

STORMWATER MANAGEMENT BRIEF

DATED: NOVEMBER 2023

PROJECT:

6 JOHN ST TOWNHOUSE DEVELOPMENT

LOCATED IN PICTON, CORPORATION OF THE
COUNTY OF PRINCE EDWARD

PREPARED FOR:

JAMR Developments Inc.
P.O. Box 1642
Belleville, ON K8N 0A5

PREPARED BY:

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1.0 INTRODUCTION

This Report has been prepared to support approvals of a proposed residential development located at 6 John Street in Picton, within the Corporation of the County of Prince Edward (the County). The proposed development is intended to support two 4-unit townhouses.

The site area is 0.23 hectares and has frontages along the east side of John Street, north of Union Street. There is an existing two-storey single family home, a garage and gravel driveway to be demolished. Site development will also require removal of some vegetation.

Property Location Map



This Brief has been prepared in support of the proposed development to demonstrate safe conveyance of site drainage and confirm there will be no impacts to the receiving system downstream.

It should be noted that changes may materialize during the detailed design process with the building permit application.

2.0 STORMWATER MANAGEMENT CRITERIA

2.1 Background and Design Criteria

In accordance with Prince Edward County design guidelines, given the proposed development is less than one (1) hectare, development will not be subject to providing stormwater quantity, quality, and erosion controls.

Conclusions drawn in this report have considered the Picton Harbour Master Drainage Plan (MDP) dated April 2020 and record drawings of adjacent roads provided by the County. Relevant excerpts from the MDP and the record drawing of John Street dated October 2006 are provided in Appendix A.

2.2 Picton Harbour Master Drainage Plan

Based on our review of the Picton Harbour Master Drainage Plan, the following findings and conclusions are relevant to the proposed development.

- The subject lands of 0.23 Ha are within sub-catchment area P-16 which is 81.9 Ha in size.
- The MDP recommends retrofit to improve water quality for an area of 17.34 Ha within sub-catchment P-16 (that does not drain to the existing swm pond) include low impact development technologies, such as CB shields at catchbasin sumps and oil-grit separator units for smaller drainage areas (< 5Ha)
- Area P-16 includes a substantial 35Ha area of future residential development, which will require new stormwater management infrastructure.
- The existing storm sewer system on John Street downstream of the subject lands convey drainage to the Red Gate Subdivision Phase 1 stormwater management pond located approximately 300m to the north of the proposed development.
- The SWM Report for the Red Gate Phase 1 Subdivision was not available in the municipal files.
- The MDP included proposed corrective action to remediate deficiencies of the Red Gate Subdivision Phase 1 stormwater management pond, as well as recommendations on regular maintenance.

3.0 PRE-DEVELOPMENT SITE CONDITIONS

The site to be redeveloped is an existing urban residential lot, including a dwelling and gravel driveway. There are no existing significant environmentally sensitive features to be retained. The surrounding area land use is also urban residential with urbanized municipal roads complete with curb and a storm sewer system.

There is no indication of adjacent streams and wetlands within the vicinity of the property to indicate vulnerable high groundwater levels and groundwater supported features that would require recharge.

Surface drainage from the site was reviewed using the topographic survey completed in September 2023 and our staff's onsite review of field conditions. The attached Pre-Development Storm Drainage *Figure 1* illustrates our findings. Based on our analysis, the proposed development area currently sheet drains onto John Street. The adjacent residential property to the east sheet drains through the subject lands. A pre-development runoff coefficient of 0.45 is consistent with the municipality's guidelines for single residential urban lots.

Drainage from site and John Street continue in a northerly direction, where there is an existing storm sewer system starting at Owen Street which eventually discharges to an existing ditch approximately 300m to the north of the proposed development. The ditch on the east side of John St conveys drainage to the existing stormwater management pond located behind residential lots of the Red Gate Phase 1 Subdivision.

We note that based on our field observations in September 2023, double catchbasins are located at the intersection of John Street and Owen Street. However, the record drawing of John Street (included in Appendix A), does not reflect this current infrastructure.

4.0 POST-DEVELOPMENT STORMWATER MANAGEMENT

4.1 Site Drainage and Conveyance

The summary of post-development site drainage and preliminary grading is presented in Figure 2A. The subject lands, including the higher ground to the east, will continue to sheet drain to John Street. Based on our review of available information, overland flow will continue to be safely conveyed with the John Street right-of-way. Minor system flows will continue to be captured by the existing storm sewer system ultimately discharging to the existing Red Gate Phase 1 stormwater management pond.

4.2 Capacity of Existing Storm Sewer System

The resulting storm sewer capacities for the 5-year return period were calculated using the Manning Formula; the storm sewer design sheet is provided in Appendix B. A post-development runoff coefficient of 0.70 was used for the site, in accordance with the municipality's guidelines for multi-residential urban lots. The pipe characteristics and drainage areas used were obtained from the MDP. We note that the pipe characteristics from the MDP varies slightly from the John Street Record Drawing. However, based on the drainage areas used in the MDP, the resulting pipe capacities using the pipe characteristics from the MDP compared to the record drawing are very similar.

Capacity of the downstream storm sewer system was verified by comparing the pre- and post-development minor system flows.

It was concluded that the existing downstream system up to the last sewer section has surplus capacity to accommodate the increased runoff coefficient of the proposed development area. Based on the characteristics of the pipes and drainage areas included in MDP, the last section of storm sewer discharging to the ditch upstream of the swm pond is overcapacity both in pre and post development conditions.

In accordance with conclusions of the Picton Harbour MDP, performance of the municipality's existing Red Gate Phase 1 SWM Pond is subject to corrective actions, and ongoing maintenance.

5.0 CONCLUSIONS

- The proposed residential development of 0.23 Ha located at 6 John Street in Picton is intended to support two 4-unit townhouses with driveways connecting to John Street.
- The existing overland flow drainage patterns were assessed through review of the topographic survey and field visit completed in September 2023.
- The proposed development area currently sheet drains onto John Street. The adjacent residential property to the east sheet drains through the subject lands.
- Drainage from site and John Street continue in a northerly direction, where there is an existing storm sewer system which eventually discharges to an existing ditch which conveys drainage to the existing stormwater management pond of the Red Gate Phase 1 Subdivision.

- In accordance with Prince Edward County design guidelines, given the proposed development is less than one (1) hectare, development will not be subject to providing stormwater quantity, quality, and erosion controls.
- Based on the calculations of flows for the 5-year storm event, the existing downstream system up to the last sewer section has surplus capacity to accommodate the increased runoff coefficient of the proposed development area. Based on the characteristics of the pipes and drainage areas included in Picton Harbour Master Drainage Plan dated 2020, the last section of storm sewer discharging to the ditch upstream of the swm pond is overcapacity both in pre and post development conditions.
- In accordance with conclusions of the Picton Harbour Master Drainage Plan dated 2020, performance of the municipality's existing Red Gate Phase 1 SWM Pond is subject to corrective actions, and ongoing maintenance.

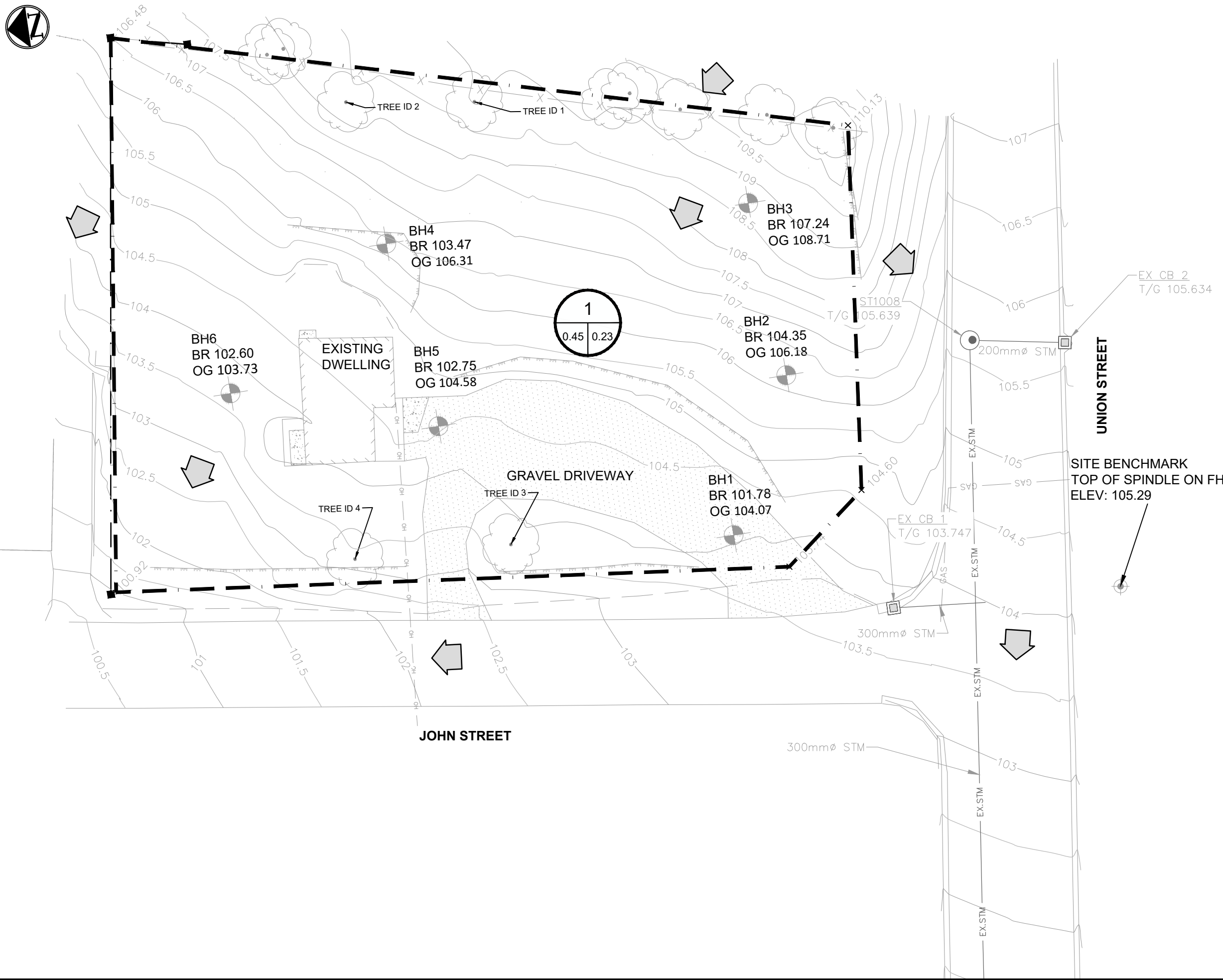
This Report has been prepared by:



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FIGURES

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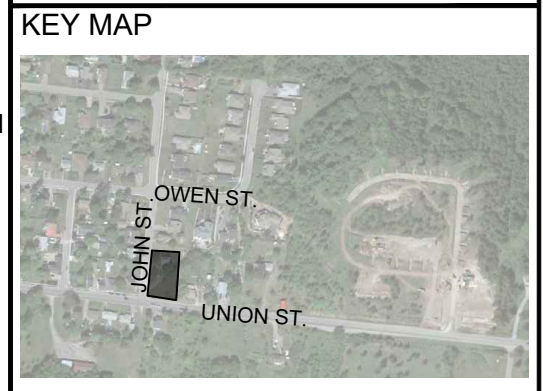


CLIENT
JAMR DEVELOPMENTS INC.

PROJECT 23-110
6 JOHN STREET

LEGEND

- AREA ID
- AREA (Ha)
- RUNOFF COEFFICIENT
- PROJECT BOUNDARY
- EXISTING CONTOUR
- OVERLAND FLOW



INSITE
PROJECT CONSULTING INC.

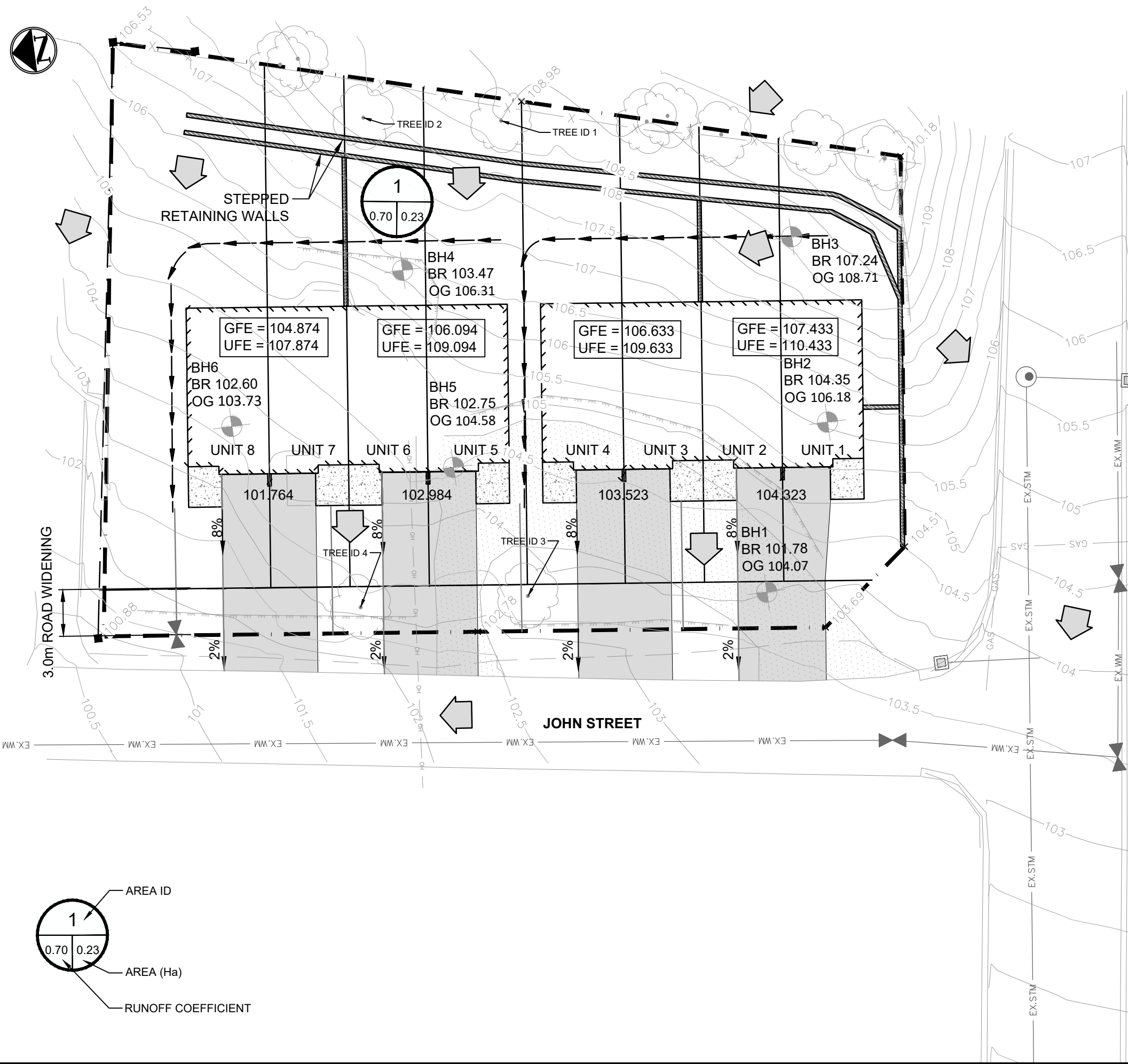
REVISIONS

#	M/D/Y	BY	ISSUED FOR

DRAWING TITLE
PRE-DEVELOPMENT
STORM DRAINAGE PLAN

SCALE 1:300	DWG. NO. 1A
SHEET ANSI B (11" X 17")	

C:\USERS\N\IN\INSITE\PROJECT CONSULTING\INSITE PROJECT CONSULTING - PROJECTS\23-110 6 JOHN ST\DRAWING FOLDER\3 FIGURES\ENGR REPORTS\GRADING PLAN.DWG

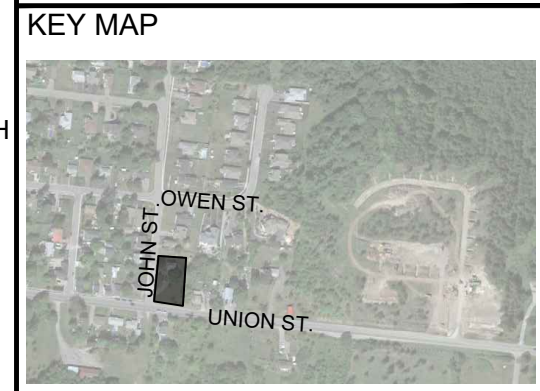


CLIENT
JAMR DEVELOPMENTS INC.

PROJECT 23-110
6 JOHN STREET

LEGEND

- PROJECT BOUNDARY
- LOTLINES
- PROPOSED SWALE
- BUILDING BOUNDARY
- EXISTING CONTOUR
- x 108.76 EXISTING ELEVATION
- ← OVERLAND FLOW



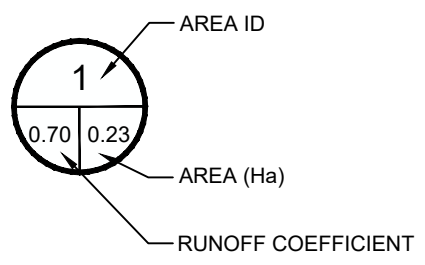
INSITE
PROJECT CONSULTING INC.

REVISIONS

#	M/D/Y	BY	ISSUED FOR

DRAWING TITLE
GRADING AND POST-DEVELOPMENT STORM DRAINAGE PLAN

SCALE 1:300	DWG. NO. 2A
SHEET ANSI B (11" X 17")	



SITE BENCHMARK
TOP OF SPINDLE ON FH
ELEV: 105.29

APPENDIX A

Excerpts from the Picton Harbour Master Drainage Plan dated
April 2020

and

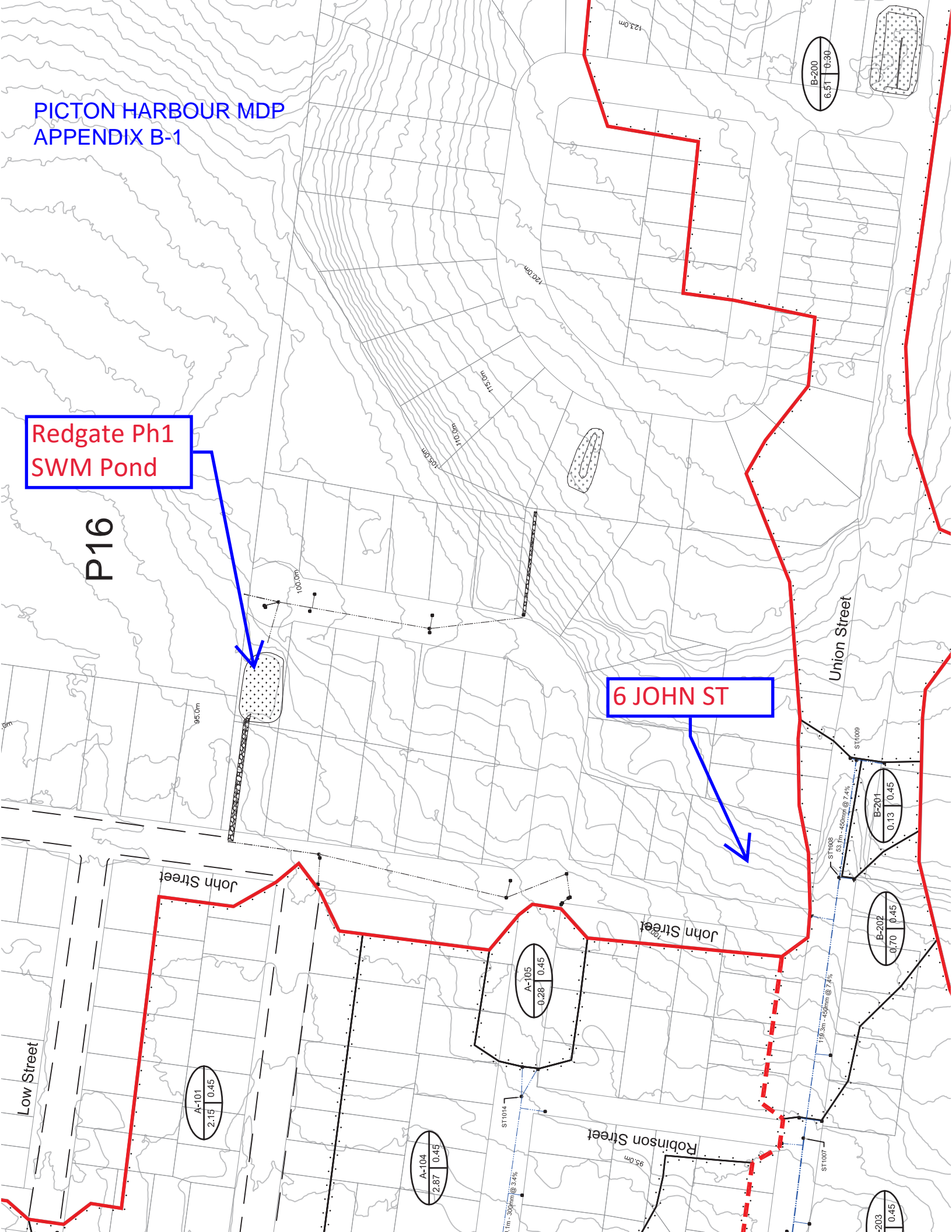
Record Drawing of John Street dated October 2006

PICTON HARBOUR MDP
APPENDIX B-1

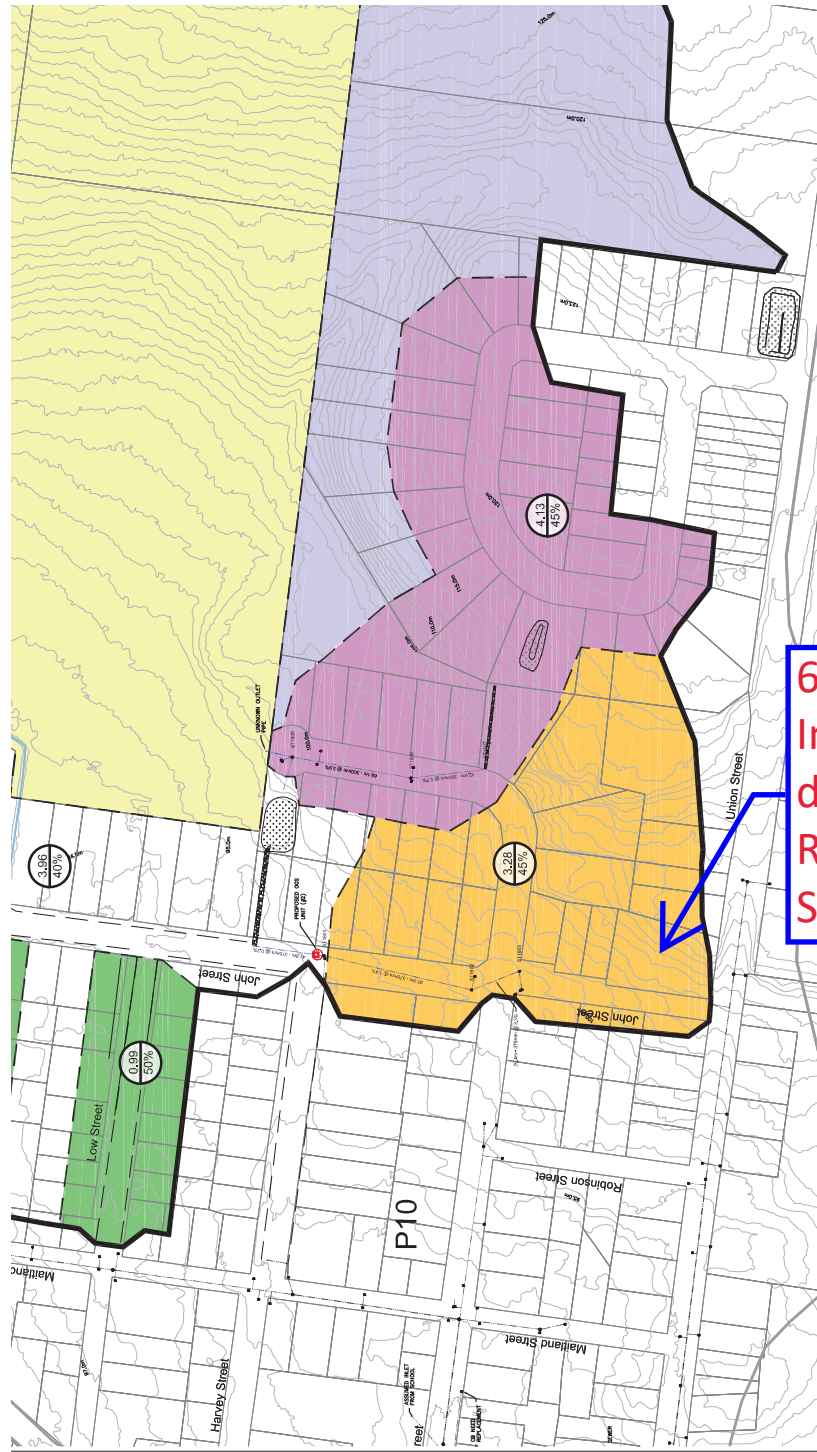
Redgate Ph1
SWM Pond

P16

6 JOHN ST



PICTON HARBOUR MDP
APPENDIX P-16



6 John St
Included in area
draining to
Redgate Ph1
SWM pond

STORM SEWER DESIGN SHEET P16B

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 for: **Belleville**

$$i = A * T_c^B$$

Where:

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

5-Year Parameters


- A = 26.4
- B = -0.677

Pipe Capacity by Manning's Equation

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

Where:

- A = area of pipe in m² Check
- R = Hydraulic radius = A / P
- P = Wetted perimeter $q \leq Q$
- S = Slope (m/m) $V \leq 6 \text{ m/s}$
- n = Manning's friction coef.

LOCATION			PEAK FLOW CALCULATION								EXISTING SEWER										
STREET	FROM	TO	CATCHMENT AREAS				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)	q/Q	Check Capacity
			RUNOFF COEFFICIENT																		
			0.30	0.45	0.50	0.65															
Queen street.																					
B-202	ST1603	ST1602	2.17				0.65	0.65	15.0	67.5	0.12	375	29.45	PVC	3.30%	0.32	2.88	0.17	2.68	0.38	OK
B-201	ST1602	ST1601		0.12			0.06	0.71	15.2	67.0	0.13	375	87.00	PVC	1.40%	0.21	1.88	0.77	1.98	0.63	OK
B-200	ST1601	OUTLET		0.99			0.45	1.15	15.9	64.8	0.21	375	41.77	PVC	0.34%	0.10	0.93	0.75	#REF!	2.03	Surch
 G.D. Jewell Engineering Inc 1-71 Millennium Parkway Belleville, ON, K8N 4Z5			Ph. 613-969-1111 Fx. 613-969-8988 www.jewelleng.ca				Designed: Patrick Quinn, E.I.T				Project: Picton Master Drainage Plan										
							Checked:														
							Date: September 18th, 2019														

APPENDIX B

Storm Sewer Design Sheet for the 5-year return period using the Manning Formula

STORM SEWER DESIGN SHEET: 5-YEAR

6 John Street Townhouses

Municipal Criteria: The Corporation of the County of Prince Edward

Prepared by: Nancy Dionne, P.Eng

Insite Project Consulting Inc.

Date: November 2023



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

$I = "A" * (Tc \text{ (hrs)} ^{"B"})$

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: $Q = (1/n) \times A \times R^{2/3} \times S^{1/2}$

Where, Q = Flow Capacity of sewer (m³/s)

R = Hydraulic radius of pipe (m) 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						
AREA ID	FROM MH	TO MH	DRAINAGE AREAS				INDIVID AC	ACCUM AC	INLET Tc (min)	RAINFALL INTENSITY I	PEAK FLOW Q (L/s)	DIA. (mm)	SLOPE (%)	LENGTH (m)	Full Flow VELOCITY (m/s)	CAPACITY (l/s)	TIME OF FLOW (min)	Q/Qcap
			0.30	0.45	0.50	0.70												
JOHN ST FROM OWEN ST TO REDGATE PH1 SWM POND																		
PRE-DEVELOPMENT (BASED ON 2020 PICTON HARBOUR MDP)																		
B-202	ST1603	ST1602	2.17				0.65	0.65	15.0	67.48	122.1	375	3.30%	29.45	2.9	318.48	0.17	0.38
B-201	ST1602	ST1601		0.18			0.08	0.73	15.2	66.97	136.3	375	1.40%	87.00	1.9	207.44	0.77	0.66
B-200	ST1601	OUTLET		0.96			0.43	1.16	15.9	64.76	209.5	377	0.34%	41.77	0.9	103.69	0.75	2.02
POST-DEVELOPMENT																		
B-202	ST1603	ST1602	1.94			0.23	0.74	0.74	15.0	67.48	139.4	375	3.30%	29.45	2.9	318.48	0.17	0.44
B-201	ST1602	ST1601		0.18			0.08	0.82	15.2	66.97	153.4	375	1.40%	87.00	1.9	207.44	0.77	0.74
B-200	ST1601	OUTLET		0.96			0.43	1.26	15.9	64.76	226.1	377	0.34%	41.77	0.9	103.69	0.75	2.18
THE EXISTING DOWNSTREAM STORM SYSTEM TO THE LAST SEWER HAS SURPLUS CAPACITY TO ACCOMMODATE THE ADDITIONAL FLOWS OF 16 L/S																		
THE EXISTING DOWNSTREAM PIPE TO THE DITCH REMAINS OVERCAPACITY.																		