



File: 24035

FUNCTIONAL SERVICING REPORT

**222 Gate Street, Niagara-on-the-Lake
Revised June 2025**

INTRODUCTION

Upper Canada Consultants has been retained to undertake and provide a Functional Servicing Report to address the servicing needs and requirements as part of a Zoning By-law Amendment submission for the proposed development. The project site is located at the above noted address, situated south of Queen Street, north of Johnson Street, and west of Victoria Street. The development site was historically developed with a single-family dwelling.

The proposed development site is approximately 0.08 hectares and shall consist of a 2-storey, 18 suite hotel and associated underground parking garage. The owners of the proposed development site are also owners of the adjacent rear (easterly) parcel and subsequent 124 on Queen Hotel and Spa development. It is the intention of the owner to merge the properties into one parcel as the 222 Gate Street hotel will be an extension of the 124 on Queen Hotel and Spa. The underground parking garage on the new building will be connected to the underground parking garage currently occupying the adjacent rear (easterly) lot that is accessed via Victoria Street.

The objectives of this study are as follows:

1. Identify domestic and fire protection water service needs for the site;
2. Identify sanitary servicing needs for the site; and,
3. Identify stormwater management needs for the site.

WATER SERVICING

There is an existing 200mm diameter watermain located on the east side of Gate Street fronting the development site. It is proposed to connect a 150mm diameter water service to provide both domestic and fire water supply for the proposed development. Although the parking garage as part of the new building will be connected to the adjacent rear parking garage, the water systems for the 222 Gate Street property will remain entirely separate.

The nearest municipal hydrants are located at the following locations:

- South corner of the intersection of Queen Street and Gate Street
- South corner of the intersection of Gate Street and Johnson Street



Per the MECP Design Guidelines for Drinking-Water Systems (2008), hotels have a daily average water use consumption of 225 L/bed-space/day with a Peak Hour peaking factor of 2.70. To be conservative, the proposed development will produce approximately 36 bed spaces resulting in a total domestic water consumption of 21,870L/day or 0.25L/sec.

A preliminary calculation has been conducted (Appendix A) to determine the minimum fire flow requirement per the Fire Underwriters Survey (2020). The calculation utilizes factors such as: Type of Construction, Area, Combustibility of Contents, etc. to determine the minimum flow rate required for this type of building. At this time, the calculations conservatively assume no sprinklers will be required, and the building will be constructed with ordinary construction methods. The calculation has concluded a minimum fire flow of 159 L/s will be required. This value includes the peak domestic flow requirement. It should be noted that this value is an estimation and may change based on future iterations of the proposed development strategy.

Utilizing hydrant flow data provided by the Town of Niagara-on-the-Lake (dated 26th & 29th of July, 2024) for the previously noted hydrants, a Fire Flow Calculation Sheet was also completed to determine the expected available flow rates during a fire event at 20 psi. The calculation has concluded that flow rates of 216 L/s and 229 L/s will be available at the hydrants at the intersections of Johnson Street and Queen Street respectively. Therefore, it is expected that the existing municipal watermain system will have sufficient capacity for the proposed development.

SANITARY SERVICING

There is an existing 200mm diameter AC sanitary sewer fronting the proposed development site conveying flows southerly on Gate Street. The proposed development will discharge sanitary flows to the existing sewer via 200mm diameter service.

A calculation (Appendix B) has been conducted to determine the peak sanitary flows from the proposed building and their effects on the immediate downstream sanitary sewer fronting the site. The analysis utilizes a peak unit sewage flow rate of 225 L/bed space/day as well as a Peaking Factor of 2.0 per the MECP Design Criteria. The analysis has determined that the proposed development will discharge a total peak flow rate of 0.21L/s to the existing sanitary sewer system. It is expected that this will be an acceptable addition to the capacity of the municipal system.

STORMWATER MANAGEMENT PLAN

The following is a summary of the Stormwater Management Plan for the proposed development site.

The criteria provided by the Town of Niagara-on-the-Lake and Region of Niagara for this development includes the requirement to control future development stormwater flows to allowable levels for up to and including the 5-year design storm event and improve stormwater quality levels to MECP Normal Protection (70% TSS removal) levels prior to discharge from the site.



Existing Conditions

Using topographical information, it has been determined that all stormwater from the site has historically been directed westerly towards the Gate Street road allowance. Stormwater flows then enter the municipal 375mm diameter Gate Street storm sewer via catch basins and discharge directly to the One Mile Creek outlet located at the north corner of the intersection of Gate Street and Johnson Street. A Weighted Impervious Calculation in Appendix C concluded the original property had a Runoff Coefficient of 0.45 when developed with a single detached dwelling.

Per the 'One Mile Creek – Floodplain Mapping' study conducted by the NPCA (July, 2004), One Mile Creek has an overall subwatershed of approximately 272.5ha in size extending from East and West Line to its' ultimate Lake Ontario outlet located just north of Niagara Boulevard. The Gate Street stormwater outlet is located well within the lower half of the drainage shed for this watercourse.

Using the Storm Drainage Area Plan for the existing Gate Street Storm Sewer System provided by the Town of Niagara-on-the-Lake, a storm sewer design sheet has been created to determine the available capacities within the sewer system as the original was not available within the town records. Figure 1 in Appendix C outlines the recreated drainage areas based on the historic Drainage Area Plan. A Weighted Impervious Calculation Sheet has concluded that the original drainage areas resulted in a total area of 0.92 hectares at an overall weighted Runoff Coefficient of 0.68 discharging to the Gate Street storm sewer system. This resulted in a peak stormwater flow 89.9 L/s occupying a maximum total capacity of approximately 82% within the downstream Gate Street storm sewer system.

Proposed Conditions

The current development strategy will result in the vast majority of the property developed with the proposed hotel building and a terrace occupying the frontage onto Gate Street. It is expected that the building will discharge stormwater flows to the existing storm sewer system on Gate Street. A storm sewer service will be constructed to the proposed building to provide an outlet for stormwater flows from the proposed development site.

Per the Weighted Impervious Calculation Sheet in Appendix C, the overall Runoff Coefficient of the Gate Street storm sewer system from 0.68 to 0.71 for the same overall drainage area. More specifically, the proposed development site Runoff Coefficient will increase to 0.80. As shown in the Storm Sewer Design Sheet, this will increase peak flows on Gate Street from approximately **156.5L/s** to **163.4L/s** (difference of 6.9L/s ~ 4%) to occupy 86% of the capacity of the existing Gate Street storm sewer system during the 5 year design storm event. Therefore, the existing municipal storm sewer system will continue to have adequate capacity under post-development conditions and no negligible effects will occur to storm sewer system during the 5 year event.

It should be noted that an additional Weighted Impervious Calculation and Modified Rational Method Calculation has been completed in Appendix C for specifically the development site upon request of the Town of Niagara-on-the-Lake. The calculations verify the 7L/s difference to the



overall peak flows discharging to Gate Street as previously calculated for the overall Gate Street storm sewer drainage area. Therefore, the existing storm sewer system will have adequate capacity for the development.

During major storm events greater than the 5-year event, stormwater flows from the proposed development site will continue to discharge to the Gate Street road allowance, where they will be directed south and immediately outlet to One Mile Creek located immediately downstream of the site.

An analysis has been conducted to determine the impact of stormwater flows within the Gate Street roadway between the development and the One Mile Creek outlet during the 100 year design storm event. As is known that storm sewers have an additional 15% capacity under surcharged conditions, the 375mm diameter storm sewer at 1.09% slope will have a total capacity of approximately 219.7L/s during a major storm event. Therefore, the total peak flow of 262.3L/s during the 100 year storm event will result in a flow of 42.6L/s within the roadway downstream of the site. As Gate Street has been topographically determined to have a slope of approximately 2.0% towards One Mile Creek, the gutter flow rate has been calculated at approximately 190L/s per Design Chart 4.04 in the MTO Drainage Management Manual. Technically, this is the capacity up to the centreline crest of the road on one half of the road, at the 11cm high mark of the 15cm high curb. As this flow is representative of the peak flows during the major storm event, it is expected that standing water within the roadway would be witnessed for a relatively minor period of time. Therefore, the 42.6L/s of total overland flows during the 100 year design storm event will result in very minimal quantities on the roadway and will not result in any adverse effects to municipal infrastructure.

An analysis has been completed to compare the increase in flows to peak stormwater flows experienced within One Mile Creek. The 'One Mile Creek – Floodplain Mapping' study completed by the NPCA utilized a peak stormwater flow value of approximately $8.93\text{m}^3/\text{s}$ at a cross section located just downstream of the existing outlet (XS 1602.851). The 100 Year Peak Stormwater Flow Analysis located on the Storm Sewer Design Sheet in Appendix C outlines an increase of 11.1L/s under proposed conditions. This represents only 0.1% of the peak flows within the One Mile Creek system during a major storm event.

Due to the Gate Street outlets' location relative to the upstream limit, as well as the extremely minor increase in peak stormwater flows, the proposed development will have a negligible effect on peak stormwater flows within the downstream One Mile Creek. Therefore, it is expected that stormwater quantity controls will not be required for this site and no adverse effects will result to downstream infrastructure as a result of the proposed development.

As the entire site will be developed with rooftop or landscape area, no significant source of Total Suspended Solids (TSS) will be occupy the site. Therefore, no additional quality control measures are expected to be required for this development.



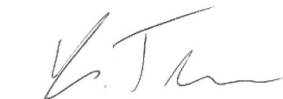
CONCLUSIONS AND RECOMMENDATIONS

Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site.

1. The existing 200mm diameter watermain will have sufficient capacity to provide both domestic and fire protection water supply.
2. The existing 200mm diameter municipal sanitary sewer will have adequate capacity for the proposed development.
3. Stormwater quantity controls will not be required prior to discharge directly to the Gate Street storm sewer system.
4. The site extreme stormwater overland route is to Gate Street and ultimately One Mile Creek.
5. The development will consist of solely non-significant sources of Total Suspended Solids (TSS) and therefore further quality controls will not be required.

Based on the above and the accompanying calculations, there exists adequate municipal servicing for this development. We trust the above comments and enclosed calculations are satisfactory for approval. If you have any questions or require additional information, please do not hesitate to contact our office.

Yours very truly,



Kurt Tiessen, P.Eng.
Revised June 26, 2025
Encl.





**UPPER CANADA
CONSULTANTS**
ENGINEERS / PLANNERS

APPENDICES



**UPPER CANADA
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APPENDIX A

**Hydrant Flow Test Data
Fire Flow Calculation Sheets
Fire Underwriters Survey Calculations**

FIRE HYDRANT TESTING & INSPECTION REPORT

Testing & inspection has been completed in accordance with Section 6.6.5. of the Ontario Fire Code.
This report to be kept on site for review upon request, in accordance with subsection 1.1.2.1.

Hydrant No.

of

Service Date 29 July 2021

Tested By Stinson. J.

Customer Information

Site Name **Niagara-on-the-Lake**

Also Known As

Site Address Gate Street

Managed or Owned By

Municipality NOTL

Our Service Agreement Expires On

Fire Hydrant Information

Hydrant Location @ Johnson -Hydrant ID:0080

Sec. Valve Location 1.3m Northwest

Hydrant Make & Model Canada Valve Century

Valve Box Type SSL

Opening Direction Left

Valve Box Height Satisfactory

Turns to Open 20

Opening Direction Left

ATD Installed No

Alarms/Fire Pumps Installed No

Turns to Open 21

Inspection Results

Service Status In Service, No Repairs

Barrel Assembly Satisfactory

Paint Quality Satisfactory

Main Valve Assembly Satisfactory

Drain Valve Assembly Satisfactory

Operating Assembly Satisfactory

Rod Assembly Satisfactory

Barrel Drainage Satisfactory

Barrel Found Dry

Hydrant Operation Satisfactory

Caps & Nozzles Satisfactory

Colour Coding Satisfactory

Barrel Nozzle Style 2 Hose, 1 Storz

Nozzle Orientation Correct

Nozzle Height Satisfactory

Access to Hydrant Satisfactory

Secondary Valve Operation Satisfactory

Valve Box Condition Satisfactory

Maintenance Routines Completed

Barrel Dewatering Not Necessary

Hydrant Painting Not Necessary

Valve Box Locating Completed/Found

Colour Coding Not Necessary

Valve Box Cleaning Completed

Hose Cap Gasket Replacement Not Necessary

Sec. Valve Cycling Completed

Pressure Testing Completed

Hydrant Lubrication Completed

Flow Testing Completed

Testing Results

Static Pressure (psig) **74**

Residual Pressure (psig) **65**

Pitot Reading (psig) **60**

Water Quality Clear

1 Port Flow, Actual (usgpm) **1300**

Comments

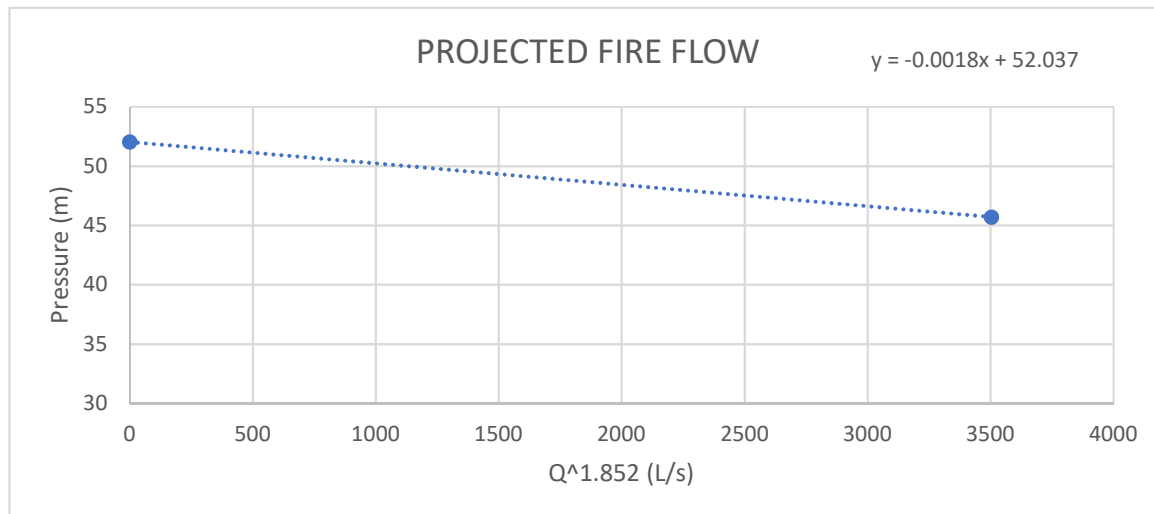
FIRE FLOW CALCULATION SHEET

Project: 222 Gate Street
Project Number: 24035
Date: November 11, 2024
Prepared By: Kurt Tiessen, P.Eng.
Reviewed By: Jason Schooley, P.Eng.

Flow Test Provided by: Town of Niagara-on-the-Lake
Hydrant Location: South corner of intersection of Gate and Johnson

FLOW TEST RESULTS

TEST	PRESSURE (psi)	FLOW RATE (USGPM)	FLOW RATE (L/s)	$Q^{1.852}$	PRESSURE (m)
STATIC	74	0	0	0	52.04
RESIDUAL 1	65	1300	82.02	3503.89	45.71



FIRE FLOW FORMULA ($y = ax + b$)

a = -0.0018
b = 52.037

FIRE FLOW AT A SPECIFIED PRESSURE

Pressure = 20 psi
Pressure = 14.06 m
 $Q^{1.852} = 21096.11$
Flow, Q = 216.21 L/s
Flow, Q = 3427.06 USGPM

FIRE HYDRANT TESTING & INSPECTION REPORT

Testing & inspection has been completed in accordance with Section 6.6.5. of the Ontario Fire Code.
This report to be kept on site for review upon request, in accordance with subsection 1.1.2.1.

Hydrant No.

of

Service Date 26 July 2021

Tested By Stinson. J.

Customer Information

Site Name **Niagara-on-the-Lake**

Also Known As

Site Address Gate Street

Managed or Owned By c/o Davpart Inc.

Municipality NOTL

Our Service Agreement Expires On

Fire Hydrant Information

Hydrant Location @ Queen Street -Hydrant ID:0090

Sec. Valve Location Unknown

Hydrant Make & Model Darling B50B-18

Valve Box Type Unknown

Opening Direction Left

Valve Box Height Buried??

Turns to Open 18

Opening Direction

ATD Installed No

Alarms/Fire Pumps Installed No

Turns to Open

Inspection Results

Service Status In Service, No Repairs

Barrel Assembly Satisfactory

Paint Quality Satisfactory

Main Valve Assembly Satisfactory

Drain Valve Assembly Satisfactory

Operating Assembly Satisfactory

Rod Assembly Satisfactory

Barrel Drainage Satisfactory

Barrel Found Dry

Hydrant Operation Satisfactory

Caps & Nozzles Satisfactory

Colour Coding Satisfactory

Barrel Nozzle Style 2 Hose

Nozzle Orientation Correct

Nozzle Height Satisfactory

Access to Hydrant Satisfactory

Secondary Valve Operation Inaccessible

Valve Box Condition Not Inspected

Maintenance Routines Completed

Barrel Dewatering Not Necessary

Valve Box Locating Completed/Not Found

Valve Box Cleaning Not Necessary

Sec. Valve Cycling Not Completed

Hydrant Lubrication Completed

Hydrant Painting Not Necessary

Colour Coding Not Necessary

Hose Cap Gasket Replacement Not Necessary

Pressure Testing Completed

Flow Testing Completed

Testing Results

Static Pressure (psig) 60

Residual Pressure (psig) 55

Pitot Reading (psig) 50

Water Quality Clear

1 Port Flow, Actual (usgpm) 1186

Comments

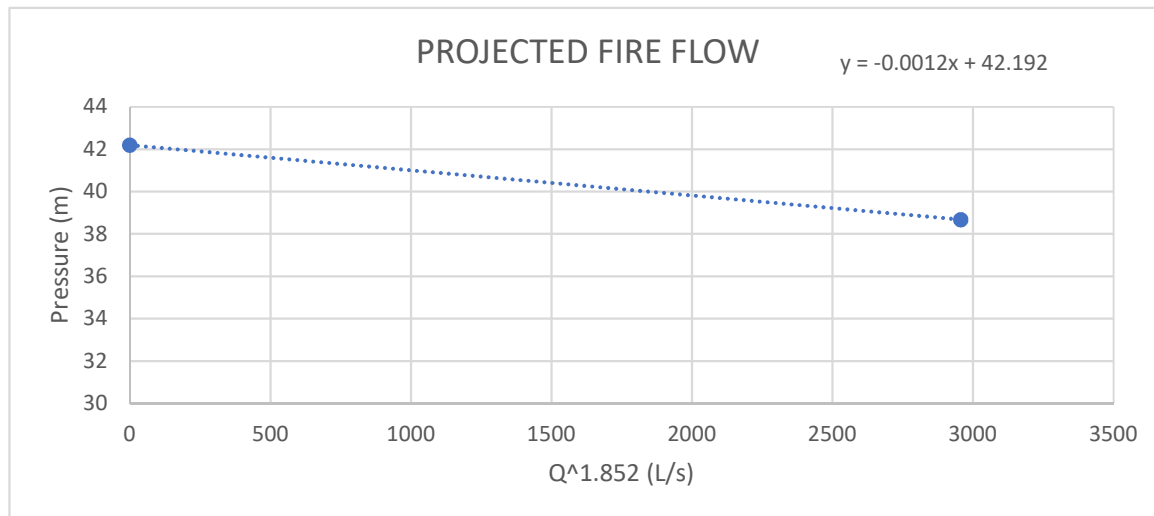
FIRE FLOW CALCULATION SHEET

Project: 222 Gate Street
Project Number: 24035
Date: November 11, 2024
Prepared By: Kurt Tiessen, P.Eng.
Reviewed By: Jason Schooley, P.Eng.

Flow Test Provided by: Town of Niagara-on-the-Lake
Hydrant Location: South corner of intersection of Gate and Queen

FLOW TEST RESULTS

TEST	PRESSURE (psi)	FLOW RATE (USGPM)	FLOW RATE (L/s)	$Q^{1.852}$	PRESSURE (m)
STATIC	60	0	0	0	42.19
RESIDUAL 1	55	1186	74.82	2956.19	38.68



FIRE FLOW FORMULA ($y = ax + b$)

$a = -0.0012$
 $b = 42.19$

FIRE FLOW AT A SPECIFIED PRESSURE

Pressure = 20 psi
Pressure = 14.06 m
 $Q^{1.852} = 23438.33$
Flow, $Q = 228.86$ L/s
Flow, $Q = 3627.53$ USGPM

Fire Underwriters Survey

Water Supply for Public Fire Protection (2020) Calculations

222 GATE STREET, NIAGARA-ON-THE-LAKE

Required Fire Flow in Litres per Minute

F=

9,520	(L/m)
158.67	(L/s)
2,515	(USgmp)

Type of Construction

Ordinary Construction (brick or other masonry walls, combustible floor and interior).

C=

1.00

Total Floor Area in square metres

A=

503.1 (m2)

Total Number of Floors

2

2. Combustibility of Contents (may not reduce fire flow demand below 2,000 L/min)

Limited Combustible

=

-15%

3. Sprinkler Systems

Is there a complete automatic sprinkler protection system per NFPA (Yes/No).

No

0%

Water supply standard for both system and fire department hose lines (Yes/No).

No

0%

Is system fully monitored (Yes/No).

No

0%

Total Sprinkler Reduction to Overall Fire Flow Demand

0%

4. Spacial Separation of Neighbouring Structures (within 45 metres)

Location of Building:

BUILDING NAME		
Distance to Nearest Building to the North	19.7 m	15%
Distance to Nearest Building to the South	9.4 m	20%
Distance to Nearest Building to the East	10.1 m	15%
Distance to Nearest Building to the West	26.0 m	10%

Total Spacial Separation to Adjacent Structures

60%

Additions

Is roof wood shingles or shakes (Yes/No).

No



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APPENDIX B

Sanitary Sewer Calculation Sheet

UPPER CANADA CONSULTANTS
3-30 HANNOVER DRIVE
ST.CATHARINES, ONTARIO
L2W 1A3

DESIGN FLOWS	SEWER DESIGN
PEAKING FACTOR: 2.0 MINIMUM 1.5 PER MECP DESIGN CRITERIA	PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
INFILTRATION RATE: 0.286 L / s / ha (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 L	PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
HOTELS 225.0 L/DAY/BED SPACE (ASSUME 2 SPACES PER ROOM, MECP)	PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY:	TOWN OF NIAGARA-ON-THE-LAKE
PROJECT :	222 GATE STREET
PROJECT NO:	24035

SANITARY SEWER DESIGN SHEET

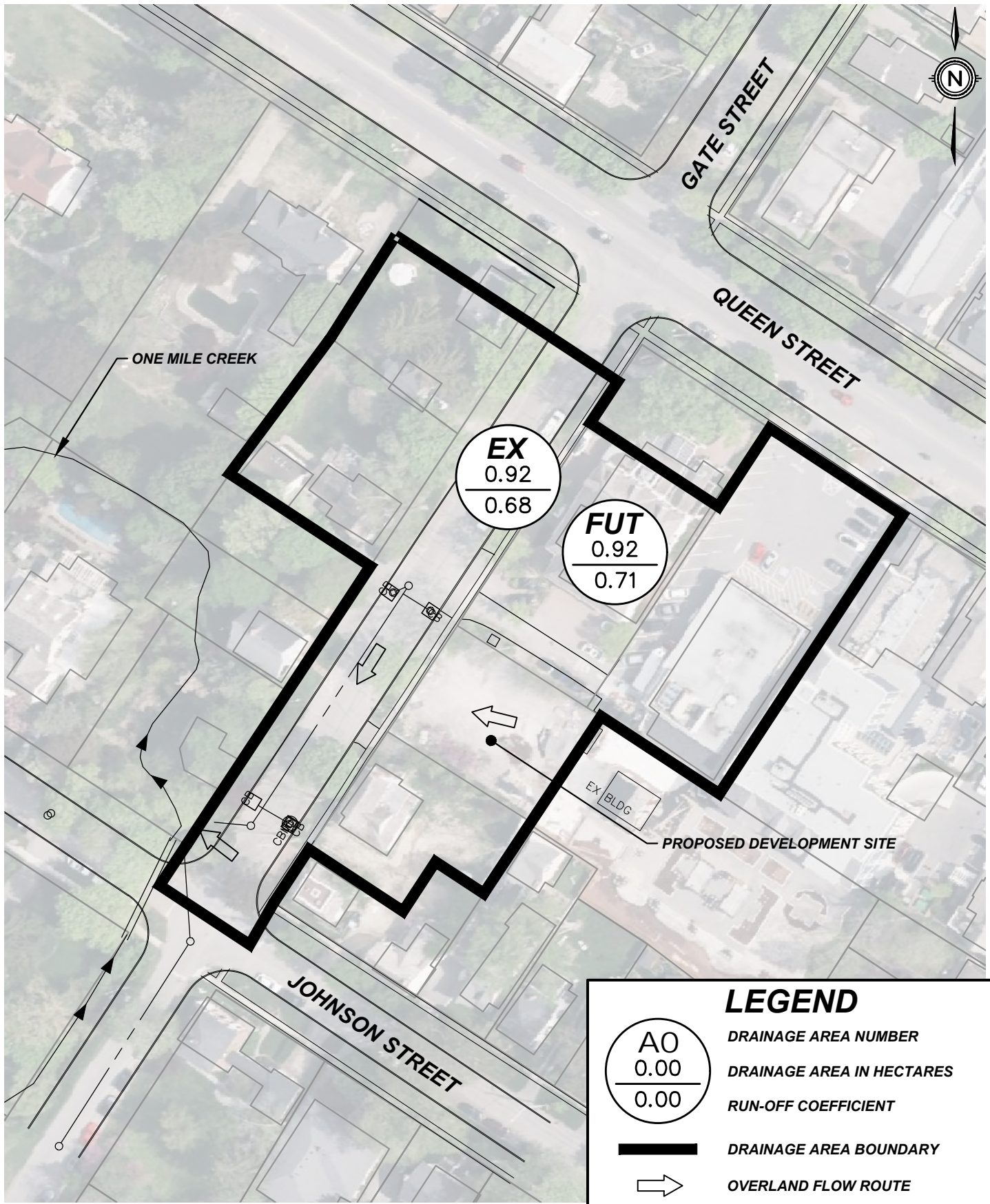
LOCATION			AREA		POPULATION		ACCUMULATED PEAK FLOW				DESIGN FLOW					
Location and Description	From M.H	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Total Population Served	Peaking Factor	Flow (L/s)	Infiltration Flow L/s	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Length (m)	Pipe Slope (%)	Full Flow Velocity (m/s)	Full Flow Capacity (L/s)	Percent Full
222 GATE STREET	HOTEL	EX SEWER	0.08	0.08	18	36	2.00	0.19	0.02	0.21	200	10.0	1.00	1.06	34.22	0.6%
GATE STREET	EX MH	EX MH		0.08				0.19	0.02	0.21	200	59.6	0.84	0.97	31.36	0.7%



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APPENDIX C

**Figure 1 – Overall Storm Drainage Area Plan
Weighted Impervious Calculation Sheet
Storm Sewer Calculation Sheet
Modified Rational Method – 5 Year Peak Flows**



LEGEND

AO $\frac{0.00}{0.00}$	DRAINAGE AREA NUMBER
	DRAINAGE AREA IN HECTARES
	RUN-OFF COEFFICIENT
	DRAINAGE AREA BOUNDARY
	OVERLAND FLOW ROUTE



**UPPER CANADA
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124 ON QUEEN
TOWN OF NIAGARA-ON-THE-LAKE
OVERALL DRAINAGE AREA PLAN

DATE	2025-05-30
SCALE	1:1000 m
REF No.	24035
DWG No.	FIGURE 1

Weighted Imperviousness Percentage Calculation Worksheet

Project Name: 124 on Queen
 Project Number: 24035
 Date: May 2025
 Person: K.Tiessen

EX - EXISTING CONDITIONS (OVERALL)

	<i>Footprint</i>	<i>Runoff Coefficient</i>	<i>Effective Impervious Area</i>
Residential	3311.7 m ²	0.45	1490.3 m ²
Roadway	2615.6 m ²	0.70	1830.9 m ²
Commercial	3309.9 m ²	0.90	2978.9 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS			6,300 m ²
TOTAL CATCHMENT AREA			9,237 m ²
EFFECTIVE RUNOFF COEFFICIENT			0.68

FUT - PROPOSED CONDITIONS (OVERALL)

	<i>Footprint</i>	<i>Runoff Coefficient</i>	<i>Effective Impervious Area</i>
124 on Queen	796.0 m ²	0.80	636.8 m ²
Residential	2515.7 m ²	0.45	1132.1 m ²
Roadway	2615.6 m ²	0.70	1830.9 m ²
Commercial	3309.9 m ²	0.90	2978.9 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS			6,579 m ²
TOTAL CATCHMENT AREA			9,237 m ²
EFFECTIVE RUNOFF COEFFICIENT			0.71

EXISTING CONDITIONS - 222 GATE ST

	<i>Footprint</i>	<i>Runoff Coefficient</i>	<i>Effective Impervious Area</i>
Roof/taop / Driveway	279.7 m ²	0.90	251.7 m ²
Landscape	516.3 m ²	0.20	103.3 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS			355 m ²
TOTAL CATCHMENT AREA			796 m ²
EFFECTIVE RUNOFF COEFFICIENT			0.45

PROPOSED CONDITIONS - 222 GATE ST

	<i>Footprint</i>	<i>Runoff Coefficient</i>	<i>Effective Impervious Area</i>
Building/Tarrace/Patio/Sidewalk	686.0 m ²	0.90	617.4 m ²
Landscape	110.0 m ²	0.20	22.0 m ²
TOTAL CATCHMENT IMPERVIOUS AREAS			639 m ²
TOTAL CATCHMENT AREA			796 m ²
EFFECTIVE RUNOFF COEFFICIENT			0.80

[illegible]

MODIFIED RATIONAL METHOD

PROJECT: 222 GATE STREET, NIAGARA-ON-THE-LAKE

LOCATION	TIME OF FLOW	STORMWATER ANALYSIS
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[illegible]

DESIGN BY:	UPPER CANADA CONSULTANTS	<u>RAINFALL PARAMETERS:</u>	a =	664.00	mm/hr
	30 HANNOVER DRIVE, UNIT 3	Time to Upper End =	10 min.	b =	4.70 minutes
	ST. CATHARINES, ON L2W 1A3	Town of Niagara-on-the-Lake - 5 Year IDF (c =	0.74	
DESIGN BY:	K.TIESSEN, P.ENG.				
DATE:	JUNE 2025				

Time to Upper End = 10 min.
Town of Niagara-on-the-Lake - 5 Year IDF (

a =	664.00	mm/hr
b =	4.70	minutes
c =	0.74	