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ENGINEERS / PLANNERS

File: 2251

FUNCTIONAL SERVICING REPORT

Dorchester and Oldfield Road
City of Niagara Falls
Revised, November 2024

INTRODUCTION

The purpose of this report is to address the servicing needs for the proposed residential development in support of the application for Zoning By-Law Amendment. The subject lands are located at south side of Dorchester Road in the southwest side of the intersection between Dorchester and Oldfield Road.

The development site area is approximately 2.6 hectares and shall consist of 106 apartment units in two 6 storey buildings. The site shall 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 municipal 300mm diameter watermain along Dorchester Road, immediately adjacent to the site at the intersection of Dorchester Road and Oldfield Road, the municipal 300mm diameter watermain connects to an existing regional 1050mm diameter watermain, as shown in the attached plan in Appendix A.

It is proposed to connect a 150mm diameter water service to the existing 300mm diameter watermain on Dorchester Road. The 150mm diameter water service will be situated between the two buildings to provide both domestic water supply and fire protection.

There is an existing fire hydrant on the south side of Dorchester Road, in front of the site. It is proposed to relocate this hydrant, with its spacing and location to be identified as part of the future detailed design.

Therefore, adequate capacity is anticipated for both domestic water supply and fire protection. If additional capacity is determined to be required during detailed design, the municipal watermain connection to the regional 1050mm diameter watermain can be upsized as needed.

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SANITARY SERVICING

There is an existing 825mm diameter concrete sanitary sewer located at the north side of Dorchester Road. It is proposed to connect the two apartment buildings with a service lateral to the existing sanitary sewer on Dorchester Road.

The proposed development, a 106 unit apartment buildings with a base sanitary area of 1.15 hectares, is projected to generate a peak sanitary flow of approximately 2.35 L/s. This flow represents 0.2% of the total capacity of the existing 825mm diameter sanitary sewer.

Based on this analysis, the addition is anticipated to be within the acceptable capacity of the existing sewer system. Detailed sanitary calculations and the sanitary drainage area plan are provided in Appendix B.

STORMWATER MANAGEMENT

As part of the site development, the following is a summary of the stormwater management plan. The criteria provided by the City of Niagara Falls for this development includes the requirement to control stormwater flows from this site up to and including the 5 year design storm event, and provide stormwater quality controls to MECP Normal Protection (70% TSS removal) levels before outletting from the site.

As shown in Figure 1, the total stormwater drainage area is 2.38 hectares, which currently consists of a gravel parking lot (A10). The majority of the existing stormwater flows overland from the gravel parking lot towards an existing swale that conveys these flows to the wetlands located south of the site (A11). Additionally, stormwater flows directed to Dorchester Road (A12) continue eastward and ultimately discharge into the Oldfield Road storm sewer, which flows further east.

As shown in figure 2, it is proposed to collect the stormwater within the site (A20) and direct the flows to the existing swale (A21) in order to maintain its natural pattern as it currently exists. Also, the flows generated by drainage area (A22) will be directed to Dorchester Road to allow it to continue its flow as per existing conditions.

The Modified Rational Method (MRM) was used to determine the peak flows and storage volume required for the 5 year storm event. From MRM analysis Table 1 shows a comparison between the existing and future peak flows and its changes.

Table 1. Peak Flow Summary						
5 Year Design Storm Event						
LOCATION	**AREA #**		**Peak Flow (L/s)**		**CHANGE**	
	EXISTING	**FUTURE***	**EXISTING**	**FUTURE***	**FLOW (L/s)**	**PERCENT**
DORCHESTER RD.	**A12**	**A22**	**12.1**	**7.2**	**-4.9**	**-40.8%**
SOUTH OUTLET	A10	A20	124.5	193.1	68.6	55.1%
	A11	A21	69.5	73.2	3.7	5.4%
	TOTAL		**194.0**	**266.3**	**72.3**	**37.3%**
Note: * Future Flows Without SWM.						

As shown in Table 1, under the existing conditions, the flow directed to Dorchester Road A12 is 12.1 L/s, and the future flow generated from A22 is 7.2 L/s, decreasing in 4.9 L/s (40.8%) the flow discharged to Dorchester Road. On the other hand, the subject site A10 plus A11 are producing a peak flow of 194.0 L/s, and the future flow generated for the future development A20 plus A21 will produce a peak flow of 266.3 L/s, increasing in 72.3 L/s (37.3%) the flow discharged to the south outlet. The required storage to control the proposed outflow is 17.5m^3 which is equivalent to 239 metres of 300mm diameter storm. All the related calculations and figures can be found in Appendix C.

To limit future stormwater flows to allowable conditions, typically a control is placed on the outlet from the site that may include an orifice of approximate 250mm diameter and site stormwater storage. To improve stormwater quality, typically an oil/grit separator provides the required TSS (Total Suspended Solids) removal for this type of development. The complete stormwater design for this development shall be identified as part of future detailed design.

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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 300mm diameter watermain on Dorchester Road will have sufficient capacity to provide both domestic and fire protection water supply.

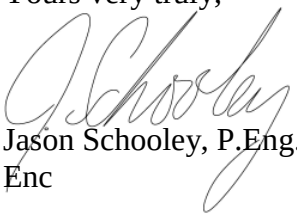
2. The existing 825mm diameter sanitary sewer on Dorchester Road will have adequate capacity for the proposed residential development.

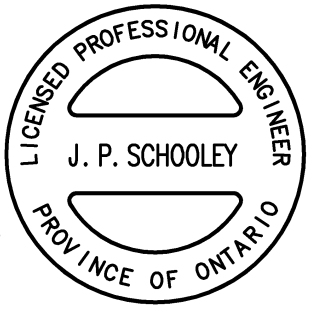
3. Stormwater quantity controls are being provided on site to the allowable capacity of the existing stormwater drainage system conditions.

4. Stormwater quality controls will be provided to MECP Normal Protection (70% TSS removal) levels.

In conclusion, there exists adequate municipal infrastructure to service the proposed 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,





Jason Schooley, P.Eng.
Enc

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APPENDICES

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APPENDIX A

Water Area Plan


SCALE 1"=100'
ONTARIO HYDRO CANAL
RONNIE CRES.
REDHAVEN CRES.
JUBILEE DRIVE
BARTO CRES.
SHARON AVE
ROAD
McLEOD
BLOCK E
BLOCK D
FRANKLIN J. MILLER PARK
BLOCK A
BLOCK B
BLOCK C
VALIANT STREET
JILL DRIVE
VENUS CRES.
SUNHAVEN DRIVE
RAINBOW CRES.
DORCHESTER ROAD
ONTARIO HYDRO
TWP LINE
OLDFIELD ROAD
SUNRISE COURT
FERN AVE.
COOPER DRIVE
JILL DRIVE

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APPENDIX B

Sanitary Sewer Design Sheet
Sanitary Drainage Area Plan

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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 & 0.286 L / s / ha)
POPULATION DENSITY: 1.55 PERSONS / UNIT

SEWER DESIGN

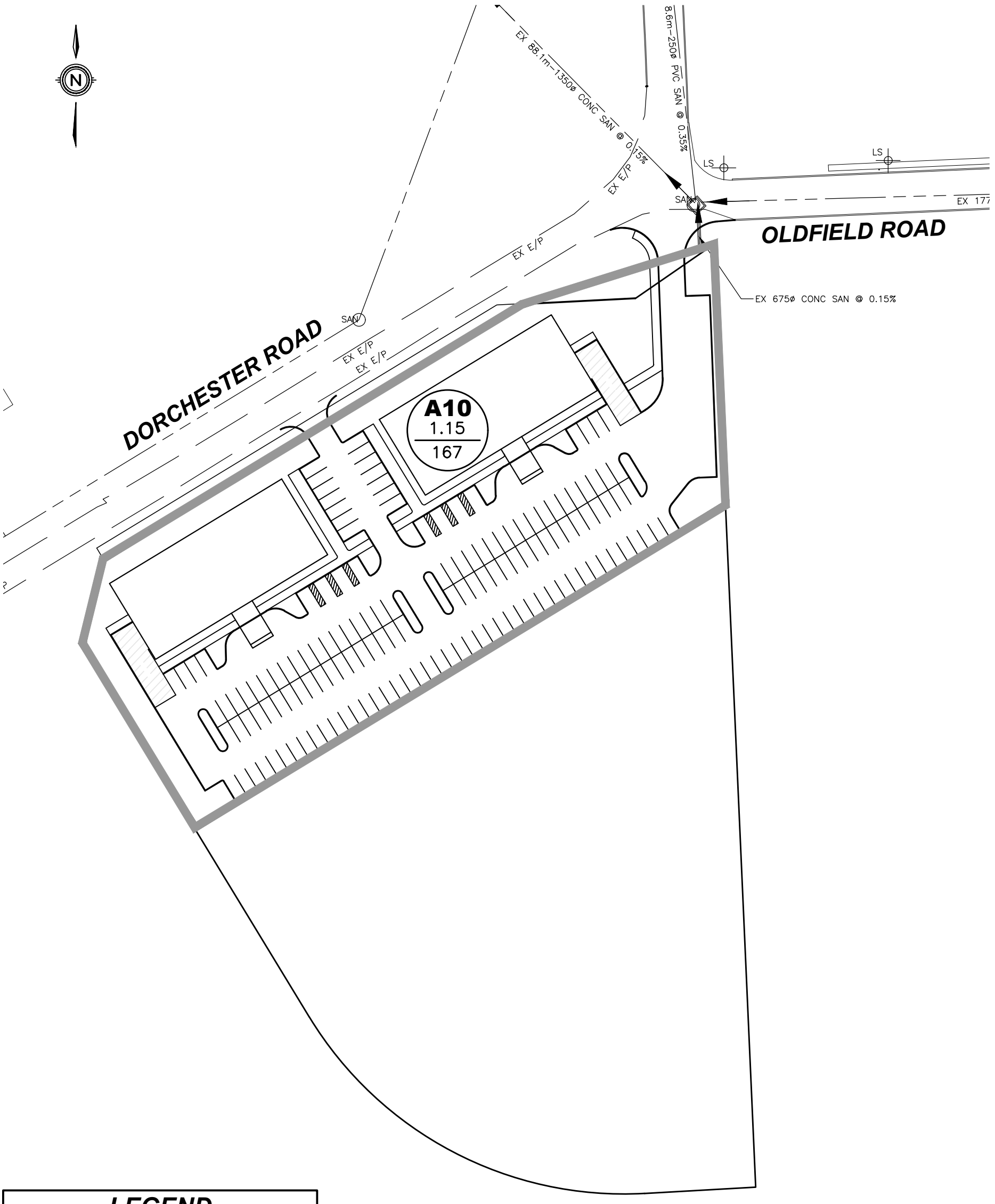
PIPE ROUGHNESS: 0.013 FOR MANNING'S EQUATION
PIPE SIZES: 1.016 IMPERIAL EQUIVALENT FACTOR
PERCENT FULL: TOTAL PEAK FLOW / CAPACITY

MUNICIPALITY: NIAGARA FALLS
PROJECT : DORCHESTER AND OLDFIELD ROAD
PROJECT NO: 2251

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
PROPOSED DEVELOPMENT	PROP	EX	1.15	1.15	106	1.55	164	164	4.18	2.03	0.33	2.35	200	60.0	0.40	0.67	21.64	10.9%
DORCHESTER ROAD	EX	EX		1.15				164	4.18	2.03	0.33	2.35	825	95.1	0.53	1.98	1090.20	0.2%



LEGEND

A10 / 1.15 / 167 — *DRAINAGE AREA NUMBER / DRAINAGE AREA (ha) / NUMBER OF PEOPLE*

DRAINAGE AREA BOUNDARY

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NIGARA FALLS

FUTURE SANITARY DRAINAGE AREA PLAN

DATE	2023–09–25
SCALE	HOR: 1:1000 m
REF. No.	-
DWG No.	2251_SANDA

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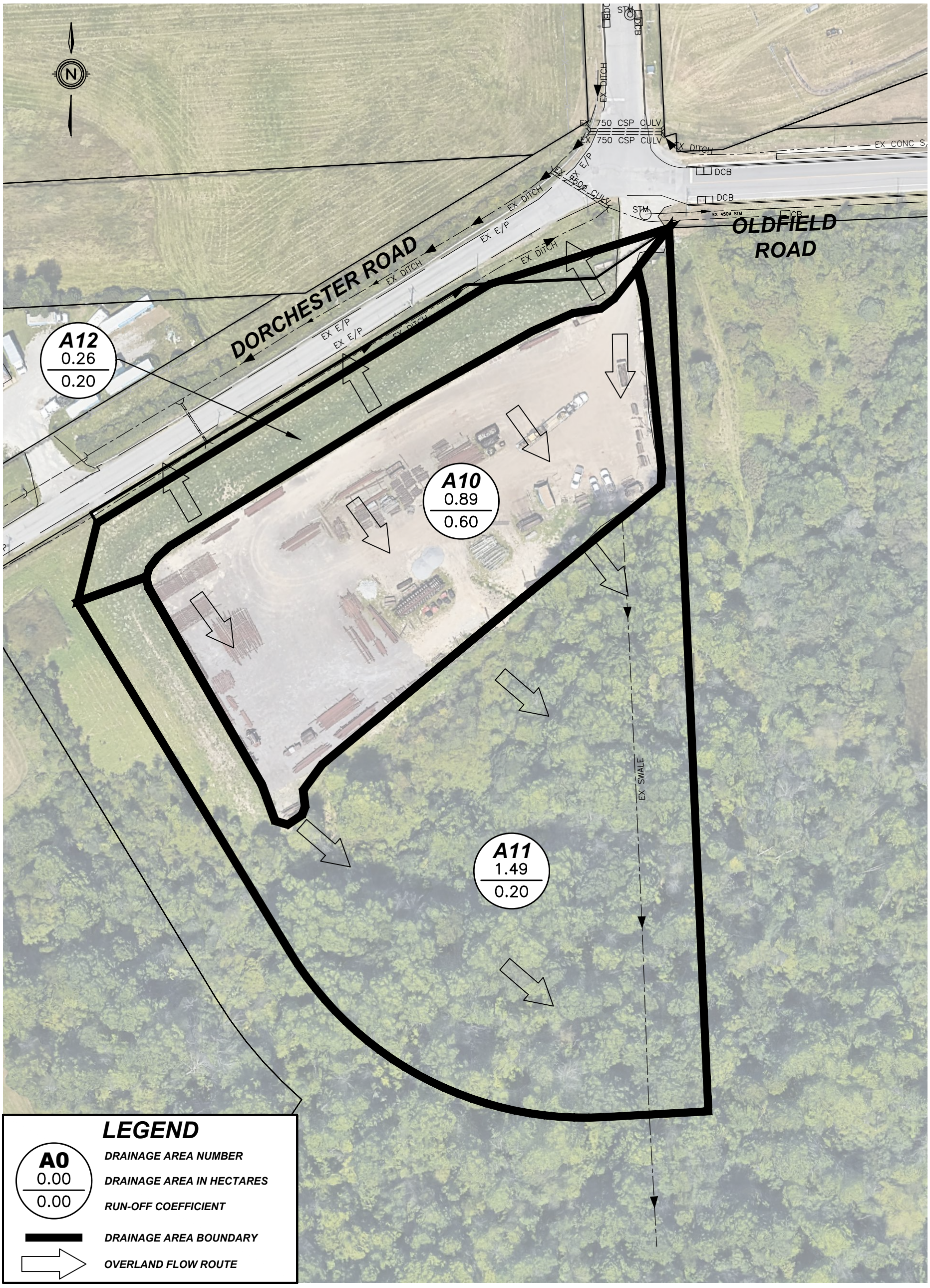
APPENDIX C

Figure 1 - Existing Drainage Area Plan
Figure 2. – Future Drainage Area Plan
Modified Rational Method – Peak Stormwater Flows for 5 Year Storm Event



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NIGARA FALLS

EXSITING STORM DRAINAGE AREA PLAN

DATE	2023–07–19
SCALE	HOR: 1:1000 m
REF. No.	-
DWG No.	FIGURE 1

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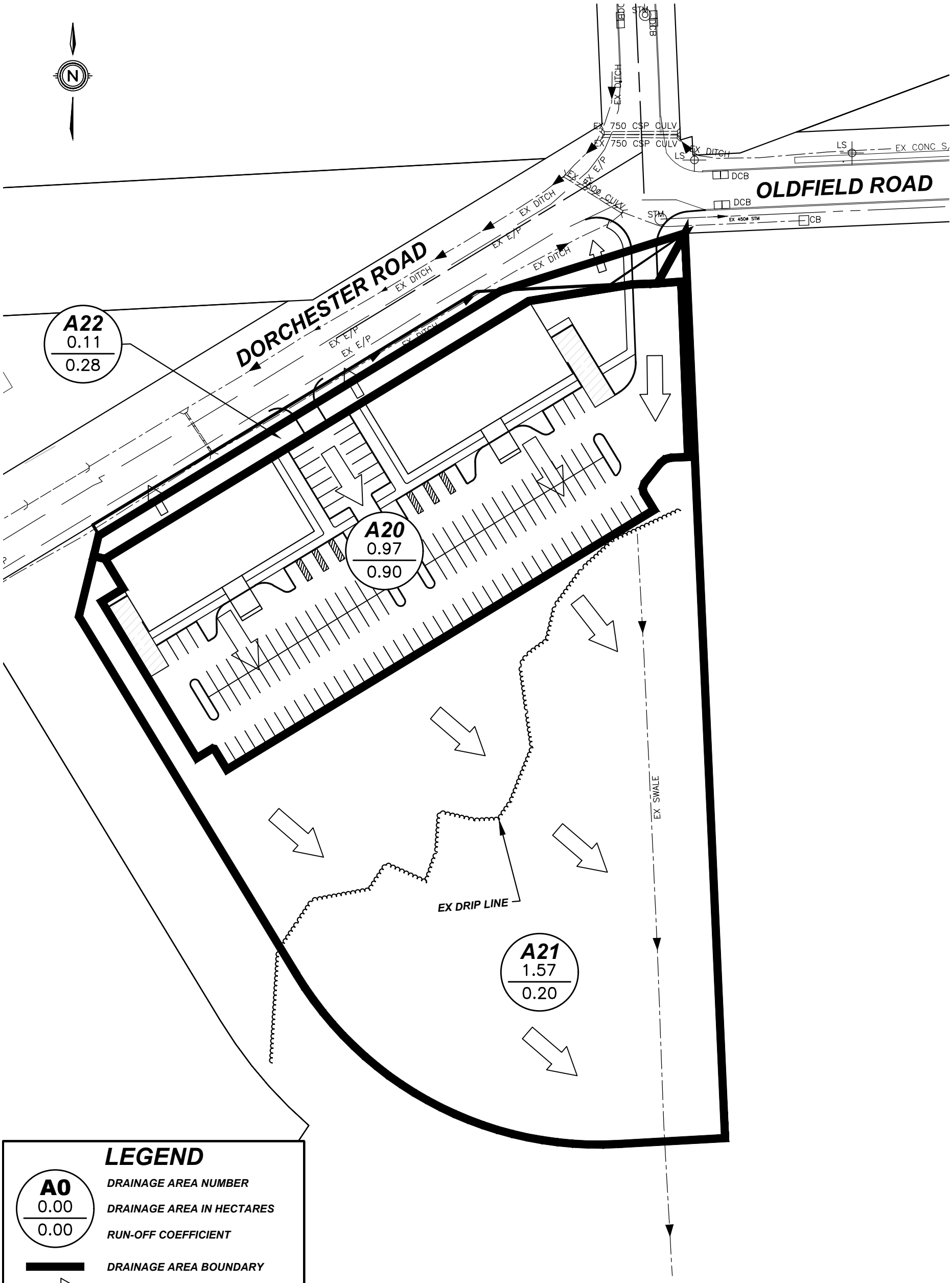

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NIGARA FALLS

FUTURE STORM DRAINAGE AREA PLAN

DATE	2023–09–25
SCALE	HOR: 1:1000 m
REF. No.	-
DWG No.	FIGURE 1

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STORM SEWER DESIGN SHEET

PROJECT: Dorchester Road, Niagara Falls.

	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)**
5 YEAR DESIGN STORM EVENT												
PRE-DEVELOPMENT CONDITIONS												
A10	SITE	SWALE		0.89	0.89	10.00	0.00	0.60	0.534	0.534	83.954	**124.5**
A11	SITE	SWALE		1.49	1.49	10.00	0.00	0.20	0.298	0.298	83.954	**69.5**
DORCHESTER ROAD												
A12	SITE	DORCHESTER RD		0.26	0.26	10.00	0.00	0.20	0.052	0.052	83.954	**12.1**
POST-DEVELOPMENT CONDITIONS												
A20	SITE	SWALE		0.92	0.92	10.00	0.00	0.90	0.828	0.828	83.954	**193.1**
A21	SITE	SWALE		1.57	1.57	10.00	0.00	0.20	0.314	0.314	83.954	**73.2**
DORCHESTER ROAD												
A22	SITE	DORCHESTER RD		0.11	0.11	10.00	0.00	0.28	0.031	0.031	83.954	**7.2**
								Allowable Structure Control Discharge				**120.8**
								Allowable Dorchester Road Discharge				**12.1**

DESIGN BY: **UPPER CANADA CONSULTANTS**
3-30 HANNOVER DRIVE
ST. CATHARINES, ON L2W 1A3
DESIGN BY: **Roberto Duarte, B.Eng.**
DATE: **August 2023**

RAINFALL PARAMETERS:
Time to Upper End = 10 min.
City of Niagara Falls - 5 Year IDF Curve

a = 719.50 mm/hr
b = 6.34 minutes
c = 0.77

Modified Rational Method (MRM) Required Storage Volume

Project:	Dorchester Road, Niagara Falls.
Project No:	2251
Date:	August 8, 2023
Design By:	Roberto Duarte, B.Eng.
Description:	*Stormwater Management Plan, Quantity Control Storage Volume Calculation*

Storm Event: **City of Niagara Falls - 5 Year IDF Curve**

a =	719.50	mm/hr
b =	6.34	minutes
c =	0.77	

Critical Storm Duration:	30.00	minutes	Tail Multiplier (x1-1.5) 1.5
Tc From Design:	10.00	minutes	
Storm Tail Time:	15.00	minutes	
Accumulated Area x R (Ha):	0.828	<-- Area x Runoff Coefficient (Sewer Design Sheet)	
Peak Rainfall Intensity:	68.37	mm/hr	
Peak Inflow at Tc:	157.26	L/s	
Maximum Release Rate:	120.80	<-- Outlet Full Flow Capacity (Design Sheet)	
Time When Outlet Exceeded:	7.68		

Time (min)	Intensity (mm/hr)	Inflow (L/s)	Outflow (L/s)	Interval Volume (m3)	Total Required Volume (m3)
0.0	0.00	0.00	120.80	-7.2	0.0
1.0	6.84	15.73	120.80	-6.3	0.0
2.0	13.67	31.45	120.80	-5.4	0.0
3.0	20.51	47.18	120.80	-4.4	0.0
4.0	27.35	62.90	120.80	-3.5	0.0
5.0	34.19	78.63	120.80	-2.5	0.0
6.0	41.02	94.35	120.80	-1.6	0.0
7.0	47.86	110.08	120.80	-0.6	0.0
8.0	54.70	125.81	120.80	0.3	0.3
9.0	61.54	141.53	120.80	1.2	1.5
10.0	68.37	157.26	120.80	2.2	3.7
11.0	68.37	157.26	120.80	2.2	5.9
12.0	68.37	157.26	120.80	2.2	8.1
13.0	68.37	157.26	120.80	2.2	10.3
14.0	68.37	157.26	120.80	2.2	12.5
15.0	68.37	157.26	120.80	2.2	14.7
16.0	63.81	146.77	120.80	1.6	16.2
17.0	59.26	136.29	120.80	0.9	17.2
18.0	54.70	125.81	120.80	0.3	***17.5***
19.0	50.14	115.32	120.80	-0.3	17.1
20.0	45.58	104.84	120.80	-1.0	16.2
21.0	41.02	94.35	120.80	-1.6	14.6
22.0	36.47	83.87	120.80	-2.2	12.4
23.0	31.91	73.39	120.80	-2.8	9.5
24.0	27.35	62.90	120.80	-3.5	6.0
25.0	22.79	52.42	120.80	-4.1	1.9
26.0	18.23	41.94	120.80	-4.7	0.0
27.0	13.67	31.45	120.80	-5.4	0.0
28.0	9.12	20.97	120.80	-6.0	0.0
29.0	4.56	10.48	120.80	-6.6	0.0
30.0	0.00	0.00	120.80	-7.2	0.0

Variable Storm Duration Storage Requirements

Duration	*Max Storage*	*Duration*	*Max Storage*	*Duration*	*Max Storage*
25 Min	14.4 m3	50 Min	0.0 m3	80 Min	0.0 m3
30 Min	**17.5 m3**	60 Min	0.0 m3	90 Min	0.0 m3
40 Min	9.4 m3	70 Min	0.0 m3	100 Min	0.0 m3