342-348 Queen Mary Street, Ottawa
Serviceability Analysis Brief

Project # CW-3-25

Prepared for:

NCTL INVESTMENTS INC.
Adenike Shittu & Carine Toham

By:

Arch-Nova Design Inc.

September 2025

Table of Contents

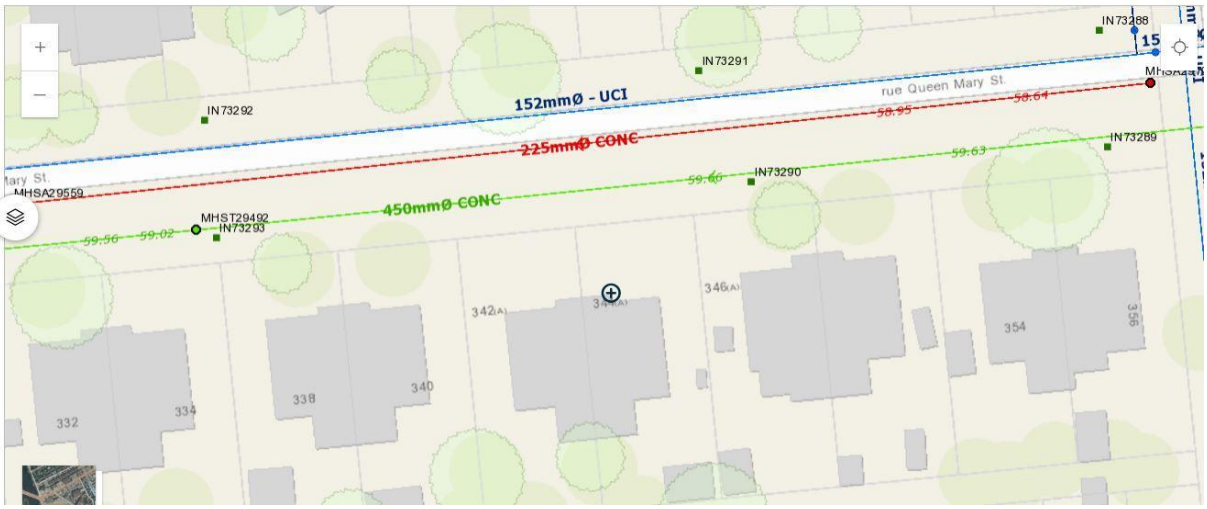
1. Introduction

The proposed residential property at 342-348 Queen Street, Ottawa, hereafter referred to as the site, will comprise of 8 townhouses with 4 units per townhouse.

Currently, on the site are two semi-detached dwellings with a total of 4 units. Houses are located on two separate lots with a driveway between and sheds at the rear.

The infrastructure at Queen Mary Street consists of:

1. Water main 152 mm UCI
2. Sanitary sewer 225 mm Concrete, and
3. Stormwater sewer 450 mm, Concrete.



Queen Mary Street: Municipal Infrastructure

2. Public Services Capacity

This section of the report will analyze existing municipal services and the potential impact of the proposed building at 342-348 Queen Street on the existing service capacity.

2.1 Water Supply

[1]The following are boundary conditions, HGL, for a hydraulic analysis at 342-348 Queen Street, connecting to the 152 mm watermain:

[1] City of Ottawa boundary condition information is based on current operation of the city water distribution system (also see Appendix A for complete correspondence information)

Minimum HGL: 110.1 m

Maximum HGL: 118.4 m, *The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*[2]

Max Available Fire Flow at 20 (psi): 88 L/s, assumed ground elevation is 61.4 m.

A multi-hydrant analysis was performed with three existing hydrants within 150 m of the property. **The total aggregate flow assuming the three identified hydrants running simultaneously provides the required fire flow of 150 L/s for the site**. (see attached PDF for Hydrants location)[3].

Table 1 presents the City of Ottawa design criteria based on MOE Guidelines.

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During Peak Hourly Demand operating pressure must remain within	275kPa and 552kPa (40-80 psi; 28-56m)
During fire flow operating pressure must not drop below	140kPa (20 psi; 14 m)
* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.	

Table 1: Water Supply Design Criteria

Current water consumption is **0.50 l/sec** (29.93 l/min), and expected consumption for the new development is **2.25 l/sec** (135.22 l/min) during the peak period. The fire flow for residential spaces was estimated to be 9,000 l/min (150 l/sec) (OBC). Calculation

[2] City of Ottawa: boundary conditions; complete information in Appendix B: Correspondence
[3] City of Ottawa: boundary conditions; complete information in Appendix B: Correspondence

based on the boundary conditions issued by the City, confirmed that the pressure and required flow are in the prescribed ranges (Table1., Table 2.)

The table below summarizes the pressure for the designed parameters:

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] (m)
Average Daily Demand	9.49	118.4
Max Day + Fire Flow	9,090.14	75.46[3]
Peak Hour	135.22	110.1

[1)] Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations.
[2)] Boundary conditions supplied by the City of Ottawa. See Appendix B for correspondence with the City.
[3)] Estimated ground level 61.4 m, fire pressure min 20 psi.

Table 2: Water Demand and Boundary Conditions

2.2 Water Supply for Proposed Development

The new building will comprise 8 townhouses with 4 units per townhouse. Peak flow requirement is calculated to be **2.25 l/sec** (135.22 l/min)**.** Each townhouse will be serviced by 25 mm lateral (copper type "K").

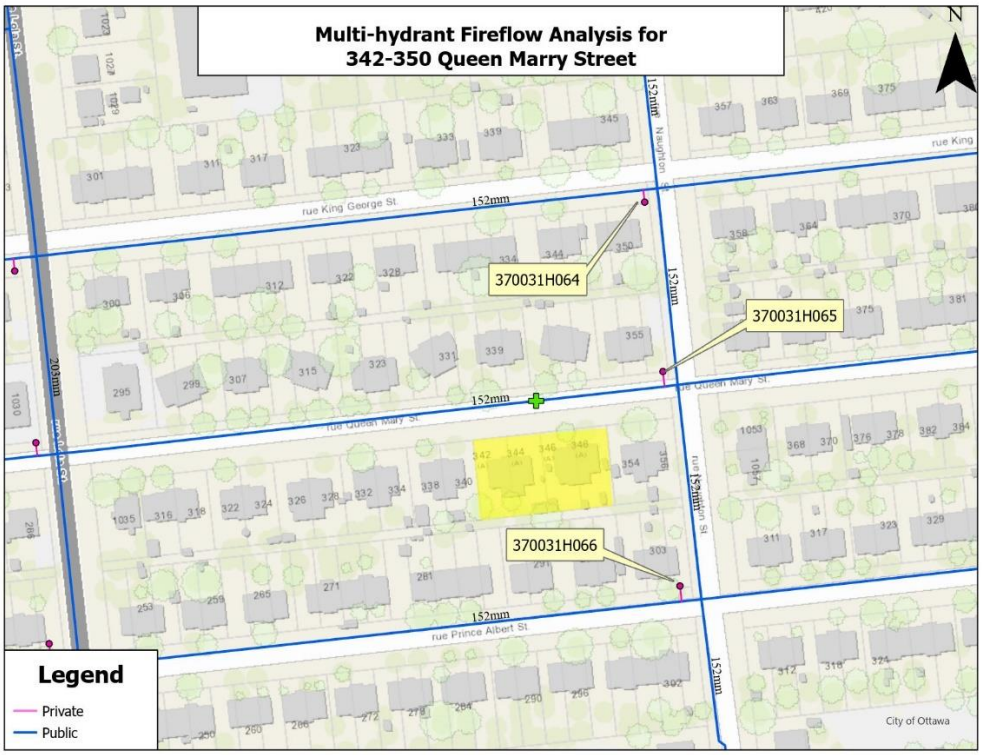
The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.[4]

2.3 Fire Flow

The OBC[5] fire flow calculation will be used as the flow demand is 9,000 l/min.

A multi-hydrant analysis was performed with three existing hydrants within 150 m of the property. **The total aggregate flow assuming the three identified hydrants running simultaneously provides the required fire flow of 150 L/s for the site**. (see attached PDF for Hydrants location)[6].

[4] City of Ottawa: boundary conditions; complete information in Appendix B: Correspondence
[5] FUS calculation (Appendix A) requires 8,000 l/min<OBC (9,000 l/min)
[6] City of Ottawa: boundary conditions; complete information in Appendix B: Correspondence



342-348 Queen Street: fire flow analysis, multi-hydrant locations

2.4 Sanitary Sewer

Current outflow for the existing building is 0.04 **l/sec** (peak flow+wet weather).

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/d/Cap*
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Commercial Space	5L/m2/day
Infiltration and Inflow Allowance	0.33 L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = (1/n)AR^{2/3}S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
* Daily consumption rate to align with the revised wastewater rates identified by City of Ottawa Technical Bulletin ISTB-2018-03. As a result, "Arch-Nova" is proposing for a deviation from the Water Supply Guidelines	

Table 3: Wastewater Design Criteria

Existing municipal sewer 225 mm has a capacity of 26.04 l/sec for a 0.3% slope and 80%, respectively.

Detailed calculation of the current sanitary flow is presented in Appendix A.

2.5 Sanitary Sewer for Proposed Development

The new building will be comprised of 8 townhouses with 4 units per townhouse. Peak flow plus wet weather outflow is calculated to be **0.67 l/sec.** This is an increase of 0.50 l/sec or 2.0% of the receiving pipe's capacity. City of Ottawa did not provide any information regarding the residual capacity of the receiving pipe, so it was assumed that the flow capacity is at 40%[7] for the peak time and that the increase can be absorbed.

Each proposed 135 mm sanitary laterals will provide the required outflow of 0.08 l/sec capacity, where the minimum self-cleansing velocity is below 0.6 m/sec. at 1.0% slope. This will require a periodic laterals inspection and flushing. Detailed calculation of flow is presented in Appendix A.

3. Conclusion and Recommendation

The new building will comprise 8 townhouses with 4 units per townhouse. Peak flow requirement is calculated to be **2.25 l/sec** (135.22 l/min)**.**

The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.

A multi-hydrant analysis was performed with three existing hydrants within 150 m of the property. The total aggregate flow assuming the three identified hydrants running simultaneously provides the required fire flow of 150 L/s for the site. (see attached PDF for Hydrants location).

Sanitary peak flow plus wet weather outflow is calculated to be **0.67 l/sec.** This is an increase of 0.50 l/sec or 2.0% of the receiving pipe's capacity. City of Ottawa did not

[7] Maintaining the self-cleaning velocity of 0.6 m/sec.

provide any information regarding the residual capacity of the receiving pipe, so it was assumed that the flow capacity is at 40%[8] for the peak time and that the increase can be absorbed.

Each proposed 135 mm sanitary laterals will provide the required outflow of 0.08 l/sec capacity, where the minimum self-cleansing velocity is below 0.6 m/sec. at 1.0% slope. This will require a periodic laterals inspection and flushing.

Prepared by:

Zoran Mrdja, P.Eng., FEC

August 2025

Professional Engineers Ontario

Authorized by Professional Engineers of Ontario to provide professional services to public

[8] Maintaining the self-cleaning velocity of 0.6 m/sec.

Appendix A: Calculations

Water Supply Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
must remain within	275kPa and 552kPa (40-80 psi; 28-56m)
During fire flow operating pressure must not drop below	140kPa (20 psi; 14 m)

* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.
** Daily consumption rate to align with the revised wastewater rates identified by City of Ottawa Technical Bulletin ISTB-2018-03. As a result, “Arch-Nova” is proposing for a deviation from the Water Supply Guidelines

342-348 Queen Mary
Current

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	0	0
Semi-detached	2.7	4	11
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
4 Bedroom	4.2	0	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	11	3.02	2.10	28.73	19.95	43.09	29.93

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5	$L/m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Office	75.0	$L/9.3m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Restaurant*	125.0	L/seat/d							
Industrial -Light	35,000.0	L/gross ha/d							
Industrial -Heavy	55,000.0	L/gross ha/d							
Total I/C/I Demand				0.00	0.00	0.00	0.00	0.00	0.00

Total Demand	3.02	2.10	28.73	19.95	43.09	29.93

* Estimated number of seats at 1seat per $9.3m^2$

Wastewater Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/cap/day
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Correction Factor (City of Ottawa Tech.Bulletin ISTB-2018-0	0.8
Commercial Space	28,000 L/ha/day
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = (1/n)AR^{2/3}S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2012.	

342-348 Queen Mary
Current

Sanitary Sewer Post Development Outflow

Site Area	**0.1132 ha**
Extraneous Flow Allowances	
Infiltration / Inflow	**0.03736 L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	**Pop**
Single Family	3.4	0	0
1 Bedroom	1.4	0	0
Duplex	2.3		0
Townhouse	2.7		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	0	0
2 Bedroom	2.1	0	0
3 Bedroom	3.1	0	0
4 Bedroom	4.2	0	0
Total Population			**0**
Average Domestic Flow			**0.00 L/s**
Peaking Factor			**3.8**
Peak Domestic Flow			**0.00 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**	**No. of Units**	**Avg Wastewater (L/s)**
Commercial	28,000 L/gross ha/d	0	0.00
Institutional	28,000 L/gross ha/d	0	0.00
Industrial - Light	35,000 L/gross ha/d	0	0.00
Industrial - Heavy	55,000 L/gross ha/d	0	0.00
Average I/C/I Flow			**0.00**
Peak Institutional / Commercial Flow*			**0.00**
Peak Industrial Flow**			**0.00**
Peak I/C/I Flow			**0**

Total Estimated Average Dry Weather Flow Rate	**0.00**
Total Estimated Peak Dry Weather Flow Rate	**0.00**
Total Estimated Peak Wet Weather Flow Rate	**0.04**

Ottawa TechBulletin ISTB-2018-01 Section 4.4.1 Page 4.5
**Use Apendix 4B diagram

Water Supply Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	9.5 x Average Daily *
Residential Maximum Hourly	1.5 x Maximum Daily *
Commercial Demand	2.5 L / m2 /d
Commercial Maximum Daily Demand	1.5 x Average Daily
Commercial Maximum Hourly	1.8 x Maximum Daily
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
must remain within	275kPa and 552kPa (40-80 psi; 28-56m)
During fire flow operating pressure must not drop below	140kPa (20 psi; 14 m)

* Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.
** Daily consumption rate to align with the revised wastewater rates identified by City of Ottawa Technical Bulletin ISTB-2018-03. As a result, “Arch-Nova” is proposing for a deviation from the Water Supply Guidelines

342-348 Queen Mary
Proposed

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4	0	0
Semi-detached	2.7		0
Townhouse	2.7		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4	8	11
2 Bedroom	2.1	12	25
3 Bedroom	3.1	4	12
4 Bedroom	4.2	0	0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	49	13.66	9.49	129.81	90.14	194.71	135.22

Institutional / Commercial / Industrial Demand

				Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**		**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	2.5	$L/m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Office	75.0	$L/9.3m^2/d$	0	0.00	0.00	0.00	0.00	0.00	0.00
Restaurant*	125.0	L/seat/d							
Industrial -Light	35,000.0	L/gross ha/d							
Industrial -Heavy	55,000.0	L/gross ha/d							
Total I/C/I Demand				0.00	0.00	0.00	0.00	0.00	0.00

Total Demand	13.66	9.49	129.81	90.14	194.71	135.22

* Estimated number of seats at 1seat per $9.3m^2$

Water Demand and Boundary Conditions

Proposed Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] (m)
Average Daily Demand	9.49	118.4
Max Day + Fire Flow	9,090.14	75.46
Peak Hour	135.22	110.1

[1)] Water demand calculation per Water Supply Guidelines. See Appendix B for detailed calculations.

[2)] Boundary conditions supplied by the City of Ottawa. See Appendix B for correspondence with the City.

Wastewater Design Criteria

Design Parameter	Value
Residential Average Apartment	1.8 P/unit
Average Daily Demand	280 L/cap/day
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Correction Factor (City of Ottawa Tech.Bulletin ISTB-2018-0	0.8
Commercial Space	28,000 L/ha/day
Infiltration and Inflow Allowance	0.28L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = (1/n)AR^{2/3}S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, November 2012.	

342-348 Queen Mary
Proposed

Sanitary Sewer Post Development Outflow

Site Area	**0.1132 ha**
Extraneous Flow Allowances	
Infiltration / Inflow	**0.03736 L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	**Pop**
Single Family	3.4	0	0
Semi-detached and duplex	2.7		0
Duplex	2.3		0
Townhouse	2.7		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	8	11.2
2 Bedroom	2.1	12	25.2
3 Bedroom	3.1	4	12.4
4 Bedroom	4.2	0	0
Total Population			**48.8**
Average Domestic Flow			**0.16 L/s**
Peaking Factor			**4.0**
Peak Domestic Flow			**0.63 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**	**No. of Units**	**Avg Wastewater (L/s)**
Commercial	28,000 L/gross ha/d	0	0.00
Institutional	28,000 L/gross ha/d	0	0.00
Industrial - Light	35,000 L/gross ha/d	0	0.00
Industrial - Heavy	55,000 L/gross ha/d	0	0.00
Average I/C/I Flow			**0.00**
Peak Institutional / Commercial Flow*			**0.00**
Peak Industrial Flow**			**0.00**
Peak I/C/I Flow			**0**

Total Estimated Average Dry Weather Flow Rate	**0.16**
Total Estimated Peak Dry Weather Flow Rate	**0.63**
Total Estimated Peak Wet Weather Flow Rate	**0.67**

Ottawa TechBulletin ISTB-2018-01 Section 4.4.1 Page 4.5
**Use Apendix 4B diagram

342-348 Queen Mary
Proposed

Fire Flow Calculation Ontario Building Code 2006 (Appendix A)

Project: 342-348 Queen Mary

ARCH-NOVA DESIGN INC.
Architecture
Engineering
Consulting

Date: **September 4, 2025**
Data input by: Zoran Mrdja, P.Eng.

Type of Construction	Building Clasification	Water Supply Coefficient (K)
Non-combustable construction, or a heavy timber conforming to article 3.1.4.6	A-2; B1-; B-2; B-3 C; D	16
		Total Building Volume (V)(m3)
Building Height (incl.Basement)	13.50	8,238.67
Building Width	14.67	
Building Length	41.60	

Side	Exposure Distance (m)	Spatial Coefficient	Total Spatial Coefficient S_{tot}*
North	20.00	0	2.4
East	1.25	0.5	
South	6.00	0.4	
West	1.25	0.5	

Total Volume of Water Required Q**	**316,365.00**	
Minimum Required Fire Flow (L/min) ***	**9,000.00**	**see table below**
Minimum Required Fire Flow (L/sec)	**150.00**	

Note:
* $S_{tot}= 1+(S_{side1}+S_{side2}+S_{side3}+S_{side4})$
** $V=KVS_{tot}$
*** Flow=Q/30 (min) for min. duration of 30 min

Summary:
1. City of Ottawa: available flow 105 l/sec (6,300 l/min) ***
2. Nearest fire hydrant distance 12.0 m;

Building Code, Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min.)
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If **Q** ≤ 108,000L)(1) 3600 (If **Q** > 108,000L **and** ≤ 135,000L)(1) 4500 (If **Q** > 135,000L **and** ≤ 162,000L)(1) 5400 (If **Q** > 162,000L **and** ≤ 190,000L)(1) 6300 (If **Q** > 190,000L **and** ≤ 270,000L)(1) 9000 (If **Q** > 270,000L)(1)

Note: (1) **$Q=KVS_{Tot}$** as referenced in Section 3 (a)

342-348 Queen Mary
Proposed

FUS Fire Flow Calculations

Project:342-348 Queen Mary

Calculations Based on 1999 Publication "Water Supply for Public

Fire Protection " by Fire Underwriters' Survey (FUS)

Fire Flow Calculation #: 1

Date: September 4, 2025 Building Type/Description/Name: Apartment building

Data input by: Zoran Mrdja, P.Eng.

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	Choose Frame Used for Construction of Unit	Framing Material						
		Coefficient related to type of construction (C)	Wood Frame	1.50	Ordinary Construction	1.00		
			Ordinary construction	1.00				
			Non-combustible construction	0.80				
			Fire resistive construction (< 2 hrs)	0.70				
			Fire resistive construction (> 2 hrs)	0.60				
2	Choose Type of Housing (if TH, Enter Number of Units Per TH Block)	Floor Space Area						
		Type of Housing	Single Family	1	Other (Comm, ind)	8	Units	
			Townhouse - indicate # of units	1				
			Other (Comm, Ind, etc.)	1				
2.2	# of Storeys	Number of Floors/ Storeys in the Unit (do not include basement):			3	3	Storeys	
3	Enter Ground Floor Area of One Unit	Enter Ground Floor Area (A) of One Unit Only :			610	610	Area in Square Meters (m^2)	
		Measurement Units	Square Feet (ft^2)	0.093	Square Metres (m2)			
			Square Metres (m^2)	610				
			Hectares (ha)	10000				
4	Obtain Required Fire Flow without Reductions	Required Fire Flow(without reductions or increases per FUS) (F = 220 * C * √A) Round to nearest 1000L/min						5,434
5	Apply Factors Affecting Burning	Reductions/Increases Due to Factors Affecting Burning						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	0.25	Non-combustible	-0.25	N/A	-1,358
			Limited combustible	-0.15				
			Combustible	0.00				
			Free burning	0.15				
			Rapid burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete Automatic Sprinkler Protection	-0.3	None	0.00	N/A	0
			None	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	20.1-30 m	0.1	0.65	m	3,532
			East Side	0-3 m	0.1			
			South Side	3.1-10 m	0.2			
			West Side	0-3 m	0.25			
6	Obtain Required Fire Flow, Duration & Volume	0.25						8,000
		Total Required Fire Flow (above) in L/s:						133
		Required Duration of Fire Flow (hrs)						2.00
		Required Volume of Fire Flow (m^3)						960

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline

Legend	
	Drop down menu - choose option, or enter value.
	No Information, No input required.

Note:

The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guideline.

Manning Formula Uniform Pipe Flow at Given Slope and Depth

342-348 Queen Mary Street: Sanitary lateral

Inputs:

Pipe Diameter, d_o	135.0000	mm
Manning Roughness, n	0.0120	
Pressure slope (possibly equal to pipe slope), S_o	1.0000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	6.0000	%

Results:

Flow, Q	0.0882	l/s
Velocity, v	0.2517	m/s
Velocity head, hv	0.0032	m
Flow Area, A	0.0004	m^2
Wetted Perimeter, P	0.0668	m
Hydraulic Radius	0.0052	m
Top Width, T	0.0641	m
Froude Number, F	1.09	
Shear Stress (tractive force), τ	0.7943	N/m^2

Note: Self clensing velocity cannot be achived. Periodic inspection and flushing is recommended.

Manning Formula Uniform Pipe Flow at Given Slope and Depth

342-348 Queen Mary Street: Sanitary Sewer

Inputs:

Pipe Diameter, d_o	225.0000	mm
Manning Roughness, n	0.0120	
Pressure slope (possibly equal to pipe slope), S_o	0.3000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	40.0000	%

Results:

Flow, Q	8.9784	l/s
Velocity, v	0.6045	m/s
Velocity head, hv	0.0186	m
Flow Area, A	0.0149	m^2
Wetted Perimeter, P	0.3081	m
Hydraulic Radius	0.0482	m
Top Width, T	0.2205	m
Froude Number, F	0.74	
Shear Stress (tractive force), τ	2.6476	N/m^2

Note: self clensing velocity achieved at 40% full.

Manning Formula Uniform Pipe Flow at Given Slope and Depth

342-348 Queen Mary Street: Sanitary Sewer

Inputs:

Pipe Diameter, d_o	225.0000	mm
Manning Roughness, n	0.0120	
Pressure slope (possibly equal to pipe slope), S_o	0.3000	% slope
Percent of (or ratio to) full depth (100% or 1 if flowing full)	80.0000	%

Results:

Flow, Q	26.0426	l/s
Velocity, v	0.7637	m/s
Velocity head, hv	0.0297	m
Flow Area, A	0.0341	m^2
Wetted Perimeter, P	0.4982	m
Hydraulic Radius	0.0684	m
Top Width, T	0.1800	m
Froude Number, F	0.56	
Shear Stress (tractive force), τ	5.2952	N/m^2

Appendix B: Guidelines, Existing Reports, Studies, and References, Plans

From:	Hughes, Brett
To:	zoran@archnova.ca; "Greg Remisz"
Cc:	"Dave Bass"; "Emily Grandy"; "Adrian Sunter"; Wu, John; "NCTLinvestments"
Subject:	RE: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief
Date:	September 2, 2025 3:10:53 PM
Attachments:	342-350 Queen Mary Street MHFA August 2025.pdf

Zoran,
Please see detailed below the revised Boundary Condition Confirmation email from the City's modelling group. Please be sure to include this email correspondence as well as the attached pdf, along with your submission of the Serviceability Brief.

******The following information may be passed on to the consultant, but do NOT forward this e-mail directly.******

The following are boundary conditions, HGL, for hydraulic analysis at 342-350 Queen Mary Street (zone 1E) assumed to be connected to the 152 mm watermain on Queen Mary via 8 Connections – presented as one connection (see attached PDF for location).

-

All Connections:

Minimum HGL: 110.1 m

Maximum HGL: 118.4 m, *The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

Max Available Fire Flow at 20 (psi): 88 L/s, assumed ground elevation is 61.4 m.

A multi-hydrant analysis was performed with three existing hydrants within 150 m of the property. **The total aggregate flow assuming the three identified hydrants running simultaneously provides the required fire flow of 150 L/s for the site**. (see attached PDF for Hydrants location).

These are for current conditions and are based on computer model simulation.

Disclaimer:

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there

may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

"The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update."

Regards,
Brett Hughes
Project Manager, Infrastructure Approvals
Development Review Central
Planning, Development & Building Services (PDBS)
110 Laurier Ave West | 4th Floor | Ottawa, ON | K1P 1J1
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 76665

From: Wu, John <John.Wu@ottawa.ca>
Sent: August 29, 2025 1:51 PM
To: zoran@archnova.ca; 'NCTLinvestments' <nctlinvestments@gmail.com>; 'Greg Remisz' <greg.remisz@remisz.com>; 'Dave Bass' <dave@sunterhomes.com>; 'Emily Grandy' <emily@sunterhomes.com>; 'Adrian Sunter' <adrian@sunterhomes.com>
Cc: Hughes, Brett <brett.hughes@ottawa.ca>
Subject: RE: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief

Hi, Zoran:

I am asking the modelling group to run the two-hydrant output at the same time how much fire flow can be provided. Please wait for the result.
In the meantime , please try to lower the fire flow demand by talking to your architects to close to the available 88 L/S .

thanks.

John

From: zoran@archnova.ca <zoran@archnova.ca>
Sent: Friday, August 29, 2025 1:23 PM
To: 'NCTLinvestments' <nctlinvestments@gmail.com>; 'Greg Remisz' <greg.remisz@remisz.com>; 'Dave

Bass' <dave@sunterhomes.com>; 'Emily Grandy' <emily@sunterhomes.com>; 'Adrian Sunter' <adrian@sunterhomes.com>
Cc: Hughes, Brett <brett.hughes@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>
Subject: RE: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief

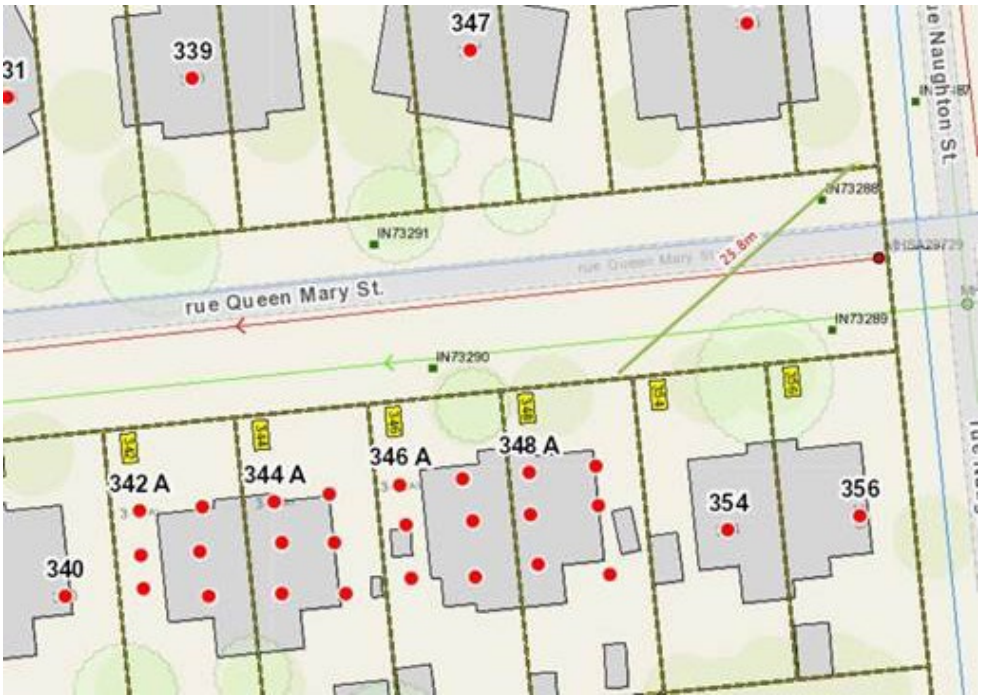
Hi Brett,

I was expecting that the single hydrant wouldn't be sufficient. Here is an excerpt form the draft serviceability report:

2.1 Fire Flow

The OBC[1] fire flow calculation will be used as the flow demand is 9,000 l/min.

Fire protection will be provided from the nearest hydrant (25.8 m from the corner of Queen Mary and Naughton Street) at a pressure of 101.3 m, and it can reach the top of the building (73.74 m.a.s.l). The second nearest hydrant is located west of the property at a 140.1 m distance (corner of Queen Mary and Lola Street). Both hydrants have blue cap markings (Class AA) and, in accordance with Table 18.5.4.3 of ISTB-2018-02, they have a combined capacity of 9,463 l/min (157.72 l/sec), which is sufficient for the fire protection of the proposed building.



342-348 Queen Street: hydrant 1 (Queen Mary & Naughton St)

342-348 Queen Street: hydrant 2 (Queen Mary & Lola St)

Would it be a sufficient information for the modeling team to provide additional information?

Regards,

Zoran Mrdja, P.Eng., FEC
Arch-Nova Design Inc.
613-818-3884

From: NCTLinvestments <nctlinvestments@gmail.com>
Sent: August 29, 2025 12:56 PM
To: Zoran@archnova <zoran@archnova.ca>; Greg Remisz <greg.remisz@remisz.com>; Dave Bass <dave@sunterhomes.com>; Emily Grandy <emily@sunterhomes.com>; Adrian Sunter <adrian@sunterhomes.com>
Subject: Fwd: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief

Hi Zoran,

Please see email from the city

Thanks
Nike and Carine

---------- Forwarded message ---------
From: **Hughes, Brett** <brett.hughes@ottawa.ca>
Date: Fri, Aug 29, 2025 at 12:30 PM
Subject: RE: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief
To: David Bass <dave@sunterhomes.com>

Cc: Carine Ngoy <nctlinvestments@gmail.com>, Emily Grandy <emily@sunterhomes.com>, Adrian Sunter <adrian@sunterhomes.com>, Krista Libman <klibman@solowaywright.com>, Wu, John <John.Wu@ottawa.ca>, Linker, Margot <margot.linker@ottawa.ca>, Rohan, Fayaz <fayaz.rohan@ottawa.ca>, Renaud, Jean-Charles <Jean-Charles.Renaud@ottawa.ca>

David,
Please see below Boundary Condition confirmation response from the City's modelling group. Please be sure to include this email correspondence as well as the attached pdf, along with your submission of the Serviceability Brief.

"The requested BC is in an area of UCI watermain with limited fire flow availability. The applicant can request a multi-hydrant fire flow analysis by selecting appropriate hydrants in the vicinity of the development and/or reduce their fire demand.

******The following information may be passed on to the consultant, but do NOT forward this e-mail directly.******

The following are boundary conditions, HGL, for hydraulic analysis at 342-350 Queen Mary Street (zone 1E) assumed to be connected to the 152 mm watermain on Queen Mary via 8 Connections – presented as one connection (see attached PDF for location).

All Connections:

Minimum HGL: 110.1 m

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Max Available Fire Flow at 20 (psi): 88 L/s, assumed ground elevation is 61.4 m.

These are for current conditions and are based on computer model simulation.

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The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account."

Regards,
Brett Hughes
Project Manager, Infrastructure Approvals
Development Review Central
Planning, Development & Building Services (PDBS)
110 Laurier Ave West | 4th Floor | Ottawa, ON | K1P 1J1
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 76665

From: David Bass <dave@sunterhomes.com>
Sent: August 13, 2025 1:11 PM
To: Hughes, Brett <brett.hughes@ottawa.ca>; Wu, John <John.Wu@ottawa.ca>
Cc: Carine Ngoy <nctlinvestments@gmail.com>; Emily Grandy <emily@sunterhomes.com>; Adrian Sunter <adrian@sunterhomes.com>; Krista Libman <klibman@solowaywright.com>
Subject: 342 - 350 Queen Mary St. - SPC: Water Boundary Conditions and SWM brief

Hi Brett and John,

I hope this email finds you well.

Attached is the mandatory Water Boundary Conditions document prepared by REMISZ Consulting Engineers Ltd. Can you please take a look before we submit to let us know if it contains everything you expect?

I'm hoping you can help me understand the following regarding this document, the submitted SWM brief and Grading and Servicing Plan, and anything else relevant to the engineering-related section of the SPC.

Before the release of the building permit:

- Do these documents meet all the requirements of the engineering-related section of the SPC?
- Is submission of these documents the only requirement at this stage to allow release of the building permit for the engineering-related SPC conditions?
- Once submitted, what is the typical turnaround time for confirmation that these documents meet the SPC conditions?

After the release of the building permit:

- Once submitted, what are the next steps? Our understanding is that the City will review and comment. Is this correct?
- How long does feedback typically take for each of these submissions?
- What is the usual process, and what would be expected from REMISZ Consulting Engineers Ltd. at that point?

Thanks, and have a great day,

DAVID BASS
Project Manager

E dave@sunterhomes.com
P 613.913.9697 x105
C 613.380.8138
sunterhomes.com

A2-120 Terence Matthews Cres.
Ottawa, ON K2M 0J1

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[1] FUS calculation (Appendix A) requires 8,000 l/min

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This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized.

Thank you.

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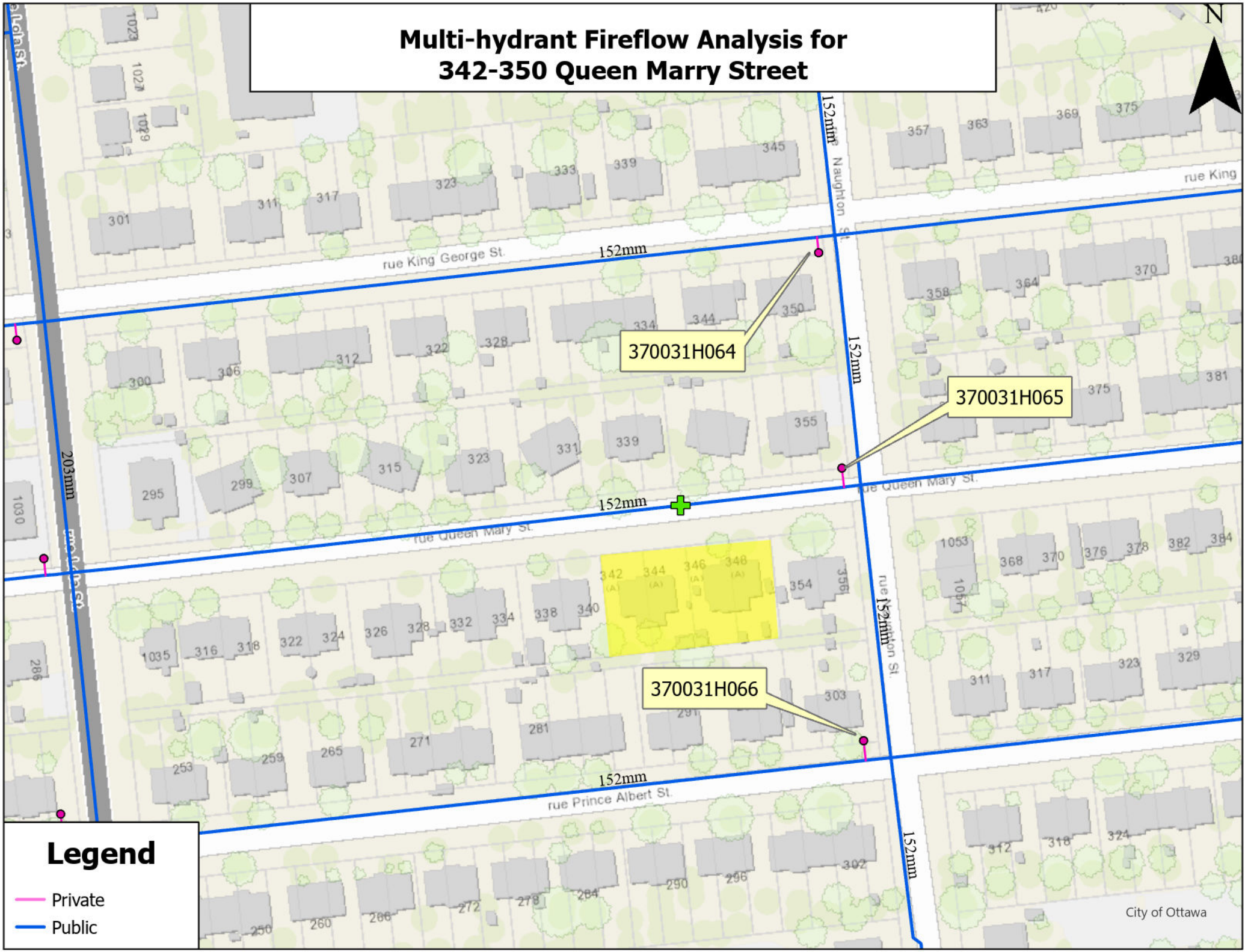
Multi-hydrant Fireflow Analysis for
342-350 Queen Marry Street
N
370031H064
370031H065
370031H066
152mm
rue King George St.
rue King
rue Queen Mary St.
rue Prince Albert St.
203mm
Legend
Private
Public
City of Ottawa

The following studies and regulations were utilized in the preparation of this report:

- **Design Guideline for Water Works**

  City of Ottawa, 2012
- **Design Guidelines for Sewage Works,**

  Ministry of the Environment, 2008., (MOE Design Guidelines)
- **Design Guideline for Sewage**

  City of Ottawa, 2008
- **Stormwater Planning and Design Manual,**

  Ministry of the Environment, March 2003.,(SWMP Design Manual)
- **Ontario Building Code Compendium**

  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update.(OBC)