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June 26, 2026 Project Number: 2704(e01)

David Schaeffer Engineering Ltd
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Attention: **John Priamo, P.Eng**

Subject: **4795 Bank Street, Ottawa – Preliminary Stormwater Analysis**

INTRODUCTION

This preliminary stormwater management analysis has been prepared to support the applications for the proposed development located at 4795 Bank Street in Ottawa. The subject property encompasses a total parcel area of 17.17 ha, of which approximately 12.62 ha is slated for residential development, with the remaining lands consisting of a pond block, park lands and a natural corridor.

The objective of this analysis is to evaluate the proposed stormwater infrastructure and ensure that the development can be effectively serviced while mitigating impacts on the receiving systems. Specifically, this memo assesses the following core components:

- **Minor System Hydraulics:** A preliminary hydraulic grade line (HGL) analysis, completed using PCSWMM, to verify that the proposed storm sewer network can safely convey minor system flows while maintaining adequate freeboard and basement flooding protection.
- **On-Site Attenuation:** The preliminary sizing of internal stormwater controls to meet established unitary release rates for a proposed 2.05 ha condominium block at the intersection of Bank Street and Blais Road.
- **Pond Expansion Logistics:** A hydrologic and hydraulic evaluation of a conceptual expansion to the existing Findlay Creek Village Stormwater Management Facility (FCVSWMF) to offset the increased runoff generated by the newly developed lands.
- **Downstream Impact Assessment:** Analysis to confirm that the combination of on-site attenuation and the proposed facility expansion yields a net reduction in peak flows to the downstream Findlay Creek watercourse.

PRELIMINARY STORM HGL ANALYSIS

A preliminary hydraulic grade line (HGL) analysis for the proposed Bank Street development was completed using PCSWMM modelling software. Pipe data, storm sewer layout, and Rational Method flows were provided by DSEL. Minor system design flows were calculated based on variable levels of service requirements dictated by City standards for specific land uses (e.g., 2-year for residential, 5-year for parks). To accommodate the increased minor system capture during the 100-year event, the baseline Rational Method flows were increased by 35%. This multiplier reflects the higher inflow rates through ICDs resulting from increased head during road ponding, alongside the 100-year capture from rear yard catchbasins.

The proposed storm sewer infrastructure data provided by DSEL was incorporated into the PCSWMM model. The flows were applied to each corresponding maintenance hole (MH) as steady inflows using the baseline inflow option. Exit losses were applied to all storm sewer pipes based on the angle of the downstream connection. A fixed tailwater boundary condition of 88.60 m was applied at the system outlet, corresponding to the 100-year high water level of the Findlay Creek Village Stormwater Facility (FCVSWMF).

The maximum HGL elevation obtained at each MH has been extracted and is provided in **Table A1 of Attachment A**. In the absence of detailed Underside of Footing (USF) elevations for the site at this preliminary stage, it was assumed that a minimum freeboard of 1.80 m from the top of the MH to the 100-year HGL provides sufficient clearance to protect the ultimate USF elevations of the proposed buildings. HGLs and freeboards will be verified and updated during the detailed design stage once unit-specific USF elevations are established.

An average freeboard of **2.90 m** from the top of grate to the 100-year HGL was observed throughout the proposed development. A localized minimum freeboard of **1.66 m** was recorded at MH-208; however, this is a shallow structure with a total depth of only 2.25 m, dictated by grading constraints required to tie into the existing Blais Road elevations. There are three additional locations with freeboards less than 1.80 m, but these are situated within the SWM pond and servicing block, which will not contain USF connections.

Based on these results, the proposed storm sewer infrastructure is sufficiently sized to safely convey minor system flows from the development under extreme conditions while maintaining adequate basement flooding protection. The PCSWMM model and associated digital files have been provided electronically.

CONDO ON-SITE STORAGE

A 2.05 ha condominium block is proposed at the intersection of Bank Street and Blais Road. Given the high imperviousness of the site (assumed runoff coefficient of 0.80) and the physical viability of implementing on-site storage—via surface ponding in parking areas, subsurface infrastructure, or a combination thereof—it is assumed that post-development stormwater controls will be managed internally within the block.

Allowable unitary release rates were established based on the Expansion of Findlay Creek Village Stormwater Facility Leitrim Development Area Design Brief (IBI Group, December 2017). Allowable discharge rates from Table 6.5 of the brief were prorated over the facility's 405 ha drainage area. **Table 1** below outlines the extracted peak discharge values and the resulting unitary target rates.

Table 1: Peak Flows from FCVSMF
(IBI Group, December 2017).

Storm Event	Facility Discharge (m^3/s)	Unitary Target Flow (L/s/ha)
25mmCHI4HR	1.09	6
2YRSCS24HR	2.86	14
5YRSCS24HR	4.82	24
100YRCHI3HR	8.44	43
100YRSCS24HR	10.89	55

Preliminary hydrologic modelling was conducted using SWMHYMO, applying the various design storms and iterating the required storage volume to meet the unitary release rates. To attenuate post-development flows to the governing 100-year target release rate, the analysis indicates a required on-site storage volume of approximately **1,210 m³**. Normalized over the 2.05 ha site, this translates to a unitary storage volume of **590 m³/ha**. While this represents a high specific storage requirement, it remains securely within a feasible range for on-site implementation.

POND EXPANSION

JFSA acquired the latest iterations of the XPSWMM and SWMHYMO models for the Findlay Creek Village Stormwater Management Facility (FCVSWMF) from Arcadis in May 2026. Concurrently, DSEL provided a post-development stormwater management plan delineating the proposed drainage areas, associated runoff coefficients, and respective outlets for the site.

To establish preliminary design parameters for DSEL, a conceptual hydrologic model was initially developed using the unitary release rates for the FCVSWMF (previously outlined in Table 1) in conjunction with DSEL's stormwater management plan. This preliminary model approximated the additional storage volume required within the existing FCVSWMF to offset the increased runoff generated by the proposed Bank Street development. Utilizing these target volumes, DSEL developed a detailed stage-storage curve for the proposed pond expansion to mitigate water level increases associated with the new development flows. The complete stage-storage curves are provided in **Attachment B**.

Following the conceptual sizing, the Arcadis SWMHYMO model was updated to accurately reflect the proposed Bank Street development lands. The resulting inflow hydrographs directed to the SWM pond were extracted for integration into the XPSWMM model to assess the impacts on the pond's operation.

The original Arcadis XPSWMM model was comprehensive, encompassing both the storm sewer and sanitary networks with over 1,000 nodes and links. Because the objective of this analysis is specifically to evaluate the hydraulic performance (water levels and peak outflows) of the expanded pond under the new flow regime, a truncated version of the model was developed. This localized model consists exclusively of the pond node, the pond outlet structure, and the direct inflow hydrographs. By extracting the hydrographs from the original large-scale model and applying them as direct boundary conditions to the pond node, upstream pipe routing is bypassed while exactly replicating the inflows to the facility. This approach significantly streamlines the analysis and reduces simulation run times.

It should be noted that while the original Arcadis model was executed in XPSWMM v9.1, the updated JFSA localized model was run utilizing XPSTORM v10.6. This transition in software platforms and versions yields minor computational differences; therefore, to ensure a valid comparative analysis, the JFSA post-development condition is compared exclusively against a JFSA-run pre-development (existing) condition model. The original Arcadis-reported values are retained in the summary table strictly for reference context.

Table 2 summarizes the peak water levels and peak outflows for the SWM facility during the 100-year design events. A full suite of design storms will be evaluated during the detailed design phase; the current preliminary analysis focuses on confirming that the proposed pond expansion provides sufficient attenuation storage for the critical 100-year events.

Table 2: Peak Water Levels & Outflows from the FCVSWMF

Condition	Modeller	Sanitary	Event	Pond Level (m)	Pond Outflow (m^3/s)
Pre-Dev - XPSWMMv9.1	Arcadis	Annual	100YRCHI3HR 100YRSCS24HR	88.419 88.648	8.791 11.496
Pre-Dev - XPSTORMv10.6 (Localized Model)	JFSA	Annual	100YRCHI3HR 100YRSCS24HR	88.394 88.605	8.545 11.214
Post-Dev - XPSTORMv10.6 (Localized Model)	JFSA	Annual	100YRCHI3HR 100YRSCS24HR	88.393 88.601	8.536 11.165

The results of this analysis indicate that the proposed pond expansion, even when subjected to the additional flows from the proposed Bank Street development, yields a net reduction in peak water levels by 1 to 4 mm and a decrease in peak outflows by 9 to 49 L/s during the 100-year design events. Consequently, the proposed expansion is appropriately sized to mitigate and accommodate the runoff from the newly developed lands.

Additional preliminary analysis was conducted on the proposed pond expansion forebay to ensure compliance with current Ministry of the Environment, Conservation and Parks (MECP) guidelines. Based on the preliminary inflow rates and the proposed forebay geometry, the design satisfies all critical sediment settlement criteria, including minimum dispersion length, settling velocity, required active volume, and minimum bottom width. Forebay design will be revisited and assessed again at detailed design.

DOWNSTREAM IMPACT ASSESSMENT

To evaluate the downstream impacts of the proposed development, a coupled modelling approach was utilized to capture both the site hydrology and the facility hydraulics. The regional Arcadis SWMHYMO model was updated to reflect all post-development hydrologic parameters for the Bank Street development site, including the proposed drainage areas, altered imperviousness, and condo on-site storage. Runoff generated from these specific areas is directed to the Expanded Pond. Conversely, the remaining natural, uncontrolled lands bypass the stormwater management facility entirely and drain directly to Findlay Creek.

The inflow hydrographs generated by the SWMHYMO model were routed through the localized XPSTORM v10.6 model of the Expanded Pond. The resulting attenuated outflow hydrographs were subsequently extracted and read back into the regional SWMHYMO model, where they combine with the uncontrolled bypass flows to simulate the total response in the receiving watercourse.

Peak flows were evaluated at "Node C," an established point of interest within the existing Arcadis model located on Findlay Creek, immediately downstream of the SWM facility outlet and upstream of the Blais Road crossing. This specific node was selected to maintain continuity with historical reporting by others and to provide a consistent baseline for evaluating downstream hydraulic conditions.

The hydrologic routing demonstrates that the proposed Bank Street development, in conjunction with the SWM pond expansion, provides a net benefit to the downstream watercourse. As summarized in **Table 3**, the updated condition yields a reduction in peak flows ranging from **52 L/s** to **771 L/s** during the 100-year design events. This reduction in downstream peak flows demonstrates that the expanded pond successfully attenuates the runoff from the proposed development site. As noted previously, the full suite of design storms will be evaluated comprehensively during the detailed design phase.

Table 3: 100-Year Peak Flows at Node C - Findlay Creek at Blais Road

Scenario	Peak Flow (m^3/s)	
	100YRCHI3HR	100YRSCS24HR
Pre-Dev (Arcadis)	7.969	17.316
Post-Dev (JFSA)	7.917	16.545
Difference	**-0.052**	**-0.771**

CONCLUSION

Based on the preliminary stormwater management analysis, the proposed development at 4795 Bank Street can be effectively serviced while mitigating adverse impacts on the existing infrastructure and receiving watercourses. The hydraulic grade line analysis confirms that the proposed storm sewer network is sufficiently sized to safely convey minor system flows from the development under extreme conditions while maintaining adequate basement flooding protection. For the proposed condominium block, implementing approximately 1,210 m^3 of on-site storage provides a feasible approach to attenuate post-development flows to the governing 100-year target release rate. Furthermore, the conceptual expansion of the Findlay Creek Village Stormwater Management Facility is appropriately sized to mitigate and accommodate the runoff from the newly developed lands. Hydrologic routing demonstrates that this expansion, in conjunction with the site's stormwater controls, yields a reduction in peak water levels within the facility and decreases downstream peak flows to Findlay Creek during the 100-year design events.

Yours truly,
JFSA Canada Inc.

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Tables
Table 1: Peak Flows from FCVSMF
Table 2: Peak Water Levels & Outflows from the FCVSWMF
Table 3: 100-Year Peak Flows at Node C - Findlay Creek at Blais Road

Attachments
Attachment A: HGL Analysis
Attachment B: FCVSWMF - Pond Expansion

Modelling Files	
SWMHYMO	**Pre Dev:** LD_UP-CN.dat LD_UP-H.dat **Post Dev:** LD_UP-CN-Post.dat LD_UP-H-Post.dat
XPSWMM	**Pre Dev:** LeitrimPond_Annual_PreDev_3CHI100_20260601.xp LeitrimPond_Annual_PreDev_24SCS100_20260601.xp **Post Dev** LeitrimPond_Annual_PostDev_3CHI100_20260619.xp LeitrimPond_Annual_PostDev_24SCS100_20260619.xp
PCSWMM	**Post Dev:** LTR_v01.1-Fixed.inp

All modelling files above have been provided digitally

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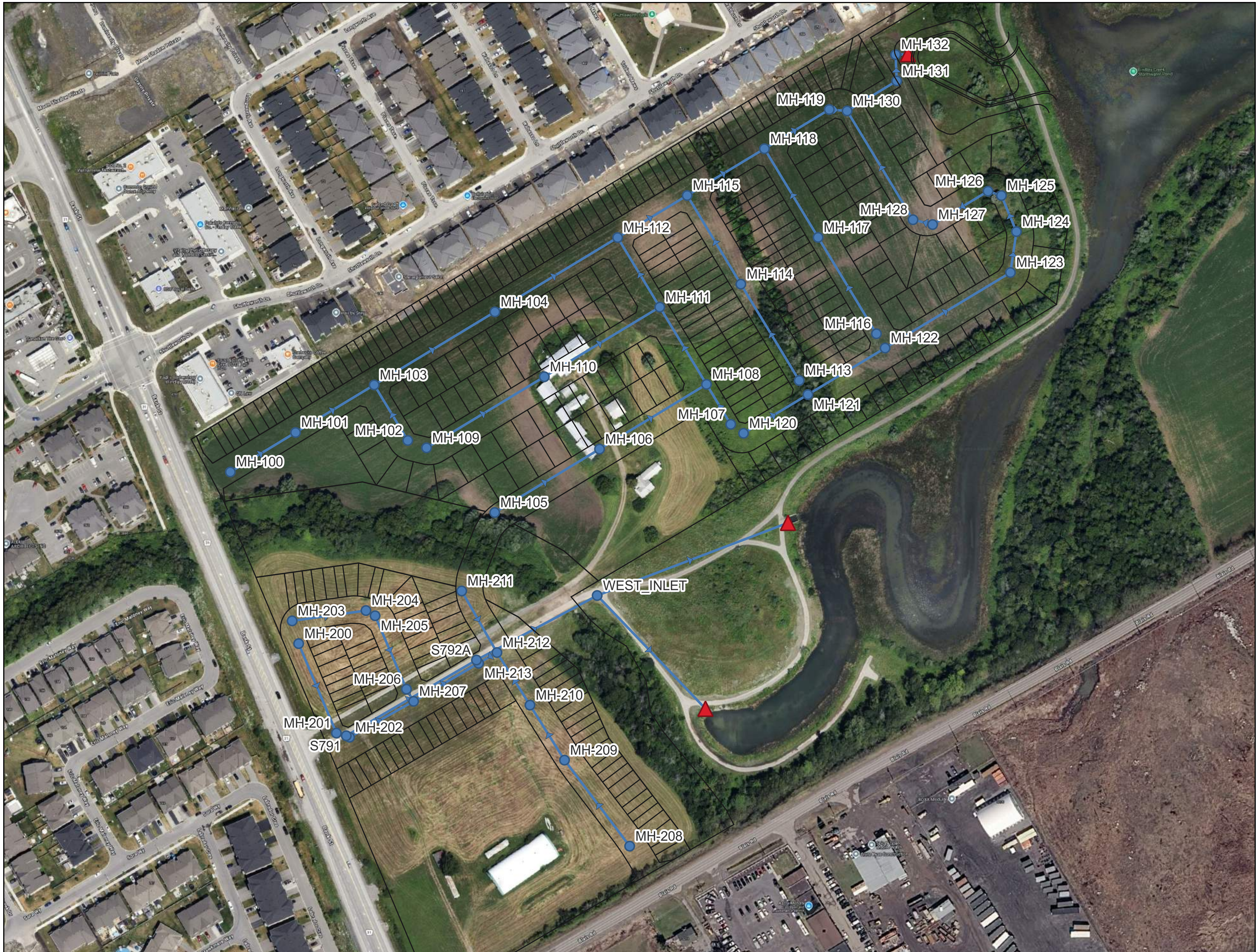
Attachment A

HGL Analysis



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Legend

- Development Plan
- Outfalls
- Junctions
- Conduits

SCALE: 1:2500

0 50 100 150 m

DSEL

JFSA CANADA INC.
WATER RESOURCE ENGINEERING, ENVIRONMENTAL MANAGEMENT AND LAND PLANNING CONSULTANTS

Bank Street

Figure A1 - Storm Sewer Plan

PROJECT	2704(e01)
DRAWN	JB
DATE	June 2026

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Table A1: Bank Street Developments
Preliminary 100-year HGL Analysis

Connection Point	MH-ID	Invert Elevation (m)	Top of MH (m)	Max HGL (m)	Top of MH Freeboard (m)	Notes
Additional Findlay Creek SWM Facility Forebay	MH-100	90.52	93.43	90.69	2.74	
	MH-101	89.91	93.69	90.37	3.32	
	MH-102	90.30	93.65	90.44	3.21	
	MH-103	89.53	93.45	90.29	3.16	
	MH-104	89.11	93.07	90.12	2.95	
	MH-105	90.61	93.94	91.10	2.84	
	MH-106	89.62	93.42	90.41	3.01	
	MH-107	89.95	93.33	90.30	3.03	
	MH-108	89.33	93.17	90.27	2.90	
	MH-109	90.36	93.74	90.85	2.89	
	MH-110	89.40	93.29	90.31	2.98	
	MH-111	88.97	92.93	90.15	2.78	
	MH-112	88.55	92.69	89.95	2.74	
	MH-113	89.55	93.05	90.31	2.74	
	MH-114	88.95	92.75	90.01	2.75	
	MH-115	88.34	92.47	89.82	2.65	
	MH-116	89.31	93.15	90.00	3.15	
	MH-117	88.75	92.69	89.77	2.92	
	MH-118	87.99	92.23	89.60	2.63	
	MH-119	87.76	92.03	89.40	2.63	
	MH-120	89.99	93.40	90.24	3.16	
	MH-121	89.57	93.12	90.17	2.95	
	MH-122	89.18	93.18	90.06	3.12	
	MH-123	88.93	92.89	89.91	2.99	
	MH-124	88.84	92.67	89.85	2.82	
	MH-125	88.73	92.57	89.78	2.79	
	MH-126	88.63	92.52	89.74	2.78	
	MH-127	88.51	92.35	89.67	2.68	
	MH-128	88.44	92.31	89.63	2.68	
	MH-130	87.64	91.97	89.32	2.65	
	MH-131	87.44	90.71	89.07	1.64	Located within the Servicing Blk; No STM service connection
	MH-132	87.32	88.90	88.79	0.11	U/S of Additional Forebay; No STM service connection
	HW1	84.00	88.85	88.60	0.25	Additional Forebay Inlet Headwall
MH-214 (Ex. Storm Sewer Junction S792A)	MH-200	91.26	94.58	91.40	3.18	
	MH-201	89.98	94.33	90.36	3.97	
	MH-202	89.67	94.29	90.28	4.01	
	MH-203	90.91	94.55	91.07	3.48	
	MH-204	90.54	94.35	90.67	3.68	
	MH-205	90.23	94.32	90.51	3.81	
	MH-206	89.99	94.10	90.38	3.72	
	MH-207	89.43	94.07	90.20	3.87	
	MH-208	90.30	92.55	90.89	1.66	Low freeboard due to tie in to existing grades at Blais
	MH-209	90.05	94.13	90.74	3.39	
	MH-210	89.90	93.95	90.66	3.29	
	MH-211	90.79	94.09	90.98	3.11	
	MH-212	89.70	93.81	90.44	3.37	
	MH-213	87.21	93.81	90.03	3.78	
	S792A	85.48	91.85	89.82	2.03	Existing Storm Sewer Connection (MH-214)
				Min	0.11	
				Max	4.01	
				Average	2.90	

Notes:

(1) Analysis assumes the use of ICDs throughout the development, therefore the Rational Method flows as per DSEL's storm design sheets were increased by 35% to account for additional flows captured into the minor system during the 100-year event.

(2) Analysis assumes a preliminary 100-year water level of 88.60m in the proposed additional Findlay Creek SWM Facility forebay as per Table 6.5 of the Dec 14, 2017 Design Brief Expansion of Findlay Creek Village SWM Facility by IBI Group.

(3) Analysis conservatively assumes a steady 100 year peak flow (27.382m^3/s) in existing storm sewer junction S792A as per 100-yr 24hr storm from the XPSWMM model by IBI Group.

(4) Model Name: LTR_v01.1-Fixed.inp.

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Attachment B

FCVSWMF - Pond Expansion

Table B1: FCVSWM Pond Expansion Curve

Elevation	Volume (m3)	Area (m2)
86.10	0	1,564
86.15	79	1,598
86.20	160	1,634
86.25	242	1,671
86.30	327	1,708
86.35	413	1,746
86.40	501	1,784
86.45	592	1,822
86.50	684	1,861
86.55	778	1,901
86.60	874	1,942
86.65	972	1,982
86.70	1,072	2,024
86.75	1,174	2,066
86.80	1,279	2,119
86.85	1,394	2,487
86.90	1,520	2,536
86.95	1,648	2,584
87.00	1,778	2,633
87.05	1,911	2,683
87.10	2,047	2,742
87.15	2,185	2,808
87.20	2,327	2,874
87.25	2,473	2,941
87.30	2,622	3,009
87.35	2,774	3,077
87.40	2,929	3,146
87.45	3,088	3,216
87.50	3,251	3,286
87.55	3,417	3,357
87.60	3,587	3,429
87.65	3,760	3,501
87.70	3,937	3,574
87.75	4,117	3,647
87.80	4,302	3,722
87.85	4,489	3,796
87.90	4,681	3,872
87.95	4,877	3,948
88.00	5,076	4,024
88.05	5,279	4,102
88.10	5,486	4,180
88.15	5,697	4,259
88.20	5,912	4,338
88.25	6,131	4,418
88.30	6,354	4,498
88.35	6,581	4,579
88.40	6,812	4,661
88.45	7,047	4,744
88.50	7,286	4,827
88.55	7,530	4,910
88.60	7,779	5,068

CALCULATION SHEET B-2: FOREBAY SIZING FOR SWM FACILITY

Bank Street Subdivision
FCVSWMF
City of Ottawa
Calculation of South Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{rQ_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:
- r = 3.00 (90 m / 30 m)
- Q_p = 0.764 m^3/s
- V_s = 0.0003 m/s

L_{min} = 87.41 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table C-6 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8Q}{dV_t}$$

where:
- Q = Inlet flow rate (10-Year, 12-Hour SCS Storm)
- d = depth of permanent pool (forebay) during peak 10-year inflow
- V_f = desired final velocity

Input:
- Q = 2.043 m^3/s
- d = 2.00 m
- Vf = 0.5 m/s

L_{min} = 16.34 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required 87 m
Length of Forebay Provided **82.5 m** (at elevation 91.20)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flow rate (10-Year, 3-Hour CHI Storm)
- d = depth of pond during peak 10-year inflow
- W_{avg} = average width of forebay

Input:
- Q = 2.043 m^3/s
- d = 2.00 m
- W_{avg} = 30 m (21 m bottom, 33 m top)

V = 0.03 m/s < 0.15 m/s