STORMWATER MANAGEMENT REPORT

PROJECT:

WEST MEADOW PH.2 BLOCK 44 APARTMENTS

LOCATED IN PICTON,

THE CORPORATION OF THE COUNTY OF PRINCE EDWARD

DATED: November 2024

REV 01 May 2025

PREPARED FOR:

1083953 Canada Ltd.

141 Main Street, Unit 203

Picton, ON K0K2T0

INSITE PROJECT CONSULTING INC.

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1.0 INTRODUCTION

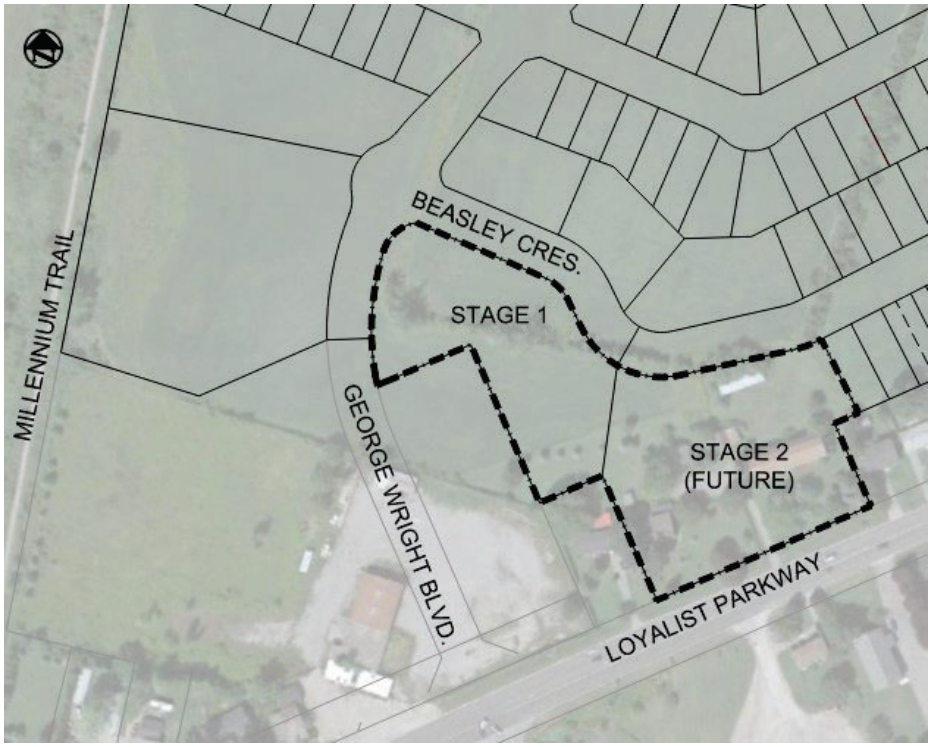
This Report has been prepared to support zoning amendment and site plan approval to construct two apartment buildings in Picton within the Corporation of the County of Prince Edward. The site to be developed is within Block 44 of the West Meadow Phase 2 Subdivision. The proposed development includes a parking lot, and each apartment building will be 3-storeys, one with thirty-six units and one with thirty-two units.

The site area is 0.72 hectares and is located to the northeast of Loyalist Parkway and George Wright Boulevard. Road access will be provided from Beasly Crescent to the north of the site. There are no significant features to be removed from the site for construction, including buildings, trees, or natura/heritage features.

1.1 Overall Development Phasing

The West Meadow Subdivision development is intended to include two high density developments. This Report is for the purpose of approvals related to Stage 1 of the two high density blocks. The engineering design has been prepared in consideration to both stages of development, as they will be serviced by the same infrastructure. The first stage (the first two apartment buildings forming part of the current application for approval) is anticipated to commence construction in 2025, while the future stage is intended to be completed in 2027.

Property Location Map



This Report has been prepared in support of the proposed development to demonstrate how the stormwater drainage conforms with the municipal design requirements and confirm availability of capacity in the receiving system.

1.2 Background Studies

This Report considers the following Studies previously completed in support of Subdivision Registration of the West Meadow Subdivision development:

- Pond Design Brief for SWM Pond in West Meadow Subdivision, dated December 2021 prepared by JF Sabourin and Associates.
- Stormwater Management Report for West Meadow Subdivision, dated December 2021prepared by Ainley Group.
- Stormwater Management Report for Highway 33 Improvements and New Urban Retail Development, dated February 2019 prepared by Jewell Engineering and subsequent Appendices submitted March 2020.
- Geotechnical Investigations Report for West Meadow Phase 2, dated November 8, 2023, prepared by Cambium.

Based on the borehole investigation completed for the Geotechnical Report, depth to groundwater is anticipated to be approximately 2.5m to 4.5m below existing ground and bedrock was encountered approximately 4.0m to 5.5m below existing ground.

2.0 STORMWATER MANAGEMENT DESIGN CRITERIA

2.1 Approved West Meadow Subdivision SWM Report

Based on the 2021 SWM Report by Ainley, the following existing downstream stormwater management systems have been sized to accommodate post-development drainage including quality and quantity controls from the subject lands.

1. The existing SWM Pond within the West Meadow Subdivision, via the existing storm sewer network fronting the property on Beasly Crescent.
2. The existing storm sewer on George Wright Boulevard ultimately draining to the existing SWM Pond south of Loyalist Parkway.
3. The existing underground storage and oil-grit separator within the commercial development to the south of the subject lands.

The proposed development of the Block 44 apartments is to demonstrate how the stormwater drainage conforms with the approved 2021 SWM Report, along with the Quinte Conservation Stormwater Management Guidelines and the Municipality's

Design Manual. In accordance with the approved 2021 SWM Report, the site design has considered the following criteria:

- The development is subject to providing Enhanced Level Protection (80% removal of suspended solids) quality control treatment.
- The subject land is not located within an area regulated by Ontario Regulation, #319/09 - Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses).

2.2 Design Guidelines

Grading and stormwater management for the proposed development has considered the following Guidelines:

- Prince Edward County Engineering Design Guidelines and Technical Standards (currently in draft)
- MECP draft LID Stormwater Management Guidance Manual 2022
- LID Stormwater Planning and Design Guide (CVC/TRCA 2010)
- The Grey to Green Low Impact Development Residential Retrofits Guide, released by CVC.

3.0 PRE-DEVELOPMENT SITE CONDITIONS

The site to be redeveloped is currently vacant and has been cleared of vegetation for imminent development. There are no existing significant environmentally sensitive features to be retained. The surrounding area land use is also urban residential with an urbanized municipal road complete with curb and storm sewer system fronting the property.

Existing overland drainage from the site was reviewed based on the topographic survey completed in May 2023 and onsite review of field conditions. It was confirmed that the site drainage is in general conformance with the Pre-Development Storm Drainage Plan from the 2021 SWM Report. The currently undeveloped lands drain southerly towards existing commercial development and Loyalist Parkway.

4.0 POST-DEVELOPMENT DRAINAGE

4.1 Site Grading and Major System Conveyance

The proposed site grading has been prepared in consideration to the post-development drainage constraints set out in the approved 2021 SWM Report for the West Meadow Subdivision, as summarized above Section 2.0. Surface drainage and

swales provide safe conveyance of the major system overland to perimeter roads. The 5-year storm drainage will be collected by catchbasins and will discharge to various existing storm sewer outlets. The apartment roof leaders will be discharged onto vegetated areas and be conveyed to site drainage swales, where there will be opportunities for infiltration of surface water.

4.2 Drainage to Retail Development (Catchment A1)

Stormwater drainage from the southern portion of the proposed development (catchment A1) will be captured and conveyed to the existing commercial development to the south.

The existing commercial development includes a stormwater management system for the required for quantity and quality controls designed to accommodate pre-development flows from the West Meadow Subdivision. The comparison of the maximum allowable flows to be released from the site (assumed flows included in the 2021 SWM Report) and the proposed flows from the proposed Block 44 apartment development are provided in Appendix B. The results conclude that the post-development flows from Block 44 are less than the maximum allowable flows to be accommodated by the commercial development.

4.3 Drainage to Centralized West Meadow SWM Pond (Catchment B1)

Stormwater drainage from the northern portion of the proposed development (catchment B1) will be captured and conveyed to the existing West Meadows centralized stormwater wet pond, located to the west.

The existing wet pond was constructed by the developer in 2022 and provides the required quality and quantity controls. The facility was sized to accommodate flows from the development. The comparison of the allowable flows to be released from the site to the pond (assumed flows included in the 2021 SWM Report) and the proposed flows from the proposed Block 44 apartment development are provided in Appendix B. The results conclude that the post-development flows from Block 44 Catchment B1 are less than the assumed flows used for the Pond design.

4.4 Drainage to George Wright Boulevard (Catchment D2)

Stormwater drainage from the grassed area along the west side of the proposed development (catchment D1) will be captured and conveyed to the existing storm sewer system on George Wright Boulevard.

The existing storm sewer system ultimately drains to a stormwater management pond to the South of Loyalist Parkway and was designed to accommodate pre-development

flows from the West Meadow Subdivision. The comparison of the allowable flows to be released from the site (maximum flows included in the 2021 SWM Report) and the proposed flows from the proposed Block 44 apartment development are provided in Appendix B. The results conclude that the post-development flows from Block 44 are more than the maximum allowable flows to be released in the downstream storm sewer system and will require quantity control.

4.5 Quantity Control for Existing Drainage along George Wright Boulevard (Catchment D1 and D2)

A 100mm orifice plate will be implemented in CB 209 with 5.2m3 of storage within the upstream swale and sewer to contain the 100-year storm event. Sizing calculations are attached in Appendix C. With this quantity control, stormwater drainage conveyed to the existing storm sewer will meet the allowable peak flow of 17 l/s.

4.6 Future Stage 2 Development Drainage (Catchments B2 and C)

Grading and post-development drainage from the future Stage 2 development will also be subject to the criteria and constraints set out in the approved 2021 SWM Report. As illustrated in the Post-Development drainage plan and the calculations included in Appendix B, onsite quantity control will be required to reduce flows to the maximum flows included in the West Meadow Subdivision design.

5.0 OPERATIONS AND MAINTENANCE FOR PRIVATE SYSTEMS

During winter months, the parking lot and driveway drainage will continue to function with conventional snow clearing of the traffic areas.

As the stormwater management controls will be located within private property, the property owners will be responsible for performing all inspection, maintenance and repair/rehabilitation, and associated record keeping for BMPs. The property owner will be responsible for maintaining an inventory of all BMPs they own and record keeping related to inspection, maintenance and repair, including results from periodic inspections to verify performance. An annual report could be submitted by the property owner to the municipality verifying that the required maintenance activities as defined within the operations manual has been completed and the facility(ies) are functional and meet the designed performance target.

The owner's consulting engineer should supervise and certify construction, which will minimize O&M activities related to improper construction or installation. The Monitoring Plan will include background information, including detailed design and a monitoring plan schedule.

6.0 CONCLUSIONS

- The proposed High Density residential Site Plan is 0.72 hectares and generally located to the northeast of Loyalist Parkway and George Wright Boulevard. The development will consist of two apartment buildings each 3-storeys and a total of sixty-eight units, with a parking lot.
- The existing site is currently vacant and has been cleared of vegetation for imminent development. Lands drain currently southerly towards existing commercial development and Loyalist Parkway.
- Results from Technical Studies prepared by others, which were completed in support of West Meadow Subdivision and the adjacent Loyalist Commercial development, were used for the site's stormwater management design criteria. Based on these studies, three existing offsite stormwater management systems have been designed to accommodate the proposed development.
- The proposed Site Grading and Post-Development Storm Drainage has been designed to convey drainage in accordance with the previously approved Technical Studies.
- Based on the post-development flows calculated for the majority of the site, there is no onsite stormwater management controls required for drainage to the receiving downstream systems including the existing West Meadow stormwater management pond, and the existing Loyalist commercial development stormwater management controls.
- Based on the post-development flows calculated for the grassed area along the western limit, the assumed flows included in the design of the downstream system design along George Wright Boulevard will be marginally exceeded, and an orifice control will be added to the catchbasin before connecting to the existing sewer system.

7.0 REPORT LIMITATIONS

General content, findings and results included in this report are based on information made available by the client, municipality, and external parties at the time of its writing. It has been assumed that the information provided is accurate and reliable, unless expressly noted otherwise. INSITE will not be held responsible or accountable for any errors, omissions or misleading information provided by others. Any changes in material following the provision of services and submission of the Report that may result in outdated and incorrect information is not collected by INSITE for the purpose of maintaining the Report current, unless expressly requested by the client.

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It is expected that INSITE be promptly notified of such occurrences.

This Report has been prepared by:

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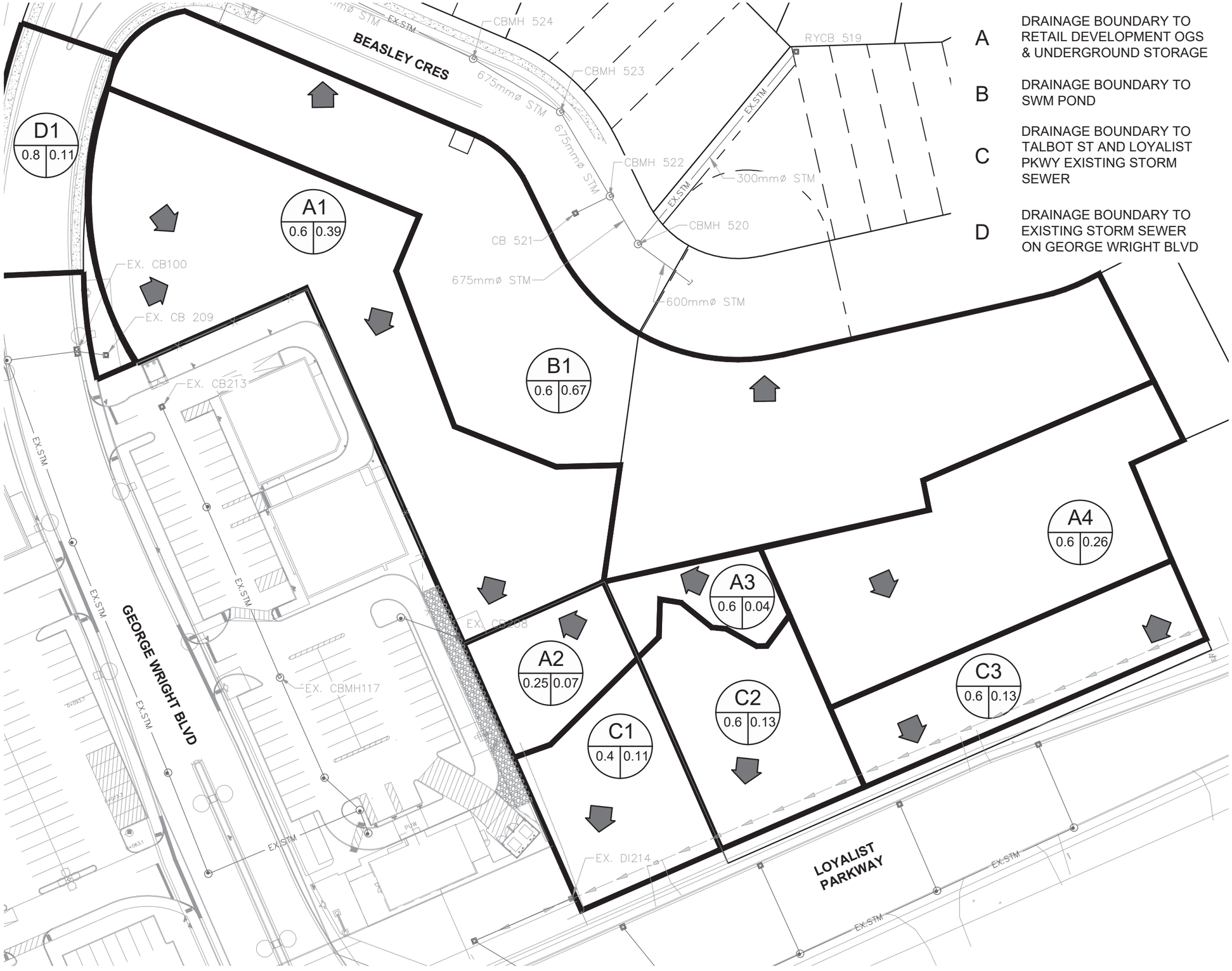
FIGURES



A — DRAINAGE BOUNDARY TO RETAIL DEVELOPMENT OGS & UNDERGROUND STORAGE

B — DRAINAGE BOUNDARY TO SWM POND

C — DRAINAGE BOUNDARY TO TALBOT ST AND LOYALIST PKWY EXISTING STORM SEWER

D — DRAINAGE BOUNDARY TO EXISTING STORM SEWER ON GEORGE WRIGHT BLVD

CLIENT

Port Picton HOMES

PROJECT 22-104

WEST MEADOW PHASE 2 SITE PLAN

LEGEND

- DRAINAGE BOUNDARY
- OVERLAND FLOW DIRECTION
- A1 (0.6 | 5.0) — DRAINAGE ID; AREA (Ha); RUNOFF COEFFICIENT

INSITE PROJECT CONSULTING INC.

REVISIONS

#	M/D/Y	BY	ISSUED FOR
1	05/27/25	N.D	SITE PLAN AGREEMENT

DRAWING TITLE

PRE-DEVELOPMENT DRAINAGE

SCALE	DWG. NO.
1:750	1

SHEET: ANSI B (11" X 17")

C:\USERS\NOAH\PINSITE PROJECT CONSULTING INC\INSITE PROJECT CONSULTING - PROJECTS\22-104 WEST MEADOW PH2 SITE PLAN\DRAWING\03 FIGURES\PRE-DEVELOPMENT DRAINAGE.DWG

APPENDIX A

- Post Development Drainage Plans from the 2021 West Meadow Subdivision Stormwater Management Report
- Post Development Drainage Plan and Storm sewer design sheets from the Highway 33 Improvements and New Urban Retail Development SWM Report Appendices issued in 2020.

LEGEND:

- DRAINAGE AREA NAME / DRAINAGE AREA (ha)
- OVERLAND FLOW DIRECTION
- EXISTING CONTOUR
- EXISTING STORM SEWERS
- PROPOSED SWALE
- LIMIT OF SUBDIVISION
- DRAINAGE BOUNDARY TO TALBOT ST AND LOYALIST PKWY EXISTING STORM SEWER
- DRAINAGE BOUNDARY TO SWM POND
- OVERALL DRAINAGE BOUNDARY TO SWM POND
- DRAINAGE BOUNDARY TO RETAIL DEVELOPMENT OGS AND UNDERGROUND STORAGE
- DRAINAGE BOUNDARY TO EXISTING STORM SEWER ON GEORGE WRIGHT BLVD
- DRAINAGE BOUNDARY TO LOYALIST PARKWAY ST-L1
- DRAINAGE BOUNDARY TO MILLENNIUM TRAIL EXISTING CULVERT

MILLENNIUM TRAIL
12 ACRES ON TALBOT SUBDIVISION
FUTURE 12AC SUBDIVISION OWNED BY DEVELOPER
TALBOT STREET
ARGYLE CRESCENT
CRESCENT D
STREET A
STREET B
STREET C
STREET E
STREET F
BLOCK 60
BLOCK 61
BLOCK 62
BLOCK 63
BLOCK 64
BLOCK 65
BLOCK 101
BLOCK 102
BLOCK 201
BLOCK 202
BLOCK 203
BLOCK 204
SWM POND
SWM FACILITY BLOCK 61
PARK
PARK-1
OPEN SPACE BLOCK 60
0.3m RESERVE BLOCK 66
0.3m RESERVE BLOCK 67
EXISTING MILLENIUM TRAIL CULVERT
EXISTING STORM SEWER ON GEORGE WRIGHT BLVD
EXISTING STORM SEWER TO COMMERCIAL BLOCK OGS AND UNDERGROUND STORAGE
GEORGE WRIGHT BOULEVARD
EXISTING DI102
EXISTING ROADSIDE SWALE NORTH OF LOYALIST PARKWAY
LOYALIST PARKWAY
10.00m EASEMENT
DRAINAGE TO ST-L1
REFER TO STM 1A FOR DRAINAGE TO TALBOT STREET
BM 106.917 TOP NUT OF FH
102.27HP

K:\Projects\21507- West Meadow Subdivision\21507-1 Project\Drawing_civil\Exhibits\21507-1 Post Development Drainage to SWM pond - Detailed Design.dwg 2021-12-06 2:07 PM

REV.#	REVISIONS	DATE	INITIAL
1	ISSUED FOR PRE-SERVICING AGREEMENT PHASE 2	11/24/2021	ND

Not Valid Unless Signed And Dated

SCALE: 1:1250
DESIGN: AD/SO/DY
DRAWN: AD/SO/DY
CHECKED: ND
DATE: NOV 2021

10838772 CANADA LTD
WEST MEADOW SUBDIVISION
PICTON, ON

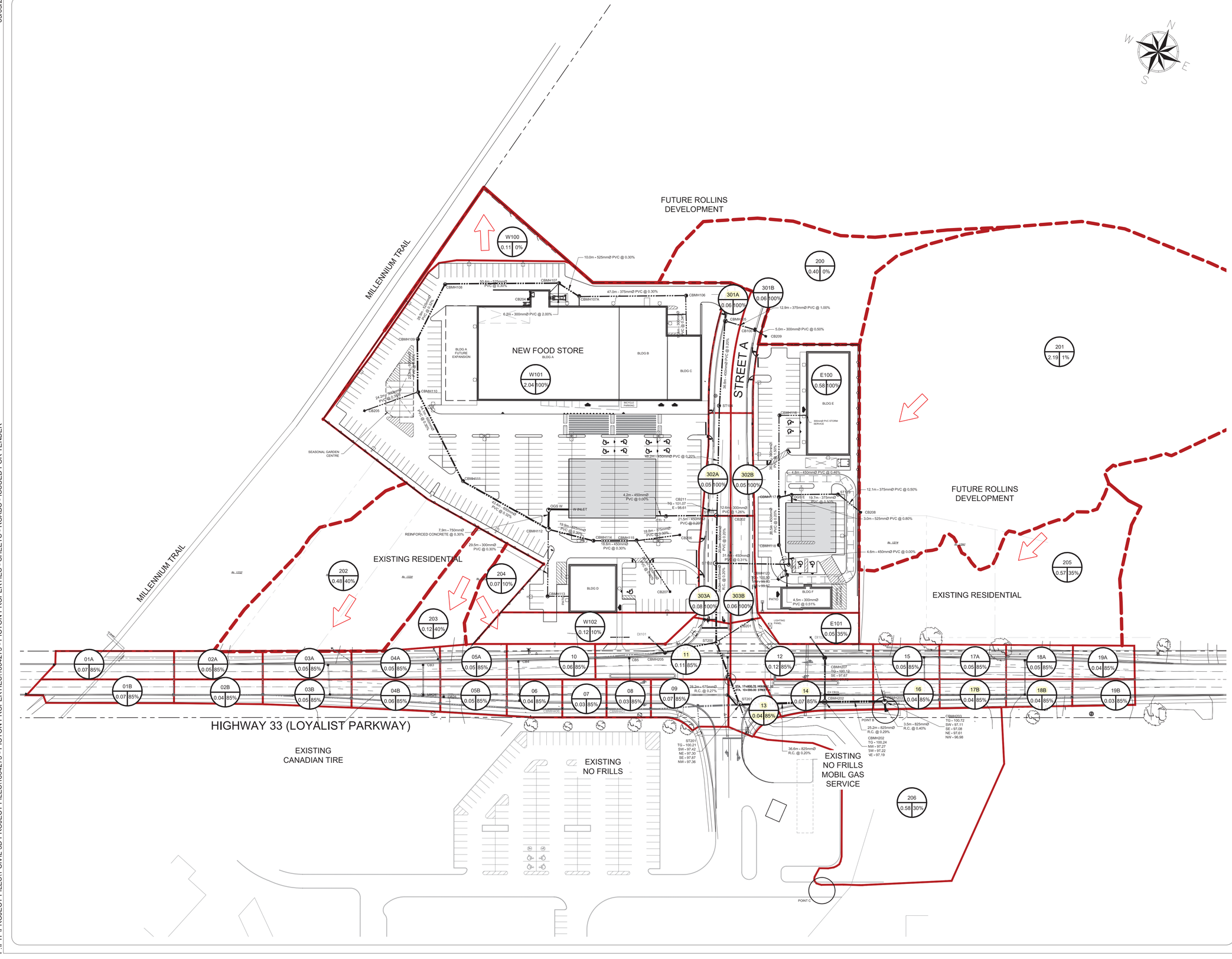
POST DEVELOPMENT DRAINAGE PLAN TO SWM POND

Ainley GROUP CONSULTING ENGINEERS PLANNERS

CONTRACT No. 21507-1 | DWG STM 1B

03/03/2020

F:\FTPROJECT FILES\1 CIVIL 3D PROJECT FILES\1804275 - PICTON PROPERTIES\1804275 - PICTON PROPERTIES - SHEETS - ROADS - ISSUED FOR TENDER



GENERAL NOTES:

ALL INFORMATION TO BE VERIFIED ON SITE PRIOR TO COMMENCING ANY WORK. ANY DISCREPANCIES ARE TO BE REPORTED TO THE CONSULTANT IMMEDIATELY.

ALL UTILITY LOCATIONS SHOWN ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR SHALL CONFIRM THE LOCATION ON SITE AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES.

EXCLUDING THE BENCHMARK AND DESCRIPTION PROVIDED FOR THIS PROJECT, NO OTHER ELEVATIONS ARE TO BE USED AS A REFERENCE ELEVATION FOR ANY PURPOSE.

METRIC NOTE:

ALL DIMENSIONS SHOWN ARE IN METRES OR MILLIMETRES, UNLESS OTHERWISE NOTED.

* * DRAWINGS ARE NOT TO BE SCALED * *

REVISIONS

NO.	DATE	DESCRIPTION	BY
2	05/21/19	AS PER CITYS COMMENTS - MAY 10, 2019	BNW
3	06/21/19	AS PER PEC COMMENTS	BNW
4	08/20/19	AS PER CLIENTS COMMENTS	BNW
5	09/12/19	SITE PLAN APPROVAL	BNW
6	12/10/19	FOR MTO APPROVAL	DFM
7	12/02/20	FOR MTO APPROVAL	DFM
8	03/03/20	FOR MTO APPROVAL	DFM

LEGEND

CATCHMENT AREA (ha) — 100 / 0.45 / 0% — CATCHMENT ID; % IMPERVIOUS

INTERNAL CATCHMENT BOUNDARY

EXTERNAL CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION

JEWELL ENGINEERING

PICTON PROPERTIES

13300 LOYALIST PARKWAY

PICTON, ONTARIO

POST-DEVELOPMENT
STORM
CATCHMENTS

DRAWN BY: JH/EP/BNW
PROJECT NO: 180-4275
DESIGNED BY: JH/BK/EP
DATE: March 2020
CHECKED BY: BK
SCALE: HORIZONTAL - 1:750 VERTICAL - N/A
APPROVED BY: BK
CONTRACT NO:
DRAWING NO: SWM-3

Appendix G

Storm Sewer Design Sheets (East, West, and Combined)

STORM SEWER DESIGN SHEET - EAST DEVELOPMENT

Peak Runoff Estimate by Rational Method

$$Q = \frac{1}{360} C\, i\, A$$

Where:

Q = Peak Flow in cms
C = Runoff Coefficient
i = Rainfall Intensity in mm/hr
A = Area in hectares

Intensity from MTO IDF Look-Up

$$i = A * T_c^B$$

Where:

i = Rainfall Intensity in mm/hr
T_c Time of Concentration in minutes

100-Year Parameters

	47
	-0.699

Manning's Coef

CSP	0.024
RCP/PVC	0.013

Pipe Capacity by Manning's Equation

$$Q = \frac{1}{n} A R^{2/3} S^{1/2}$$

Where:

A = area of pipe in m^2
R = Hydraulic radius = A / P
P = Wetted perimeter
S = Slope (m/m)
n = Manning's friction coef.

Check
$q \leq Q$
$V \leq 6\ m/s$

			PEAK FLOW CALCULATION									EXISTING SEWER							
LOCATION	FROM	TO	CATCHMENT AREAS (HA) RUNOFF COEFFICIENT 0.25	0.56	0.75	0.98	R.C. x A ha	CUM. R.C x A ha	TIME OF CONCENTRATION min	INTENSITY mm/hr	PEAK FLOW m^3/s	Pipe Size (mm)	Length (m)	Type of Pipe	Grade *(use m/m)* (%)	Capacity, n = 0.013 (m^3/s)	Full Flow Velocity (m/s)	Time of Flow min	Actual Velocity at Q_d (m/s)	Check Capacity	q/Q
	Building E	*CBMH116*				0.0900	0.09	0.09	15.0	123.9	0.030	300	11.33	PVC	*2.50%*	0.153	2.16	0.09	1.68	OK	0.20
1014	*CBMH116*	***CBMH117***				0.1500	0.15	0.24	15.0	123.9	0.081	300	36.00	PVC	*1.50%*	0.118	1.68	0.36	1.80	OK	0.68
	Building F	CBMH120				0.0200	0.02	0.02	15.0	123.9	0.007	300	4.50	PVC	*0.51%*	0.069	0.98	0.08	0.62	OK	0.10
1017	CBMH120	CBMH118				0.0700	0.07	0.09	15.0	123.9	0.030	300	14.18	PVC	*1.33%*	0.112	1.58	0.15	1.34	OK	0.27
1016	*CBMH118*	***CBMH117***				0.1700	0.17	0.25	15.0	123.9	0.088	450	20.50	PVC	*0.20%*	0.128	0.80	0.43	0.86	OK	0.69
1015	*CBMH117*	***OGS E***				0.0800	0.08	0.57	15.4	121.5	0.192	450	6.00	PVC	*0.46%*	0.193	1.22	0.08	1.38	OK	0.99
201	*CB208*	*ST119*	2.1900				0.55	0.55	33.3	70.9	0.108	375	12.10	Concrete	*0.50%*	0.124	1.12	0.18	1.27	OK	0.87
	ST119	***OGS E***					0.00	0.55	33.5	70.7	0.108	375	19.70	Concrete	*0.50%*	0.124	1.12	0.29	1.26	OK	0.87
	OGS E	***East SWM Facility***					0.00	1.12	15.5	121.0	0.375	525	3.00	Concrete	*0.80%*	0.385	1.78	0.03	2.02	OK	0.98
						2.7700	**1.12**	**1.12**													
						Area	**Sum RxA**														

Jewell Engineering Inc
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Belleville, ON, K8N 4Z5
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Fx. 613-969-8988
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Designed:	Julie Humphries
Revised:	Elliott Fledderus, P. Eng.
Checked:	Bryon Keene, P.Eng.
Date:	Tuesday, February 25, 2020

Project:
Picton Properties
East Development

STORM SEWER DESIGN SHEET - WEST DEVELOPMENT

Peak Runoff Estimate by Rational Method

$$Q = \frac{1}{360} C\, i\, A$$

Where:

Q = Peak Flow in cms
C = Runoff Coefficient
i = Rainfall Intensity in mm/hr
A = Area in hectares

Intensity from MTO IDF Look-Up

$$i = A * T_c^B$$

Where:

i = Rainfall Intensity in mm/hr
T_c Time of Concentration in minutes

100-Year Parameters

47
-0.699

Manning's Coef

CSP 0.024
RCP/PVC 0.013

Pipe Capacity by Manning's Equation

$$Q = \frac{1}{n} A R^{2/3} S^{1/2}$$

Where:

A = area of pipe in m^2
R = Hydraulic radius = A / P
P = Wetted perimeter
S = Slope (m/m)
n = Manning's friction coef.

Check
$q \leq Q$
$V \leq 6\ m/s$

			PEAK FLOW CALCULATION										EXISTING SEWER								
Catchment	FROM	TO	CATCHMENT AREAS (HA) RUNOFF COEFFICIENT 0.25	0.31	0.44	0.98	R.C. x A ha	CUM. R.C x A ha	TIME OF CONCENTRATION min	INTENSITY mm/hr	PEAK FLOW m^3/s	Pipe Size (mm)	Length (m)	Type of Pipe	Grade *(use m/m)* (%)	Capacity, n = 0.013 (m^3/s)	Full Flow Velocity (m/s)	Time of Flow min	Actual Velocity at Q_d (m/s)	Check Capacity	q/Q
	Building A	***CBMH107***				0.34	0.33	0.33	15.0	123.9	0.115	300	9.90	PVC	*2.00%*	0.137	1.93	0.09	2.17	OK	0.84
	Building B	***CBMH106***				0.10	0.10	0.10	15.0	123.9	0.034	300	8.25	PVC	*0.30%*	0.053	0.75	0.18	0.79	OK	0.64
	Building C	***CBMH106***				0.05	0.05	0.05	15.0	123.9	0.017	300	17.30	PVC	*0.34%*	0.056	0.80	0.36	0.70	OK	0.30
1000	*CBMH106*	*CBMH107*				0.07	0.07	0.22	15.0	123.9	0.074	375	47.00	PVC	*0.30%*	0.096	0.87	0.90	0.96	OK	0.77
1002	*CB204*	*CBMH107*				0.10	0.10	0.10	15.0	123.9	0.034	CB204 located in loading zone and pumped to ST107.									
1001	*CBMH107*	*CBMH108*				0.06	0.06	0.71	15.9	118.9	0.233	525	50.39	PVC	*0.30%*	0.236	1.09	0.77	1.24	OK	0.99
1003	*CBMH108*	*CBMH109*				0.04	0.04	0.74	16.7	115.0	0.238	525	26.90	PVC	*0.32%*	0.243	1.12	0.40	1.28	OK	0.98
1004	*CBMH109*	*CBMH110*				0.07	0.07	0.81	17.1	113.2	0.256	600	22.90	Concrete	*0.30%*	0.336	1.19	0.32	1.31	OK	0.76
1005	*CB205*	*CBMH110*				0.09	0.09	0.09	15.0	123.9	0.030	300	24.24	PVC	*0.35%*	0.057	0.81	0.50	0.82	OK	0.53
1006	*CBMH110*	*CBMH111*				0.05	0.05	0.95	17.4	111.7	0.295	600	44.10	Concrete	*0.30%*	0.336	1.19	0.62	1.34	OK	0.88
1007	*CBMH111*	*CBMH112*				0.19	0.19	1.14	18.0	109.0	0.344	600	43.40	Concrete	*0.32%*	0.347	1.23	0.59	1.40	OK	0.99
	Building D	*CBMH113*				0.05	0.05	0.05	14.0	130.0	0.018	300	8.76	PVC	*0.30%*	0.053	0.75	0.19	0.67	OK	0.33
1008	*CBMH113*	*CBMH112*				0.05	0.05	0.10	15.0	123.9	0.034	300	29.50	PVC	*0.30%*	0.053	0.75	0.66	0.79	OK	0.64
1009	*CB207*	*CBMH115*				0.09	0.09	0.09	15.0	123.9	0.030	300	26.40	PVC	*0.30%*	0.053	0.75	0.59	0.77	OK	0.57
1010	*CB206*	*CBMH115*				0.15	0.15	0.15	15.0	123.9	0.051	375	18.80	PVC	*0.30%*	0.096	0.87	0.36	0.88	OK	0.53
1011	*CBMH115*	*CBMH114*				0.14	0.14	0.37	15.4	121.8	0.126	450	18.60	PVC	*0.30%*	0.156	0.98	0.32	1.10	OK	0.81
1012	*CBMH114*	*CBMH112*				0.15	0.14	0.51	15.7	120.1	0.172	525	19.90	PVC	*0.30%*	0.236	1.09	0.30	1.19	OK	0.73
1013	*CBMH112*	*OGS W*				0.26	0.25	2.00	18.6	106.6	0.592	750	7.90	Concrete	*0.30%*	0.610	1.38	0.10	1.57	OK	0.97
	OGS W	*West SWM Facility*				0.00	0.00	2.00	18.7	106.2	0.590	750	8.35	Concrete	*0.45%*	0.747	1.69	0.08	1.89	OK	0.79
						2.04	**2.00**	**2.00**													
TOTAL						**Area**	**Sum RxA**														

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Designed:	Julie Humphries
Revised:	Elliott Fledderus, P. Eng.
Checked:	Bryon Keene, P.Eng.
Date:	Monday, February 10, 2020

Project:
Picton Properties
West Development

POST STORM SEWER DESIGN SHEET - COMBINED PICTON PROPERTIES DEVELOPMENT AND HIGHWAY 33 IMPROVEMENTS

Peak Runoff Estimate by Rational Method

$$Q = \frac{1}{360} C\, i\, A$$

Where:

Q = Peak Flow in cms
C = Runoff Coefficient
i = Rainfall Intensity in mm/hr
A = Area in hectares

Intensity from MTO IDF Lookup

$$i = A * T_c^B$$

Where:

i Rainfall Intensity in mm/hr
T_c Time of Concentration in minutes

100-Year Parameters

47
-0.699

Manning's Coef

CSP 0.024
RCP/PVC 0.013

Pipe Capacity by Manning's Equation

$$Q = \frac{1}{n} A R^{2/3} S^{1/2}$$

Where:

A = area of pipe in m^2
R = Hydraulic radius = A / P
P = Wetted perimeter
S = Slope (m/m)
n = Manning's friction coef.

Check
$q \leq Q$
$V \leq 6\ m/s$

LOCATION	FROM	TO	PEAK FLOW CALCULATION: CATCHMENT AREAS (HA) RUNOFF COEFFICIENT 0.25	0.31	0.44	0.56	0.98	R.C. x A ha	CUM. R.C x A ha	TIME OF CONCENTRATION min	INTENSITY mm/hr	PEAK FLOW m^3/s	EXISTING SEWER: Pipe Size (mm)	Length (m)	Type of Pipe	Grade (use m/m) (%)	Capacity, n = 0.013 (m^3/s)	Full Flow Velocity (m/s)	Time of Flow min	Actual Velocity at Q_d (m/s)	Check Capacity	q/Q
External																						
200	CB209	CB100	0.40					0.10	0.10	17.4	111.7	0.031	300	5.0	PVC	0.50%	0.068	0.97	0.09	0.94	OK	0.45
Street A																						
301A	CBMH100	CBMH105					0.06	0.05	0.15	17.5	111.3	0.048	375	12.9	PVC	1.00%	0.175	1.59	0.14	1.35	OK	0.27
301B	CBMH105	ST104					0.06	0.05	0.21	17.6	110.7	0.064	450	36.8	PVC	0.20%	0.128	0.80	0.77	0.80	OK	0.50
302A	CB211	450 PVC ST104-103					0.05	0.05	0.05	10.0	164.4	0.023	300	3.5	PVC	2.00%	0.137	1.93	0.03	1.43	OK	0.17
	ST104	**ST103**						0.00	0.26	18.4	107.4	0.077	450	48.2	PVC	0.20%	0.128	0.80	1.00	0.83	OK	0.60
302B	CB202	**ST103**					0.05	0.05	0.05	10.0	164.1	0.021	300	12.6	PVC	1.26%	0.109	1.54	0.14	1.19	OK	0.20
Addition of West SWM Outlet	W OUTLET	CTL 1						*FROM JEWELL SWM REPORT (100-YR)*				**0.022**	450	4.2	PVC	0.00%						
	CTL 1	**ST103**										0.022	450	21.4	PVC	0.20%	0.128	0.80	0.44	0.60	OK	0.17
Street A																						
	ST103	ST102						0.00	0.30	19.4	103.5	0.110	600	20.0	PVC	0.20%	0.275	0.97	0.34	0.91	OK	0.40
Addition of East SWM Outlet	E OUTLET	CTL 2						*FROM JEWELL SWM REPORT (100-YR)*				**0.090**	450	4.6	PVC	0.00%						
	CTL 2	ST102										0.090	450	31.4	PVC	0.31%	0.159	1.00	0.52	1.02	OK	0.57
303A	CB210	675 RC ST102-200					0.08	0.08	0.08	10.0	164.4	0.036	300	4.6	PVC	0.30%	0.053	0.75	0.10	0.80	OK	0.68
	ST102	**ST200**						0.00	0.38	19.7	102.3	0.221	675	34.0	CONCRETE	0.20%	0.376	1.05	0.54	1.09	OK	0.59
303B	CB201	**ST200**					0.06	0.06	0.06	10.0	164.4	0.027	300	17.8	PVC	0.30%	0.053	0.75	0.40	0.75	OK	0.51
204, W102	DI101	CBMH205			0.19			0.08	0.08	12.5	140.7	0.145	450	8.6	PVC	4.00%	0.570	3.59	0.04	2.99	OK	0.25
								0.00														
205, E101	DI102	CBMH207			0.62			0.27	0.27	8.7	181.3	0.137	450	11.1	PVC	1.00%	0.285	1.79	0.10	1.77	OK	0.48
Hwy. 33 - West of Point. B & Street A																						
11	CBMH205	**ST200**					0.11	0.11	0.19	10.0	164.4	0.087	450	22.1	PVC	0.25%	0.143	0.90	0.41	0.94	OK	0.61
1-9, 202, 203	ST409	**ST201**			0.60		0.71	0.96	0.96	13.1	135.9	0.362	675	18.9	CONCRETE	0.35%	0.497	1.39	0.23	1.52	OK	0.73
	ST200	**ST201**						0.00	0.63	20.3	100.3	0.289	675	30.1	CONCRETE	0.25%	0.420	1.17	0.43	1.26	OK	0.69
13	ST201	**CBMH202**					0.04	0.04	1.63	20.7	98.9	0.561	825	36.6	CONCRETE	0.20%	0.642	1.20	0.51	1.35	OK	0.87
12	CBMH207	**CBMH202**					0.12	0.12	0.39	8.8	179.8	0.194	450	17.8	PVC	1.00%	0.285	1.79	0.17	1.92	OK	0.68
14	CBMH202	**CBMH203**					0.07	0.07	2.09	21.2	97.2	0.677	825	26.9	CONCRETE	0.29%	0.773	1.45	0.31	1.63	OK	0.88
Hwy. 33 - East of Point B & Street A																						
15	CB308	**CBMH203**					0.05	0.05	0.05	10.0	164.0	0.022	300	21.0	PVC	0.50%	0.068	0.97	0.36	0.86	OK	0.33
17-19	CBMH410	**CBMH203**					0.25	0.25	0.25	11.0	153.5	0.105	375	24.8	PVC	1.00%	0.175	1.59	0.26	1.65	OK	0.60
16	CBMH203	**Point B**					0.04	0.04	2.43	21.5	96.3	0.761	825	3.8	CONCRETE	0.40%	0.908	1.70	0.04	1.91	OK	0.84
							3.55	**2.43**	**2.43**													
							Area	**Sum RxA**														

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From Dillon storm network
From Jewell SWM Report
Revised values by Jewell Feb. 26, 2020

Designed: Julie Humphries (Monday, July 8, 2019)
Revised: Elliott Fledderus, P. Eng.
Date: 2/26/2020

Project:
Picton Properties Development and Highway 33 Improvements
Combined Storm Sewer Design Sheet

POST STORM SEWER DESIGN SHEET - STREET 'A' AND PICTON PROPERTIES WEST SIDE ONLY AND HIGHWAY 33 IMPROVEMENTS

Peak Runoff Estimate by Rational Method

$$Q = \frac{1}{360}\, C\, i\, A$$

Where:

Q = Peak Flow in cms
C = Runoff Coefficient
i = Rainfall Intensity in mm/hr
A = Area in hectares

Intensity from MTO IDF Lookup

$$i = A * T_c^B$$

Where:

i = Rainfall Intensity in mm/hr
T_c = Time of Concentration in minutes

100-Year Parameters

A = 47
B = -0.699

Manning's Coef

CSP	0.024
RCP/PVC	0.013

Pipe Capacity by Manning's Equation

$$Q = \frac{1}{n}\, A\, R^{2/3}\, S^{1/2}$$

Where:

A = area of pipe in m^2
R = Hydraulic radius = A / P
P = Wetted perimeter
S = Slope (m/m)
n = Manning's friction coef.

Check

$q \leq Q$
$V \leq 6\ m/s$

LOCATION	FROM	TO	PEAK FLOW CALCULATION										EXISTING SEWER									
			CATCHMENT AREAS (HA) RUNOFF COEFFICIENT					R.C. x A	CUM. R.C x A	TIME OF CONCENTRATION	INTENSITY	PEAK FLOW	Pipe Size	Length	Type of Pipe	Grade *(use m/m)*	Capacity, n = 0.013	Full Flow Velocity	Time of Flow	Actual Velocity at Q_d	Check Capacity	q/Q
			0.25	0.31	0.44	0.56	0.98	ha	ha	min	mm/hr	m^3/s	(mm)	(m)		(%)	(m^3/s)	(m/s)	min	(m/s)		
External																						
200	CB209	CB100	0.40					0.10	0.10	17.4	111.7	0.031	300	5.0	PVC	0.50%	0.068	0.97	0.09	0.94	OK	0.45
Street A																						
301A	CB100	CBMH105					0.06	0.05	0.15	17.5	111.3	0.048	375	12.9	PVC	1.00%	0.175	1.59	0.14	1.35	OK	0.27
301B	CBMH105	ST104					0.06	0.05	0.21	17.6	110.7	0.064	450	36.8	PVC	0.20%	0.128	0.80	0.77	0.80	OK	0.50
302A	CB211	450 PVC ST104-103					0.05	0.05	0.05	10.0	164.4	0.023	300	3.5	PVC	2.00%	0.137	1.93	0.03	1.43	OK	0.17
	ST104	**ST103**						0.00	0.26	18.4	107.4	0.077	450	48.2	PVC	0.20%	0.128	0.80	1.00	0.83	OK	0.60
302B	CB202	**ST103**					0.05	0.05	0.05	10.0	164.1	0.021	300	12.6	PVC	1.26%	0.109	1.54	0.14	1.19	OK	0.20
Addition of West SWM Outlet	W OUTLET	CTL 1						*FROM JEWELL SWM REPORT (100-YR)*				**0.022**	450	4.2	PVC	0.00%						
	CTL 1	**ST103**										0.022	450	21.4	PVC	0.20%	0.128	0.80	0.44	0.60	OK	0.17
Street A																						
	ST103	ST102						0.00	0.30	19.4	103.5	0.110	600	20.0	PVC	0.20%	0.275	0.97	0.34	0.91	OK	0.40
Addition of East SWM Outlet	E OUTLET	CTL 2						*Assume Parcel B Not Developed*				**0.000**	450	4.6	PVC	0.00%						
	CTL 2	ST102										0.000	450	31.4	PVC	0.31%	0.159	1.00	0.52	0.00	OK	0.00
303A	CB210	675 RC ST102-200					0.08	0.08	0.08	10.0	164.4	0.036	300	4.6	PVC	0.30%	0.053	0.75	0.10	0.80	OK	0.68
	ST102	**ST200**						0.00	0.38	19.7	102.3	0.131	675	34.0	CONCRETE	0.20%	0.376	1.05	0.54	0.95	OK	0.35
303B	CB201	**ST200**					0.06	0.06	0.06	10.0	164.4	0.027	300	17.8	PVC	0.30%	0.053	0.75	0.40	0.75	OK	0.51
204, W102	DI101	CBMH205			0.19			0.08	0.08	12.5	140.7	0.055	450	8.6	PVC	4.00%	0.570	3.59	0.04	2.26	OK	0.10
								0.00														
201, 205, E101, E100	DI102	CBMH207	2.77		0.62			0.96	0.96	33.3	70.9	0.190	450	11.1	PVC	1.00%	0.285	1.79	0.10	1.91	OK	0.67
Hwy. 33 - West of Point. B & Street A																						
11	CBMH205	**ST200**					0.11	0.11	0.19	10.0	164.4	0.087	450	22.1	PVC	0.25%	0.143	0.90	0.41	0.94	OK	0.61
1-9, 202, 203	ST409	**ST201**			0.60		0.71	0.96	0.96	13.1	135.9	0.362	675	18.9	CONCRETE	0.35%	0.497	1.39	0.23	1.52	OK	0.73
	ST200	**ST201**						0.00	0.63	20.3	100.3	0.199	675	30.1	CONCRETE	0.25%	0.420	1.17	0.43	1.16	OK	0.47
13	ST201	**CBMH202**					0.04	0.04	1.63	20.7	98.9	0.471	825	36.6	CONCRETE	0.20%	0.642	1.20	0.51	1.31	OK	0.73
12	CBMH207	**CBMH202**					0.12	0.12	1.08	33.4	70.8	0.213	450	17.8	PVC	1.00%	0.285	1.79	0.17	1.97	OK	0.75
14	CBMH202	**CBMH203**					0.07	0.07	2.78	21.2	97.2	0.775	825	26.9	CONCRETE	0.29%	0.773	1.45	0.31	1.64	OK	1.00
										(used Tc of Site)												
Hwy. 33 - East of Point B & Street A																						
15	CB308	**CBMH203**					0.05	0.05	0.05	10.0	164.0	0.022	300	21.0	PVC	0.50%	0.068	0.97	0.36	0.86	OK	0.33
17-19	ST410	**CBMH203**					0.25	0.25	0.25	11.0	153.5	0.105	375	24.8	PVC	1.00%	0.175	1.59	0.26	1.65	OK	0.60
16	CBMH203	**Point B**					0.04	0.04	3.12	21.5	96.3	0.856	825	3.8	CONCRETE	0.40%	0.908	1.70	0.04	1.93	OK	0.94
							6.32	***3.12***	***3.12***													
							Area	**Sum RxA**														

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From Dillon storm network
From Jewell SWM Report
Revised Values by Jewell Feb. 26, 2020

Designed:	Julie Humphries (Monday, July 8, 2019)
Revised:	Elliott Fledderus, P. Eng.
Checked:	Bryon Keene, P. Eng.
Date:	February 25, 2020

Project:
Picton Properties Development and Highway 33 Improvements
Combined Storm Sewer Design Sheet

APPENDIX B

Storm Sewer Design Sheet

STORM SEWER DESIGN SHEET: 5-YEAR

West Meadow Phase 2 Block 44 Apartments

Municipal Criteria: The Corporation of the County of Prince Edward

Prepared by: Nancy Dionne, P.Eng
Insite Project Consulting Inc.
Date: May 9th 2025

For drainage areas 40 Ha. or less:

RATIONAL METHOD: Q = 2.78 C I A
Q = flow in litres per second (L/s)
C = runoff coefficient
A = Drainage area in hectares (ha)
I = rainfall intensity in millimetres per hour (mm/hr)

RAINFALL INTENSITY:
City of Belleville IDF Curve
I = "A" * (Tc (hrs) ^"B")

Return period	"A"	"B"
5-yr	26.4	-0.677
100-yr	47	-0.699

The maximum inlet time for the first pipe of a storm sewer system is 10 minutes.

Runoff Coefficients

Land Use	C
Forest and Dense Wooded areas	0.25
Parks, Open Space and Playgrounds	0.35
Single Residential	0.45
Semi-Detached Residential	0.6
Multi-Residential	0.7
Apartments	0.75
Industrial	0.75
Commercial	0.85
Institutional	0.75
Densely Built, Paved	0.95
Asphalt, Concrete, Roof areas	0.95

Pipe Capacity:

Chezy-Manning Formula: Q = (1/n) x A x R2/3 x S1/2
Where, Q = Flow Capacity of sewer (m3/s)
R = Hydraulic radius of pipe (A = Cross-sectional area (m2)
S = Sewer slope (m/m) n = Manning roughness coefficient
* Min slope shall be 0.5%, and first leg shall be 1%

Pipe Material	Value of 'n'
Concrete	0.013
Polyvinyl Chloride (PVC)	0.013
High Density Polyethylene (HDPE)	0.013
Corrugated Steel Pipe (CSP)	
- Plain Pipe	0.024
- Paved Invert	0.02

Velocity Criteria: Min: 1.0 m/s, Max 6.0 m/s
* Pipes w. velocities over 4m/s should be designed to protect against pipe displacement, scouring, erosion and hydraulic jumps

LOCATION			RATIONAL METHOD FLOWS									SEWER CHARACTERISTICS						
			DRAINAGE AREAS															
AREA ID	FROM MH	TO MH	AREA ha	C	AREA ha	C	INDIVID AC	ACCUM AC	INLET Tc (min)	RAINFALL INTENSITY I	PEAK FLOW Q (L/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	VELOCITY (m/s)	CAPACITY (l/s)	TIME OF FLOW (min)	Q/Qcap
1. TO SWM POND (Catchment B1)																		
ALLOWABLE PER APPROVED WM Ph2 SWM REPORT:																		
		CBMH 524	0.67	0.6			0.40	0.40	24.80	48.01	53.7							
PROPOSED:																		
B1 (STAGE 1)		BEASLY	0.23	0.75			0.17	0.17	15.00	67.48	32.4							
THE PROPOSED PEAK FLOW FOR STAGE 1 OF 36.6 L/S ARE LESS THAN THE ALLOWABLE DESIGN FLOW FROM WM PH2																		
ALLOWABLE FOR FUTURE STAGE 2																		
B2 (FUTURE STAGE 2)		BEASLY	0.61	0.75			0.46	0.46	15.00	67.48	85.8							
MAX ALLOWABLE:											21.3							
THE FUTURE PEAK FLOW FOR STAGE 2 WILL BE SUBJECT TO ONSITE SWM CONTROLS TO MEET THE ALLOWABLE FLOWS REMAINING OF 21.3 (53.7-32.4) L/S																		
2. COMMERCIAL SITE (Catchment A1)																		
ALLOWABLE PER APPROVED WM Ph2 SWM REPORT:																		
		CB 208	2.19	0.25			0.55	0.55	33.30	39.33	59.9							
PROPOSED:																		
A1		BEASLY	0.34	0.75			0.26	0.26	15.00	67.48	47.8							
THE PROPOSED PEAK FLOW OF 49.2 L/S ARE LESS THAN THE ALLOWABLE DESIGN FLOW FROM WM PH2																		
3. GEORGE WRIGHT BOULEVARD (Catchment D2)																		
ALLOWABLE PER APPROVED WM Ph2 SWM REPORT:																		
		EX. SEWER	0.4	0.25			0.10	0.10	17.40	61.03	17.0							
PROPOSED:																		
D1 and D2		EX. SEWER	0.11	0.8	0.13	0.35	0.13	0.13	15.00	67.48	25.0							
THE PROPOSED PEAK FLOW OF 25 L/S EXCEED THE ALLOWABLE DESIGN FLOW FROM WM PH2 AND WILL REQUIRE QUANTITY CONTROLS																		

APPENDIX C

Flow Attenuation Tables From JFSA

Table 1 - CB209 Flow Attenuation - Stage-Storage-Outflow

						Vertical Orifice Plate	
						Diameter (m)	0.100
						Invert (m)	99.572
						Cd	0.62
						Area (m^2	0.0079
Elevation (m)	**Notes**	**Area (m^2)**	**Incremental Depth (m^2)**	**Cumulative Depth (m)**	**Incremental Volume (m^3)**	**Cumulative Volume (m^3)**	**Flow (L/s)**
99.572	CB Lead Invert	0.09	0	0	-	0.0	0.0
101.000	Top of CB Grate	0.09	1.428	1.428	0.13	0.13	25.8
101.050		0.54	0.05	1.478	0.01	0.14	26.2
101.100		2.36	0.05	1.528	0.07	0.21	26.7
101.150		4.99	0.05	1.578	0.18	0.39	27.1
101.200		9.16	0.05	1.628	0.35	0.74	27.5
101.250		13.56	0.05	1.678	0.56	1.30	27.9
101.300		19.86	0.05	1.728	0.83	2.13	28.4
101.350		28.12	0.05	1.778	1.19	3.33	28.8
101.400		39.45	0.05	1.828	1.68	5.01	29.2
101.450		53.85	0.05	1.878	2.32	7.33	29.6
101.500		71.32	0.05	1.928	3.12	10.45	29.9
101.550		91.35	0.05	1.978	4.06	14.51	30.3
101.600	Max Ponding	114.76	0.05	2.028	5.14	19.65	30.7

Table 2 - CB209 Flow Attenuation - Summary

Event	Peak Flow to CB209 (L/s)	Peak Flow to STM100 (L/s)	Storage Volume Used (m^3)	Ponding Elevation (m)	Ponding Depth at CB Grate (m)
2YrCHI4Hr	15	15	0.08	100.41	-
5YrCHI4Hr	22	22	0.09	100.62	-
10YrCHI4Hr	25	25	0.11	100.79	-
25YrCHI4Hr	29	27	0.13	100.96	-
50YrCHI4Hr	32	28	0.26	101.11	0.11
100YrCHI4Hr	35	29	1.14	101.24	0.24
2YrSCS24Hr	19	19	0.10	100.63	-
5YrSCS24Hr	28	27	0.12	100.92	-
10YrSCS24Hr	31	28	0.16	101.06	0.06
25YrSCS24Hr	34	29	1.01	101.22	0.22
50YrSCS24Hr	37	29	2.21	101.30	0.30
100YrSCS24Hr	39	30	3.55	101.36	0.36