



File: 25104

## **FUNCTIONAL SERVICING REPORT**

**547 King Street, Port Colborne  
November 2025**

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### **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 Site Plan Application for the proposed development. The project site is located at the above noted address situated north of Killaly Street West (Regional Road 5) and south of the Minto Street intersection on the east side of King Street. The property is abutted by lands under ownership of the St. Lawrence Seaway Commission to the south and east. Historically, the property has included a single detached dwelling and has utilized the seaway-owned lands to the south as the access.

The proposed development site is approximately 0.08 hectares and shall consist of a 3-storey, 30-unit residential apartment building and will include associated asphalt parking lot, concrete curb, catch basins, storm sewers, sanitary service, and a water service.

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 250mm diameter municipal watermain located within King Street fronting the subject property. It is proposed to construct a 150mm diameter service to provide both domestic water supply and fire protection for the proposed development apartment building.

The nearest fire hydrant is located at the northwest corner of the intersection of Minto Street and King Street that will provide adequate fire protection for the development. A hydrant flow test was conducted by Niagara Regional Fire Protection at the existing hydrant at the intersection of Minto Street with the results with further calculations included in Appendix A. A flow calculation has determined that the hydrant will provide approximately **373.2L/s** at fire flow conditions of 20psi.

Utilizing a density of 1.6 persons per apartment unit, the proposed development will result in a total population of 48 persons. Per the 2021 Regional Water Master Servicing Plan Update, 240 L/cap/day is attributed as the average daily demand. City of Port Colborne Design Standards



require Max Day and Peak Hour Peaking Factors of 1.57 and 2.75, respectively. Therefore, the average, maximum day and peak hour domestic requirements will be 11,520L/day, 18,086L/day, and 31,680L/day, respectively.

A preliminary Minimum Fire Flow Calculation has been conducted (Appendix A) utilizing the standards and requirements set forth in the Fire Underwriters Survey (2020) document and known conditions of the proposed building. The calculation used factors such as the type of construction, combustibility of contents and proximity to adjacent structures to determine the minimum fire flow amount required to provide adequate fire protection. The calculation has determined that a minimum flow rate of **267L/s** will be required at a pressure of 20psi (140kPa) under fire flow conditions. This calculation assumes the building will be wood frame construction with no internal sprinkler system. This value will be confirmed at Building Permit stage.

Therefore, the existing municipal watermain system will have adequate capacity for the proposed development.

### **SANITARY SERVICING**

The existing dwelling on subject property currently discharges to a 300mm diameter AC municipal sanitary sewer on King Street. The sanitary sewer conveys flows northerly, ultimately discharging to the Union Regional Sanitary Pumping Station located at the east limit of Union Street. It is proposed to discharge flows from the proposed apartment building to the existing sanitary sewer with a 200mm diameter sanitary service. The existing sanitary lateral will be decommissioned as part of site development.

A Peak Sanitary Flow Analysis has been completed and included in Appendix B. The calculations provided a comparison of peak sanitary flows discharging from the development site under both existing and future conditions. The analysis used a population density of 1.6 persons per apartment unit, and 2.4 persons per single detached dwelling per the Niagara Regional Official Plan. The calculations conclude that a peak flow of **0.63L/s** will discharge from the site under future conditions which will occupy 1.1% of the capacity of the existing sewer fronting the site. As the existing property currently discharges a peak sanitary flow of 0.05L/s, the development will result in an increase of **0.58L/s** to the municipal sanitary sewer system. It is expected that this will be an acceptable addition to the current capacity.

### **STORMWATER MANAGEMENT PLAN**

As part of the site development, the following is a summary of the Stormwater Management Plan.

The criteria provided by the City of Port Colborne and Region of Niagara for this development includes the requirement to control future development stormwater flows to allowable levels from this site for up to and including the 5-year design storm event. It is also required to improve stormwater quality levels to MECP Normal Protection (70% TSS removal) levels prior to discharge to the existing storm sewer on King Street.



### **Existing Conditions**

There is an existing 675mm diameter storm sewer on King Street fronting the subject property conveying flows south towards Killaly Street (Regional Road 5) where flows are directed east via 1350mm diameter trunk sewer before ultimately discharging to the Welland Canal. The existing site conditions direct stormwater flows from the front yard towards the road allowance with the remaining lands sloping towards the seaway owned lands to the east.

Although drainage area plans were unable to be obtained for the existing King Street storm sewer, a Storm Drainage Area Plan (Figure 2, Appendix C) and associated calculation sheet has been created to ensure sufficient capacity is available within the King Street storm sewer downstream of the site. Drainage areas have been delineated based on the property boundaries fronting the street. As the storm sewer was designed and constructed in 1977, the majority of properties on this street were mainly occupied by single detached dwellings with a corresponding Runoff Coefficient of 0.40 – including the proposed development site. Runoff Coefficients have been conservatively increased to ensure sufficient capacity is available, although it is expected that recently developed properties discharging to the noted sewer will have been provided quantity controls. In conclusion, the analysis has determined that the downstream storm sewer on King Street has sufficient capacity for the existing property utilizing a Runoff Coefficient of 0.40.

### **Proposed Conditions**

The proposed development will consist of an apartment building and associated asphalt parking lot occupying the entire development site. Figure 1 in Appendix C outlines the existing and future expected development conditions. It is expected that a single stormwater outlet will be constructed to the storm sewer fronting the site on King Street. It will be required to provide peak stormwater quantity controls prior to discharge to the King Street storm sewer, restricting peak flows from the future site Runoff Coefficient of 0.90 to the existing allowable Runoff Coefficient of 0.40.

The Site Plan has been completed to allow a 1.2m setback between the building and the north property line and 1.1m setback on the east property line. A shallow swale will be constructed within the northerly setback that will discharge to the easterly lands at rates significantly reduced from existing conditions.

The apartment building will be constructed with a ‘flat’ roof that will capture flows and discharge to the onsite storm sewer system. Stormwater flows within the parking lot will be captured via catch basin and internal storm sewers and ultimately discharge to the 675mm diameter storm sewer on King Street.

A preliminary Modified Rational Method calculation has been conducted for the proposed development to determine the expected required storage for this development. Per the calculations in Appendix C, approximately 6.1m<sup>3</sup> of underground pipe storage will be required in order to restrict peak stormwater flows to allowable levels prior to discharge from the site.

As previously noted, it is required to provide stormwater quality enhancements to Normal (70% TSS removal) Protection levels prior to discharge from the site. Of the 784m<sup>2</sup> total site area,



approximately 571m<sup>2</sup> (72.8% of the total site) will consist of the rooftop area and surrounding landscape area that can be considered non-significant sources of Total Suspended Solids (TSS). Therefore, stormwater quality enhancements are inherently provided to the necessary levels as a result of the proposed site design. Further enhancements may be provided by a CB Shield ETV verified quality enhancement device within the on-site catch basin, however this will be determined at Site Plan design.

### **CONCLUSIONS AND RECOMMENDATIONS**

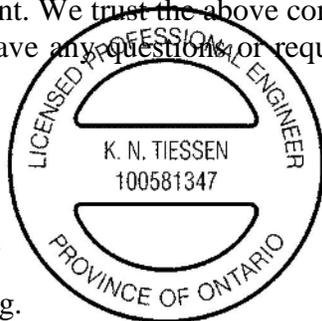
Therefore, based on the above comments and design calculations provided for this site, the following summarizes the servicing for this site.

1. The existing 250mm diameter watermain will have sufficient capacity to provide both domestic and fire protection water supply.
2. The existing 300mm diameter municipal sanitary sewer on King Street will have adequate capacity for the proposed residential development.
3. Stormwater quantity controls will be provided to allowable conditions up to and including the 5-year design storm event.
4. The site extreme stormwater overland route from the road system is to the King Street and ultimately to the Welland Canal as under existing conditions.
5. Stormwater quality protection will be provided to Normal Protection (70% TSS removal) levels prior to discharge from the site.

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.  
November 6, 2025  
Encl.





**UPPER CANADA  
CONSULTANTS**  
*ENGINEERS / PLANNERS*

## **APPENDICES**

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**UPPER CANADA  
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## **APPENDIX A**

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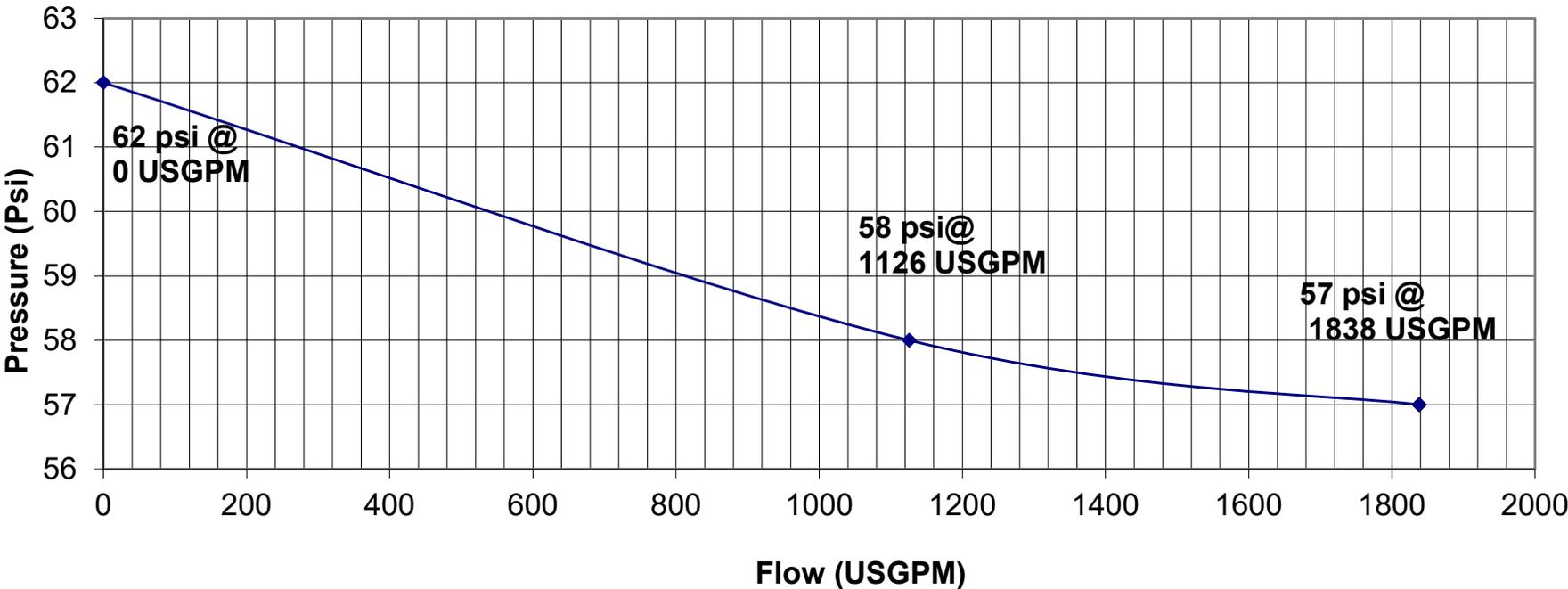
**Hydrant Flow Test Data – Niagara Regional Fire Protection Inc.  
Hydrant Fire Flow Calculation Sheet  
Preliminary Fire Underwriters Survey Calculations**

**NIAGARA REGIONAL FIRE PROTECTION INC.**

**Flow Test Location: King Street and Minto Street**

<b>Static Pressure (Psi)</b>		<b>Pitot Reading 1</b>	45	<b># of Outlets Flowed 1</b>	1
	62	<b>Outlet Size 1</b>	2.5	<b># of Outlets Flowed 2</b>	2
<b>Residual Pressure 1 (Psi)</b>		<b>Pitot Reading 2</b>	30	<b># of Outlets Flowed 3</b>	2
	58	<b>Outlet Size 2</b>	2.5	<b>Graph Data:</b>	
<b>Residual Pressure 2 (Psi)</b>		<b>Pitot Reading 3</b>	30	<b>Pressure Values (y-axis)</b>	<b>Flow Values (x-axis)</b>
	57	<b>Outlet Size 3</b>	2.5	62	0
<b>Residual Pressure 3 (Psi)</b>		<b>Flow 1 Calculated</b>		58	1126
	57		1125.6	57	1838
<b>Extrapolated to 20psi residual 5800 GPM</b>		<b>Flow 2 Calculated</b>		57	1838
<b>Color code Blue</b>			1838.1	<b>Date &amp; Time of Test :</b>	
<b>Coefficient value</b>		<b>Flow 3 Calculated</b>		<b>Oct. 17/2025</b>	
	0.9		1838.1	<b>9:00am</b>	
				<b>Performed by:</b>	
				Alex & Callum	

**Water Graph**



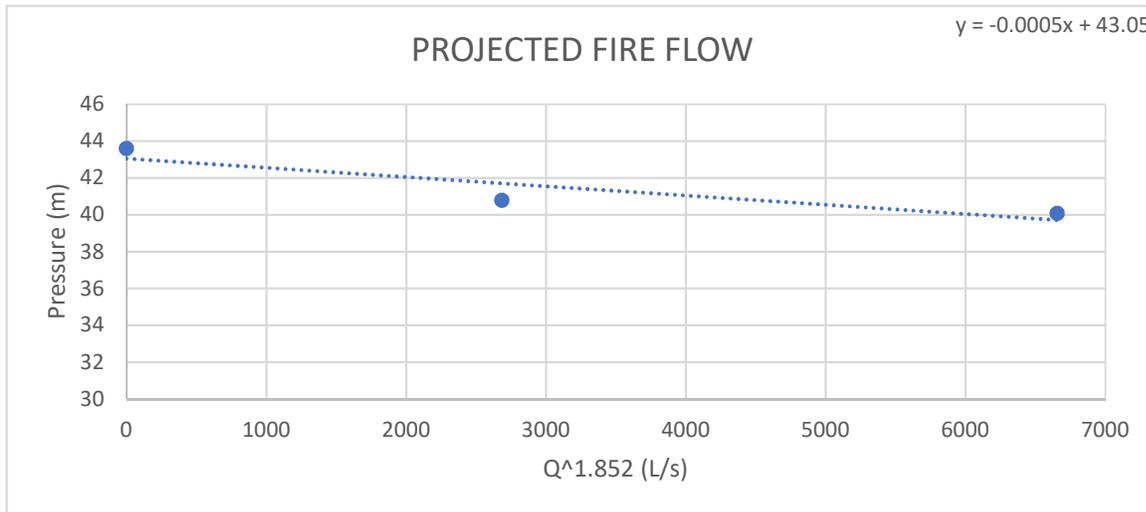
# FIRE FLOW CALCULATION SHEET

**Project:** 547 King Street Apartments  
**Project Number:** 25104  
**Date:** October 20, 2025  
**Prepared By:** Kurt Tiessen, P.Eng.

**Flow Test Provided by:** Niagara Regional Fire Protection  
**Data of Test:** October 17, 2025  
**Hydrant Location:** King Street and Minto Street, Port Colborne

## FLOW TEST RESULTS

TEST	PRESSURE (psi)	FLOW RATE (USGPM)	FLOW RATE (L/s)	Q <sup>1.852</sup>	PRESSURE (m)
STATIC	62	0	0	0	43.60
RESIDUAL 1	58	1125.6	71.01	2683.43	40.79
RESIDUAL 2	57	1838.1	115.97	6654.85	40.08



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

a = -0.0005  
 b = 43.05

## FIRE FLOW AT A SPECIFIED PRESSURE

Pressure = 20 psi  
 Pressure = 14.064 m  
 Q<sup>1.852</sup> = 57972.00  
**Flow, Q = 373.19 L/s**  
 Flow, Q = 5915.23 USGPM

## PRESSURE AT SPECIFIED FIRE FLOW

Flow (Q) = 0 L/s  
 Q<sup>1.852</sup> = 0.00  
 Pressure = 43.05 m  
 Pressure = 61.22 psi

\*\*Hazen-Williams Equation (1.852)

# Fire Underwriters Survey

## Water Supply for Public Fire Protection (2020) Calculations

### 547 King Street Apartment, Port Colborne

Required Fire Flow in Litres per Minute	F=	16,000 (L/m)
		266.67 (L/s)
		4,227 (USgmp)

Type of Construction	C=	1.50
Wood Frame Construction (structure essentially all combustible).		

Total Floor Area in square metres (including all stories, excluding basements at least 50% below grade)	A=	479.4 (m2)
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**NOTE:** Fire Walls that meet or exceed Nation Building Code of Canada (2 hour fire resistance) divide building.

Total Number of Floors	3
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2. Combustibility of Contents (may not reduce fire flow demand below 2,000 L/min)	=	-15%
Limited Combustible		

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

Location of Building:

547 King Street Apartment		
Distance to Nearest Building to the North	5.2 m	20%
Distance to Nearest Building to the South	16.5 m	15%
Distance to Nearest Building to the East	-	0%
Distance to Nearest Building to the West	26.5 m	10%

Total Spacial Separation to Adjacent Structures	45%
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#### Additions

Is roof wood shingles or shakes (Yes/No).	No
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**UPPER CANADA  
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*ENGINEERS / PLANNERS*

## **APPENDIX B**

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### **Sanitary Sewer Calculations**

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

**DESIGN FLOWS**

RESIDENTIAL: 255 LITRES/PERSON/DAY (AVERAGE DAILY FLOW)  
 INFILTRATION RATE: 0.286 L / s / ha (M.O.E FLOW ALLOWANCE IS BETWEEN 0.10 & 0.28 L / s / ha)  
 POPULATION DENSITY: 1.6 PERSONS / UNIT

**SEWER DESIGN**

PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION  
 PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR  
 PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: CITY OF PORT COLBORNE  
 PROJECT : 547 KING STREET APARTMENT  
 PROJECT NO: 25104

**SANITARY SEWER DESIGN SHEET**

Peaking Factor=  $M = 1 + \frac{14}{4 + P^{0.5}}$  Where P = design population in thousands

LOCATION			AREA		POPULATION				ACCUMULATED PEAK FLOW				DESIGN FLOW						
Location and Description	From M.H.	To M.H.	Increment (hectares)	Accumulated (hectares)	Number of Units	Population Density (persons/unit)	Population Increment	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	
<b>EXISTING CONDITIONS</b>																			
547 KING STREET	PROP	EX MH	0.08	0.08	1	2.4	2	2	4.46	0.03	0.02	0.05							
<b>PROPOSED CONDITIONS</b>																			
547 KING STREET	PROP	SEWER	0.08	0.08	30	1.6	48	48	4.32	0.61	0.02	0.63	200	10.0	0.40	0.67	21.64	2.9%	
KING STREET	EX MH 569	EX MH 568		0.08				48	4.32	0.61	0.02	0.63	300	80.3	0.34	0.81	58.82	1.1%	
KING STREET	EX MH 568	EX MH 940		0.08				48	4.32	0.61	0.02	0.63	350	81.5	0.23	0.73	72.98	0.9%	
KING STREET	EX MH 940	EX MH 1116		0.08				48	4.32	0.61	0.02	0.63	350	72.8	0.18	0.65	64.56	1.0%	
UNION STREET	EX MH 1116	EX MH 941		0.08				48	4.32	0.61	0.02	0.63	600	56.7	0.72	1.86	543.53	0.1%	

Note: Existing Sewer information size, length and slope information gathered from City GIS Database



## APPENDIX C

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**Figure 1 – Existing Storm Drainage Area Plan  
Modified Rational Method – Peak Flow Calculations  
Modified Rational Method – Storage Volume Calculations  
Figure 2 – Proposed Overall Storm Drainage Area Plan  
Storm Sewer Calculation Sheet**



**LEGEND**

	<b>DRAINAGE AREA NUMBER</b>
	<b>DRAINAGE AREA IN HECTARES</b>
	<b>RUN-OFF COEFFICIENT</b>
	<b>DRAINAGE AREA BOUNDARY</b>
	<b>OVERLAND FLOW ROUTE</b>



**UPPER CANADA  
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L2W 1A3  
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Fax: (905)688-5274

**547 KING STREET APARTMENT**  
**CITY OF PORT COLBORNE**  
**OVERALL STORM DRAINAGE AREA PLAN**

DATE	2025-10-31
SCALE	1:250 m
REF No.	25104
DWG No.	FIGURE 1

# STORM SEWER DESIGN SHEET

**PROJECT: 547 KING STREET APARTMENT, PORT COLBORNE**

LOCATION					TIME OF FLOW		STORMWATER ANALYSIS					
DESCRIPTION	FROM M.H.	TO M.H.	PIPE LENGTH (m)	INCREMENT AREA (hectares)	TOTAL AREA (hectares)	TO UPPER END (min)	IN SECTION (min)	RUNOFF COEFF	SECTION A X R	ACCUMLD A x R	RAINFALL INTENSITY (mm/hr)	PEAK FLOW (L/s)
<b><u>EXISTING CONDITIONS</u></b>												
EX	SITE	OUTLET		0.08	0.08	10.00	0.00	0.400	0.032	0.032	91.243	8.1
<b><u>FUTURE CONDITIONS</u></b>												
A10 - Controlled	SITE	OUTLET		0.08	0.08	10.00	0.00	0.900	0.072	0.072	91.243	18.2
ALLOWABLE PEAK OUTFLOW												8.1
PROVIDED OUTFLOW (250mm PIPE)												<b>8.1</b>

**DESIGN BY:** UPPER CANADA CONSULTANTS  
 30 HANNOVER DRIVE, UNIT 3  
 ST. CATHARINES, ON L2W 1A3

**DESIGN BY:** K.TIESSEN, P.ENG.  
**DATE:** OCTOBER 2025

**RAINFALL PARAMETERS:**

a = 1106.60 mm/hr  
 b = 11.29 minutes  
 c = 0.82

Time to Upper End = 10 min.  
 City of Port Colborne - 5 Year IDF Curve

## Modified Rational Method (MRM) Required Storage Volume

Project: 547 KING STREET APARTMENT, PORT COLBORNE  
 Project No: 25104  
 Date: OCTOBER 2025  
 Design By: K. TIESSEN, P.ENG.  
 Description: STORMWATER MANAGEMENT PLAN

Storm Event: **City of Port Colborne - 5 Year IDF Curve**

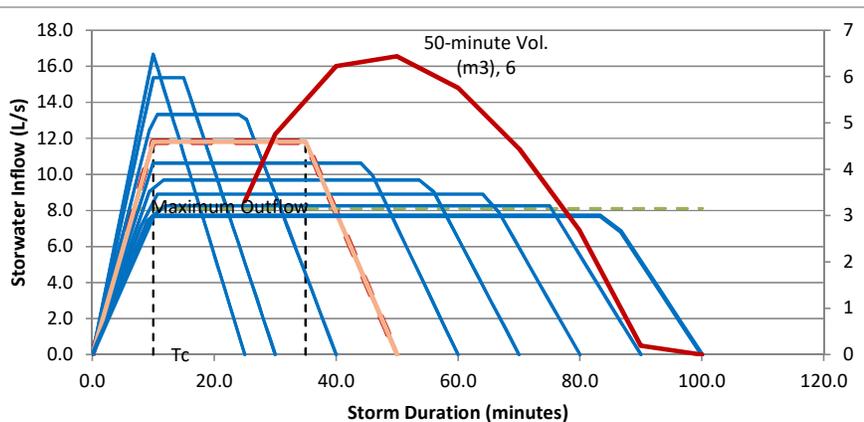
a = 1106.60 mm/hr  
 b = 11.29 minutes  
 c = 0.82

Critical Storm Duration: 50.00 minutes Tail Multiplier (x1-11.5)  
 Tc From Design: 10.00 minutes  
 Storm Tail Time: 35.00 minutes  
 Accumulated Area x R (Ha): 0.072 <-- Area x Runoff Coefficient (Sewer Design Sheet)  
 Peak Rainfall Intensity: 59.05 mm/hr  
 Peak Inflow at Tc: 11.81 L/s  
 Maximum Release Rate: 8.11 <-- Outlet Full Flow Capacity (Design Sheet)  
 Time When Outlet Exceeded: 6.87

Time (min)	Intensity (mm/hr)	Inflow (L/s)	Outflow (L/s)	Interval Volume (m3)	Total Required Volume (m3)
0.0	0.00	0.00	8.11	-0.5	0.0
1.7	9.84	1.97	8.11	-0.6	0.0
3.3	19.68	3.94	8.11	-0.4	0.0
5.0	29.52	5.90	8.11	-0.2	0.0
6.7	39.37	7.87	8.11	0.0	0.0
8.3	49.21	9.84	8.11	0.2	0.2
10.0	59.05	11.81	8.11	0.4	0.5
11.7	59.05	11.81	8.11	0.4	0.9
13.3	59.05	11.81	8.11	0.4	1.3
15.0	59.05	11.81	8.11	0.4	1.7
16.7	59.05	11.81	8.11	0.4	2.0
18.3	59.05	11.81	8.11	0.4	2.4
20.0	59.05	11.81	8.11	0.4	2.8
21.7	59.05	11.81	8.11	0.4	3.1
23.3	59.05	11.81	8.11	0.4	3.5
25.0	59.05	11.81	8.11	0.4	3.9
26.7	59.05	11.81	8.11	0.4	4.2
28.3	59.05	11.81	8.11	0.4	4.6
30.0	59.05	11.81	8.11	0.4	5.0
31.7	59.05	11.81	8.11	0.4	5.4
33.3	59.05	11.81	8.11	0.4	5.7
35.0	59.05	11.81	8.11	0.4	6.1
36.7	52.49	10.50	8.11	0.2	6.3
38.3	45.93	9.19	8.11	0.1	6.4
40.0	39.37	7.87	8.11	0.0	6.4
41.7	32.80	6.56	8.11	-0.2	6.3
43.3	26.24	5.25	8.11	-0.3	6.0
45.0	19.68	3.94	8.11	-0.4	5.6
46.7	13.12	2.62	8.11	-0.5	5.0
48.3	6.56	1.31	8.11	-0.7	4.3
50.0	0.00	0.00	8.11	-0.8	3.5

### Variable Storm Duration Storage Requirements

Duration	Max Storage	Duration	Max Storage	Duration	Max Storage
25 Min	3.3 m3	50 Min	6.4 m3	80 Min	2.7 m3
30 Min	4.8 m3	60 Min	5.8 m3	90 Min	0.2 m3
40 Min	6.2 m3	70 Min	4.4 m3	100 Min	0.0 m3

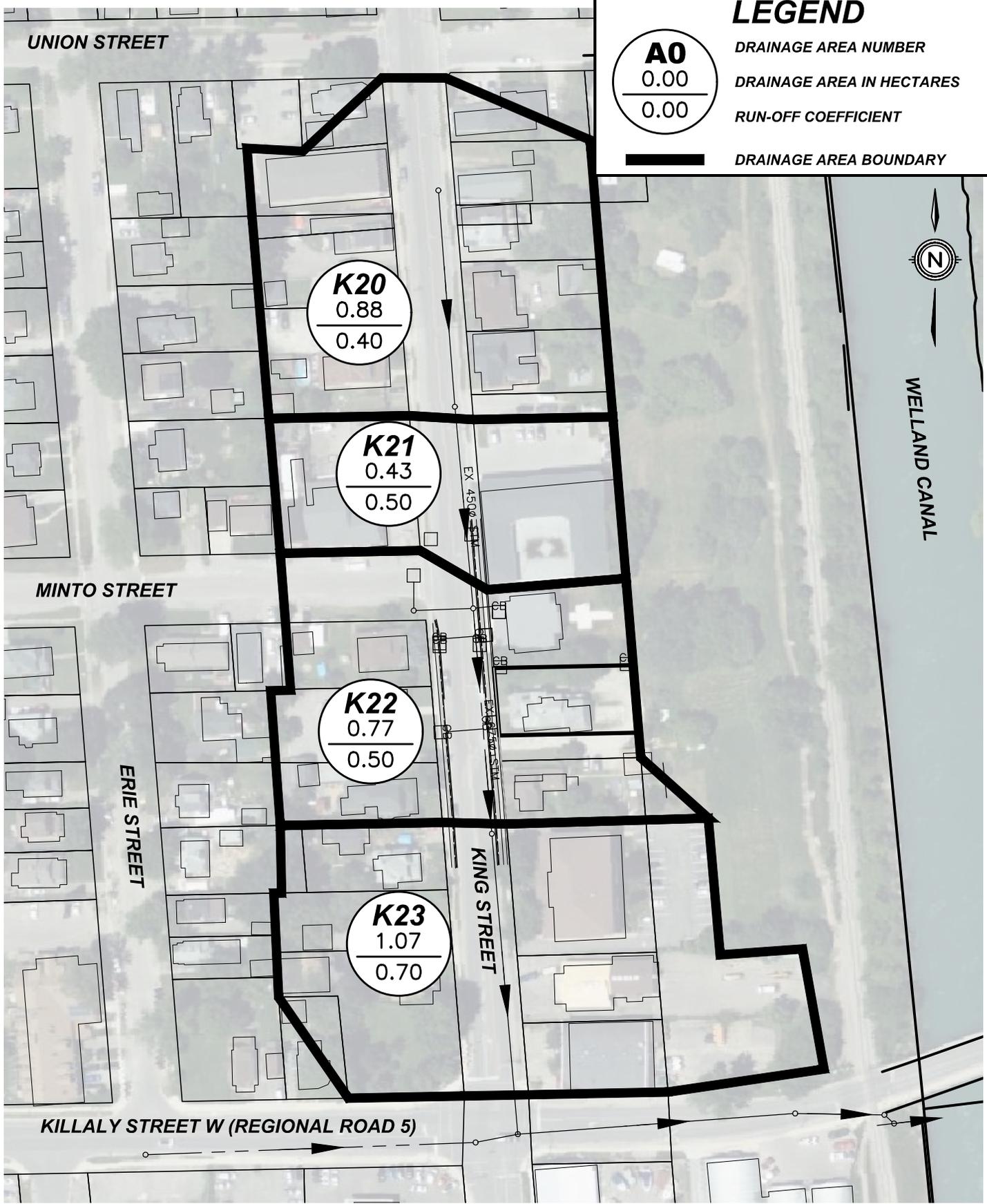


# LEGEND

<b>A0</b>	DRAINAGE AREA NUMBER
0.00	DRAINAGE AREA IN HECTARES
0.00	RUN-OFF COEFFICIENT
	DRAINAGE AREA BOUNDARY



WELLAND CANAL



**K20**  
0.88  
0.40

**K21**  
0.43  
0.50

**K22**  
0.77  
0.50

**K23**  
1.07  
0.70

UNION STREET

MINTO STREET

ERIE STREET

KING STREET

KILLALY STREET W (REGIONAL ROAD 5)



30 Hannover Drive Unit 3  
St. Catharines, Ontario  
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**547 KING STREET**  
CITY OF PORT COLBORNE  
STORM DRAINAGE AREA PLAN

DATE	2025-11-06
SCALE	1:1500 m
REF No.	25104
DWG No.	FIGURE 2

DESCRIPTION			STORMWATER ANALYSIS										STORM SEWER DESIGN						
LOCATION	FROM MH	TO MH	AREA (ha)	ACCUMLTD AREA (ha)	RUNOFF COEFFICNT	A*R	ACCUMLTD A*R	T of C (min.)	PIPE TIME (min.)	T of C (sum)	INTENSITY (mm/hr)	FLOW (L/s)	LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	VELOCITY (m/s)	PERCENT FULL	
A20 - KING STREET	EX MH 154	EX MH 153	0.88	0.88	0.40	0.352	0.352	10.00	1.12	11.12	90.1	88.1	60.9	450	0.25	148.78	0.9	59.2%	
A21 - KING STREET	EX MH 153	EX MH 152	0.43	1.31	0.50	0.215	0.567	11.12	1.06	12.18	86.4	136.1	57.8	450	0.25	148.78	0.9	91.5%	
A22 - KING STREET	EX MH 152	EX MH 151	0.77	2.08	0.50	0.385	0.952	12.18	0.87	13.06	83.2	220.0	62.2	675	0.25	438.64	1.2	50.2%	
A23 - KING STREET	EX MH 151	EX MH 149	1.07	3.15	0.70	0.749	1.701	13.06	1.20	14.26	80.7	381.5	92.1	675	0.29	472.43	1.3	80.8%	

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

**STORM SEWER DESIGN**

MUNICIPALITY: CITY OF PORT COLBORNE A = 1106.60 mm/hr 5 YEAR DESIGN IDF  
PROJECT: 547 KING STREET B = 11.29 minutes  
UCC PROJECT NO.: 25104 C = 0.820

PIPE ROUGHNESS = 0.013  
PIPE CONVERSION FACTOR = 1.016