FUNCTIONAL SERVICING DESIGN BRIEF — HALLEX ENGINEERING

PROPOSED RESIDENTIAL DEVELOPMENT
3085 DOMINION ROAD, FORT ERIE

FUNCTIONAL SERVICING DESIGN BRIEF
NEW STORM, SANITARY AND WATER SERVICES

REV 0 – January 17, 2023

PREPARED BY:

HALLEX ENGINEERING LTD.

HALLEX PROJECT #220808

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 residential development consists of an existing single-family dwelling to remain, the demolition of the existing snack bar and the garage complete with gravel laneway & parking areas and grass areas and the construction of six new semi-detached two-storey dwellings complete with asphalt driveways and grass areas. This development is located at 3085 Dominion Road, which is at the southwest corner of the Dominion Road and Bernard Avenue intersection in the Town of Fort Erie, 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 from the north to the southerly side of the property via overland flow as shown in Figure 1 – Niagara Navigator Map – Existing Site Contours.

Figure 1 – Niagara Navigator Map – Existing Site Contours

This overland flow appears to ultimately drain to the existing roadside ditch at Parker Avenue which discharges to the existing roadside ditch at Bernard Avenue.

2.2 ROADSIDE DITCH

The existing site is not currently serviced with a storm lateral connection. The existing drainage infrastructure at Dominion Road and Bernard Avenue consist of roadside ditches which connect at the intersection and drains southerly towards the drainage ditches at the Friendship Trail.

2.3 SANITARY SEWER

The existing site is currently serviced with two sanitary lateral connections to Bernard Avenue as it consisted of the existing single-family dwelling and the existing snack bar, however the size and location of the existing sanitary laterals are unknown. The existing sanitary infrastructure at Bernard Avenue consists of a 200mm municipal sanitary sewer which drains southerly towards Hyman Avenue. There is no existing sanitary infrastructure at Dominion Road.

2.4 WATERMAIN

The existing site is currently serviced with a water service connection(s) to Bernard Avenue as it consisted of the existing single-family dwelling and the existing snack bar, however the size and location of the existing water service(s) are unknown. The existing watermain infrastructure at Bernard Avenue consists of a 200mm municipal asbestos cement watermain. The existing watermain infrastructure at Dominion Road consists of a 150mm municipal PVC watermain and a 400mm municipal asbestos cement watermain.

3. STORM DRAINAGE SYSTEM

3.1 PRE-DEVELOPMENT SITE FLOW

The total drainage area for the subject development is 0.281 hectares with an existing runoff coefficient of 0.39 based on the existing roof, asphalt, gravel and grass surfaces. 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 Storm Flow
5-year Storm	25.8 L/s

These flows are calculated using the Town of Fort Erie 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 six new semi-detached two-storey dwellings complete with asphalt driveways and grass areas. The grading for the site will ensure drainage through the proposed drainage system and shall be conveyed to the existing roadside ditches at Dominion Road and Bernard Avenue. The total drainage for the site consists of 0.281 hectares with a calculated runoff coefficient of 0.63 based on the existing and proposed roof, asphalt and grass surfaces. 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 Storm Flow
5-year Storm	41.9 L/s

These flows are calculated using the Town of Fort Erie 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.

4. SANITARY SEWER SYSTEM

The site is to be partly redeveloped for the proposed residential development. As such, the existing single-family dwelling sanitary lateral is to remain unaltered, provided it meets the below recommendations. All other existing sanitary laterals are to be located, capped and abandoned as required at the municipal sanitary sewer. A new municipal sanitary sewer extension shall be proposed given a sanitary sewer does not exist on Dominion Road to service the six new semi-detached two-storey dwellings. Six new sanitary laterals shall be proposed from each dwelling to the extended municipal sanitary sewer at Dominion 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 existing single-family dwelling is assumed to have two-bedrooms where each bedroom is assumed to have a maximum of 2 persons.
- The proposed semi-detached dwellings are assumed to each have three-bedrooms where each bedroom is assumed to have a maximum of 2 persons.
- The plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #3 are assumed and may not represent the final building plumbing design.

The peak drainage rate for the proposed residential development is determined to be 282.6 L/min based on the fixtures and fixture units shown in Exhibit #3 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine probable peak drainage rates for the total fixture units. The wastewater generation for the

proposed residential development is determined to be 11,300 L/day using Table 8.2.1.3A of the Ontario Building Code as shown in Exhibit #3, attached.

Based on the above, Hallex recommends the existing single-family dwelling sanitary lateral is to remain unaltered provided it is a minimum 100mm diameter sanitary sewer @ 1.0% and it is in good working condition. The owner is responsible for having the sewer to be reused video inspected to confirm the size and condition of the sewer lateral. Should the size be too small or the condition of the pipe is poor, the lateral shall be replaced with a minimum 100mm diameter sanitary sewer @ 1.0%.

Furthermore, Hallex recommends an extension of the municipal sanitary sewer at the intersection of Bernard Avenue and Dominion Road in order to service the six new semi-detached two-storey dwellings. The proposed municipal sanitary sewer shall be a minimum 200mm diameter sanitary sewer @ 0.4%. The proposed dwellings shall discharge to the proposed municipal sanitary sewer with a minimum 100mm diameter sanitary lateral @ 1.0%. The conceptual servicing plan for the six new semi-detached two-storey dwellings is provided on Hallex Sketch CSK3, attached.

5. WATER DISTRIBUTION SYSTEM

The site is to be partly redeveloped for the proposed residential development. As such, the existing single-family dwelling water service is to remain unaltered, provided it meets the below recommendations. All other existing water services are to be located, capped and abandoned as required at the municipal watermain. Six new water service connections shall be proposed from each dwelling to the existing 150mm diameter municipal watermain at Dominion 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 plumbing fixtures and the number of plumbing fixtures indicated in Exhibit #4 are assumed and may not represent the final building plumbing design.
- Each building is assumed to be of wood-frame construction and will not have sprinklers installed throughout the building.

The domestic water demand for the proposed development is determined to be 246.0 L/min based on the fixtures and fixture units shown in Exhibit #4 attached. Table 7.4.10.5 in the Ontario Building Code is used to determine water demands for the total fixture units.

Using the calculations provided in the Fire Underwriters Survey – 1999 Water Supply for Public Fire Protection, the minimum water supply flow rate for fire protection is determined to be 3,000 L/min for the existing dwelling, 10,000 L/min for the proposed westerly lot semi-detached dwelling, 11,000 L/min for the proposed middle lot semi-detached dwelling and 10,000 L/min for the proposed easterly lot semi-detached dwelling

based on the above assumptions as shown in Exhibits #5-8, attached. There is one existing municipal fire hydrant located near the site which is immediately adjacent to the northeast corner of the site on the southwest corner of the Dominion Road and Bernard Avenue intersection.

Based on the above, Hallex recommends the existing single-family dwelling water service is to remain unaltered provided it is a minimum 19mm diameter water service and it is in good working condition. Should the size be too small or the condition of the pipe is poor, the service shall be replaced with a minimum 19mm diameter water service.

Furthermore, Hallex recommends a minimum 25mm diameter water service to be installed to provide water supply to each proposed dwelling from the existing 150mm diameter municipal watermain at Dominion Road. Each dwelling is proposed to be metered individually complete with a remote reader on the face of the building to monitor individual water usage. The conceptual servicing plan for the six new semi-detached two-storey dwellings is provided on Hallex Sketch CSK3, attached.

6. CONCLUSION

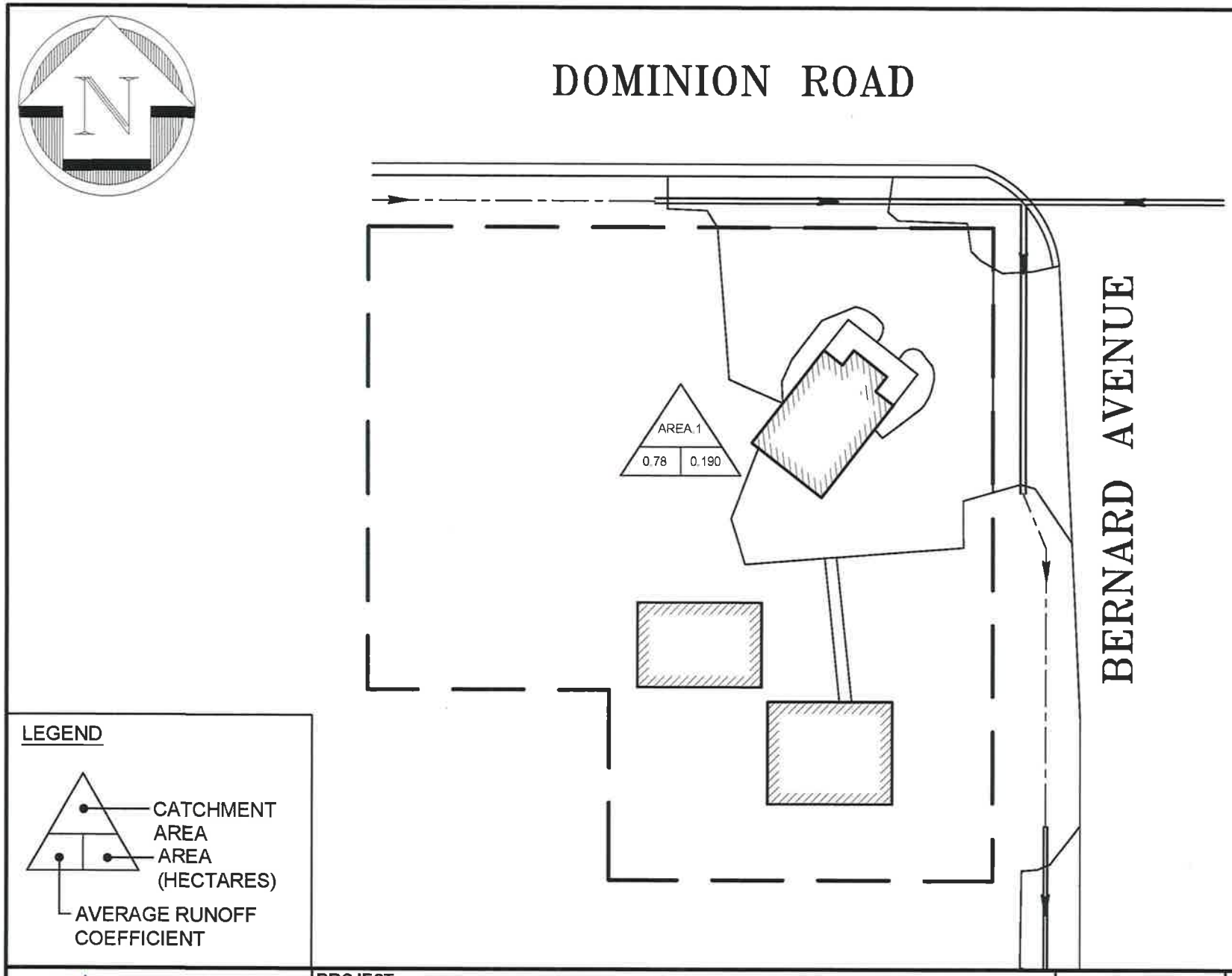
The aforementioned calculations and recommendations for the storm, sanitary and water services are based on the current design for the site as of writing this report. A final sealed report, complete with updates to the recommendations made in this report, may be required based on the final site design.

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

Yours truly,
HALLEX ENGINEERING LTD

Jim Halucha P.Eng
Civil/Structural Engineer

Jonathan Skinner, C.E.T., B.Tech
Civil Technologist



LEGEND

CATCHMENT AREA
AREA (HECTARES)
AVERAGE RUNOFF COEFFICIENT

HALLEX ENGINEERING LTD.
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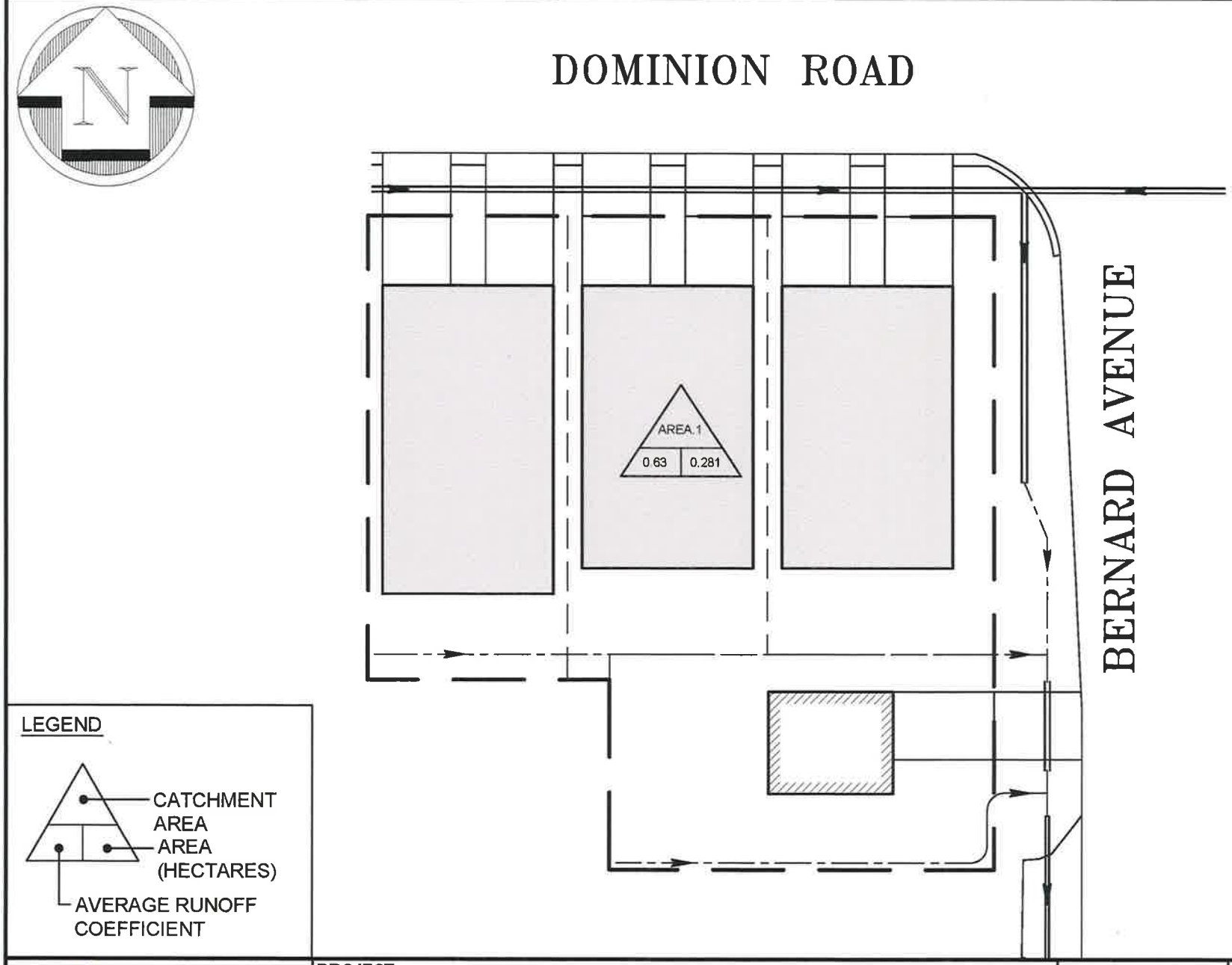
PROJECT:
PROPOSED RESIDENTIAL DEVELOPMENT
3085 DOMINION ROAD, FORT ERIE, ON

SHEET TITLE:
PRE-DEVELOPMENT CATCHMENT AREA PLAN

DATE: 01/17/2023	**JOB No.:** 220808	
SCALE: 1:500	**DWG.** CSK1	**REV.** 0
DR. BY: JS		
CH. BY: JH		



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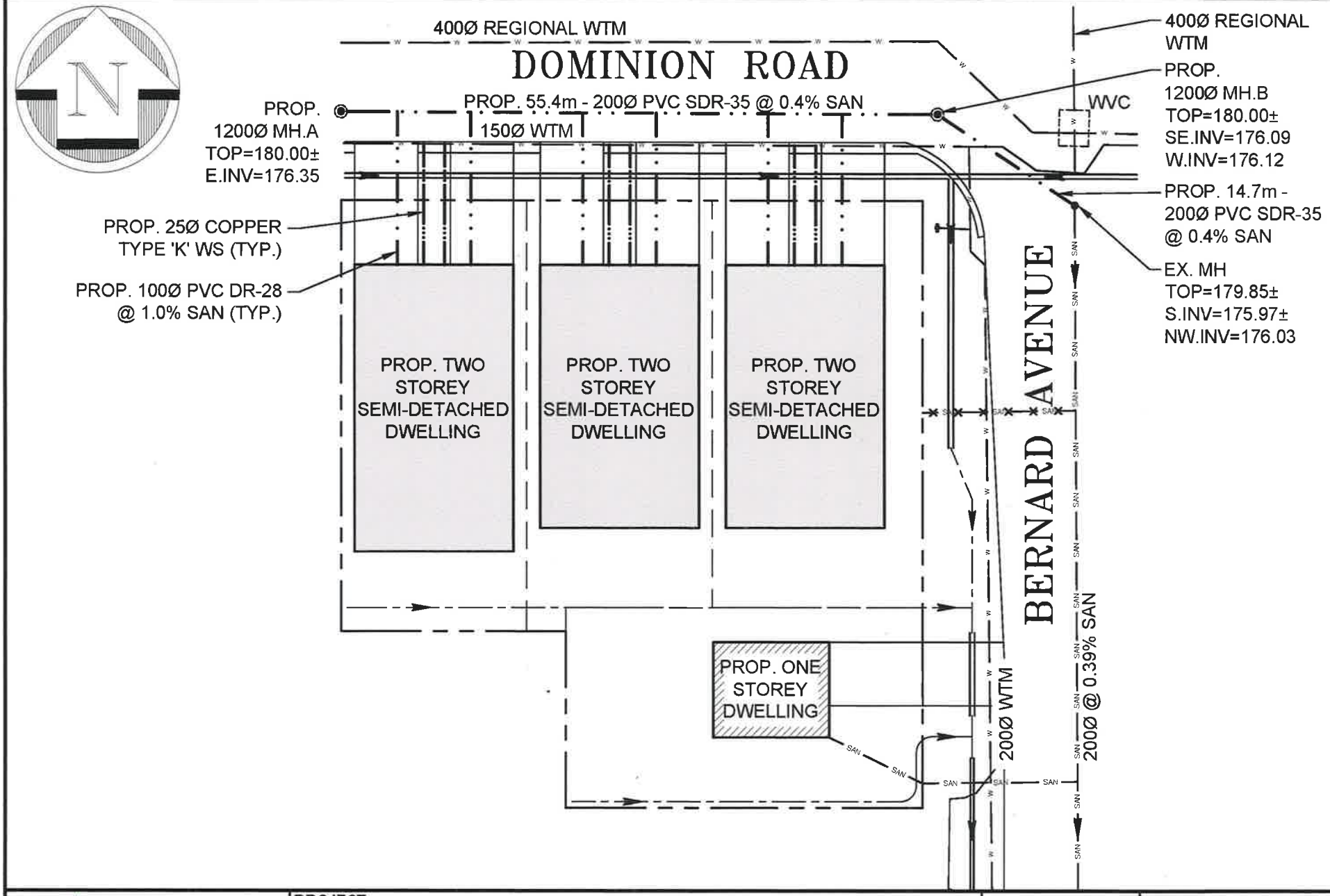
PROJECT:
PROPOSED RESIDENTIAL DEVELOPMENT
3085 DOMINION ROAD, FORT ERIE, ON

SHEET TITLE:
POST-DEVELOPMENT CATCHMENT AREA PLAN

DATE: 01/17/2023
SCALE: 1:500
DR. BY: JS
CH. BY: JH

JOB No.: 220808
DWG. CSK2
REV. 0



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PROJECT:
PROPOSED RESIDENTIAL DEVELOPMENT
3085 DOMINION ROAD, FORT ERIE, ON

SHEET TITLE:
CONCEPTUAL SERVICING PLAN

DATE: 01/17/2023
SCALE: 1:500
DR. BY: JS
CH. BY: JH

JOB No.: 220808
DWG. CSK3
REV. 0

3085 Dominion Road, Fort Erie
Exhibit #1 - 5 Year Pre - Development Calculations

1/17/2023
Job: 220808

MUNICIPALITY: **Fort Erie**

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

Rainfall Intensity Values = A= 747.930
B= 6.800
C= 0.768

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**	**N/A**	**0.281**	**0.281**	**10.00**	**N/A**	**86**	**61682**	**2225.7**	**0.0258**
Roof	-	-	-	0.027	-	-	-	-	19532.5	527.4	-
Paved	-	-	-	0.003	-	-	-	-	18504.5	55.5	-
Gravel	-	-	-	0.049	-	-	-	-	12336.3	604.5	-
Grass	-	-	-	0.202	-	-	-	-	5140.1	1038.3	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Gravel Surface	C =	0.60
Perm. Paver	C =	0.30
Grass Surface	C =	0.25

Velocity Range:

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

Time of Concentration = 10 min

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3085 Dominion Road, Fort Erie
Exhibit #2 - 5 Year Post - Development Calculations

1/17/2023
Job: 220808

MUNICIPALITY: **Fort Erie**

Rainfall Intensity Values =

A=	747.930
B=	6.800
C=	0.768

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**	**N/A**	**0.281**	**0.281**	**10.00**	**N/A**	**86**	**43177**	**3618.7**	**0.0419**
Roof	-	-	-	0.126	-	-	-	-	19532.5	2461.1	-
Paved	-	-	-	0.027	-	-	-	-	18504.5	499.6	-
Grass	-	-	-	0.128	-	-	-	-	5140.1	657.9	-

Run-off Coefficients Used:

Roof Structure	C =	0.95
Paved Surface	C =	0.90
Gravel Surface	C =	0.60
Perm. Paver	C =	0.30
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

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3085 Dominion Road, Fort Erie
Exhibit #3 - Wastewater Generation Rate & Peak Drainage Rate

1/17/2023
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WASTEWATER GENERATION ASSESSMENT

Occupancy	# of Units	Development Statistics	Volume (Table 8.2.1.3. A)	Total Daily Volume	Notes
2 Bedroom Dwelling	1	1 dwelling	1100 L/dwelling	1100 L/day	
3 Bedroom Dwelling	6	1 dwelling	1600 L/dwelling	9600 L/day	
Add'l Dwelling Fixture Units	6	2 FUs	50 L/FU	600 L/day	Choose greater of add'l bedrooms, area & fixture units
			Total =	11300 L/day	

Therefore the total calculated sanitary flow from the site is determined to be 11300 L/day.

MAXIMUM PROBABLE DRAINAGE RATE

Fixture	# of Units	# of Plumbing Fixtures	Fixture Units (Table 7.4.9.3.)	Total Sanitary Fixture Units
Existing Dwelling				
Bathroom group with flush tank	1	2 fixtures	6 FUs	12 FUs
Clothes washer (private, domestic)	1	1 fixture	1.5 FUs	1.5 FUs
Sink (domestic)	1	1 fixture	1.5 FUs	1.5 FUs
Dishwasher (domestic)	1	1 fixture	1 FUs	1 FUs
Proposed Dwellings				
Bathroom group with flush tank	6	3 fixtures	6 FUs	108 FUs
Clothes washer (private, domestic)	6	1 fixture	1.5 FUs	9 FUs
Sink (domestic)	6	1 fixture	1.5 FUs	9 FUs
Dishwasher (domestic)	6	1 fixture	1 FUs	6 FUs
			Total =	148.0 FUs
			Total Flow =	282.6 L/min

Therefore the total calculated peak drainage rate is determined to be 282.6L/min.

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3085 Dominion Road, Fort Erie
Exhibit #4 - Water Demand

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Job: 220808

DOMESTIC WATER SUPPLY

Fixture	# of Units	# of Plumbing Fixtures	Fixture Units (Table 7.6.3.2.A.)	Total Water Fixture Units
Existing Dwelling				
Bathroom group with flush tank	1	2 fixtures	3.6 FUs	7.2 FUs
Clothes washer (private, domestic)	1	1 fixture	1.4 FUs	1.4 FUs
Sink (domestic)	1	1 fixture	2 FUs	2 FUs
Dishwasher (domestic)	1	1 fixture	1.4 FUs	1.4 FUs
Proposed Dwellings				
Bathroom group with flush tank	6	3 fixtures	3.6 FUs	64.8 FUs
Clothes washer (private, domestic)	6	1 fixture	1.4 FUs	8.4 FUs
Sink (domestic)	6	1 fixture	2 FUs	12 FUs
Dishwasher (domestic)	6	1 fixture	1.4 FUs	8.4 FUs
			Total =	105.6 FUs
			Total Flow =	246.0 L/min

Therefore the maximum domestic water demand is determined to be 246 L/min.

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3085 Dominion Road, Fort Erie
Exhibit #5 - Fire Water Demand - Ex. Bldg

1/17/2023
Job: 220808

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area		Reduct.	
First Floor	99 m^2	1.00	99 m^2
			99 m^2

Construction Type: Wood Frame Construction — Construction Coefficient: 1.5

1st Preliminary Fire Flow = 3000 L/min

Fire Hazard: Non-Combustible — Fire Hazard Factor: -0.25

Net Decrease = -750 L/min

2nd Preliminary Fire Flow = 2250 L/min

Sprinkler System: No System — Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	10.8 m	0.15
South	12.9 m	0.15
West	45+ m	0.00
East	31.6 m	0.05
		0.35

Net Increase = 787.5 L/min

FINAL FIRE FLOW = 3000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey

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3085 Dominion Road, Fort Erie
Exhibit #6 - Fire Water Demand - West Bldg

1/17/2023
Job: 220808

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area		Reduct.	
First Floor	408.2 m^2	1.00	408.2 m^2
Second Floor	408.2 m^2	1.00	408.2 m^2
			816.4 m^2

Construction Type: Wood Frame Construction

Construction Coefficient: 1.5

1st Preliminary Fire Flow = 9000 L/min

Fire Hazard: Non-Combustible

Fire Hazard Factor: -0.25

Net Decrease = -2250 L/min

2nd Preliminary Fire Flow = 6750 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	45+ m	0.00
South	20.8 m	0.10
West	8.7 m	0.20
East	2.5 m	0.25
		0.55

Net Increase = 3712.5 L/min

FINAL FIRE FLOW = 10000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey

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3085 Dominion Road, Fort Erie
Exhibit #7 - Fire Water Demand - Middle Bldg

1/17/2023
Job: 220808

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area		Reduct.	
First Floor	374.4 m^2	1.00	374.4 m^2
Second Floor	374.4 m^2	1.00	374.4 m^2
			748.8 m^2

Construction Type: Wood Frame Construction

Construction Coefficient: 1.5

1st Preliminary Fire Flow = 9000 L/min

Fire Hazard: Non-Combustible

Fire Hazard Factor: -0.25

Net Decrease = -2250 L/min

2nd Preliminary Fire Flow = 6750 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	45+ m	0.00
South	10.9 m	0.15
West	2.5 m	0.25
East	2.5 m	0.25
		0.65

Net Increase = 4387.5 L/min

FINAL FIRE FLOW = 11000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey

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3085 Dominion Road, Fort Erie
Exhibit #8 - Fire Water Demand - East Bldg

1/17/2023
Job: 220808

FIRE WATER SUPPLY

Building Type: No Fire Protection

Floor Area		Reduct.	
First Floor	374.4 m^2	1.00	374.4 m^2
Second Floor	374.4 m^2	1.00	374.4 m^2
			748.8 m^2

Construction Type: Wood Frame Construction

Construction Coefficient: 1.5

1st Preliminary Fire Flow = 9000 L/min

Fire Hazard: Non-Combustible

Fire Hazard Factor: -0.25

Net Decrease = -2250 L/min

2nd Preliminary Fire Flow = 6750 L/min

Sprinkler System: No System

Sprinkler System Factor: 0.0

No Change = 0 L/min

Separation Factor

North	45+ m	0.00
South	10.8 m	0.15
West	2.5 m	0.25
East	33.1 m	0.05
		0.45

Net Increase = 3037.5 L/min

FINAL FIRE FLOW = 10000.0 L/min

Minimum Water Supply Flow Rate for Fire Protection as determined by the Water Supply For Public Fire Protection, dated 1999, by the Fire Underwriter's Survey