PROPOSED 4-STOREY APARTMENT BUILDING
5558 DRUMMOND ROAD, NIAGARA FALLS

FUNCTIONAL SERVICING DESIGN BRIEF
NEW STORM, SANITARY AND WATER SERVICES

REV 0 – December 11, 2025

PREPARED BY:

HALLEX PROJECT #251144

HALLEX NIAGARA
4999 VICTORIA AVENUE
NIAGARA FALLS, ON L2E 4C9

HALLEX HAMILTON
745 SOUTH SERVICE ROAD, UNIT 205
STONEY CREEK, ON L8E 5Z2

TABLE OF CONTENTS

1. INTRODUCTION

The proposed 4-storey apartment building development consists of the demolition of the existing gravel laneway and grass areas and the construction of a 4-storey apartment building, asphalt laneway and parking areas, and grass areas. This development is located at 5558 Drummond Road, which is south of the Prospect Street and Drummond Road intersection in the City of Niagara Falls, ON.

The purpose of the service assessment is to determine the functional sizing of the proposed storm, sanitary and water services in addition to the post-development flows from the site to determine the impact on the existing municipal infrastructure.

2. EXISTING MUNICIPAL INFRASTRUCTURE

2.1 EXISTING SITE DRAINAGE

The existing site currently drains to the north and west sides of the property via overland flow as per the Topographic Survey prepared for this property. The drainage beyond the west property line is directly to Drummond Road and the drainage beyond the north property line continues overland through existing residential properties to Prospect Street. Additionally, the subject site is included in the Drainage Area Plans that were prepared for the existing municipal storm sewers at Drummond Road and Prospect Street.

2.2 STORM SEWER

The existing site is currently not serviced with a storm lateral connection as it is a vacant lot. The existing drainage infrastructure at Drummond Road consists of a 675mm municipal storm sewer which drains northerly beyond Prospect Street towards Highway 420. The existing drainage infrastructure at Prospect Street consists of a 375mm PVC municipal storm sewer which drains easterly towards Portage Road.

2.3 SANITARY SEWER

The existing site is currently not serviced with a sanitary lateral connection as it is a vacant lot. The existing sanitary infrastructure at Drummond Road consists of a 300mm municipal sanitary sewer which drains northerly beyond Prospect Street towards Highway 420.

2.4 WATERMAIN

The existing site is currently not serviced with a water service connection as it is a vacant lot. The existing watermain infrastructure at Drummond Road consists of a 150mm cast iron municipal watermain, a 500mm hyprescon regional watermain, and an abandoned 200mm steel municipal regional watermain.

3. STORM SEWER SYSTEM

3.1 PRE-DEVELOPMENT SITE FLOW

The total drainage area for the subject development is 0.370 hectares with allowable runoff coefficients as per the Storm Sewer Drainage Area Plan 84-CA-65, dated March 1984, and the Storm Sewer Design Computation Sheet 84-CA-65, dated November 15, 1983 for the drainage to Drummond Road and the Storm Drainage Area Plan 20145752-00-601, dated April 04, 2016, and the Storm Sewer Design Sheet 20145752, dated May 12, 2021 for the drainage to Prospect Street. The catchment area plan for the pre-development site condition is provided on Hallex Sketch CSK1, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the allowable peak flow for the pre-development site is as follows:

Storm Event	Pre-Development 5-yr Storm Flow
Drummond Rd (Area.1)	12.0 L/s
Prospect St (Area.2)	31.1 L/s

These flows are calculated using the City of Niagara Falls intensity-duration-frequency curves. The pre-development flows for the proposed development are provided in Exhibit #1 for the five-year storm at the end of the design brief.

3.2 POST-DEVELOPMENT SITE FLOW

The proposed development includes the 4-storey apartment building, asphalt laneway and parking areas, and grass areas. The grading for the site will ensure drainage through the proposed storm sewer system for storm water quantity and quality controls. The overland flow route for the site shall be designed to ensure the development will drain to Drummond Road in the event of a blockage or a major storm event that surcharges the proposed sewer system. The proposed drainage system onsite has been designed according to the five-year storm event as per the City of Niagara Falls intensity-duration-frequency curve.

The total drainage for the site consists of 0.370 hectares with a calculated runoff coefficient of 0.76 based on the proposed roof, asphalt, concrete and grass surfaces. The proposed storm sewer system for the site will then discharge to the existing 675mm municipal storm sewer at Drummond Road. The catchment area plan for the post-development site condition is provided on Hallex Sketch CSK2, attached.

Utilizing the rationale method (Q = CiA/360) and the minimum recommended time of concentration of 10 minutes, the calculated peak flow for the post-development site is as follows:

Storm Event	Post-Development 5-yr Storm Flow
Drummond Rd (Area.1)	65.6 L/s
Prospect St (Area.2)	0.0 L/s

These flows are calculated using the City of Niagara Falls intensity-duration-frequency curves. The post-development flows for the proposed development are provided in Exhibit #2 for the five-year storm at the end of the design brief.

3.3 STORMWATER QUANTITY CONTROL

The post-development storm water runoff to Prospect Street will be eliminated and the post-development storm water runoff for the subject site will entirely be directed to Drummond Road. As such, the storm flows will increase by 53.6 L/s from the allowable flow for the five-year storm. As such, storm water detention will be required for the proposed development.

Stormwater quantity controls for the site can be achieved by utilizing an orifice plate within a maintenance hole prior to discharging to the existing 675mm municipal storm sewer at Drummond Road. The orifice plate will ensure the post development runoff is controlled to the allowable pre-development runoff rate for the five-year storm event. The resulting 63.0 m^3 volume generated for the five-year storm event can be stored within a proposed underground storage chamber system, a storm sewer system consisting of oversized storm sewers, catchbasins / maintenance holes and/or temporary surface ponding prior to discharging to the existing 675mm municipal storm sewer at Drummond Road.

3.4 STORMWATER QUALITY CONTROL

Stormwater quality controls for the site can be achieved by utilizing a HydroStorm HS5 prior to draining to the existing 675mm municipal storm sewer at Drummond Road. This will achieve a total suspended solids removal of at least 73% based on the above post-development site conditions. This value is greater than the required 'Normal' treatment of 70% as indicated in the MOE Stormwater Management Planning and Design Manual, dated March 2003 (refer to Chapter 3: Environmental Design Criteria, Section 3.3.1.1. Level of Protection).

4. SANITARY SEWER SYSTEM

Given the site is to be completely developed for the proposed 4-storey apartment building development, any existing sanitary laterals are to be located, capped and abandoned as required at the municipal sanitary sewer. A new sanitary lateral shall be proposed from the building to the existing 300mm municipal sanitary sewer at Drummond Road.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The average daily design flow is based on the recommendation in Section 5.5.2.1 Domestic Sewage Flows of the Ministry of the Environment Design Guidelines for Sewage Works 2008 and Section 3 - Sanitary Drainage Systems of the City of Niagara Falls Engineering Design Guidelines Manual.
- The 4-storey apartment building is assumed to have 6 one-bedroom units and 36 two-bedroom units for a total of 42 units. Each unit is assumed to have a maximum of 2 persons per bedroom.

The peak dry weather design flow for the proposed 4-storey residential development is determined to be 3.250 L/s and the peak wet weather design flow is determined to be 3.354 L/s. These calculations are based on the Post-Development Sanitary Catchment Area Plan CSK3 and the Post-Development Sanitary Sewer Design sheet provided in Exhibit #3, attached.

Based on the above, Hallex recommends a minimum 200mm sanitary sewer @ 1.0% to be installed to convey sanitary flows from the proposed building to the existing 300mm municipal sanitary sewer at Drummond Road.

5. WATER DISTRIBUTION SYSTEM

Given the site is to be completely developed for the proposed 4-storey apartment building development, any existing water services are to be located, capped and abandoned as required at the municipal watermain. A new water service shall be proposed from the building to the existing 150mm cast iron municipal watermain at Drummond Road.

The building development is currently in the concept phase; therefore, the following assumptions based on the architectural drawings are made in carrying out the calculations:

- The average daily water demand is based on Section 3.4.2. Domestic Water Demands of the Ministry of the Environment Design Guidelines for Drinking-Water Systems 2008.
- The peaking factors are based on the recommendation in Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People of the Ministry of the Environment Design Guidelines for Drinking-Water Systems 2008.
- The building is assumed to be fire resistive, of non-combustible construction and will have sprinklers and hose cabinets installed throughout the building as per applicable standards.

The domestic water demand for the proposed development is calculated in Exhibit #4, attached and summarized as follows:

Site	Average Day Water Demand	Maximum Day Water Demand	Peak Hour Water Demand
Area.1	70.2 m^3/day	340.3 m^3/day	4.65 L/s

Using the calculations provided in the Fire Underwriters Survey – 2020 Water Supply for Public Fire Protection, the minimum water supply flow rate for fire protection is determined to be 7,000 L/min for the building based on the above assumptions as shown in Exhibit #5, attached. There are three existing municipal fire hydrants located near the site. The first is located immediately adjacent to the northwest corner of the site on the east side of Drummond Road. This hydrant is to be relocated to the south as it conflicts with the proposed driveway entrance to the site. The second is approximately 56.0m north of the property on the southeast corner of the Drummond Road and Prospect Street intersection. The third is approximately 78.2m south of the property on the southeast corner of the Drummond Road and North Street intersection.

The resulting domestic flow head losses for the development are determined to be 0.20 kPa (0.03 psi). The resulting combined domestic flow and fire flow head losses for the development are determined to be 85.47 kPa (12.40 psi). As such, the minimum working pressure within the existing municipal watermain is required to be 40.03 psi to ensure a minimum normal operating pressure of 40 psi (domestic) and 20 psi (domestic & fire) within the municipal watermain. These calculations are based on the Water Demand Design sheet provided in Exhibit #4, attached.

Based on the above, Hallex recommends a minimum 150mm water service to be installed to provide water supply to the proposed development from the existing 150mm cast iron municipal watermain at Drummond Road. The water service is to be separated at the property line with a 100mm domestic water service and a 150mm fire protection service and shall extend to the mechanical room of the proposed building complete with a water meter and backflow preventer as per applicable standards.

6. CONCLUSION

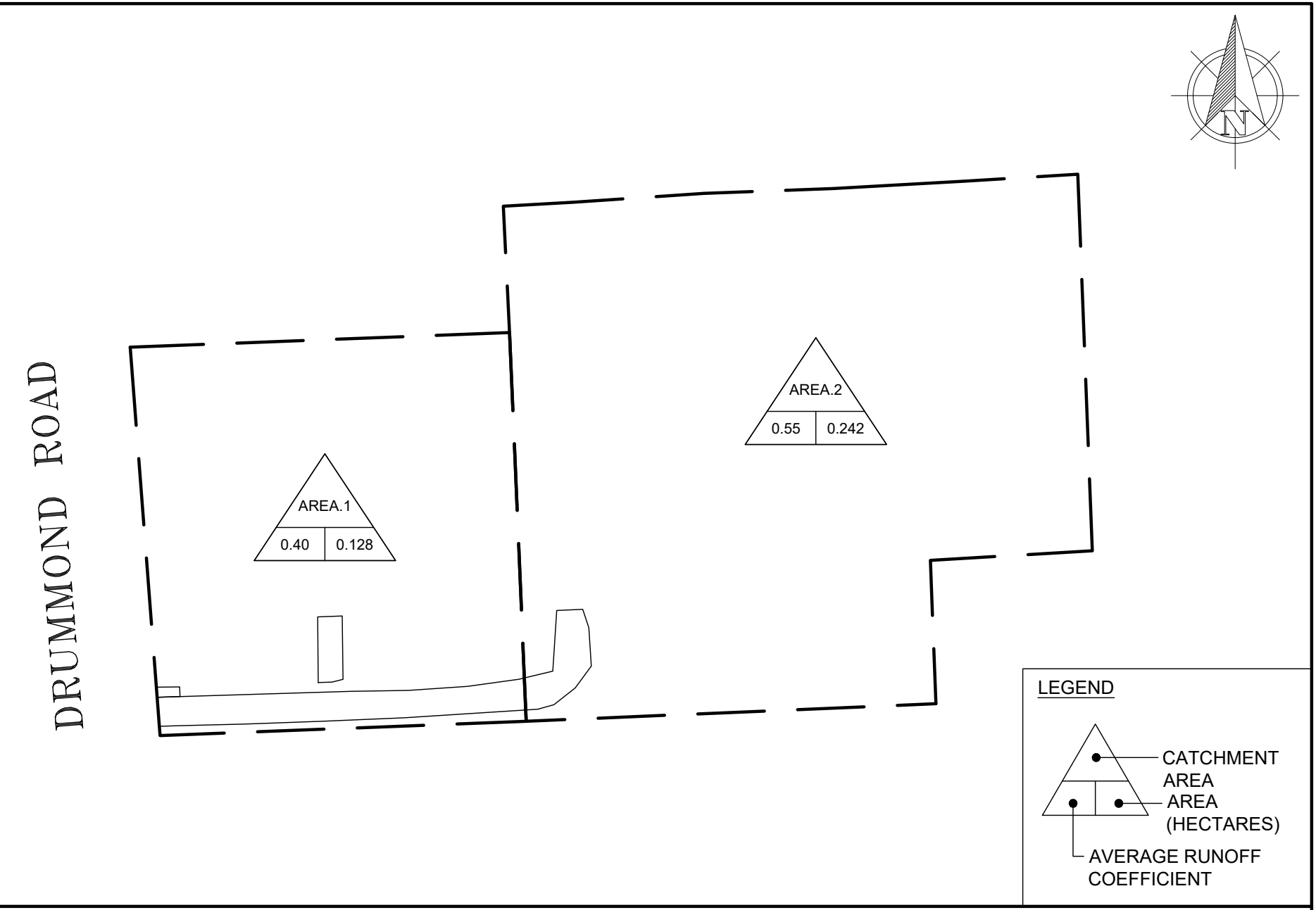
The aforementioned calculations and recommendations for the storm, sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

We trust this report meets your approval. Please contact the undersigned should you have any questions or comments.

Yours truly,
HALLEX CIVIL ENGINEERING LTD

Jim Halucha P.Eng
Partner, Civil/Structural Engineer

Jonathan Skinner, C.E.T., B.Tech
Partner, Civil Department Manager

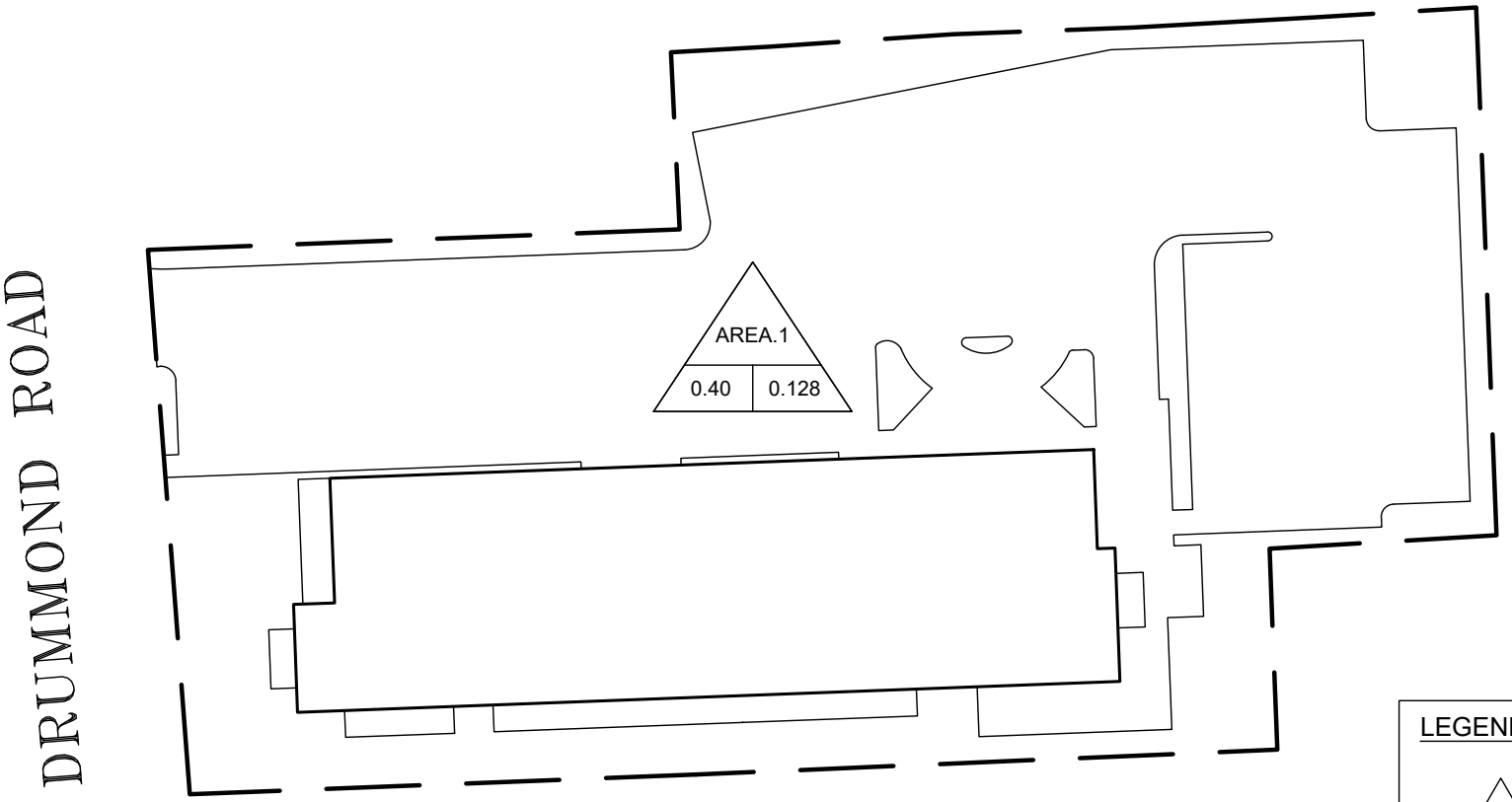


HALLEX CIVIL ENGINEERING LTD.
4999 Victoria Avenue
Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105

PROJECT:
4-STOREY APARTMENT BUILDING
5558 DRUMMOND RD, NIAGARA FALLS

SHEET TITLE:
PRE-DEVELOPMENT
CATCHMENT AREA PLAN

SCALE: 1:500	JOB NUMBER: 251144
DATE: 2025/12/11	ISSUED FOR: ZONING BYLAW AMENDMENT
DRAWN BY: BT	DWG CSK1 REV. 0
DESIGNED BY: JS	
CHECKED BY: JH	



LEGEND

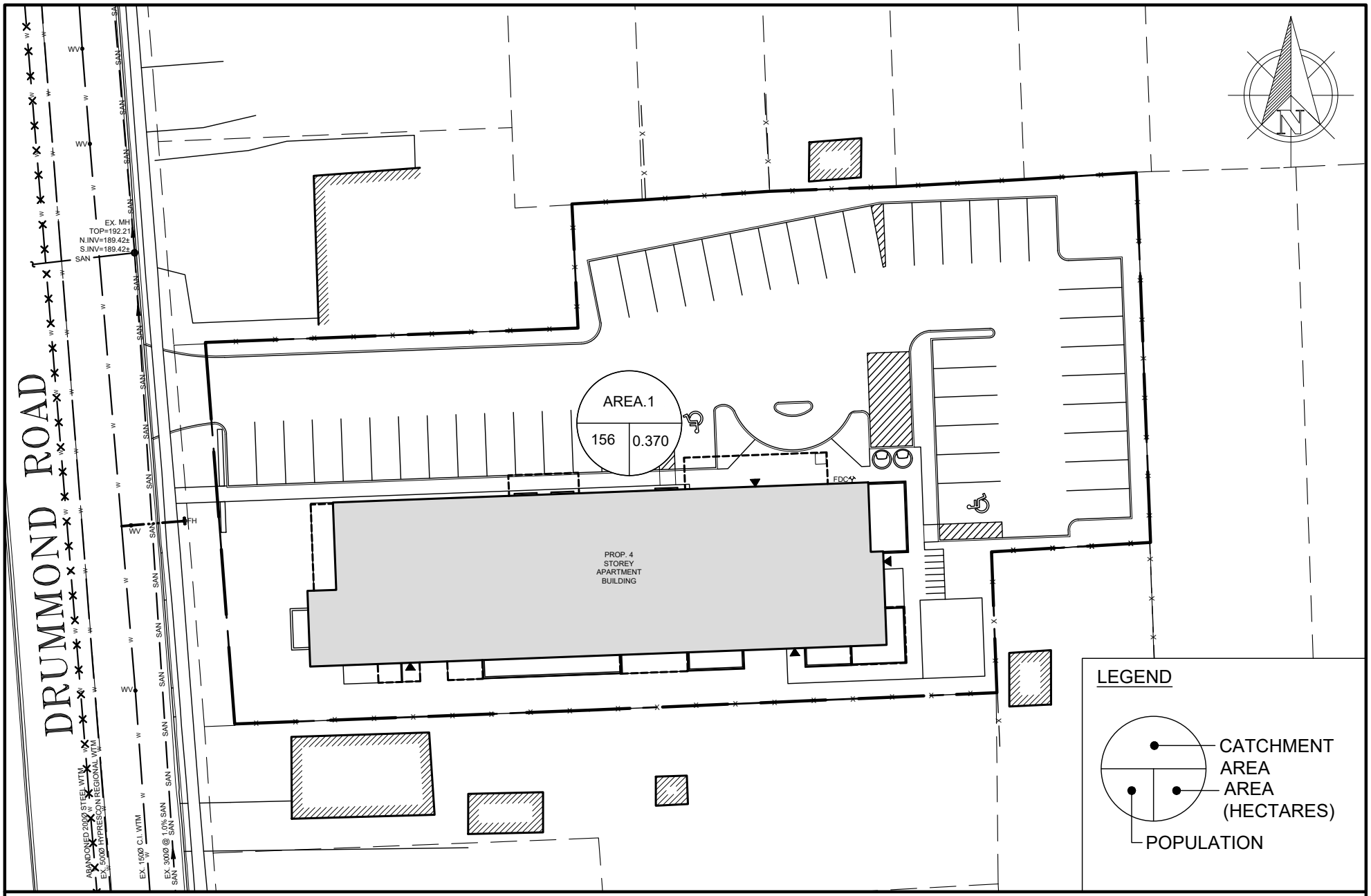
CATCHMENT AREA
AREA (HECTARES)
AVERAGE RUNOFF COEFFICIENT

HALLEX CIVIL ENGINEERING LTD.
4999 Victoria Avenue
Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105

PROJECT:
4-STOREY APARTMENT BUILDING
5558 DRUMMOND RD, NIAGARA FALLS

SHEET TITLE:
POST-DEVELOPMENT
CATCHMENT AREA PLAN

SCALE: 1:500	JOB NUMBER: 251144
DATE: 2025/12/11	ISSUED FOR: ZONING BYLAW AMENDMENT
DRAWN BY: BT	DWG CSK2 REV. 0
DESIGNED BY: JS	
CHECKED BY: JH	



HALLEX CIVIL ENGINEERING LTD.
4999 Victoria Avenue
Niagara Falls, ON L2E 4C9
Tel: 905-357-4015 Fax: 905-353-1105

PROJECT:
4-STOREY APARTMENT BUILDING
5558 DRUMMOND RD, NIAGARA FALLS

SHEET TITLE:
POST-DEVELOPMENT SANITARY CATCHMENT AREA PLAN

SCALE: 1:500	JOB NUMBER: 251144
DATE: 2025/12/11	ISSUED FOR: ZONING BYLAW AMENDMENT
DRAWN BY: BT	DWG CSK3 REV. 0
DESIGNED BY: JS	
CHECKED BY: JH	

Proposed 4-Storey Apartment Building
Exhibit #1 - 5 Year Pre - Development Calculations

2025-12-11
Job: 251144

MUNICIPALITY: **Niagara Falls**

manning's n = 0.013 Conc Pipe
0.013 PVC Pipe
0.024 Corr. Stl Pipe

Rainfall Intensity Values = A= 719.500
B= 6.340
C= 0.769

Location			Length of Pipe	Area		Flow Time		Rainfall Intensity	Unit rate of Runoff	Design Flows	
Pipe	From Node	To Node		Incre-ment	Cum Total	To Upper	In Sectio			Cum Flow	Cum Flow
			(m)	(ha)	(ha)	(min)	(min)	mm/hr	m^3/ha*day	(m^3/d)	(m^3/s)
1	**Area.1**	**Street.1**	**N/A**	**0.128**	**0.128**	**10.00**	**N/A**	**84**	**61506**	**1032.5**	**0.0120**
Avg 1	-	-	-	0.128	-	-	-	-	8066.3	1032.5	-
2	**Area.2**	**Street.2**	**N/A**	**0.242**	**0.242**	**10.00**	**N/A**	**84**	**61506**	**2684.1**	**0.0311**
Avg 2	-	-	-	0.242	-	-	-	-	11091.2	2684.1	-

Run-off Coefficients Used:

Site Average 1 C = 0.40
Site Average 2 C = 0.55

Velocity Range:

Minimum Velocity = 0.80 m/s
Maximum Velocity = 6.00 m/s

Time of Concentration = 10 min

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

Proposed 4-Storey Apartment Building
Exhibit #2 - 5 Year Post - Development Calculations

2025-12-11
Job: 251144

MUNICIPALITY: **Niagara Falls**

Rainfall Intensity Values =

A=	719.500
B=	6.340
C=	0.769

Location			Length of Pipe	Area		Flow Time		Rainfall Intensity	Unit rate of Runoff	Design Flows	
Pipe	From Node	To Node		Incre-ment	Cum Total	To Upper	In Section			Cum Flow	Cum Flow
			(m)	(ha)	(ha)	(min)	(min)	mm/hr	m^3/ha*day	(m^3/d)	(m^3/s)
1	**Area 1**	**Street 1**	**N/A**	**0.370**	**0.370**	**10.00**	**N/A**	**84**	**42348**	**5671.6**	**0.0656**
Roof	-	-	-	0.083	-	-	-	-	19157.5	1590.1	-
Paved	-	-	-	0.201	-	-	-	-	18149.2	3648.0	-
Grass	-	-	-	0.086	-	-	-	-	5041.4	433.6	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Grass Surface	C =	0.25

Velocity Range:

Minimum Velocity =	0.80	m/s
Maximum Velocity =	6.00	m/s

Time of Concentration:

Time of Concentration = 10 min

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

Proposed 4-Storey Apartment Building
Exhibit #3 - Post-Development Sanitary Sewer Design

2025-12-11
Job: 251144

Niagara Falls

manning's n = 0.013 PVC Pipe
0.013 Conc Pipe
0.024 Corr. Stl Pipe

Location			Length	INDIVIDUAL		CUMULATIVE		M	Q (p)	Q (i)	Q	Sewer Design			
Pipe	From Node	To Node		Resid'l Populat'n	Area	Resid'l Populat'n	Area					Slope	Capacity Full	Velocity Full	Dia-meter
			(m)		(ha)		(ha)		(L/s)	(L/s)	(L/s)	(m/m)	(L/s)	(m/s)	(m)
1	Area. 1	Street. 1	6.5	156	0.370	156	0.370	4.00	3.250	0.104	3.354	0.0100	32.798	1.044	0.200

Calculations:

M = domestic peaking factor — $M = \frac{5}{P^{0.2}}$ where P=population in 1000's (min 2; max 4)

Q (p) = peak population flow (L/s) — $Q(p) = \frac{P_r * q_r * M}{86.4}$ where P=population in 1000's

Q (i) = peak extraneous flow (L/s) — Q (i) = I * A (L/s) where A = area in hectares

Q = peak design flow (L/s) — Q = Q(p)+Q(i) (L/s)

q_r = domestic sewage flow 450 L/cap.d — P_r = residential population

I = infiltration allowance 0.280 L/ha.s — A = area (hectares)

Velocity Range:

Minimum Velocity = 0.60 m/s
Maximum Velocity = 3.00 m/s

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX CIVIL ENGINEERING LTD.

Proposed 4-Storey Apartment Building
Exhibit #4 - Water Demand Design

2025-12-11
Job: 251144

Roughness Coefficient = 100 for 100mm & 150mm pipe
110 for 200mm & 250mm pipe

Location			Length	Pop.	Area	Water Demand by			Fire Flow	Watermain Design						
Pipe	From Node	To Node				Average Day	Maximum Day	Peak Hour		Dia-meter	Dom. Head Loss	Domestic Pressure Loss		Fire & Dom. HL	Fire & Domestic Pressure Loss	
			(m)		(ha)	m^3/day	m^3/day	L/s	(L/s)	(m)	(m)	(kPa)	(psi)	(m)	(kPa)	(psi)
1	Area 1	Street 1	20.2	156	0.370	70.2	340.3	4.65	116.67	0.150	0.021	0.20	0.03	8.721	85.47	12.40

Calculations:

Avg Daily Water Demand (Domestic)	0.450 m^3/cap./day	Max Day Factor	4.85
Fluid Specific Weight	9.8 kN/m^3	Max Hourly Peaking Factor	5.72

4999 Victoria Avenue
Niagara Falls, ON L2E 4C9

745 South Service Road, Unit 205
Stoney Creek, ON L8E 5Z2

HALLEX CIVIL ENGINEERING LTD.

Proposed 4-Storey Apartment Building
Exhibit #5 - Fire Water Demand

2025-12-11
Job: 251144

FIRE WATER SUPPLY

Building Type: Fire Resistive

Floor Area		Reduct.	
First Floor	825.9 m^2	1.00	825.9 m^2
Second Floor	821.7 m^2	1.00	821.7 m^2
Third Floor	821.7 m^2	0.50	410.9 m^2
Fourth Floor	821.7 m^2	0.50	410.9 m^2
			2469.3 m^2

Construction Type: Non-Combustible Const.

Construction Coefficient: 0.8

1st Preliminary Fire Flow = 9000 L/min

Fire Hazard: Limited Combustible

Fire Hazard Factor: -0.15

Net Decrease = -1350 L/min

2nd Preliminary Fire Flow = 7650 L/min

Sprinkler System: Sprinkler & Hose Lines

Sprinkler System Factor: -0.4

Net Decrease = -3060 L/min

Separation Factor

North	17.1 m	0.15
South	6.7 m	0.20
West	30+ m	0.00
East	30+ m	0.00
		0.35

Net Increase = 2677.5 L/min

FINAL FIRE FLOW = 7000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 2020, by the Fire Underwriter's Survey