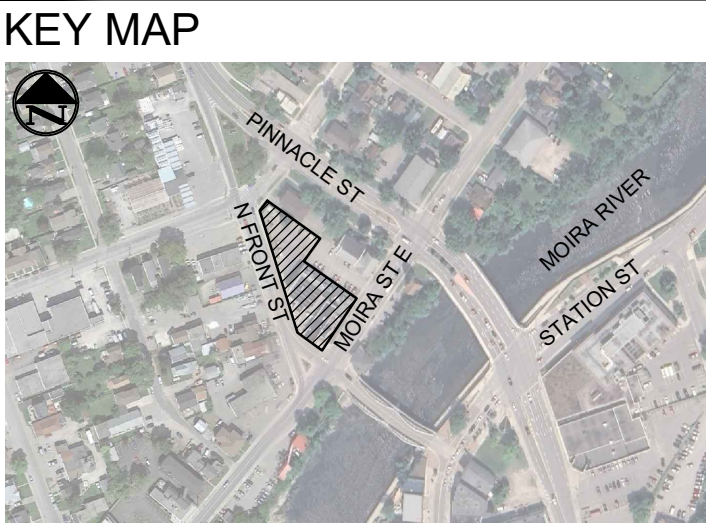
AS BUILT SERVICES ON MUNICIPAL ROADS EXTRACTED FROM DRAWINGS:
"M-23-64-1_North_Front_Street_Plan_Profile_Grid_1984" &
"M-23-63-2_Moria_Street_Plan_Profile_Grid_1984",
PROVIDED BY THE CITY OF BELLEVILLE

CLIENT

**BELLEVILLE
AFFORDABLE
HOUSING GP CORP.**

PROJECT 26-135

**1 NORTH FRONT ST
PHASE 2**



- LEGEND
- PROPERTY BOUNDARY
 - PROPOSED BUILDING
 - EXISTING BUILDING
 - EXISTING SANITARY SEWER
 - EXISTING SANITARY MH
 - PROPOSED SANITARY SEWER
 - PROPOSED SANITARY MH
 - EXISTING STORM SEWER
 - EXISTING STORM MH
 - EXISTING CATCH BASIN
 - EXISTING WATER MAIN
 - EXISTING HYDRANT
 - PROPOSED WATER SERVICE
 - PROPOSED VALVE

INSITE
PROJECT CONSULTING INC.

DRAWN BY: D.YIN
DESIGNED BY: N.DIONNE

REVISIONS			
#	M/D/Y	BY	ISSUED FOR
1	01/23/26	N.D	FUNCTIONAL SERVICING REPORT

DRAWING TITLE

**PRELIMINARY
SERVICING PLAN**

SCALE	1:200	DWG. NO.
SIZE	ARCH D (24"X36")	1

APPENDIX A

Calculations for

Fire Flow Requirement and Domestic Water Demand

1. FIRE FLOW REQUIREMENT CALCULATIONS
1 NORTH FRONT HOUSING
Municipal Criteria: The City of Belleville



Prepared by: Eman Khalid

Reviewed by :Nancy Dionne, P.Eng

Date: January 20th, 2026

Fire flow requirements per Fire Underwriters Survey Water Supply for Public Fire Protection, 2020

RFF (l/s) = 220 C $\sqrt{A}$, to the nearest 1,000 LPM, where:

C = Construction Coefficient

A (sqm)= total effective floor area

	Proposed	Existing
A. Determine Construction Coefficient 'C)	0.8	1
1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior) 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls) 0.6 for fire resistive construction (fully protected frame, floors, roof)		
B. Determine Total Effective Floor Area (A)		
Number of stories	9	4
For C < 1.0 : a) two largest adjoining floors plus 50% of each of any floors immediately above them up to eight, when the vertical openings of enclosure walls are inadequately protected (less than one hour rating). OR b) only the area of the largest floor plus 25% of each of the two immediately adjoining floors, when the vertical openings are properly protected (per NBC Div B, Sec 3.5 Vertical Transportation).	2,846	
For C = 1.0 : All floor areas		3,734
C. Calculate Required Fire Flow (LPM)		
Fire Flow Equation:	9389	13443
C1 - Fire Flow (Rounded to nearest 1,000 LPM)	9000	13000
D. Determine Occupancy Content Adjustment Factor:		
D1 - (Non-Combustible)	-15%	-15%
E. Determine Automatic Sprinkler Protection:		
E1 - % Reduction for Sprinkler Credit	-30%	-10%

	Proposed	Existing
F. Determine Total Exposure Adjustment Charge (max 75%):		
a) Exposure distance: Distance to the building to the north	3.4	17.4
Table 6 Max. Exposure Adjustment Charge	20%	15%
b) Exposure distance: Distance to the building to the South	28.6	31.9
Table 6 Max. Exposure Adjustment Charge	10%	5%
c) Exposure distance: Distance to the building to the East	2.3	19.1
Table 6 Max. Exposure Adjustment Charge	25%	15%
d) Exposure distance: Distance to the building to the West	> 45	2.3
Table 6 Max. Exposure Adjustment Charge	0%	25%
F1 - Total Max. Exposure Charge = a + b + c + d	55%	60%
G. Final Required Fire Flow (nearest 1000 LPM):		
Adjusted Fire Flow (L/min) = $C1 + C1 * (D1 + E1 + F1)$	9900	17550
Adjusted Fire Flow, rounded to nearest 1000 (L/min)	10000	18000
<i>Verify Simple Method for dwellings less than 450 sqm, and 3-10m exposure distances</i>	NA	NA
Wood shingle or shake roof (add'l charge of 2000-4000 L/min)	no	no
Required Fire Flow (L/s)	167	300

2. DOMESTIC WATER DEMAND CALCULATIONS
1 NORTH FRONT HOUSING
Municipal Criteria: The City of Belleville



Prepared by: Eman Khalid

Reviewed by: Nancy Dionne, P.Eng

Date: January 22nd, 2026

DESIGN DENSITIES (POP)

Low Density: Singles, semis / duplex PPU : 3.0

Med Density: Triplex, Fourplex, THs PPU : 2.5

High Density: Apartments (54 to 300 units/Ha) PPU :

1 bdrm: 1.4 3 bdrm: 2.4

2 bdrm: 2.1 4 bdrm: 3.0

* Peaking Factors shall be based on MECP Design Guidelines for Drinking Water Systems Tables 3.1 and 3.3 in consultation with the Development Services Department.

Notes:

Max Day Factor, Peak Hour Factor per City of Belleville.

Average day per capita per City of Belleville.

Proposed Unit

Average day per capita (L per person/day)	350	A
Number of Units (Apartments)	48	B
PPU Density (Number of Person /unit) 18 2-bdrm unit / 30 1-bdrm	1.66	C
* Maximum Day Factor:	1.8	D
* Peak Hour Factor	2.7	E
Required Fire Flow (RFF) L/s	167	F

FLOW REQUIREMENTS	L/day	L/min	L/sec
Average Day Demand ADD $Q_{ave} = A \times B \times C$	27,930.0	19.4	0.3
Max Day Demand MDD $Q_{mdd} = Q_{ave} \times D$	50,274.0	34.9	0.6
Peak Hour Demand PHD $Q_{phd} = Q_{ave} \times E$	75,411.0	52.4	0.9
Total Demand TD $Q_{td} = Q_{mdd} + RFF$	50,440.67	10,034.9	167.2

Existing Unit

Average day per capita (L per person/day)	350	A
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Number of Units (Apartments)	38	B
PPU Density (Number of Person /unit) 38 1-bdrm	1.40	C
* Maximum Day Factor:	1.8	D
* Peak Hour Factor	2.7	E
Required Fire Flow (RFF) L/s	300	F

FLOW REQUIREMENTS	L/day	L/min	L/sec
Average Day Demand ADD $Q_{ave} = A \times B \times C$	18,620.0	12.9	0.2
Max Day Demand MDD $Q_{mdd} = Q_{ave} \times D$	33,516.0	23.3	0.4
Peak Hour Demand PHD $Q_{phd} = Q_{ave} \times E$	50,274.0	34.9	0.6
Total Demand TD $Q_{td} = Q_{mdd} + RFF$	33,816.0	18,023.3	300.4

APPENDIX B

Sanitary Sewer Design Sheet

SANITARY SEWER DESIGN SHEET
1 North Front Housing Site Plan
Municipal Criteria: City of Belleville

Prepared by: Eman Khalid
Reviewed by: Nancy Dionne, P.Eng
Insite Project Consulting Inc.
Date: February 2nd, 2026



RATIONAL METHOD: $Q_d = Q_p + Q_i$ $Q(p)$ = peak population flow (L/s) $Q(i)$ = peak extraneous flow (L/s) $Q(d)$ = peak design flow (L/s) $Q(p) = P * q * M / 86.4$ (L/s) $Q(i) = i * A$ (L/s) P = Population in thousands = POP/1000 q = average daily per capita flow (L/day/person) i = Unit of peak extraneous flow (L/s/ha) A = Gross Tributary Area (Ha) M = Harmon's Peaking Factor Formula: $M = 1 + 14 / (4 + (POP/1000) ^ 0.5)$ Min M Permissible per MECP: 2 $M = 2.75$ for maximum flow and 4.0 for minimum flow
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MUNICIPAL GUIDELINES Residential (q) : 350 (225 to 450 L/cap.d) Extraneous (i) : 0.3 (0.1 to 0.28 L.s/ha) DESIGN DENSITIES (POP) Low Density: Singles, semis / duplex PPU : 3.0 Med Density: Triplex, Fourplex, THs PPU : 2.5 High Density: Apartments (54 to 300 units/Ha) PPU : 1 bdrm: 1.4 3 bdrm: 2.4 2 bdrm: 2.1 4 bdrm: 3 Flows from commercial and industrial (Q_c): Commerical and Industrial (incl. Infiltration): 1.05 L/s/ha Hotels: 225 L/d/Bed Space Velocity: Min: 0.6 m/s (for pipe flow above pipe depth of 0.3 of pipe dia.) Max 3.0 m/s Min Slope 1% min for first leg of sewer Max full flow capacity: 80%
--

MANNING EQUATION FOR FULL PIPE FLOW: Q_{cap} (cum/s) = $1/n * A * R^{2/3} * S^{1/2}$ = $1/n * ((\pi D^2)/4) * (D/4)^{2/3} * S^{1/2}$ Mean Velocity (m/s) = Q / A D = Pipe Diameter (m) R = Hydraulic radius (m) = $A / P_w = D / 4$ A (sqm) = Cross sectional flow area = $(\pi D^2)/4$ P_w = Wetted Perimeter = $\pi * D$ S = slope (grade) of pipe (m/m) n = Manning's roughness coefficient Concrete, PVC and HDPE: $n = 0.013$
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LOCATION			RATIONAL METHOD FLOWS												SEWER CHARACTERISTICS			MANNING'S EQUATION		
AREA ID	FROM MH	TO MH	INDIVIDUAL					CUMULATIVE		PEAKING FACTOR (M)	PEAK FLOWS			DIA. (m)	SLOPE (m/m)	LENGTH (m)	PIPE VELOCITY Vcap (m/s)	PIPE CAPACITY Qcap (L/s)	Qd/Qcap (%)	
			PPU	Total Units (1 bdrm)	PPU	Total Units (2 bdrm)	AREA (ha)	POP (persons)	AREA (ha)		POP (persons)	POP Qp (L/s)	EXTRAN Qi (L/s)							DESIGN Qd (L/s)
Existing flows to North Front Street																				
	Existing commercial building		N/A	N/A	N/A	N/A	0.23	N/A	0.23	N/A	2.00	0.24	N/A	0.24						
Proposed flows to North Front Street																				
	Proposed Building	Proposed Sanitary MH	1.4	30.0	2.1	18.0	0.12	79.8	0.12	79.8	4.27	1.38	0.03	1.41						
	Existing Building	Proposed Sanitary MH	1.4	38.0	2.1	0.0	0.12	53.2	0.12	53.2	4.31	0.93	0.03	0.96						
	Proposed Sanitary MH	Proposed Sanitary MH Connecting to Existing	0.0	0.0	0.0	0.0	0.00	0	0.23	133.0	4.21	2.27	0.06	2.33						