

2705460 ONTARIO INC.

1131-1151 Teron Road

Stormwater Management Report

April 16, 2021





1131-1151 Teron Road Stormwater Management Report

2705460 ONTARIO INC.

Confidential
Issue for City Review
Project No.: 20M-01534-00
Date: April 16, 2021

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Revision History

FIRST ISSUE

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Signatures

Prepared by



April 16, 2021

Kathryn Kerker
Water Resources E.I.T.

Date

APPROVED BY



April 16, 2021

Michelle Hughes, P.Eng. MSc.
Manager, Water Resources

Date

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1 INTRODUCTION

1.1 Scope

WSP Canada Inc. was retained by 2705460 Ontario inc. to conduct a stormwater management study in support of proposals to develop nine-storey and three-storey residential buildings with a connecting underground parking garage.

1.2 Site Location

The site is located at 1131-1151 Teron Road, Ottawa, Ontario. The location of the proposed development is illustrated in **Figure 1**.

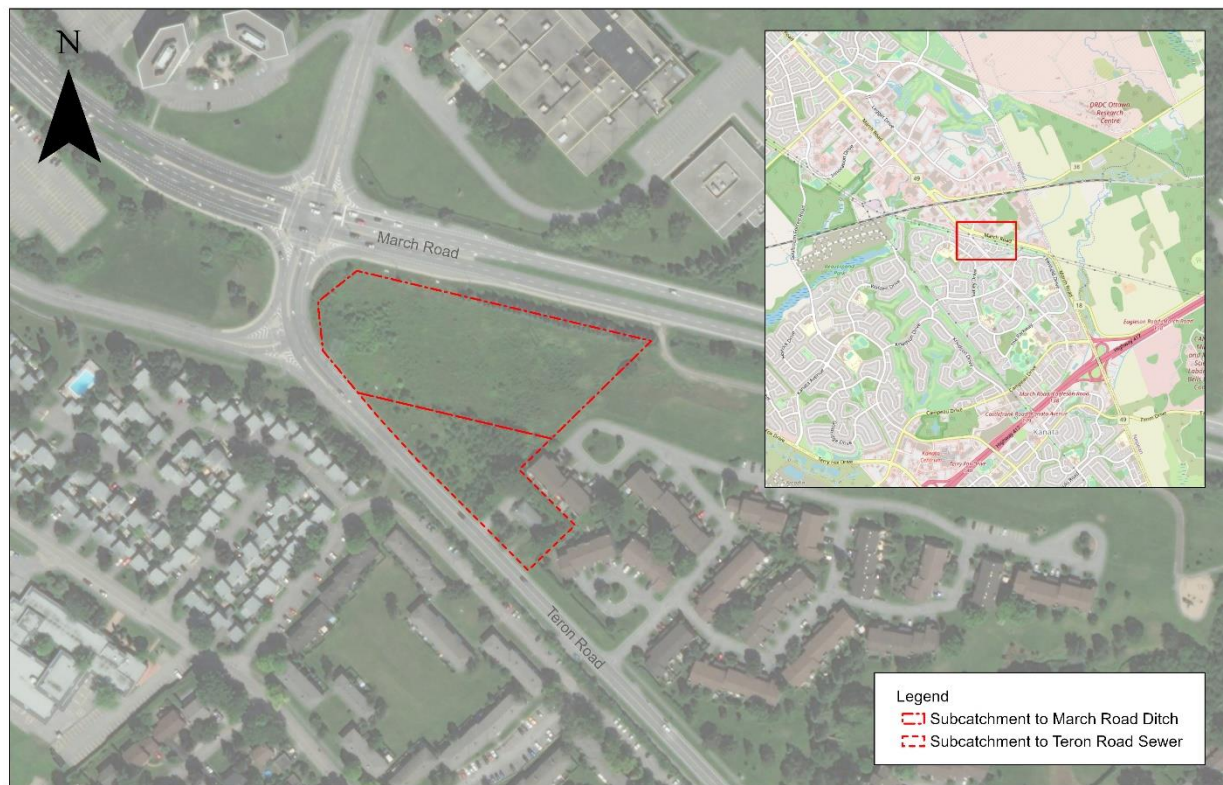


Figure 1: Site Location

1.3 Stormwater Management Plan Objectives

The objectives of the stormwater management (SWM) study are as follows:

- Collect and review background information.
 - Confirm applicable SWM design criteria with City of Ottawa staff.
 - Evaluate various SWM practices that meet the stormwater management requirements and recommend a preferred strategy—specifically related to the applicable quantity and quality control criteria.
-

1.4 Design Criteria

Design criteria were confirmed through pre-consultation with the City of Ottawa held on January 14, 2021 (Meeting minutes included in **Appendix A**). Criteria for 1131-1151 Teron Road are as follows:

Water Quantity Control and Discharge to Municipal Infrastructure

- Stormwater directed to March Road ditch must be controlled to pre-development conditions up to the 100-year event.
- Stormwater directed to Teron Road storm sewer must be controlled to the pre-development 5-year event.
- Allowable Runoff coefficient (C): C = the lesser of the existing pre-development conditions to a maximum of 0.5
- Time of concentration (Tc): Tc = pre-development (Calculated); maximum Tc = 10 min

Water Quality

- MVCA requires enhanced water quality protection (80% TSS removal) be provided on-site

2 PRE-DEVELOPMENT CONDITIONS

2.1 General

Currently the land proposed for the new development is a greenfield site (1151 Teron Road) and contains a single-family home (1131 Teron Road). The site is primarily covered in grasses and small trees/bushes. The total site area is 1.48 ha. A large part of the site along March Road remains untouched in proposed conditions and has been excluded from the analysis, making the total study area 0.88 ha.

2.2 Rainfall Information

The rainfall intensity is calculated in accordance with Section 5.4.2 of the Ottawa Sewer Design Guidelines (October 2012):

$$i = \left[\frac{A}{(T_d + C)^B} \right]$$

Where;

- A, B, C = regression constants for each return period (defined in section 5.4.2)
 - i = rainfall intensity (mm/hour)
 - T_d = storm duration (minutes)
 - The IDF parameters/regression constants are included in **Appendix B**.
-

2.3 Allowable Flow Rates

As noted in **Section 1.4**, for the developed area draining to the March Road ditch (0.49 ha), post-development stormwater runoff must not exceed the pre-development runoff up to the 100-year event, calculated using a runoff coefficient being the lesser of 0.50 or existing conditions. In this instance existing conditions are represented by a runoff coefficient of 0.20, therefore this value has been used to calculate the allowable release rate.

For the area draining to the Teron Road sewer (0.38 ha), post-development stormwater runoff up to the 100-year event must not exceed the pre-development 5-year runoff, calculated using a runoff coefficient being the lesser of 0.50 or existing conditions. In this instance existing conditions are represented by a runoff coefficient of 0.27, therefore this value has been used to calculate the allowable release rate.

The calculated peak flow rates for the site in the pre-development condition are summarized below in Table 2-1.

Table 2-1: Pre-Development Peak Flow Rate Calculations (Runoff Coefficient, C = 0.20 and $T_c=10$ min)

Return Period	Rainfall Intensity	March Rd Ditch Peak Flow Rate (S1_EX)	Target Release Rate	Teron Rd Sewer Peak Flow Rate (S2_EX)	Target Release Rate
years	mm/hour	C = 0.20, T_c = 10min, l/s		C = 0.27, T_c = 10min, l/s	
2	76.8	21	21	21	29
5	104.2	28	28	29	
10	122.1	33	33	34	
25	144.7	39	39	40	
50	161.5	44	44	45	
100	178.6	48	48	50	

3 POST-DEVELOPMENT CONDITIONS

3.1 General

The site will be developed with a nine-storey residential building with a rear surface parking lot, as well as a three-storey residential building connected by an underground parking garage. A bioswale will be used to control the flow to the March Road ditch, and roof storage plus an underground cistern will be used to control flow to the Teron Road storm sewer.

Note that this report should be read in conjunction with the proposed site servicing drawing package—specifically drawings C02 (Grading Plan), C03 (Servicing Plan), and C04 (Drainage Area Plan).

3.2 Water Quantity

3.2.1 March Road Ditch

As noted in **Section 2.3**, the target allowable discharge rate discharging to the March Road ditch 48 L/s. This is equivalent to the peak runoff rate under pre-development conditions during a 100-year design storm event with a runoff coefficient of 0.20. Compliance with the 100-yr target offsite discharge rate will be achieved through use of bioswales in the central parking lot island, with inlet control prior to discharge into the proposed sewer to the March Road ditch

It is noted that a small portion of the developed area (gravel walkway) will not drain to the proposed bioswale due to grading constraints. Post-development runoff calculations have accounted for uncontrolled runoff from this area, and the following results report on the cumulative release rates from the study area (controlled plus uncontrolled). The pervious area along March Road remains untouched in proposed conditions, so is not included in the analysis. There are no external areas draining to the site.

A HydroCAD model of the project was created and includes:

- Three bioswales (total storage volume 49 m³, 38 m³, 46 m³), with outlet controlled using HYDROVEX 100-VHV-1 vortex valves to detain 0.48 ha of the new development
- Uncontrolled runoff from 0.01 ha gravel path area (C = 0.70)

The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise, and the model has informed the maximum

storage volume used in each bioswale based on the proposed flow. The peak flow rate generated from the uncontrolled drainage area within the project site and controlled flow from the bioswales is 44 L/s which meets the allowable 100-year release rate of 48 L/s. Modelling results are summarized below in **Table 3-1** and shown in **Appendix D**.

Note that results provided below describe performance of the proposed system at several different storm durations, which have been solved iteratively within HydroCAD to represent critical conditions (i.e. maximum storage utilized within storage features, and peak release rate at the system discharge point). The results demonstrate that the target allowable 100-year release rate is satisfied at all durations.

Table 3-1: Summary of Modelling Results

Return Period (Years)	Time of Conc. (min)	Bioswale ID	Utilized Storage (m³)	Peak Water Elevation in storage (m)	Peak Flow Rate at control (L/s)	Total Flow Leaving Site* (L/s)	Allowable 100-yr Flow Rate (L/s)
100 (Peak Discharge)	18	B1	40.8	89.918	14	44	48
		B2	24.1	89.825	13		
		B3	36.2	89.899	14		
100-Year Peak Storage Bioswale 1	33	B1	43.9	89.948	14	43	
		B2	23.7	89.820	13		
		B3	38.0	89.918	14		
100-Year Peak Storage Bioswale 2	24	B1	43.0	89.940	14	44	
		B2	24.6	89.830	14		
		B3	37.8	89.916	14		
100-Year Peak Storage Bioswale 3	30	B1	43.8	89.948	14	44	
		B2	24.1	89.826	13		
		B3	38.2	89.920	14		

*Total Flow Leaving Site' includes all developed area draining to the March road ditch from the study area.

3.2.2 Teron Road Storm Sewer

As noted in **Section 2.3**, the target allowable discharge rate discharging to the Teron Road storm sewer 29 L/s. This is equivalent to the peak runoff rate under pre-development conditions during a 5-year design storm event with a runoff coefficient of 0.27. Compliance with the 100-yr target offsite discharge rate will be achieved through roof storage and underground storage with outlet control prior to discharge into the Teron Road storm sewer.

A HydroCAD model of the project was created and includes:

- Rooftop flow control drains to utilize roof storage on both buildings, to control 0.20 ha of new development.
- Underground storage (active storage volume minimum 27m³), with outlet controlled using ICD (IPEX Type B) to detain 0.17 ha of the new development

The Modified Rational Method (an inherent subroutine of the HydroCAD software) has been used for the modelling exercise, and the model has informed the maximum storage volume used on each roof and within the cistern based on the proposed flow. The peak flow rate generated from the controlled roof drainage and controlled flow from the cistern is 24 L/s which meets the allowable 100-year release rate of 29 L/s. Modelling results are summarized below in **Table 3-1** and shown in **Appendix C**.

Note that results provided below describe performance of the proposed system at several different storm durations, which have been solved iteratively within HydroCAD to represent critical conditions (i.e. maximum storage utilized within storage features, and peak release rate at the system discharge point). The results demonstrate that the target allowable 100-year release rate is satisfied at all durations.

Table 3-2: Summary of Modelling Results

Return Period (Years)	Time of Conc. (min)	Storage Unit	Utilized Storage (m³)	Peak Water Elevation in storage (m)	Peak Flow Rate at control (L/s)	Total Flow Leaving Site (L/s)	Allowable 100-yr Flow Rate (L/s)
100 (Peak Discharge)	23	Cistern	26.1	88.823	18	24	29
		Bldg1	49.6	0.13	4		
		Bldg2	17.1	0.11	2		
100 (Peak Cistern Storage)	23	Cistern	26.1	88.823	18	24	
		Bldg1	49.6	0.13	4		
		Bldg2	17.1	0.11	2		
100 (Peak Bldg 1 Roof Storage)	87	Cistern	10.9	88.594	13	19	
		Bldg1	61.5	0.15	4		
		Bldg2	19.6	0.12	2		
100 (Peak Bldg 2 Roof Storage)	66	Cistern	16.3	88.675	15	20	
		Bldg1	60.7	0.15	4		
		Bldg2	19.9	0.12	2		

^aDepth of rooftop storage.

3.3 Water Quality

As noted in section 1.4, quality control is required to provide enhanced water quality treatment of the site (80% TSS removal).

For the area draining to March Road ditch, quality treatment is provided within the bioswale. The bioswale outlet catch basins are offset by 100mm to promote infiltration and enhance water quality. The volume below the outlet was calculated to ensure the water quality storage requirements are met (MOE, 2003). Based on table 3.2 of the MOE stormwater management planning and design manual, a water quality volume of 40 m³/ha is required. For the 0.486 ha area draining to the bioswale, this equals 19 m³. The bioswales provide a total of 37.8 m³ below the outlet, which meets the water quality volume target.

Table 3-3: Bioswale water quality volume

Bioswale	Area	Infiltration trench volume (m ³)	Surface volume below outlet (m ³)	Total Volume
Bioswale 1	0.188	8.1	5.5	13.6
Bioswale 2	0.122	6.5	4.1	10.6
Bioswale 3	0.176	8.6	4.9	13.5
Total	0.486	23.3	14.5	37.8

For the area draining to the Teron Road sewer, treatment is required for the areas with vehicular traffic. An OGS unit of appropriate size will be provided downstream of the cistern which will treat areas B-101 and B-102. Roof drainage, which discharges to the Teron Road sewer at a separate connection, is considered adequate quality for discharge without further treatment. OGS sizing is provided in **Appendix E**.

4 CONCLUSIONS

A stormwater management plan has been prepared to support the site plan application for the 1131 – 1151 Teron Road development in the City of Ottawa. The key points are summarized below.

WATER QUANTITY

March Road Ditch

Runoff from the catchment will be directed to a bioswale in the median of the parking area and will provide a storage volume of 130 m³ to control the post-development flows to the pre-development flows. The peak 100-year discharge from the site is 44 L/s, which meets the allowable release rate of 48 L/s

Teron Road Storm Sewer

Roof runoff will be detained using rooftop flow control drains before discharging to the Teron Road sewer. The remaining area flows to the cistern, which has a minimum volume of 27 m³ to control the 100-year event to the 5-year pre-development release rate. The peak 100-year discharge from the site is 24 L/s, which meets the allowable release rate of 29 L/s.

WATER QUALITY

March Road Ditch

Water treatment is provided by bioswales in the parking lot median.

Teron Road Storm Sewer

Water treatment is provided by an OGS unit placed just upstream of the city storm sewer connection.

This report demonstrates that the proposed SWM strategy will address stormwater management related impacts from this project and meet the requirements of the City of Ottawa.

APPENDIX

A

Pre-consultation meeting minutes
(January 14, 2021)

Kerker, Kathryn

From: Worth, Ben
Sent: January 14, 2021 4:28 PM
To: Kerker, Kathryn
Subject: FW: 1131 - 1151 Teron Road SPC Discussion

FYI

Ben Worth, P.Eng. C.Eng. MICE
Manager, Water Resources
T+ 1 613-690-3928
M+ 1 613-986-8997



From: Armstrong, Justin [mailto:justin.armstrong@ottawa.ca]
Sent: January 14, 2021 3:59 PM
To: Yang, Winston <Winston.Yang@wsp.com>; Worth, Ben <Ben.Worth@wsp.com>
Subject: 1131 - 1151 Teron Road SPC Discussion

Hi Winston and Ben,

See the following bullet-point summary of our discussion from earlier today.

- SWM quantity criteria to reflect previous requirements:
 - Areas discharging to March Road ditch - post-development flows up to the 100-yr controlled to corresponding pre-development flows.
 - Areas discharging to Teron Road storm sewer - post-development flows up to the 100-yr controlled to the pre-development 5-yr with a C-value of existing or 0.5, whichever is less, and a calculated time of concentration no less than 10 min).
- SWM quality criteria to be confirmed by the MVCA, however 80% TSS removal was previously required and should be assumed for the site unless MVCA indicates otherwise. MVCA to confirm if treatment is required for rooftop portion of site discharging to the Teron Road storm sewer. Matt Craig mcraig@mvc.on.ca was included as an MVCA contact in previous comments letter.
- There is no sanitary sewer fronting the site in Teron Road or March Road. A connection to the private sanitary sewer within Weeping Willow Lane was previously proposed. A letter of agreement must be provided from the owner of the private sanitary sewer to allow for the connection / easement / works on private property. An easement & or a Joint Use & Maintenance Agreement with the owner of the sewer will be needed. An assessment of available capacity will also need to be performed.
- Water service connections to the 610mm feedermain within Teron Road are not permitted. As such, a local watermain extension must be made from Steacie Drive and extended along Teron Road to the development site in order to service the development. A **second** connection to the existing hydrant lateral (fed by the 610mm feedermain) would be accepted, assuming a **first** connection to the local watermain off Steacie Drive is provided. If the 610mm feedermain is taken offline, there must be another watermain feed to service the development.

Feel free to contact me should you have any more questions.

Justin

During this period of uncertainty surrounding COVID-19, we are following best practices recommended to minimize the risk of exposure, while ensuring that service to our clients remains as uninterrupted as possible. I am working from home and will respond to emails at my earliest opportunity. Should there be delays due to internet connectivity, I thank your understanding and patience.

Justin Armstrong, E.I.T.

Project Manager

Planning, Infrastructure and Economic Development Department - Services de la planification, de l'infrastructure et du développement économique

Development Review - West Branch

City of Ottawa | Ville d'Ottawa

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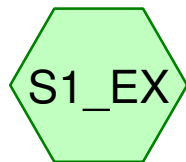
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APPENDIX

B

Pre-Development Stormwater Management Calculations



Existing



Existing



Reach



Routing Diagram for 20210407_TeronRd
Prepared by WSP Canada inc., Printed 2021-04-09
HydroCAD® 10.00-22 s/n 10697 © 2018 HydroCAD Software Solutions LLC

20210407_TeronRd

Prepared by WSP Canada inc.

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Printed 2021-04-09

Page 2

Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
4,945.5	0.20	(S1_EX)
3,770.0	0.27	(S2_EX)
8,715.5	0.23	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=3 mm
Tc=10.0 min C=0.20 Runoff=0.02073 m³/s 12.7 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=3 mm
Tc=10.0 min C=0.27 Runoff=0.02134 m³/s 13.0 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 25.7 m³ Average Runoff Depth = 3 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

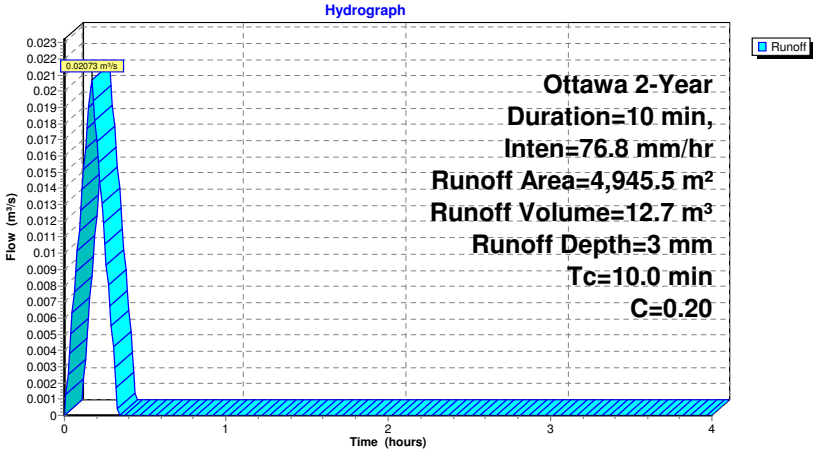
Runoff = 0.02073 m³/s @ 0.17 hrs, Volume= 12.7 m³, Depth= 3 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

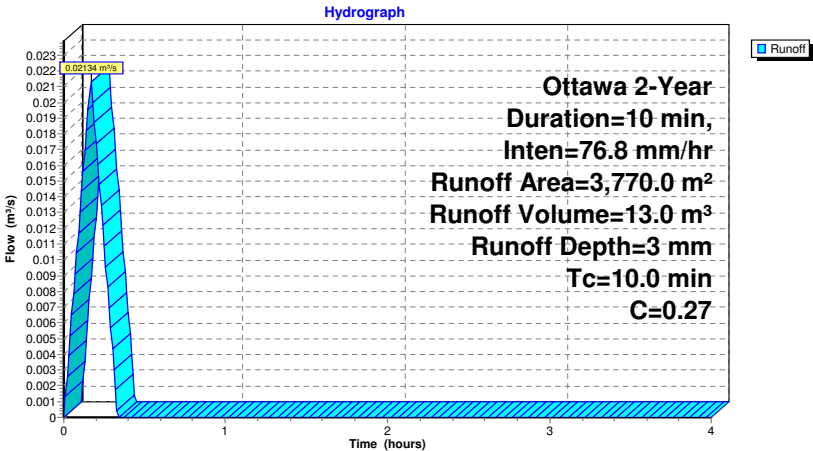
Runoff = 0.02134 m³/s @ 0.17 hrs, Volume= 13.0 m³, Depth= 3 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 2-Year Duration=10 min, Inten=76.8 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=3 mm
Tc=10.0 min C=0.20 Runoff=0.02813 m³/s 17.2 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min C=0.27 Runoff=0.02895 m³/s 17.7 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 34.8 m³ Average Runoff Depth = 4 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

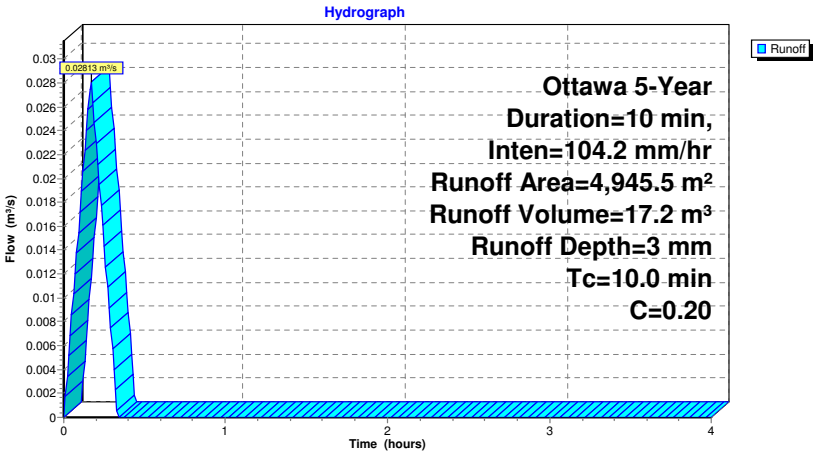
Runoff = 0.02813 m³/s @ 0.17 hrs, Volume= 17.2 m³, Depth= 3 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=10 min, Inten=104.2 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

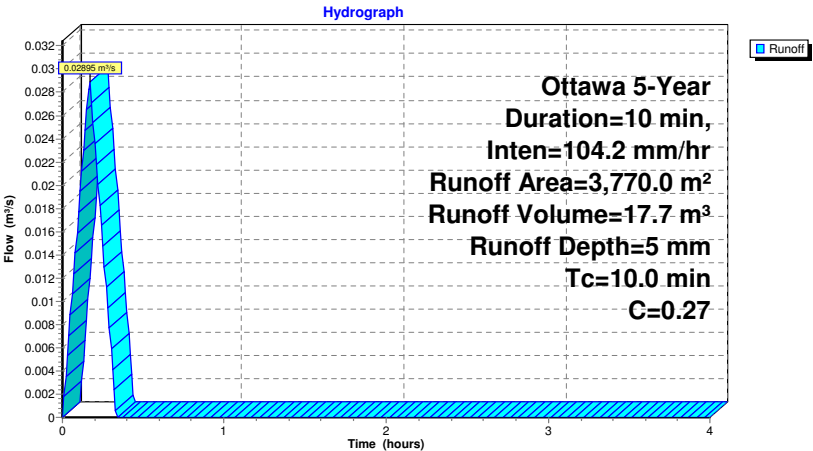
Runoff = 0.02895 m³/s @ 0.17 hrs, Volume= 17.7 m³, Depth= 5 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 5-Year Duration=10 min, Inten=104.2 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=4 mm
Tc=10.0 min C=0.20 Runoff=0.03297 m³/s 20.1 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min C=0.27 Runoff=0.03393 m³/s 20.7 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 40.8 m³ Average Runoff Depth = 5 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

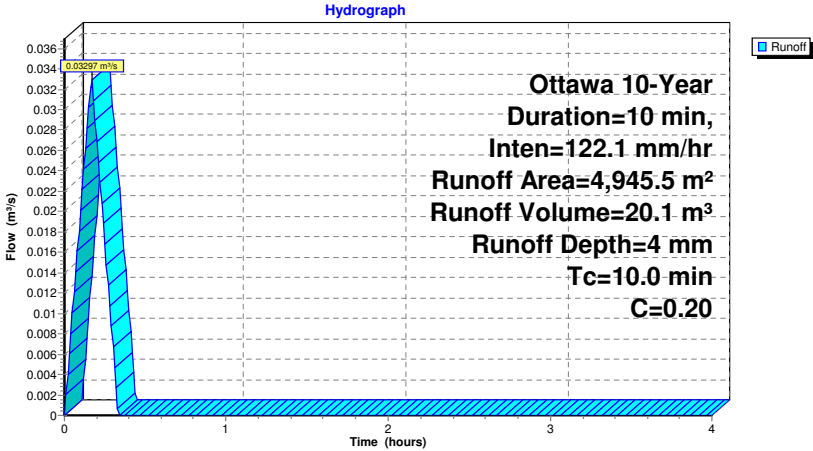
Runoff = 0.03297 m³/s @ 0.17 hrs, Volume= 20.1 m³, Depth= 4 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 10-Year Duration=10 min, Inten=122.1 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

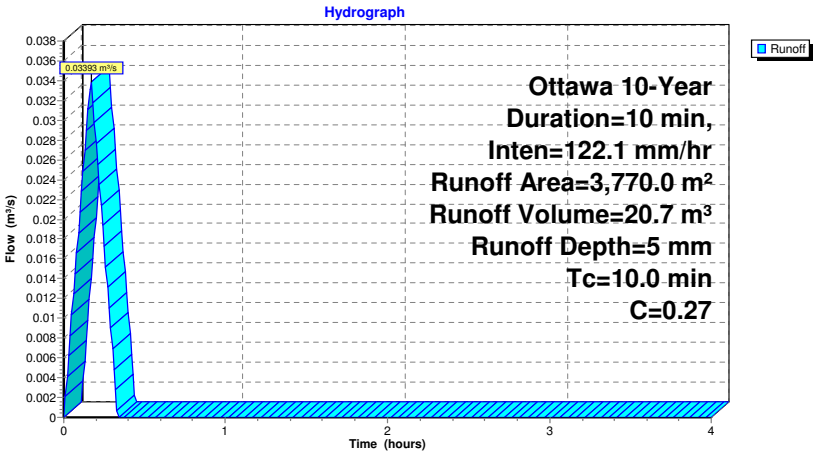
Runoff = 0.03393 m³/s @ 0.17 hrs, Volume= 20.7 m³, Depth= 5 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 10-Year Duration=10 min, Inten=122.1 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min C=0.20 Runoff=0.03906 m³/s 23.8 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=7 mm
Tc=10.0 min C=0.27 Runoff=0.04020 m³/s 24.5 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 48.4 m³ Average Runoff Depth = 6 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

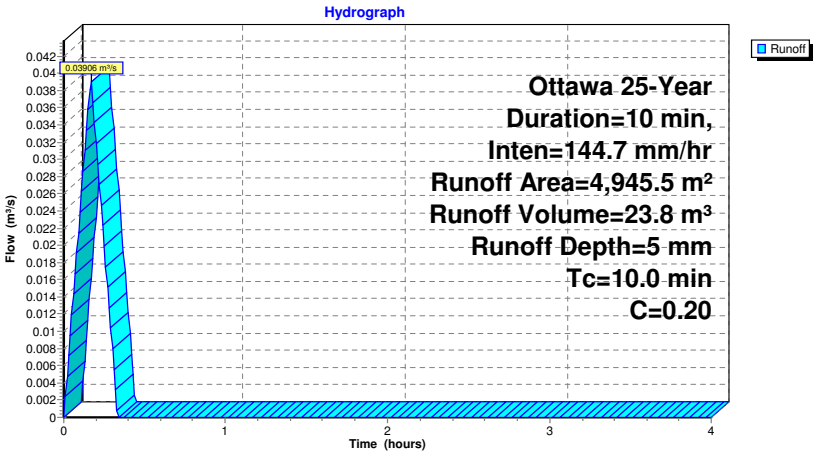
Runoff = 0.03906 m³/s @ 0.17 hrs, Volume= 23.8 m³, Depth= 5 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 25-Year Duration=10 min, Inten=144.7 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

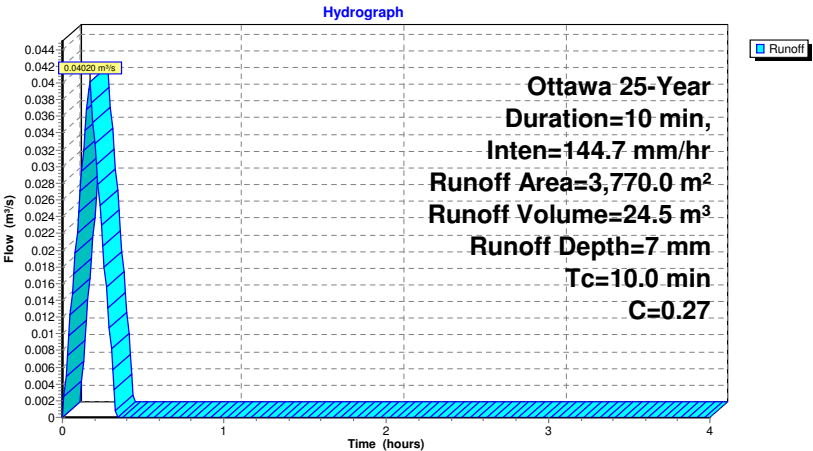
Runoff = 0.04020 m³/s @ 0.17 hrs, Volume= 24.5 m³, Depth= 7 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 25-Year Duration=10 min, Inten=144.7 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min C=0.20 Runoff=0.04359 m³/s 26.6 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=7 mm
Tc=10.0 min C=0.27 Runoff=0.04486 m³/s 27.4 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 54.0 m³ Average Runoff Depth = 6 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

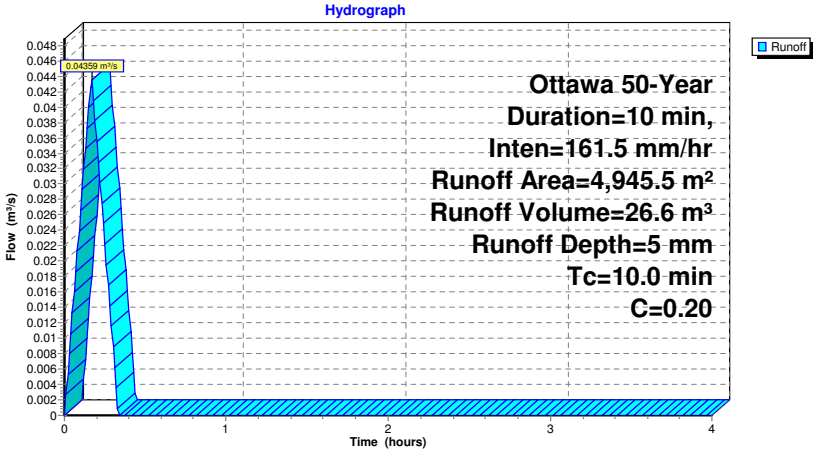
Runoff = 0.04359 m³/s @ 0.17 hrs, Volume= 26.6 m³, Depth= 5 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 50-Year Duration=10 min, Inten=161.5 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

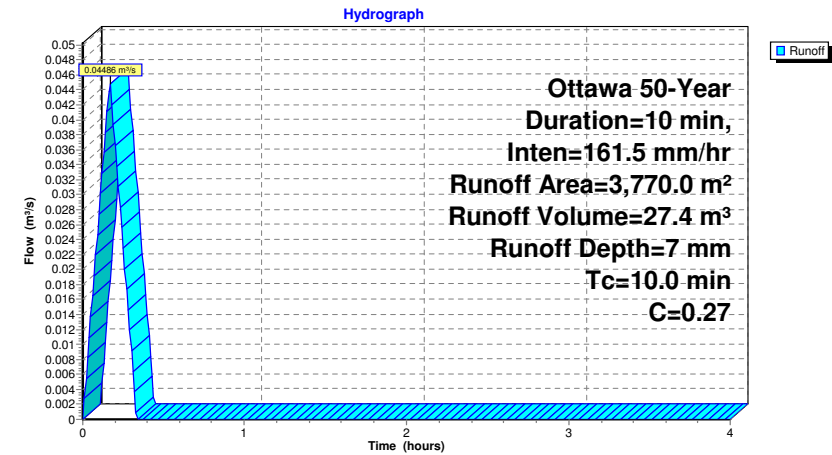
Runoff = 0.04486 m³/s @ 0.17 hrs, Volume= 27.4 m³, Depth= 7 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 50-Year Duration=10 min, Inten=161.5 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment S1_EX: Existing Runoff Area=4,945.5 m² 0.00% Impervious Runoff Depth=6 mm
Tc=10.0 min C=0.20 Runoff=0.04820 m³/s 29.4 m³

Subcatchment S2_EX: Existing Runoff Area=3,770.0 m² 0.00% Impervious Runoff Depth=8 mm
Tc=10.0 min C=0.27 Runoff=0.04960 m³/s 30.3 m³

Total Runoff Area = 8,715.5 m² Runoff Volume = 59.7 m³ Average Runoff Depth = 7 mm
100.00% Pervious = 8,715.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment S1_EX: Existing

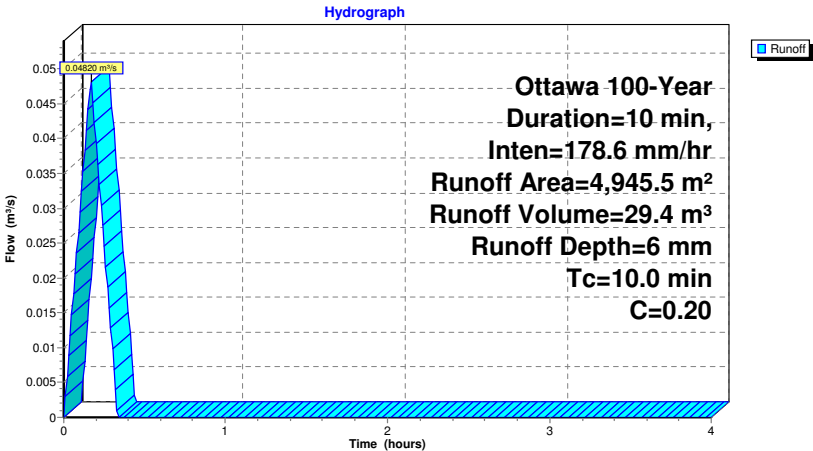
Runoff = 0.04820 m³/s @ 0.17 hrs, Volume= 29.4 m³, Depth= 6 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr

Area (m²)	C	Description
4,945.5	0.20	
4,945.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S1_EX: Existing



Summary for Subcatchment S2_EX: Existing

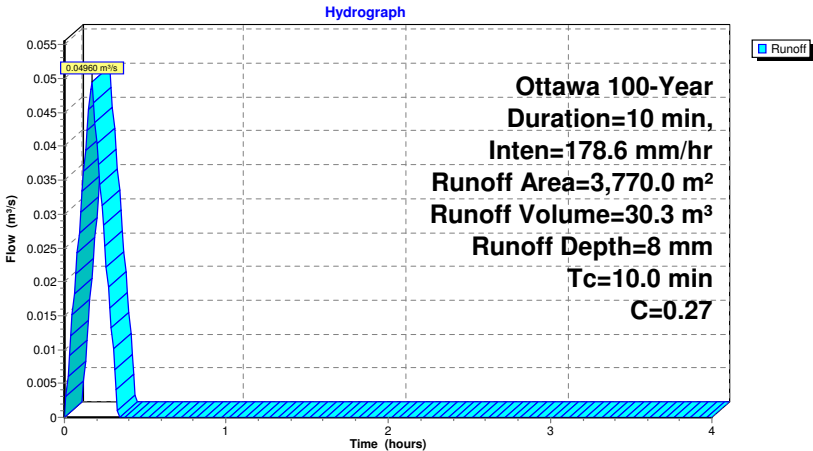
Runoff = 0.04960 m³/s @ 0.17 hrs, Volume= 30.3 m³, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=10 min, Inten=178.6 mm/hr

Area (m²)	C	Description
3,770.0	0.27	
3,770.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment S2_EX: Existing



APPENDIX

C

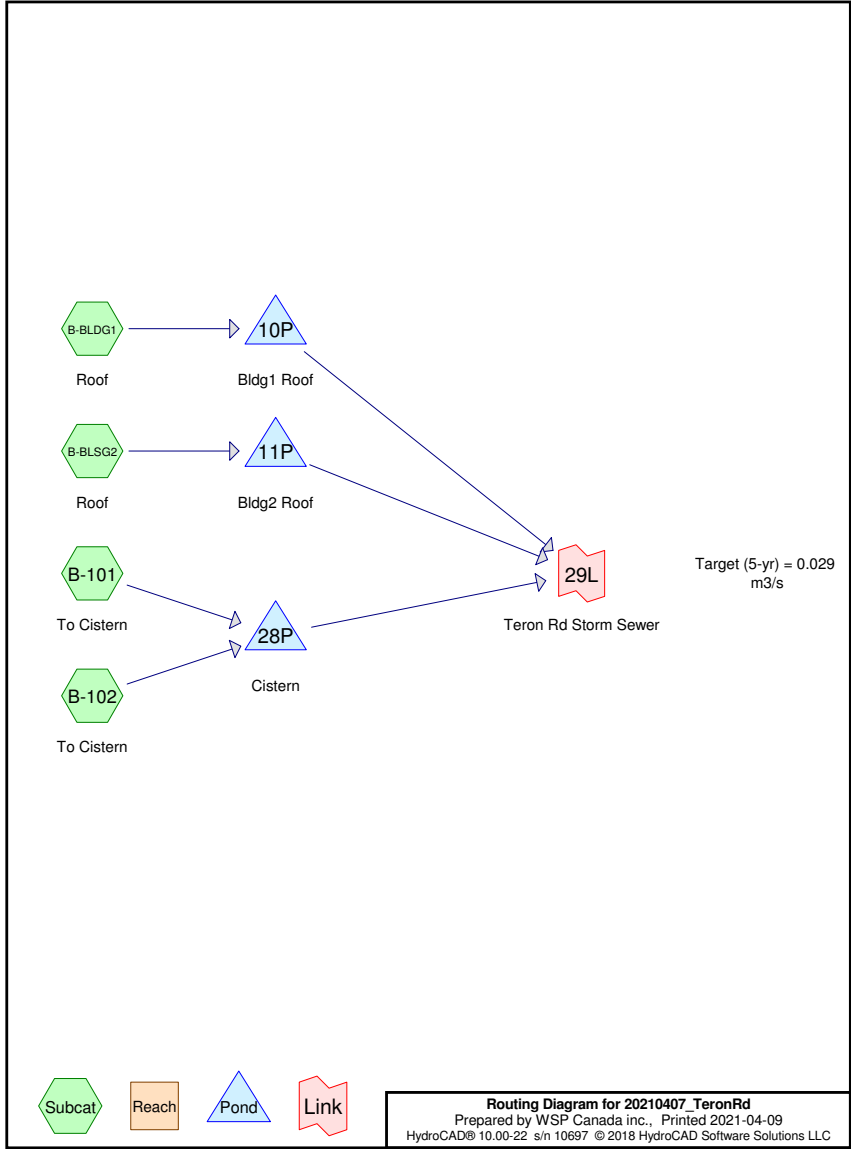
HydroCAD Model Output – Teron
Road Sewer

APPENDIX

C-1

100-Year Analysis (Peak Discharge and Peak Cistern Storage, $T_c = 23$ min)

The storm system for the site is governed by the 100-year storm. Peak storage in each storage unit and peak discharge may occur at separate times of concentration and are therefore reported separately.



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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,610.0	0.65	(B-101)
2,160.0	0.90	(B-102, B-BLDG1, B-BLSG2)
3,770.0	0.79	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment B-101: To Cistern	Runoff Area=1,610.0 m² 0.00% Impervious Runoff Depth=27 mm Tc=10.0 min C=0.65 Runoff=0.03188 m³/s 44.0 m³
Subcatchment B-102: To Cistern	Runoff Area=130.0 m² 0.00% Impervious Runoff Depth=38 mm Tc=10.0 min C=0.90 Runoff=0.00356 m³/s 4.9 m³
Subcatchment B-BLDG1: Roof	Runoff Area=1,490.0 m² 0.00% Impervious Runoff Depth=38 mm Tc=10.0 min C=0.90 Runoff=0.04086 m³/s 56.4 m³
Subcatchment B-BLSG2: Roof	Runoff Area=540.0 m² 0.00% Impervious Runoff Depth=38 mm Tc=10.0 min C=0.90 Runoff=0.01481 m³/s 20.4 m³
Pond 10P: Bldg1 Roof	Peak Elev=100.134 m Storage=49.6 m³ Inflow=0.04086 m³/s 56.4 m³ Outflow=0.00372 m³/s 53.2 m³
Pond 11P: Bldg2 Roof	Peak Elev=100.108 m Storage=17.1 m³ Inflow=0.01481 m³/s 20.4 m³ Outflow=0.00186 m³/s 20.4 m³
Pond 28P: Cistern	Peak Elev=88.823 m Storage=26.1 m³ Inflow=0.03545 m³/s 48.9 m³ Outflow=0.01811 m³/s 48.9 m³
Link 29L: Teron Rd Storm Sewer	Inflow=0.02369 m³/s 122.5 m³ Primary=0.02369 m³/s 122.5 m³

Total Runoff Area = 3,770.0 m² Runoff Volume = 125.7 m³ Average Runoff Depth = 33 mm
100.00% Pervious = 3,770.0 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment B-101: To Cistern

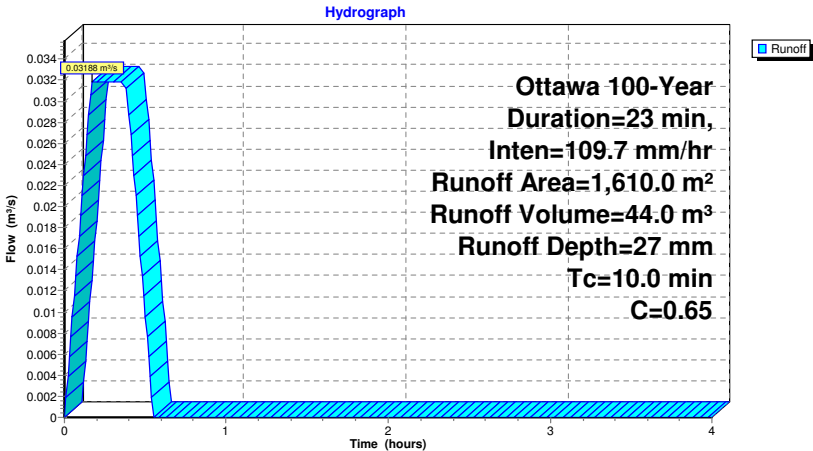
Runoff = 0.03188 m³/s @ 0.17 hrs, Volume= 44.0 m³, Depth= 27 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

Area (m²)	C	Description
1,610.0	0.65	
1,610.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-101: To Cistern



Summary for Subcatchment B-102: To Cistern

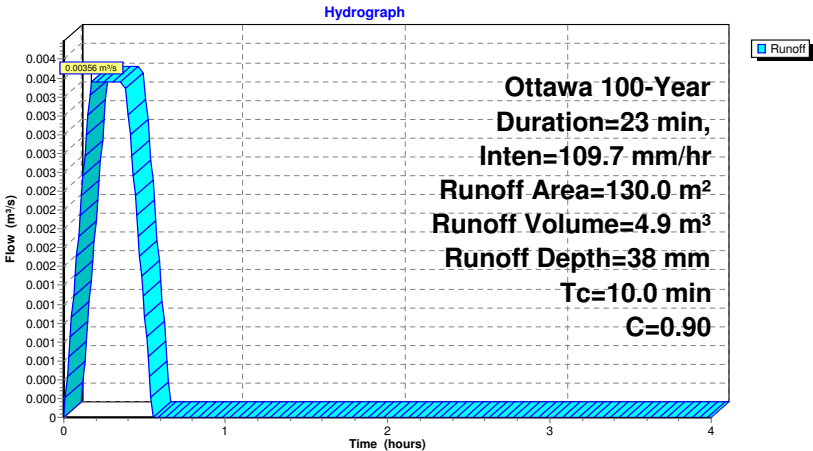
Runoff = 0.00356 m³/s @ 0.17 hrs, Volume= 4.9 m³, Depth= 38 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

Area (m²)	C	Description
130.0	0.90	
130.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-102: To Cistern



Summary for Subcatchment B-BLDG1: Roof

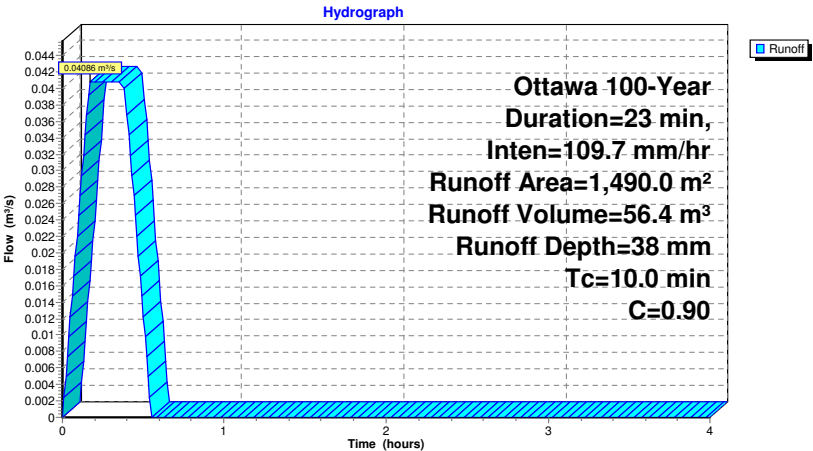
Runoff = 0.04086 m³/s @ 0.17 hrs, Volume= 56.4 m³, Depth= 38 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

Area (m²)	C	Description
1,490.0	0.90	
1,490.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLDG1: Roof



Summary for Subcatchment B-BLSG2: Roof

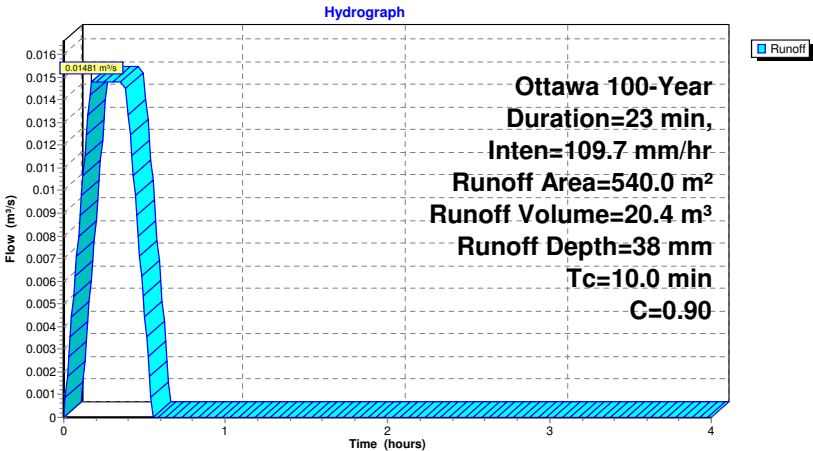
Runoff = 0.01481 m³/s @ 0.17 hrs, Volume= 20.4 m³, Depth= 38 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

Area (m²)	C	Description
540.0	0.90	
540.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLSG2: Roof



Summary for Pond 10P: Bldg1 Roof

Inflow Area = 1,490.0 m², 0.00% Impervious, Inflow Depth = 38 mm for 100-Year event
Inflow = 0.04086 m³/s @ 0.17 hrs, Volume= 56.4 m³
Outflow = 0.00372 m³/s @ 0.08 hrs, Volume= 53.2 m³, Atten= 91%, Lag= 0.0 min
Primary = 0.00372 m³/s @ 0.08 hrs, Volume= 53.2 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.134 m @ 0.53 hrs Surf.Area= 740.6 m² Storage= 49.6 m³

Plug-Flow detention time= 105.5 min calculated for 53.2 m³ (94% of inflow)
Center-of-Mass det. time= 104.7 min (121.2 - 16.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	16.6 m³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	27.2 m³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	10.6 m³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	27.2 m³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	2.2 m³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	2.2 m³	Roof drain 6 (Prismatic) Listed below (Recalc)
#7	100.000 m	25.6 m³	Roof drain 7 (Prismatic) Listed below (Recalc)
#8	100.000 m	25.6 m³	Roof drain 8 (Prismatic) Listed below (Recalc)
#9	100.000 m	5.8 m³	Roof drain 9 (Prismatic) Listed below (Recalc)
#10	100.000 m	8.5 m³	Roof drain 10 (Prismatic) Listed below (Recalc)
#11	100.000 m	25.0 m³	Roof drain 11 (Prismatic) Listed below (Recalc)
#12	100.000 m	9.9 m³	Roof drain 12 (Prismatic) Listed below (Recalc)
186.7 m³ Total Available Storage			

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	74.0	5.6	5.6
100.300	74.0	11.1	16.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	47.0	3.5	3.5
100.300	47.0	7.0	10.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

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Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

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Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	26.0	2.0	2.0
100.300	26.0	3.9	5.8

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	38.0	2.9	2.9
100.300	38.0	5.7	8.5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	111.0	8.3	8.3
100.300	111.0	16.6	25.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	44.0	3.3	3.3
100.300	44.0	6.6	9.9

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 12.00

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Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

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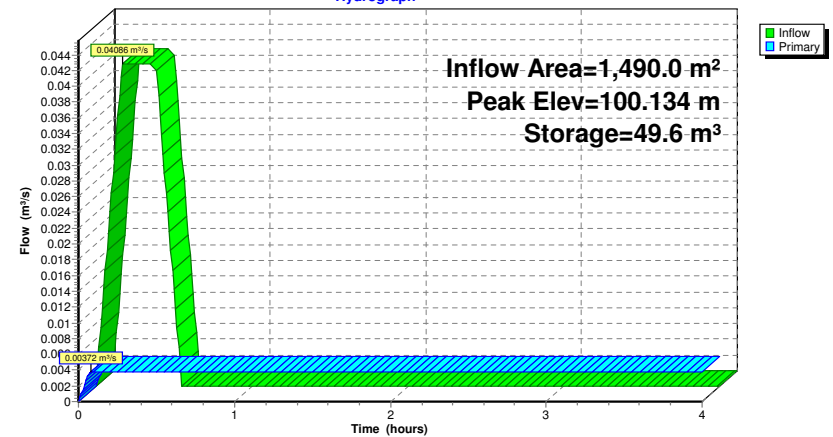
Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152
 Disch. (m³/s) 0.000000 0.000310 0.000310 0.000310 0.000310
 0.000310 0.000310

Primary OutFlow Max=0.00372 m³/s @ 0.08 hrs HW=100.028 m (Free Discharge)

↳1=WATTS Accutrol_5-Closed (Custom Controls 0.00372 m³/s)

Pond 10P: Bldg1 Roof

Hydrograph



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Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

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Summary for Pond 11P: Bldg2 Roof

Inflow Area = 540.0 m², 0.00% Impervious, Inflow Depth = 38 mm for 100-Year event
 Inflow = 0.01481 m³/s @ 0.17 hrs, Volume= 20.4 m³
 Outflow = 0.00186 m³/s @ 0.09 hrs, Volume= 20.4 m³, Atten= 87%, Lag= 0.0 min
 Primary = 0.00186 m³/s @ 0.09 hrs, Volume= 20.4 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.108 m @ 0.53 hrs Surf.Area= 318.2 m² Storage= 17.1 m³

Plug-Flow detention time= 77.7 min calculated for 20.4 m³ (100% of inflow)
 Center-of-Mass det. time= 77.7 min (94.2 - 16.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	14.2 m ³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	13.3 m ³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	13.0 m ³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	13.9 m ³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	29.5 m ³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	16.0 m ³	Roof drain 6 (Prismatic) Listed below (Recalc)
		99.9 m ³	Total Available Storage

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	63.0	4.7	4.7
100.300	63.0	9.4	14.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	59.0	4.4	4.4
100.300	59.0	8.8	13.3

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	58.0	4.4	4.4
100.300	58.0	8.7	13.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	62.0	4.7	4.7
100.300	62.0	9.3	13.9

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	131.0	9.8	9.8
100.300	131.0	19.6	29.5

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Ottawa 100-Year Duration=23 min, Inten=109.7 mm/hr

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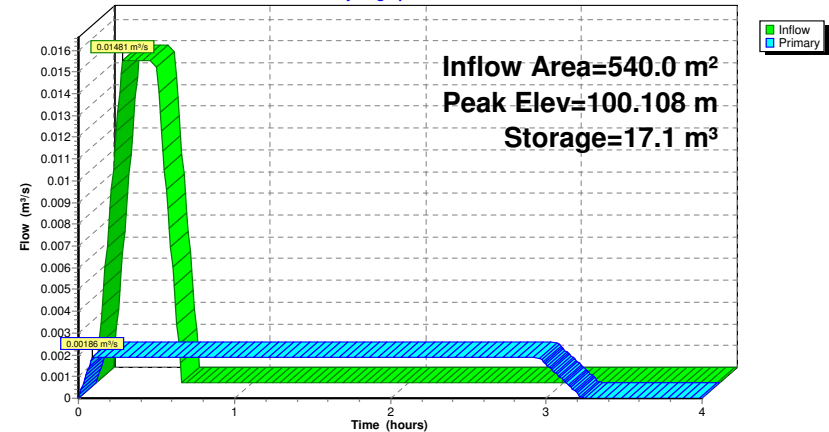
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	71.0	5.3	5.3
100.300	71.0	10.6	16.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 6.00 Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m ³ /s) 0.000000 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310

Primary OutFlow Max=0.00186 m³/s @ 0.09 hrs HW=100.026 m (Free Discharge)
 ↳1=WATTS Accutrol_5-Closed (Custom Controls 0.00186 m³/s)

Pond 11P: Bldg2 Roof

Hydrograph



Summary for Pond 28P: Cistern

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1,740.0 m², 0.00% Impervious, Inflow Depth = 28 mm for 100-Year event
Inflow = 0.03545 m³/s @ 0.17 hrs, Volume= 48.9 m³
Outflow = 0.01811 m³/s @ 0.46 hrs, Volume= 48.9 m³, Atten= 49%, Lag= 17.7 min
Primary = 0.01811 m³/s @ 0.46 hrs, Volume= 48.9 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 88.823 m @ 0.46 hrs Surf.Area= 0.0 m² Storage= 26.1 m³

Plug-Flow detention time= 16.8 min calculated for 48.9 m³ (100% of inflow)
Center-of-Mass det. time= 16.7 min (33.2 - 16.5)

Volume	Invert	Avail.Storage	Storage Description
#1	88.431 m	50.0 m³	Custom Stage Data Listed below

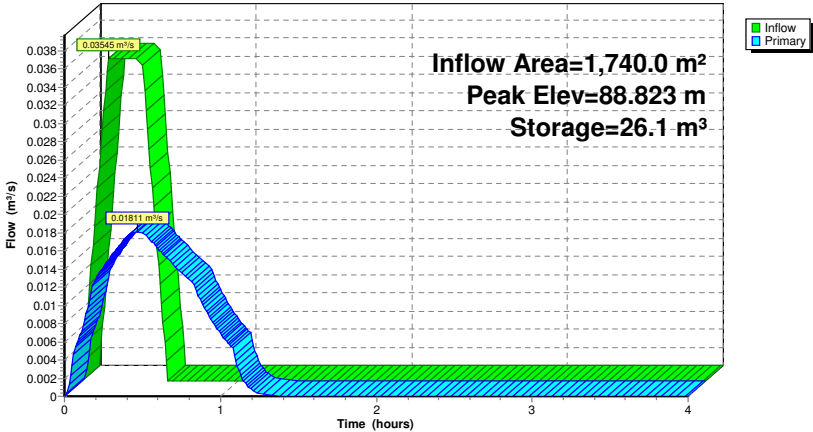
Elevation (meters)	Cum.Store (cubic-meters)
88.431	0.0
89.181	50.0

Device	Routing	Invert	Outlet Devices
#1	Primary	88.364 m	IPEX_ICD_B
Head (meters) 0.000 0.200 0.500 1.000 1.500 1.800			
Disch. (m³/s) 0.000000 0.012500 0.019000 0.026000 0.031000			
0.032500			

Primary OutFlow Max=0.01811 m³/s @ 0.46 hrs HW=88.823 m (Free Discharge)
↑-IPEX_ICD_B (Custom Controls 0.01811 m³/s)

Pond 28P: Cistern

Hydrograph

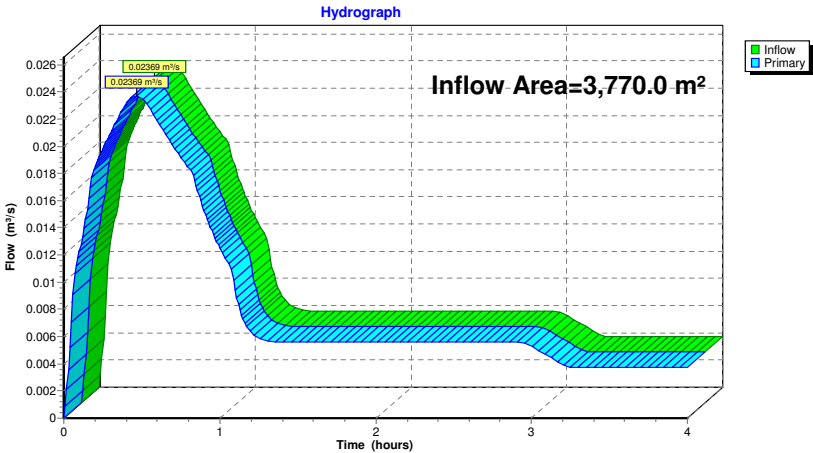


Summary for Link 29L: Teron Rd Storm Sewer

Inflow Area = 3,770.0 m², 0.00% Impervious, Inflow Depth > 32 mm for 100-Year event
Inflow = 0.02369 m³/s @ 0.46 hrs, Volume= 122.5 m³
Primary = 0.02369 m³/s @ 0.46 hrs, Volume= 122.5 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

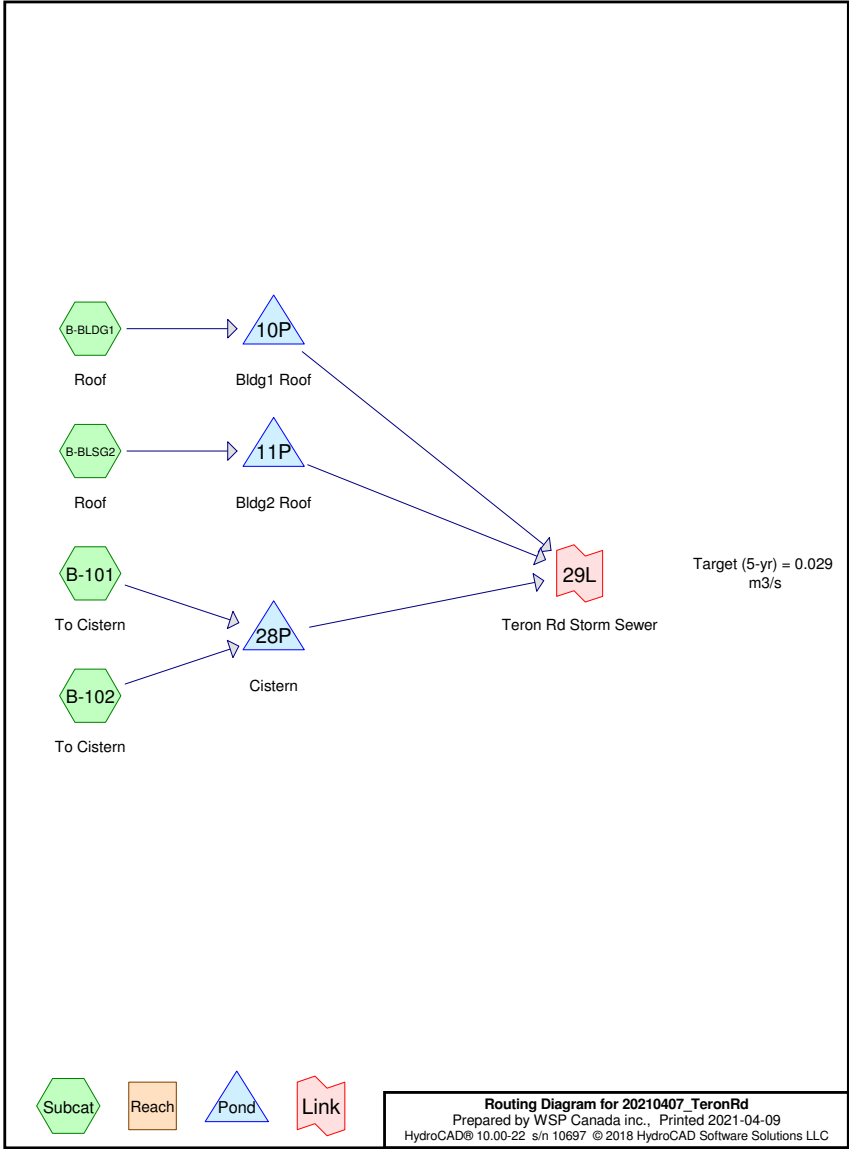
Link 29L: Teron Rd Storm Sewer



APPENDIX

C-2 100-Year Analysis (Peak Building 1 Rooftop Storage, $T_c = 87$ Min)

The storm system for the site is governed by the 100-year storm. Peak storage in each storage unit and peak discharge may occur at separate times of concentration and are therefore reported separately.



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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,610.0	0.65	(B-101)
2,160.0	0.90	(B-102, B-BLDG1, B-BLSG2)
3,770.0	0.79	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment B-101: To Cistern	Runoff Area=1,610.0 m² 0.00% Impervious Runoff Depth=40 mm Tc=10.0 min C=0.65 Runoff=0.01227 m³/s 64.0 m³
Subcatchment B-102: To Cistern	Runoff Area=130.0 m² 0.00% Impervious Runoff Depth=55 mm Tc=10.0 min C=0.90 Runoff=0.00137 m³/s 7.2 m³
Subcatchment B-BLDG1: Roof	Runoff Area=1,490.0 m² 0.00% Impervious Runoff Depth=55 mm Tc=10.0 min C=0.90 Runoff=0.01572 m³/s 82.0 m³
Subcatchment B-BLSG2: Roof	Runoff Area=540.0 m² 0.00% Impervious Runoff Depth=55 mm Tc=10.0 min C=0.90 Runoff=0.00570 m³/s 29.7 m³
Pond 10P: Bldg1 Roof	Peak Elev=100.149 m Storage=61.5 m³ Inflow=0.01572 m³/s 82.0 m³ Outflow=0.00372 m³/s 52.8 m³
Pond 11P: Bldg2 Roof	Peak Elev=100.115 m Storage=19.6 m³ Inflow=0.00570 m³/s 29.7 m³ Outflow=0.00186 m³/s 26.3 m³
Pond 28P: Cistern	Peak Elev=88.594 m Storage=10.9 m³ Inflow=0.01364 m³/s 71.2 m³ Outflow=0.01315 m³/s 71.2 m³
Link 29L: Teron Rd Storm Sewer	Inflow=0.01873 m³/s 150.3 m³ Primary=0.01873 m³/s 150.3 m³

Total Runoff Area = 3,770.0 m² Runoff Volume = 183.0 m³ Average Runoff Depth = 49 mm
100.00% Pervious = 3,770.0 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment B-101: To Cistern

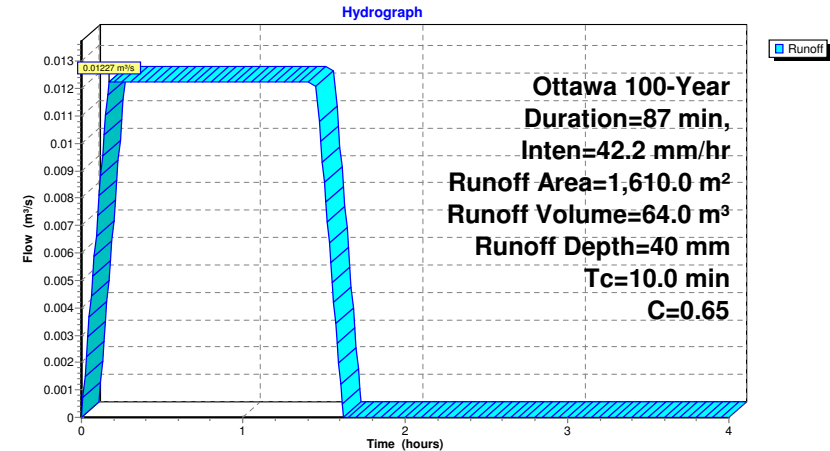
Runoff = 0.01227 m³/s @ 0.17 hrs, Volume= 64.0 m³, Depth= 40 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

Area (m²)	C	Description
1,610.0	0.65	
1,610.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-101: To Cistern



Summary for Subcatchment B-102: To Cistern

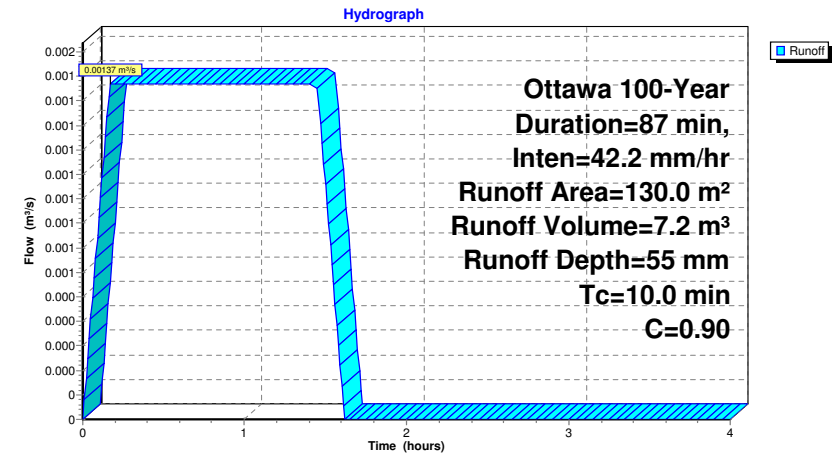
Runoff = 0.00137 m³/s @ 0.17 hrs, Volume= 7.2 m³, Depth= 55 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

Area (m²)	C	Description
130.0	0.90	
130.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-102: To Cistern



Summary for Subcatchment B-BLDG1: Roof

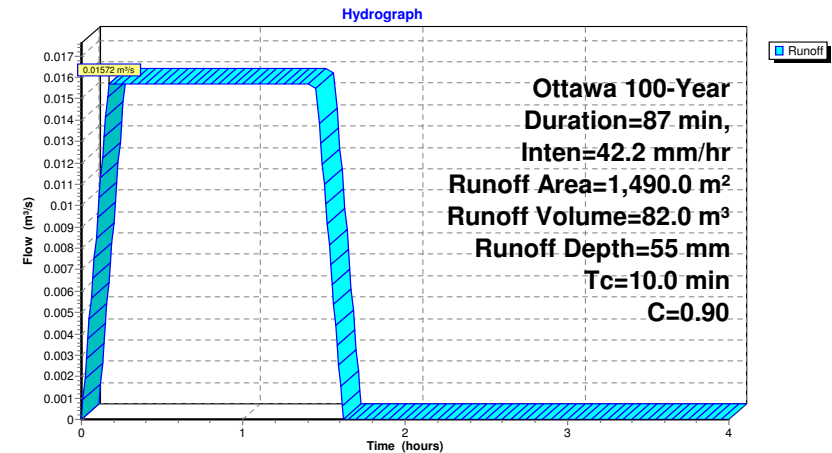
Runoff = 0.01572 m³/s @ 0.17 hrs, Volume= 82.0 m³, Depth= 55 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

Area (m²)	C	Description
1,490.0	0.90	
1,490.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLDG1: Roof



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Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

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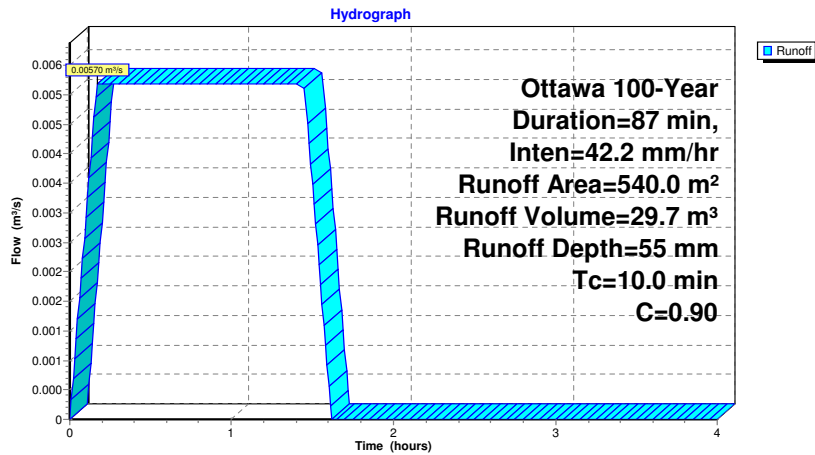
Summary for Subcatchment B-BLSG2: Roof

Runoff = 0.00570 m³/s @ 0.17 hrs, Volume= 29.7 m³, Depth= 55 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

Area (m²)	C	Description
540.0	0.90	
540.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLSG2: Roof**20210407_TeronRd**

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Summary for Pond 10P: Bldg1 RoofInflow Area = 1,490.0 m², 0.00% Impervious, Inflow Depth = 55 mm for 100-Year event
Inflow = 0.01572 m³/s @ 0.17 hrs, Volume= 82.0 m³
Outflow = 0.00372 m³/s @ 0.13 hrs, Volume= 52.8 m³, Atten= 76%, Lag= 0.0 min
Primary = 0.00372 m³/s @ 0.13 hrs, Volume= 52.8 m³Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.149 m @ 1.58 hrs Surf.Area= 824.8 m² Storage= 61.5 m³Plug-Flow detention time= 89.1 min calculated for 52.8 m³ (64% of inflow)
Center-of-Mass det. time= 73.5 min (122.0 - 48.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	16.6 m³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	27.2 m³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	10.6 m³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	27.2 m³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	2.2 m³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	2.2 m³	Roof drain 6 (Prismatic) Listed below (Recalc)
#7	100.000 m	25.6 m³	Roof drain 7 (Prismatic) Listed below (Recalc)
#8	100.000 m	25.6 m³	Roof drain 8 (Prismatic) Listed below (Recalc)
#9	100.000 m	5.8 m³	Roof drain 9 (Prismatic) Listed below (Recalc)
#10	100.000 m	8.5 m³	Roof drain 10 (Prismatic) Listed below (Recalc)
#11	100.000 m	25.0 m³	Roof drain 11 (Prismatic) Listed below (Recalc)
#12	100.000 m	9.9 m³	Roof drain 12 (Prismatic) Listed below (Recalc)
		186.7 m³	Total Available Storage

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	74.0	5.6	5.6
100.300	74.0	11.1	16.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	47.0	3.5	3.5
100.300	47.0	7.0	10.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

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Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	26.0	2.0	2.0
100.300	26.0	3.9	5.8

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	38.0	2.9	2.9
100.300	38.0	5.7	8.5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	111.0	8.3	8.3
100.300	111.0	16.6	25.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	44.0	3.3	3.3
100.300	44.0	6.6	9.9

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 12.00

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Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

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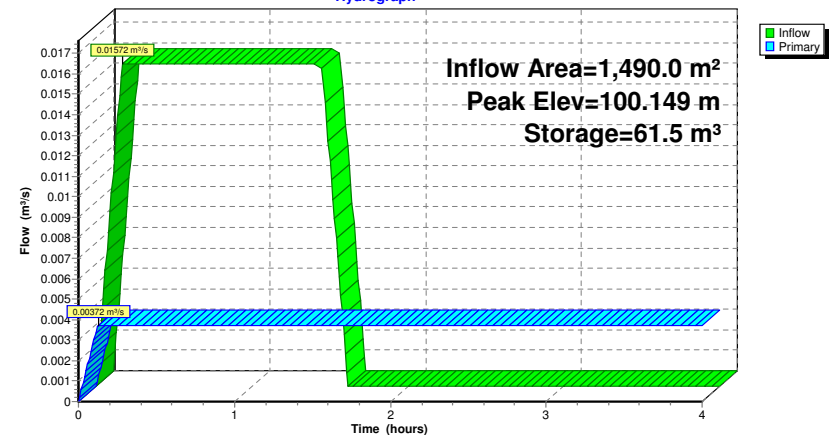
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Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152
 Disch. (m³/s) 0.000000 0.000310 0.000310 0.000310 0.000310
 0.000310 0.000310

Primary OutFlow Max=0.00372 m³/s @ 0.13 hrs HW=100.027 m (Free Discharge)
 1=WATTS Accutrol_5-Closed (Custom Controls 0.00372 m³/s)

Pond 10P: Bldg1 Roof

Hydrograph



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Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

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Summary for Pond 11P: Bldg2 Roof

Inflow Area = 540.0 m², 0.00% Impervious, Inflow Depth = 55 mm for 100-Year event
 Inflow = 0.00570 m³/s @ 0.17 hrs, Volume= 29.7 m³
 Outflow = 0.00186 m³/s @ 0.16 hrs, Volume= 26.3 m³, Atten= 67%, Lag= 0.0 min
 Primary = 0.00186 m³/s @ 0.16 hrs, Volume= 26.3 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.115 m @ 1.56 hrs Surf.Area= 340.6 m² Storage= 19.6 m³

Plug-Flow detention time= 79.0 min calculated for 26.3 m³ (88% of inflow)
 Center-of-Mass det. time= 73.9 min (122.4 - 48.5)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	14.2 m ³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	13.3 m ³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	13.0 m ³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	13.9 m ³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	29.5 m ³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	16.0 m ³	Roof drain 6 (Prismatic) Listed below (Recalc)
		99.9 m ³	Total Available Storage

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	63.0	4.7	4.7
100.300	63.0	9.4	14.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	59.0	4.4	4.4
100.300	59.0	8.8	13.3

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	58.0	4.4	4.4
100.300	58.0	8.7	13.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	62.0	4.7	4.7
100.300	62.0	9.3	13.9

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	131.0	9.8	9.8
100.300	131.0	19.6	29.5

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Ottawa 100-Year Duration=87 min, Inten=42.2 mm/hr

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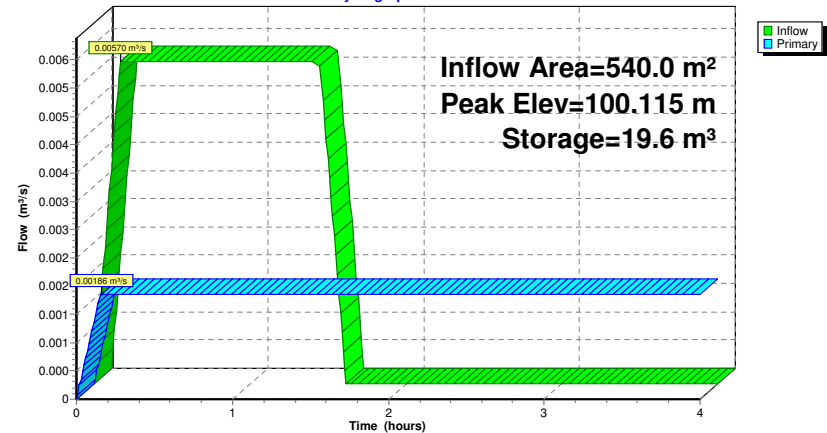
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	71.0	5.3	5.3
100.300	71.0	10.6	16.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 6.00 Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m ³ /s) 0.000000 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310

Primary OutFlow Max=0.00186 m³/s @ 0.16 hrs HW=100.026 m (Free Discharge)
 ↳1=WATTS Accutrol_5-Closed (Custom Controls 0.00186 m³/s)

Pond 11P: Bldg2 Roof

Hydrograph



Summary for Pond 28P: Cistern

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1,740.0 m², 0.00% Impervious, Inflow Depth = 41 mm for 100-Year event
Inflow = 0.01364 m³/s @ 0.17 hrs, Volume= 71.2 m³
Outflow = 0.01315 m³/s @ 1.46 hrs, Volume= 71.2 m³, Atten= 4%, Lag= 77.2 min
Primary = 0.01315 m³/s @ 1.46 hrs, Volume= 71.2 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 88.594 m @ 1.46 hrs Surf.Area= 0.0 m² Storage= 10.9 m³

Plug-Flow detention time= 11.6 min calculated for 71.2 m³ (100% of inflow)
Center-of-Mass det. time= 11.5 min (60.0 - 48.5)

Volume	Invert	Avail.Storage	Storage Description
#1	88.431 m	50.0 m³	Custom Stage Data Listed below

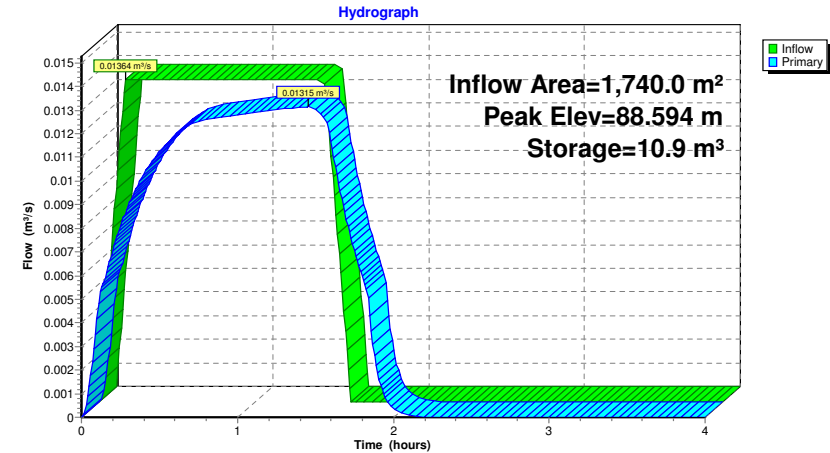
Elevation (meters)	Cum.Store (cubic-meters)
88.431	0.0
89.181	50.0

Device	Routing	Invert	Outlet Devices
#1	Primary	88.364 m	IPEX_ICD_B

Head (meters)	0.000	0.200	0.500	1.000	1.500	1.800
Disch. (m³/s)	0.000000	0.012500	0.019000	0.026000	0.031000	0.032500

Primary OutFlow Max=0.01315 m³/s @ 1.46 hrs HW=88.594 m (Free Discharge)
↑-IPEX_ICD_B (Custom Controls 0.01315 m³/s)

Pond 28P: Cistern

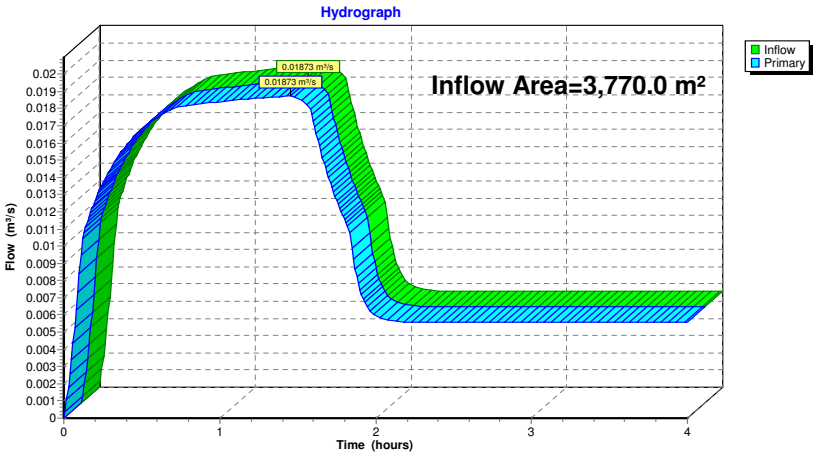


Summary for Link 29L: Teron Rd Storm Sewer

Inflow Area = 3,770.0 m², 0.00% Impervious, Inflow Depth > 40 mm for 100-Year event
Inflow = 0.01873 m³/s @ 1.46 hrs, Volume= 150.3 m³
Primary = 0.01873 m³/s @ 1.46 hrs, Volume= 150.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 29L: Teron Rd Storm Sewer

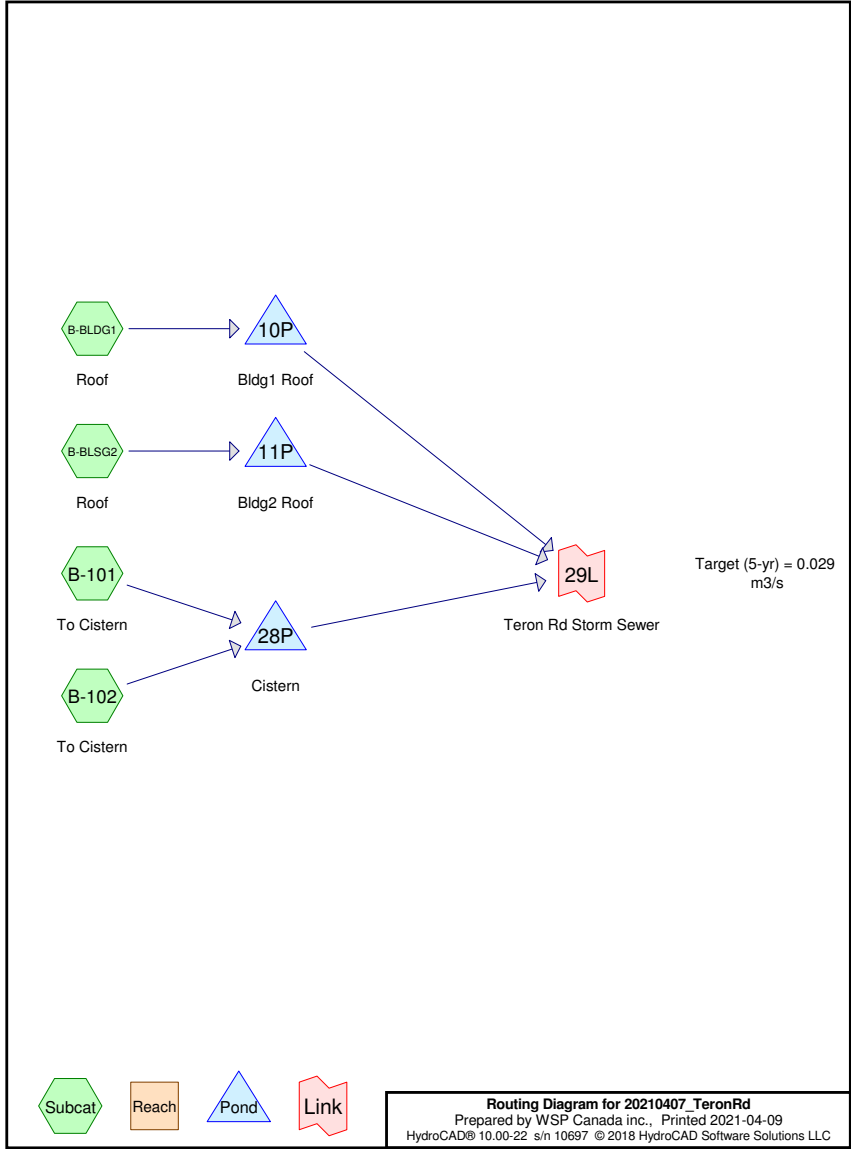


APPENDIX

C-3

100-Year Analysis (Peak Building 2 Rooftop Storage, $T_c = 66$ Min)

The storm system for the site is governed by the 100-year storm. Peak storage in each storage unit and peak discharge may occur at separate times of concentration and are therefore reported separately.



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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
1,610.0	0.65	(B-101)
2,160.0	0.90	(B-102, B-BLDG1, B-BLSG2)
3,770.0	0.79	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment B-101: To Cistern	Runoff Area=1,610.0 m ² 0.00% Impervious Runoff Depth=37 mm Tc=10.0 min C=0.65 Runoff=0.01513 m ³ /s 59.9 m ³
Subcatchment B-102: To Cistern	Runoff Area=130.0 m ² 0.00% Impervious Runoff Depth=52 mm Tc=10.0 min C=0.90 Runoff=0.00169 m ³ /s 6.7 m ³
Subcatchment B-BLDG1: Roof	Runoff Area=1,490.0 m ² 0.00% Impervious Runoff Depth=52 mm Tc=10.0 min C=0.90 Runoff=0.01939 m ³ /s 76.8 m ³
Subcatchment B-BLSG2: Roof	Runoff Area=540.0 m ² 0.00% Impervious Runoff Depth=52 mm Tc=10.0 min C=0.90 Runoff=0.00703 m ³ /s 27.8 m ³
Pond 10P: Bldg1 Roof	Peak Elev=100.148 m Storage=60.7 m ³ Inflow=0.01939 m ³ /s 76.8 m ³ Outflow=0.00372 m ³ /s 52.9 m ³
Pond 11P: Bldg2 Roof	Peak Elev=100.116 m Storage=19.9 m ³ Inflow=0.00703 m ³ /s 27.8 m ³ Outflow=0.00186 m ³ /s 26.4 m ³
Pond 28P: Cistern	Peak Elev=88.675 m Storage=16.3 m ³ Inflow=0.01682 m ³ /s 66.6 m ³ Outflow=0.01491 m ³ /s 66.6 m ³
Link 29L: Teron Rd Storm Sewer	Inflow=0.02049 m ³ /s 145.9 m ³ Primary=0.02049 m ³ /s 145.9 m ³

Total Runoff Area = 3,770.0 m² Runoff Volume = 171.2 m³ Average Runoff Depth = 45 mm
100.00% Pervious = 3,770.0 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment B-101: To Cistern

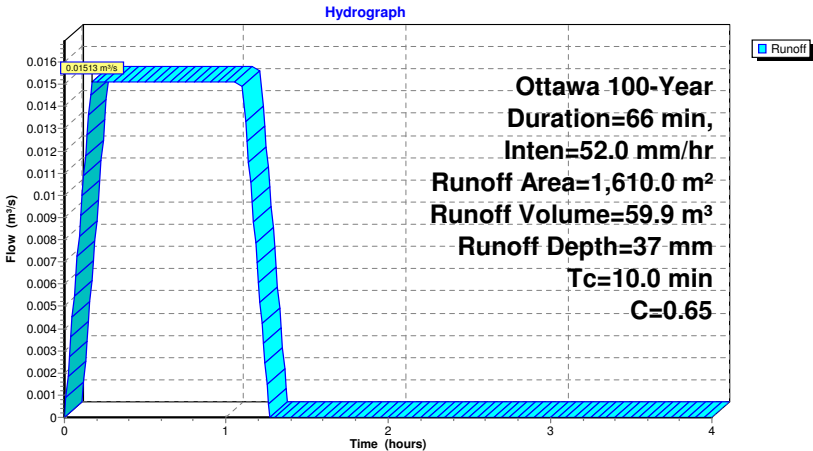
Runoff = 0.01513 m³/s @ 0.17 hrs, Volume= 59.9 m³, Depth= 37 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (m ²)	C	Description
1,610.0	0.65	
1,610.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m ³ /s)	Description
10.0					Direct Entry,

Subcatchment B-101: To Cistern



Summary for Subcatchment B-102: To Cistern

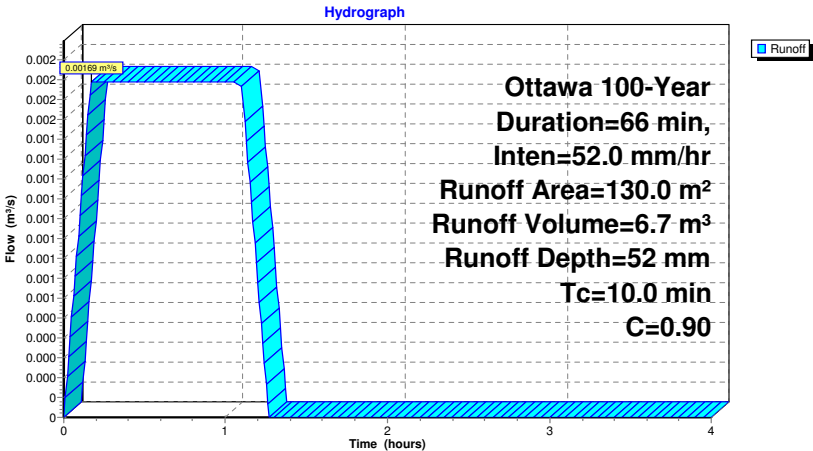
Runoff = 0.00169 m³/s @ 0.17 hrs, Volume= 6.7 m³, Depth= 52 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (m²)	C	Description
130.0	0.90	
130.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-102: To Cistern



Summary for Subcatchment B-BLDG1: Roof

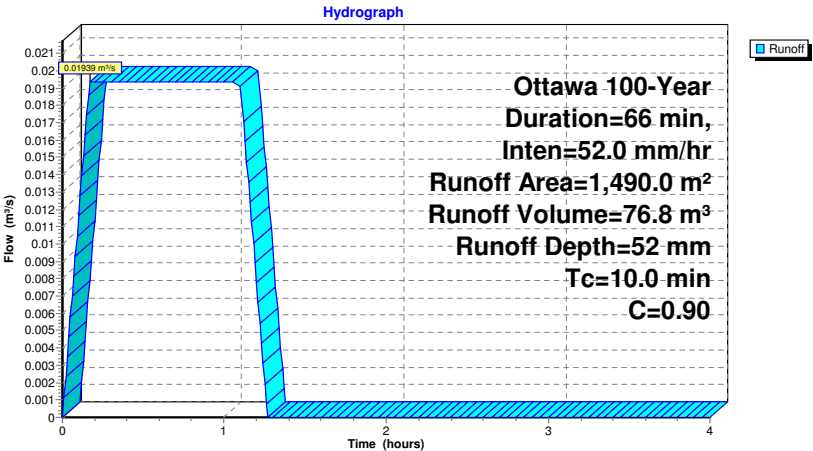
Runoff = 0.01939 m³/s @ 0.17 hrs, Volume= 76.8 m³, Depth= 52 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (m²)	C	Description
1,490.0	0.90	
1,490.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLDG1: Roof



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Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

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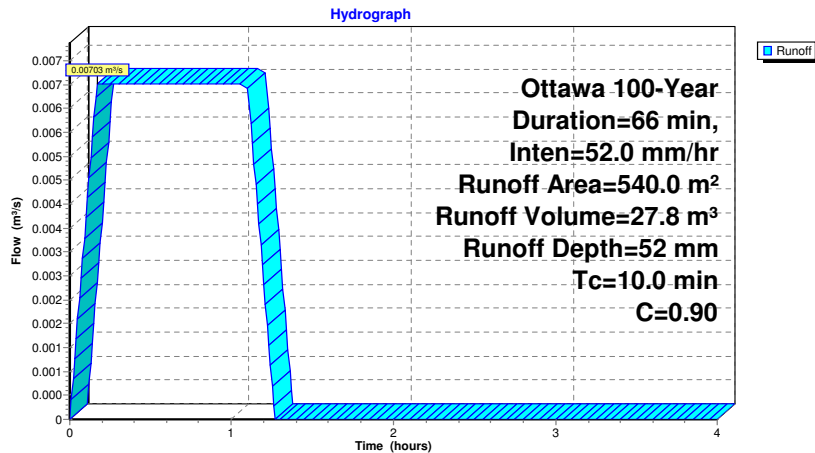
Summary for Subcatchment B-BLSG2: Roof

Runoff = 0.00703 m³/s @ 0.17 hrs, Volume= 27.8 m³, Depth= 52 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

Area (m²)	C	Description
540.0	0.90	
540.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment B-BLSG2: Roof**20210407_TeronRd**

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Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

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Summary for Pond 10P: Bldg1 RoofInflow Area = 1,490.0 m², 0.00% Impervious, Inflow Depth = 52 mm for 100-Year event
Inflow = 0.01939 m³/s @ 0.17 hrs, Volume= 76.8 m³
Outflow = 0.00372 m³/s @ 0.11 hrs, Volume= 52.9 m³, Atten= 81%, Lag= 0.0 min
Primary = 0.00372 m³/s @ 0.11 hrs, Volume= 52.9 m³Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 100.148 m @ 1.23 hrs Surf.Area= 819.9 m² Storage= 60.7 m³Plug-Flow detention time= 94.1 min calculated for 52.9 m³ (69% of inflow)
Center-of-Mass det. time= 83.8 min (121.8 - 38.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	16.6 m³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	27.2 m³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	10.6 m³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	27.2 m³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	2.2 m³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	2.2 m³	Roof drain 6 (Prismatic) Listed below (Recalc)
#7	100.000 m	25.6 m³	Roof drain 7 (Prismatic) Listed below (Recalc)
#8	100.000 m	25.6 m³	Roof drain 8 (Prismatic) Listed below (Recalc)
#9	100.000 m	5.8 m³	Roof drain 9 (Prismatic) Listed below (Recalc)
#10	100.000 m	8.5 m³	Roof drain 10 (Prismatic) Listed below (Recalc)
#11	100.000 m	25.0 m³	Roof drain 11 (Prismatic) Listed below (Recalc)
#12	100.000 m	9.9 m³	Roof drain 12 (Prismatic) Listed below (Recalc)
		186.7 m³	Total Available Storage

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	74.0	5.6	5.6
100.300	74.0	11.1	16.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	47.0	3.5	3.5
100.300	47.0	7.0	10.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	121.0	9.1	9.1
100.300	121.0	18.1	27.2

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Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	10.0	0.8	0.8
100.300	10.0	1.5	2.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	114.0	8.6	8.6
100.300	114.0	17.1	25.6

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	26.0	2.0	2.0
100.300	26.0	3.9	5.8

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	38.0	2.9	2.9
100.300	38.0	5.7	8.5

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	111.0	8.3	8.3
100.300	111.0	16.6	25.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	44.0	3.3	3.3
100.300	44.0	6.6	9.9

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 12.00

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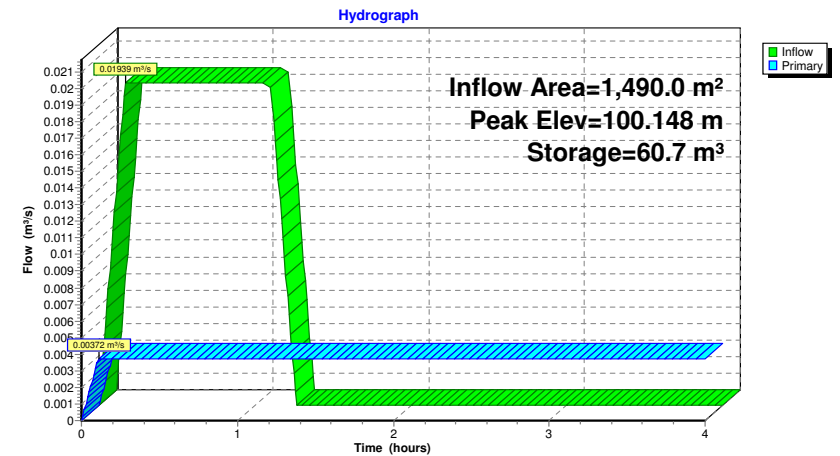
Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

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Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152
 Disch. (m³/s) 0.000000 0.000310 0.000310 0.000310 0.000310
 0.000310 0.000310

Primary OutFlow Max=0.00372 m³/s @ 0.11 hrs HW=100.025 m (Free Discharge)
 1=WATTS Accutrol_5-Closed (Custom Controls 0.00372 m³/s)

Pond 10P: Bldg1 Roof

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Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

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Summary for Pond 11P: Bldg2 Roof

Inflow Area = 540.0 m², 0.00% Impervious, Inflow Depth = 52 mm for 100-Year event
 Inflow = 0.00703 m³/s @ 0.17 hrs, Volume= 27.8 m³
 Outflow = 0.00186 m³/s @ 0.14 hrs, Volume= 26.4 m³, Atten= 74%, Lag= 0.0 min
 Primary = 0.00186 m³/s @ 0.14 hrs, Volume= 26.4 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
 Peak Elev= 100.116 m @ 1.22 hrs Surf.Area= 343.6 m² Storage= 19.9 m³

Plug-Flow detention time= 86.0 min calculated for 26.4 m³ (95% of inflow)
 Center-of-Mass det. time= 84.2 min (122.2 - 38.0)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	14.2 m ³	Roof drain 1 (Prismatic) Listed below (Recalc)
#2	100.000 m	13.3 m ³	Roof drain 2 (Prismatic) Listed below (Recalc)
#3	100.000 m	13.0 m ³	Roof drain 3 (Prismatic) Listed below (Recalc)
#4	100.000 m	13.9 m ³	Roof drain 4 (Prismatic) Listed below (Recalc)
#5	100.000 m	29.5 m ³	Roof drain 5 (Prismatic) Listed below (Recalc)
#6	100.000 m	16.0 m ³	Roof drain 6 (Prismatic) Listed below (Recalc)
		99.9 m ³	Total Available Storage

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	63.0	4.7	4.7
100.300	63.0	9.4	14.2

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	59.0	4.4	4.4
100.300	59.0	8.8	13.3

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	58.0	4.4	4.4
100.300	58.0	8.7	13.0

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	62.0	4.7	4.7
100.300	62.0	9.3	13.9

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	131.0	9.8	9.8
100.300	131.0	19.6	29.5

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Ottawa 100-Year Duration=66 min, Inten=52.0 mm/hr

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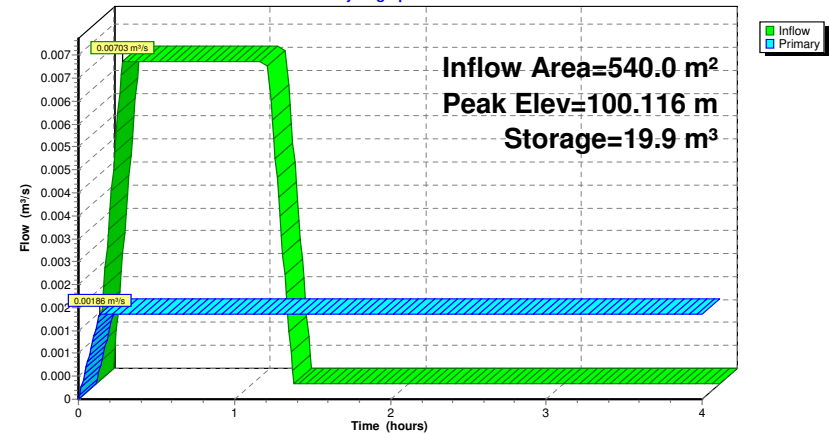
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
100.000	0.0	0.0	0.0
100.150	71.0	5.3	5.3
100.300	71.0	10.6	16.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	WATTS Accutrol_5-Closed X 6.00 Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m ³ /s) 0.000000 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310 0.000310

Primary OutFlow Max=0.00186 m³/s @ 0.14 hrs HW=100.026 m (Free Discharge)
 ↳1=WATTS Accutrol_5-Closed (Custom Controls 0.00186 m³/s)

Pond 11P: Bldg2 Roof

Hydrograph



Summary for Pond 28P: Cistern

[44] Hint: Outlet device #1 is below defined storage

Inflow Area = 1,740.0 m², 0.00% Impervious, Inflow Depth = 38 mm for 100-Year event
Inflow = 0.01682 m³/s @ 0.17 hrs, Volume= 66.6 m³
Outflow = 0.01491 m³/s @ 1.12 hrs, Volume= 66.6 m³, Atten= 11%, Lag= 56.9 min
Primary = 0.01491 m³/s @ 1.12 hrs, Volume= 66.6 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 88.675 m @ 1.12 hrs Surf.Area= 0.0 m² Storage= 16.3 m³

Plug-Flow detention time= 13.7 min calculated for 66.4 m³ (100% of inflow)
Center-of-Mass det. time= 13.7 min (51.7 - 38.0)

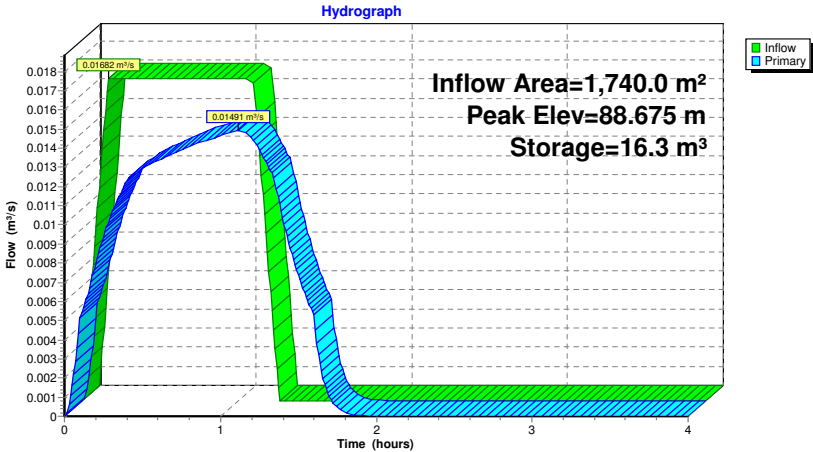
Volume	Invert	Avail.Storage	Storage Description
#1	88.431 m	50.0 m³	Custom Stage Data Listed below

Elevation (meters)	Cum.Store (cubic-meters)
88.431	0.0
89.181	50.0

Device	Routing	Invert	Outlet Devices
#1	Primary	88.364 m	IPEX_ICD_B
Head (meters) 0.000 0.200 0.500 1.000 1.500 1.800			
Disch. (m³/s) 0.000000 0.012500 0.019000 0.026000 0.031000			
0.032500			

Primary OutFlow Max=0.01491 m³/s @ 1.12 hrs HW=88.675 m (Free Discharge)
↑I=IPEX_ICD_B (Custom Controls 0.01491 m³/s)

Pond 28P: Cistern

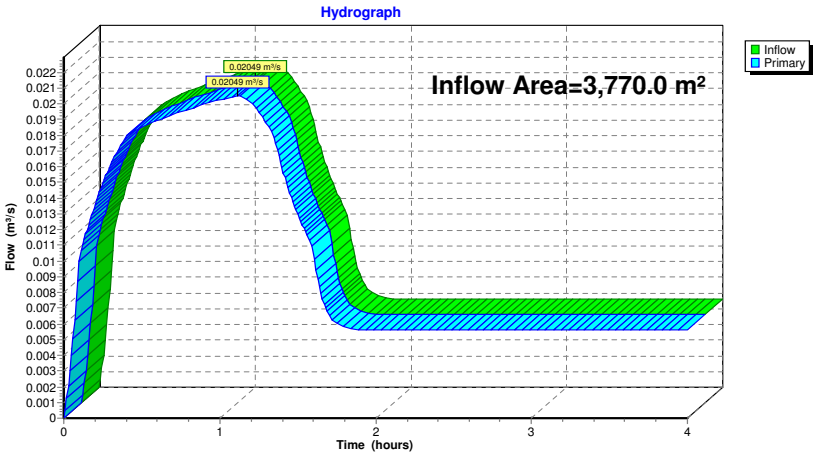


Summary for Link 29L: Teron Rd Storm Sewer

Inflow Area = 3,770.0 m², 0.00% Impervious, Inflow Depth > 39 mm for 100-Year event
Inflow = 0.02049 m³/s @ 1.12 hrs, Volume= 145.9 m³
Primary = 0.02049 m³/s @ 1.12 hrs, Volume= 145.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 29L: Teron Rd Storm Sewer



APPENDIX

D

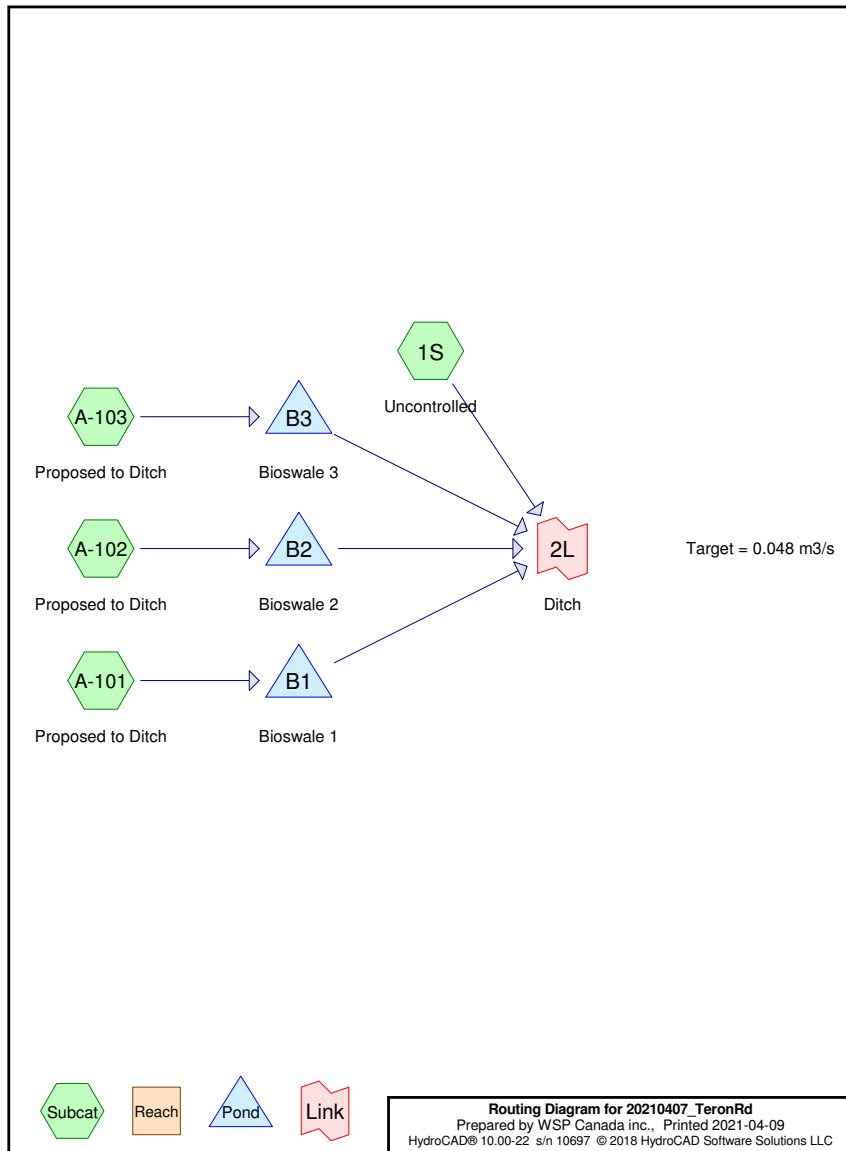
HydroCAD Model Output – March
Road Ditch

APPENDIX

D-1

100-Year Analysis (Peak Outflow, $T_c = 18$ Min)

The storm system for the site is governed by the 100-year storm. Peak storage for each storage unit and peak discharge occur at separate times of concentration and are therefore reported separately.



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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
135.5	0.70	(1S)
1,880.0	0.75	(A-101)
1,220.0	0.78	(A-102)
1,760.0	0.74	(A-103)
4,995.5	0.75	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Uncontrolled Runoff Area=135.5 m² 0.00% Impervious Runoff Depth=27 mm
Tc=10.0 min C=0.70 Runoff=0.00337 m³/s 3.6 m³

Subcatchment A-101: Proposed to Ditch Runoff Area=1,880.0 m² 0.00% Impervious Runoff Depth=29 mm
Tc=10.0 min C=0.75 Runoff=0.05017 m³/s 54.2 m³

Subcatchment A-102: Proposed to Ditch Runoff Area=1,220.0 m² 0.00% Impervious Runoff Depth=30 mm
Tc=10.0 min C=0.78 Runoff=0.03386 m³/s 36.6 m³

Subcatchment A-103: Proposed to Ditch Runoff Area=1,760.0 m² 0.00% Impervious Runoff Depth=28 mm
Tc=10.0 min C=0.74 Runoff=0.04634 m³/s 50.0 m³

Pond B1: Bioswale 1 Peak Elev=89.918 m Storage=40.8 m³ Inflow=0.05017 m³/s 54.2 m³
Outflow=0.01350 m³/s 43.9 m³

Pond B2: Bioswale 2 Peak Elev=89.825 m Storage=24.1 m³ Inflow=0.03386 m³/s 36.6 m³
Outflow=0.01348 m³/s 28.7 m³

Pond B3: Bioswale 3 Peak Elev=89.899 m Storage=36.2 m³ Inflow=0.04634 m³/s 50.0 m³
Outflow=0.01425 m³/s 40.5 m³

Link 2L: Ditch Inflow=0.04368 m³/s 116.7 m³
Primary=0.04368 m³/s 116.7 m³

Total Runoff Area = 4,995.5 m² Runoff Volume = 144.4 m³ Average Runoff Depth = 29 mm
100.00% Pervious = 4,995.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment 1S: Uncontrolled

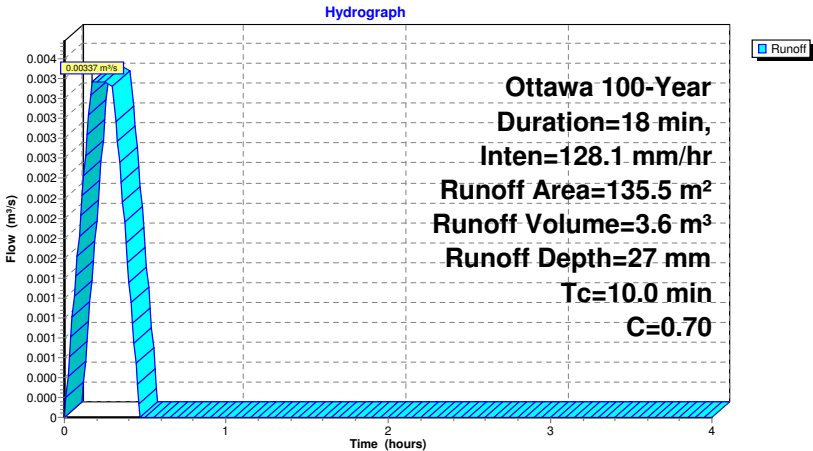
Runoff = 0.00337 m³/s @ 0.17 hrs, Volume= 3.6 m³, Depth= 27 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=18 min, Inten=128.1 mm/hr

Area (m²)	C	Description
135.5	0.70	
135.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 1S: Uncontrolled



Summary for Subcatchment A-101: Proposed to Ditch

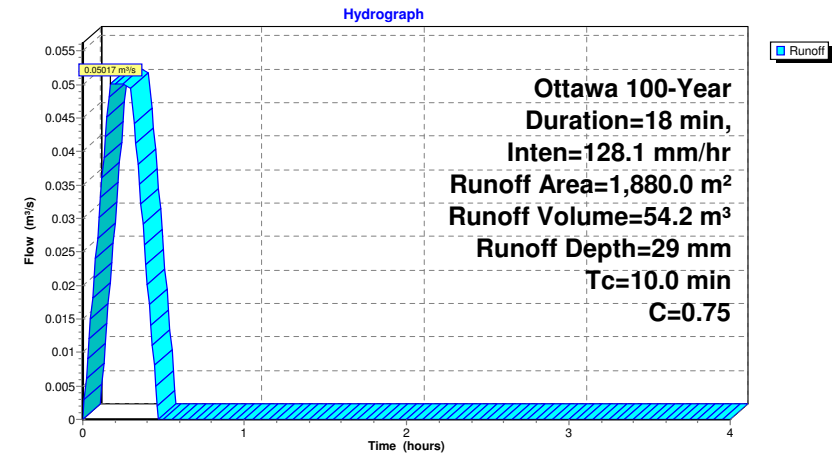
Runoff = 0.05017 m³/s @ 0.17 hrs, Volume= 54.2 m³, Depth= 29 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=18 min, Inten=128.1 mm/hr

Area (m²)	C	Description
1,880.0	0.75	
1,880.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-101: Proposed to Ditch



Summary for Subcatchment A-102: Proposed to Ditch

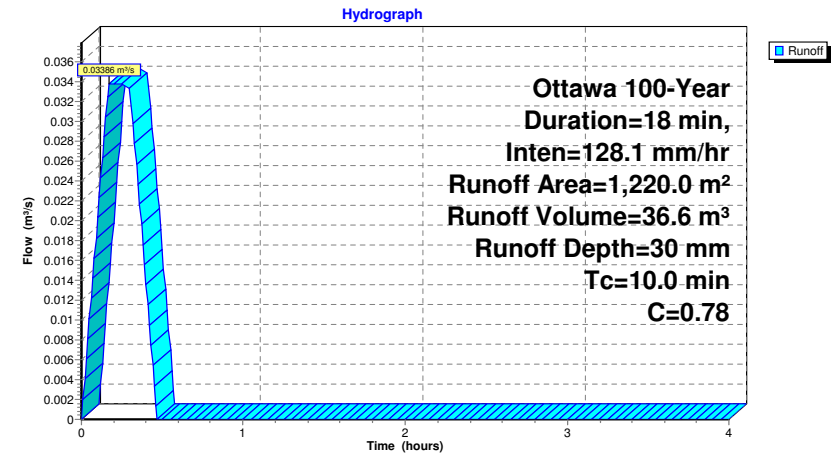
Runoff = 0.03386 m³/s @ 0.17 hrs, Volume= 36.6 m³, Depth= 30 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=18 min, Inten=128.1 mm/hr

Area (m²)	C	Description
1,220.0	0.78	
1,220.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-102: Proposed to Ditch



Summary for Subcatchment A-103: Proposed to Ditch

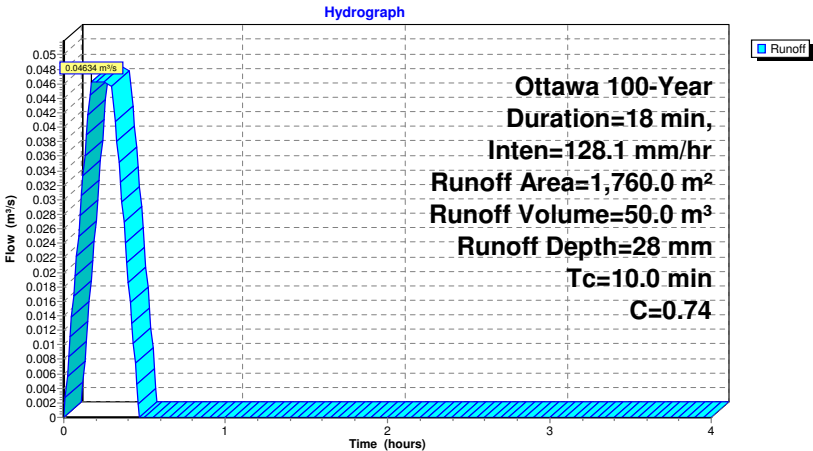
Runoff = 0.04634 m³/s @ 0.17 hrs, Volume= 50.0 m³, Depth= 28 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=18 min, Inten=128.1 mm/hr

Area (m²)	C	Description
1,760.0	0.74	
1,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-103: Proposed to Ditch



Summary for Pond B1: Bioswale 1

Inflow Area = 1,880.0 m², 0.00% Impervious, Inflow Depth = 29 mm for 100-Year event
Inflow = 0.05017 m³/s @ 0.17 hrs, Volume= 54.2 m³
Outflow = 0.01350 m³/s @ 0.42 hrs, Volume= 43.9 m³, Atten= 73%, Lag= 15.1 min
Primary = 0.01350 m³/s @ 0.42 hrs, Volume= 43.9 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.918 m @ 0.42 hrs Surf.Area= 133.7 m² Storage= 40.8 m³

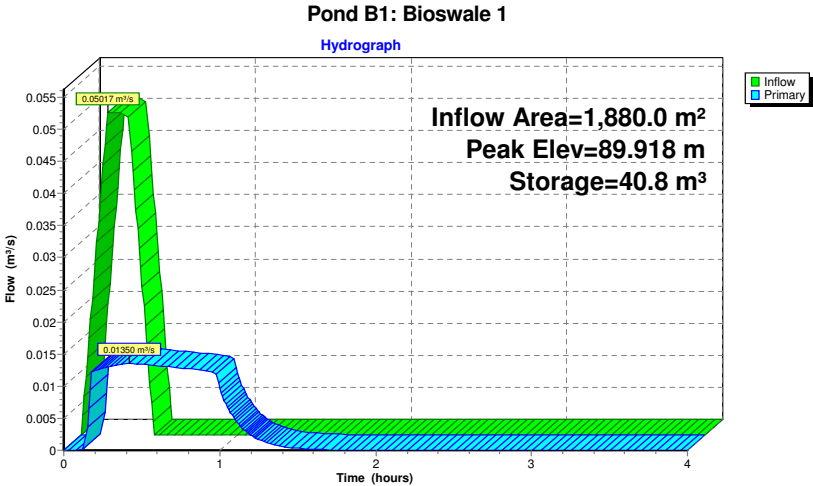
Plug-Flow detention time= 26.1 min calculated for 43.8 m³ (81% of inflow)
Center-of-Mass det. time= 24.3 min (38.3 - 14.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	199.2 m³	Custom Stage Data (Prismatic) Listed below

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	55.0	0.0	0.0
90.000	150.0	49.2	49.2
91.000	150.0	150.0	199.2

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.730 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01350 m³/s @ 0.42 hrs HW=89.918 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01350 m³/s)
1=Single OPSD 400.01 (Passes 0.01350 m³/s of 0.19907 m³/s potential flow)



Summary for Pond B2: Bioswale 2

Inflow Area = 1,220.0 m², 0.00% Impervious, Inflow Depth = 30 mm for 100-Year event

Inflow = 0.03386 m³/s @ 0.17 hrs, Volume= 36.6 m³

Outflow = 0.01348 m³/s @ 0.40 hrs, Volume= 28.7 m³, Atten= 60%, Lag= 13.8 min

Primary = 0.01348 m³/s @ 0.40 hrs, Volume= 28.7 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Peak Elev= 89.825 m @ 0.40 hrs Surf.Area= 89.2 m² Storage= 24.1 m³

Plug-Flow detention time= 17.1 min calculated for 28.6 m³ (78% of inflow)

Center-of-Mass det. time= 14.9 min (28.9 - 14.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	154.9 m ³	Custom Stage Data (Prismatic) Listed below

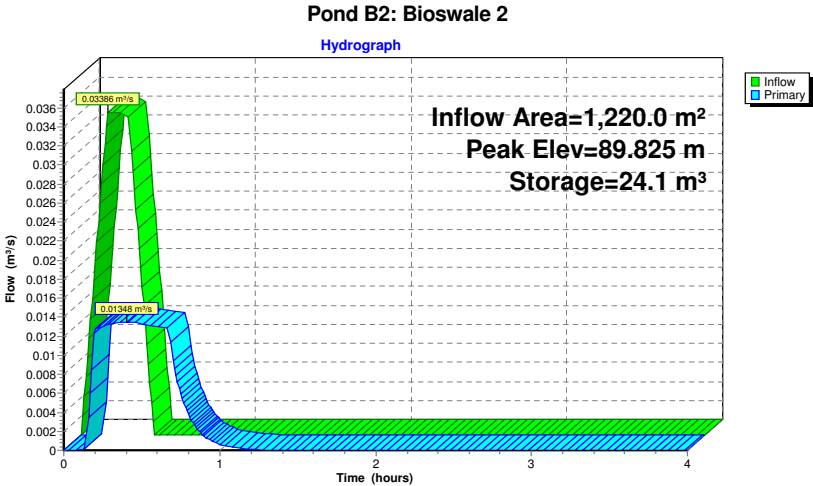
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	41.0	0.0	0.0
90.000	117.0	37.9	37.9
91.000	117.0	117.0	154.9

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m ³ /s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.641 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m ³ /s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01348 m³/s @ 0.40 hrs HW=89.825 m (Free Discharge)

2=HYDROVEX 100-VHV-1 (Custom Controls 0.01348 m³/s)

1=Single OPSD 400.01 (Passes 0.01348 m³/s of 0.16184 m³/s potential flow)



Summary for Pond B3: Bioswale 3

Inflow Area = 1,760.0 m², 0.00% Impervious, Inflow Depth = 28 mm for 100-Year event
Inflow = 0.04634 m³/s @ 0.17 hrs, Volume= 50.0 m³
Outflow = 0.01425 m³/s @ 0.42 hrs, Volume= 40.5 m³, Atten= 69%, Lag= 14.7 min
Primary = 0.01425 m³/s @ 0.42 hrs, Volume= 40.5 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.899 m @ 0.42 hrs Surf.Area= 122.4 m² Storage= 36.2 m³

Plug-Flow detention time= 23.1 min calculated for 40.5 m³ (81% of inflow)
Center-of-Mass det. time= 20.9 min (34.9 - 14.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	187.8 m³	Custom Stage Data (Prismatic) Listed below

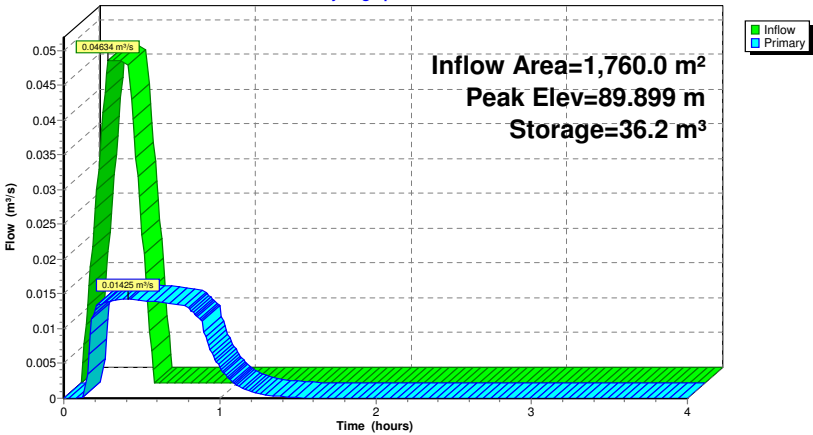
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	49.0	0.0	0.0
90.000	142.0	45.8	45.8
91.000	142.0	142.0	187.8

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.555 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01425 m³/s @ 0.42 hrs HW=89.899 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01425 m³/s)
1=Single OPSD 400.01 (Passes 0.01425 m³/s of 0.19151 m³/s potential flow)

Pond B3: Bioswale 3

Hydrograph

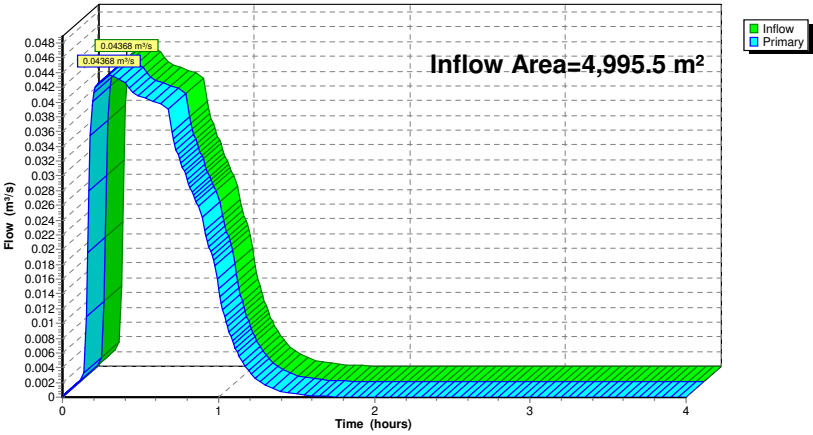


Summary for Link 2L: Ditch

Inflow Area = 4,995.5 m², 0.00% Impervious, Inflow Depth = 23 mm for 100-Year event
Inflow = 0.04368 m³/s @ 0.30 hrs, Volume= 116.7 m³
Primary = 0.04368 m³/s @ 0.30 hrs, Volume= 116.7 m³, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Ditch

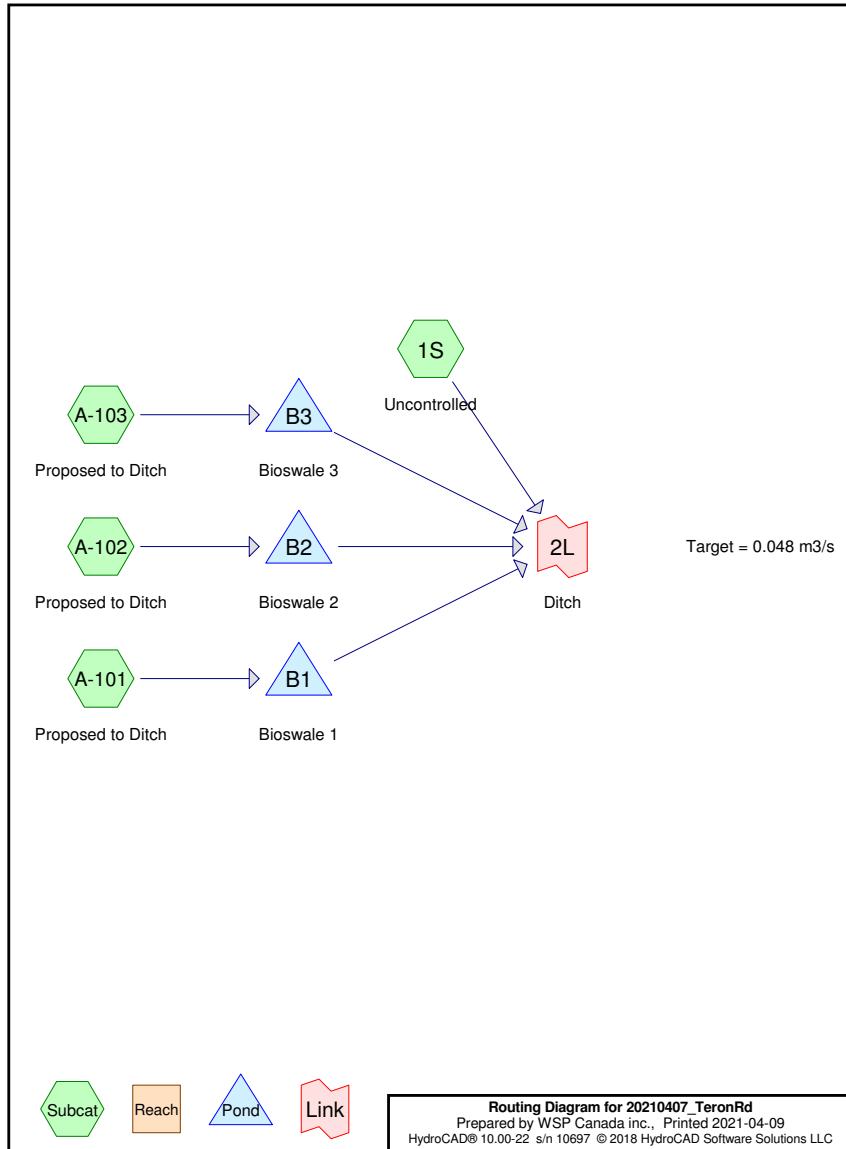
Hydrograph



APPENDIX

D-2

100-Year Analysis (Peak Storage Bioswale 1, $T_c = 33$ Min)



20210407_TeronRd

Prepared by WSP Canada inc.

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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
135.5	0.70	(1S)
1,880.0	0.75	(A-101)
1,220.0	0.78	(A-102)
1,760.0	0.74	(A-103)
4,995.5	0.75	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Uncontrolled Runoff Area=135.5 m² 0.00% Impervious Runoff Depth=33 mm
Tc=10.0 min C=0.70 Runoff=0.00227 m³/s 4.5 m³

Subcatchment A-101: Proposed to Ditch Runoff Area=1,880.0 m² 0.00% Impervious Runoff Depth=35 mm
Tc=10.0 min C=0.75 Runoff=0.03370 m³/s 66.7 m³

Subcatchment A-102: Proposed to Ditch Runoff Area=1,220.0 m² 0.00% Impervious Runoff Depth=37 mm
Tc=10.0 min C=0.78 Runoff=0.02274 m³/s 45.0 m³

Subcatchment A-103: Proposed to Ditch Runoff Area=1,760.0 m² 0.00% Impervious Runoff Depth=35 mm
Tc=10.0 min C=0.74 Runoff=0.03113 m³/s 61.6 m³

Pond B1: Bioswale 1 Peak Elev=89.948 m Storage=43.9 m³ Inflow=0.03370 m³/s 66.7 m³
Outflow=0.01365 m³/s 56.5 m³

Pond B2: Bioswale 2 Peak Elev=89.820 m Storage=23.7 m³ Inflow=0.02274 m³/s 45.0 m³
Outflow=0.01346 m³/s 37.1 m³

Pond B3: Bioswale 3 Peak Elev=89.918 m Storage=38.0 m³ Inflow=0.03113 m³/s 61.6 m³
Outflow=0.01434 m³/s 52.1 m³

Link 2L: Ditch Inflow=0.04334 m³/s 150.2 m³
Primary=0.04334 m³/s 150.2 m³

Total Runoff Area = 4,995.5 m² Runoff Volume = 177.9 m³ Average Runoff Depth = 36 mm
100.00% Pervious = 4,995.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment 1S: Uncontrolled

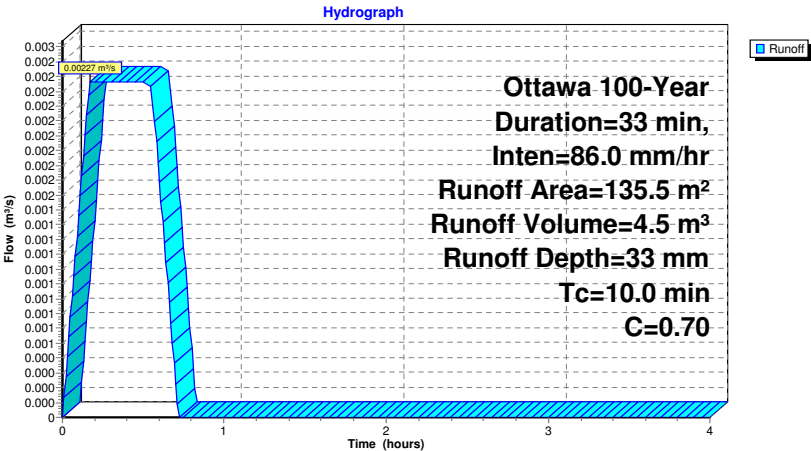
Runoff = 0.00227 m³/s @ 0.17 hrs, Volume= 4.5 m³, Depth= 33 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=33 min, Inten=86.0 mm/hr

Area (m²)	C	Description
135.5	0.70	
135.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 1S: Uncontrolled



Summary for Subcatchment A-101: Proposed to Ditch

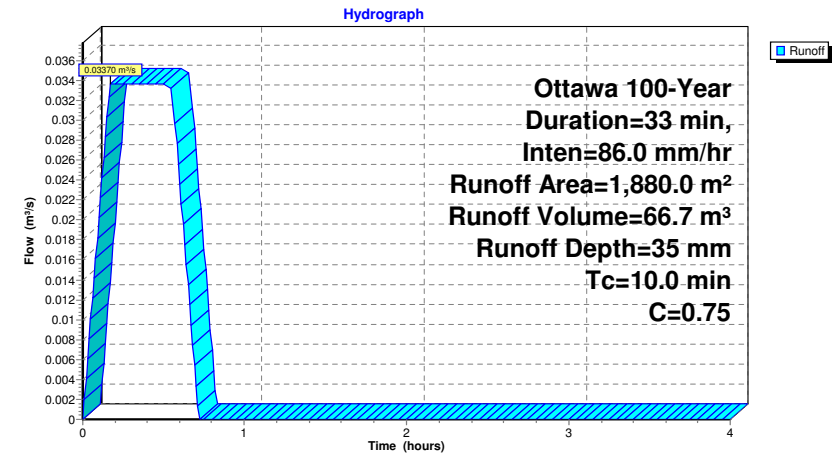
Runoff = 0.03370 m³/s @ 0.17 hrs, Volume= 66.7 m³, Depth= 35 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=33 min, Inten=86.0 mm/hr

Area (m²)	C	Description
1,880.0	0.75	
1,880.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-101: Proposed to Ditch



Summary for Subcatchment A-102: Proposed to Ditch

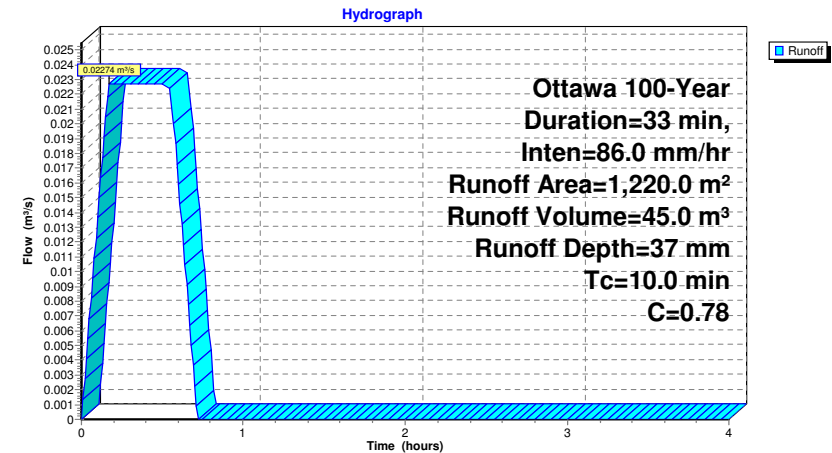
Runoff = 0.02274 m³/s @ 0.17 hrs, Volume= 45.0 m³, Depth= 37 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=33 min, Inten=86.0 mm/hr

Area (m²)	C	Description
1,220.0	0.78	
1,220.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-102: Proposed to Ditch



Summary for Subcatchment A-103: Proposed to Ditch

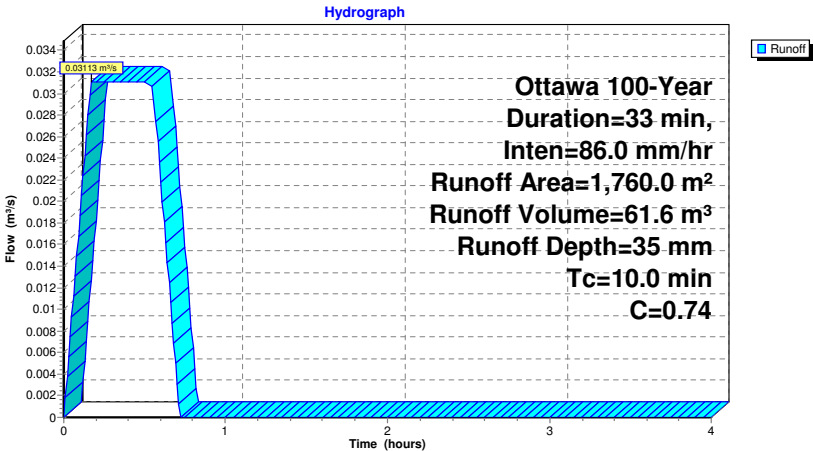
Runoff = 0.03113 m³/s @ 0.17 hrs, Volume= 61.6 m³, Depth= 35 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=33 min, Inten=86.0 mm/hr

Area (m²)	C	Description
1,760.0	0.74	
1,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-103: Proposed to Ditch



Summary for Pond B1: Bioswale 1

Inflow Area = 1,880.0 m², 0.00% Impervious, Inflow Depth = 35 mm for 100-Year event
Inflow = 0.03370 m³/s @ 0.17 hrs, Volume= 66.7 m³
Outflow = 0.01365 m³/s @ 0.65 hrs, Volume= 56.5 m³, Atten= 59%, Lag= 28.8 min
Primary = 0.01365 m³/s @ 0.65 hrs, Volume= 56.5 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.948 m @ 0.65 hrs Surf.Area= 139.8 m² Storage= 43.9 m³

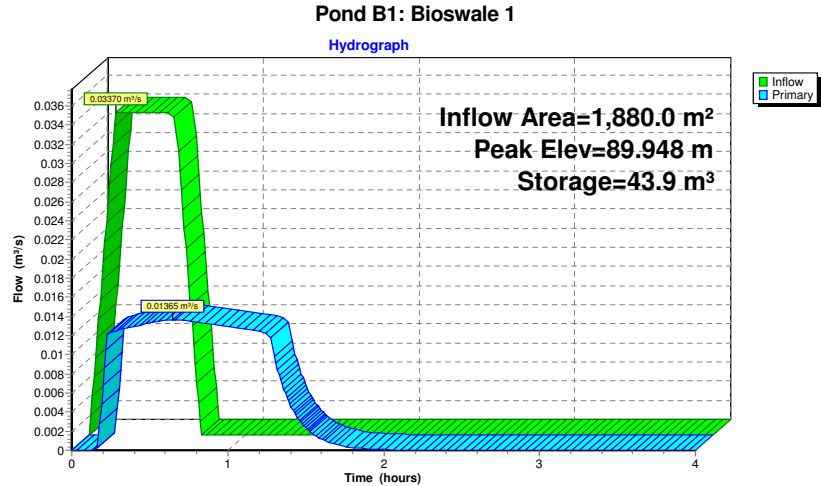
Plug-Flow detention time= 29.7 min calculated for 56.5 m³ (85% of inflow)
Center-of-Mass det. time= 26.9 min (48.4 - 21.5)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	199.2 m³	Custom Stage Data (Prismatic) Listed below

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	55.0	0.0	0.0
90.000	150.0	49.2	49.2
91.000	150.0	150.0	199.2

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.730 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01365 m³/s @ 0.65 hrs HW=89.948 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01365 m³/s)
1=Single OPSD 400.01 (Passes 0.01365 m³/s of 0.21128 m³/s potential flow)



Summary for Pond B2: Bioswale 2

Inflow Area = 1,220.0 m², 0.00% Impervious, Inflow Depth = 37 mm for 100-Year event

Inflow = 0.02274 m³/s @ 0.17 hrs, Volume= 45.0 m³

Outflow = 0.01346 m³/s @ 0.62 hrs, Volume= 37.1 m³, Atten= 41%, Lag= 26.9 min

Primary = 0.01346 m³/s @ 0.62 hrs, Volume= 37.1 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Peak Elev= 89.820 m @ 0.62 hrs Surf.Area= 88.5 m² Storage= 23.7 m³

Plug-Flow detention time= 18.8 min calculated for 37.1 m³ (82% of inflow)

Center-of-Mass det. time= 15.5 min (37.0 - 21.5)

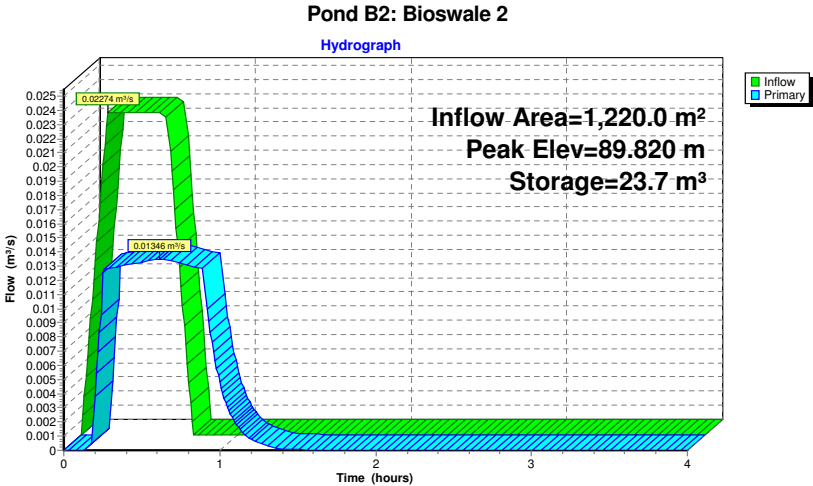
Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	154.9 m ³	Custom Stage Data (Prismatic) Listed below
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	41.0	0.0	0.0
90.000	117.0	37.9	37.9
91.000	117.0	117.0	154.9

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m ³ /s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.641 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m ³ /s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01346 m³/s @ 0.62 hrs HW=89.820 m (Free Discharge)

2=HYDROVEX 100-VHV-1 (Custom Controls 0.01346 m³/s)

1=Single OPSD 400.01 (Passes 0.01346 m³/s of 0.15993 m³/s potential flow)



Summary for Pond B3: Bioswale 3

Inflow Area = 1,760.0 m², 0.00% Impervious, Inflow Depth = 35 mm for 100-Year event
Inflow = 0.03113 m³/s @ 0.17 hrs, Volume= 61.6 m³
Outflow = 0.01434 m³/s @ 0.64 hrs, Volume= 52.1 m³, Atten= 54%, Lag= 28.2 min
Primary = 0.01434 m³/s @ 0.64 hrs, Volume= 52.1 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.918 m @ 0.64 hrs Surf.Area= 126.2 m² Storage= 38.0 m³

Plug-Flow detention time= 25.3 min calculated for 51.9 m³ (84% of inflow)
Center-of-Mass det. time= 22.8 min (44.3 - 21.5)

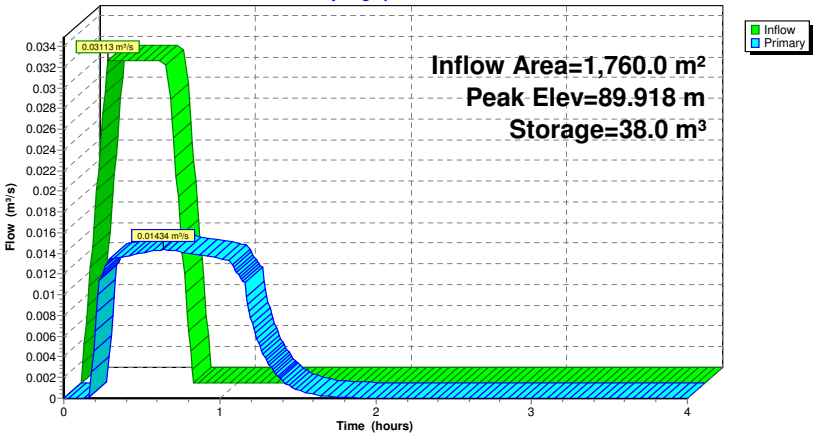
Volume Invert Avail.Storage Storage Description			
#1	89.520 m	187.8 m ³	Custom Stage Data (Prismatic) Listed below
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	49.0	0.0	0.0
90.000	142.0	45.8	45.8
91.000	142.0	142.0	187.8

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m ³ /s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.555 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m ³ /s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01434 m³/s @ 0.64 hrs HW=89.918 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01434 m³/s)
1=Single OPSD 400.01 (Passes 0.01434 m³/s of 0.19935 m³/s potential flow)

Pond B3: Bioswale 3

Hydrograph



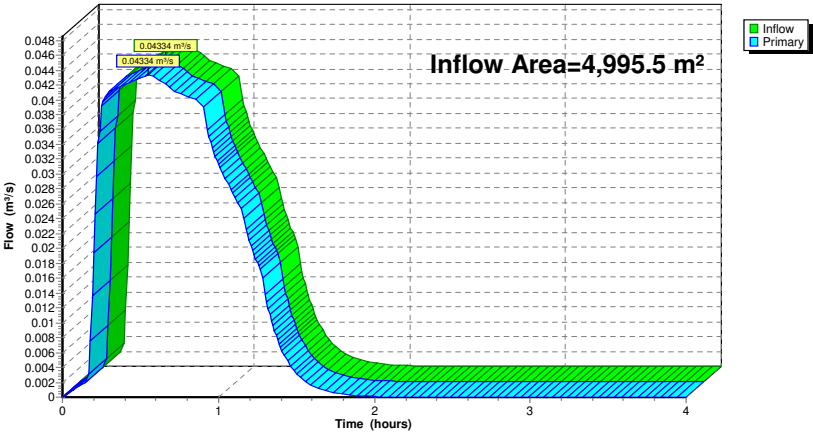
Summary for Link 2L: Ditch

Inflow Area = 4,995.5 m², 0.00% Impervious, Inflow Depth = 30 mm for 100-Year event
Inflow = 0.04334 m³/s @ 0.55 hrs, Volume= 150.2 m³
Primary = 0.04334 m³/s @ 0.55 hrs, Volume= 150.2 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Ditch

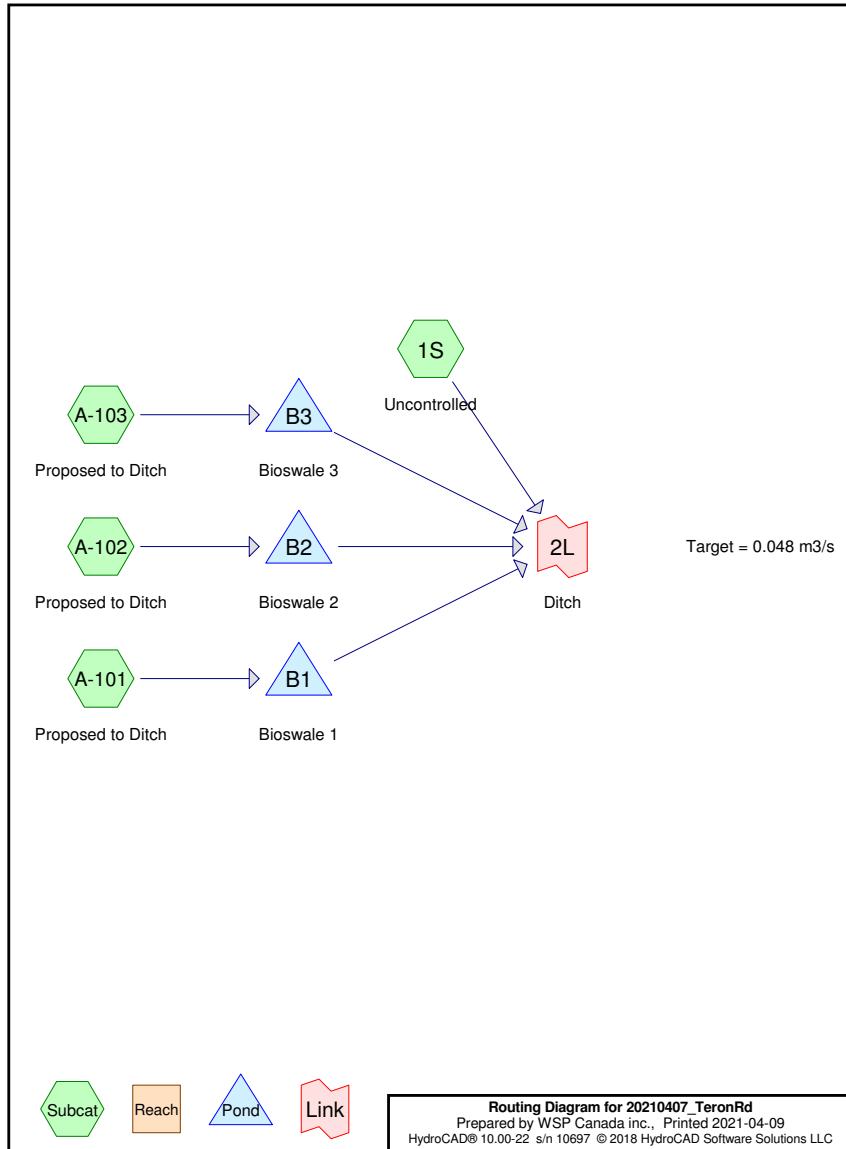
Hydrograph



APPENDIX

D-3

100-Year Analysis (Peak Storage Bioswale 2, $T_c = 24$ Min)



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Prepared by WSP Canada inc.

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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
135.5	0.70	(1S)
1,880.0	0.75	(A-101)
1,220.0	0.78	(A-102)
1,760.0	0.74	(A-103)
4,995.5	0.75	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Uncontrolled Runoff Area=135.5 m² 0.00% Impervious Runoff Depth=30 mm
Tc=10.0 min C=0.70 Runoff=0.00281 m³/s 4.0 m³

Subcatchment A-101: Proposed to Ditch Runoff Area=1,880.0 m² 0.00% Impervious Runoff Depth=32 mm
Tc=10.0 min C=0.75 Runoff=0.04178 m³/s 60.2 m³

Subcatchment A-102: Proposed to Ditch Runoff Area=1,220.0 m² 0.00% Impervious Runoff Depth=33 mm
Tc=10.0 min C=0.78 Runoff=0.02820 m³/s 40.6 m³

Subcatchment A-103: Proposed to Ditch Runoff Area=1,760.0 m² 0.00% Impervious Runoff Depth=32 mm
Tc=10.0 min C=0.74 Runoff=0.03859 m³/s 55.6 m³

Pond B1: Bioswale 1 Peak Elev=89.940 m Storage=43.0 m³ Inflow=0.04178 m³/s 60.2 m³
Outflow=0.01361 m³/s 49.9 m³

Pond B2: Bioswale 2 Peak Elev=89.831 m Storage=24.6 m³ Inflow=0.02820 m³/s 40.6 m³
Outflow=0.01351 m³/s 32.7 m³

Pond B3: Bioswale 3 Peak Elev=89.916 m Storage=37.8 m³ Inflow=0.03859 m³/s 55.6 m³
Outflow=0.01433 m³/s 46.0 m³

Link 2L: Ditch Inflow=0.04363 m³/s 132.7 m³
Primary=0.04363 m³/s 132.7 m³

Total Runoff Area = 4,995.5 m² Runoff Volume = 160.4 m³ Average Runoff Depth = 32 mm
100.00% Pervious = 4,995.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment 1S: Uncontrolled

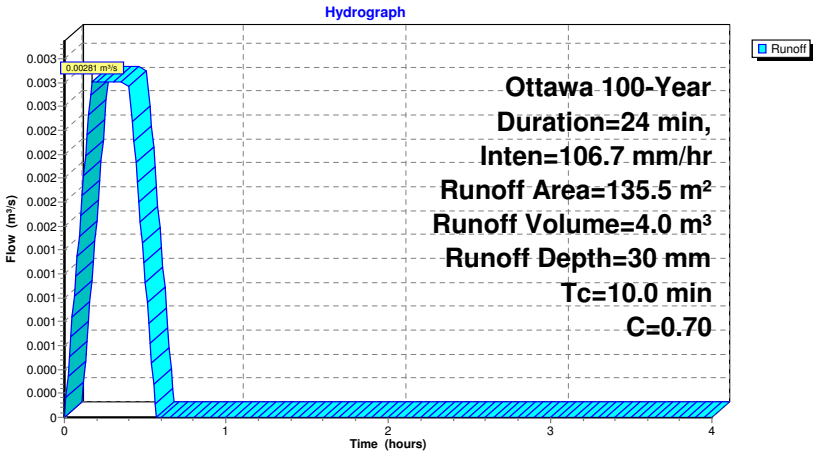
Runoff = 0.00281 m³/s @ 0.17 hrs, Volume= 4.0 m³, Depth= 30 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=24 min, Inten=106.7 mm/hr

Area (m²)	C	Description
135.5	0.70	
135.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 1S: Uncontrolled



Summary for Subcatchment A-101: Proposed to Ditch

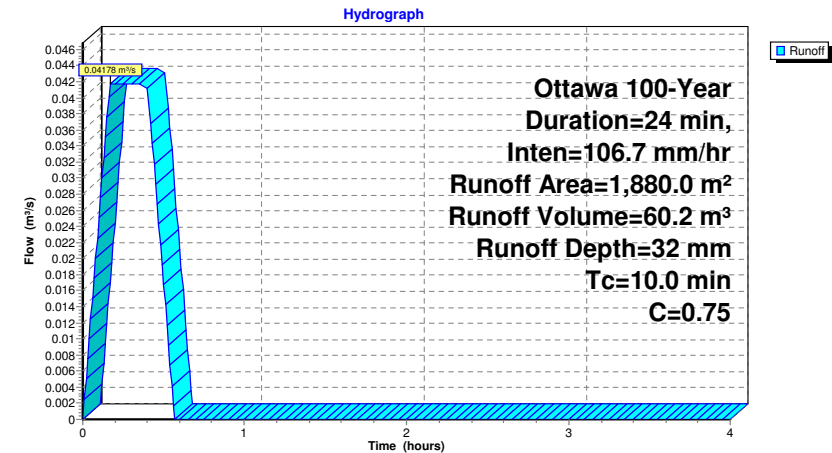
Runoff = 0.04178 m³/s @ 0.17 hrs, Volume= 60.2 m³, Depth= 32 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=24 min, Inten=106.7 mm/hr

Area (m²)	C	Description
1,880.0	0.75	
1,880.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-101: Proposed to Ditch



Summary for Subcatchment A-102: Proposed to Ditch

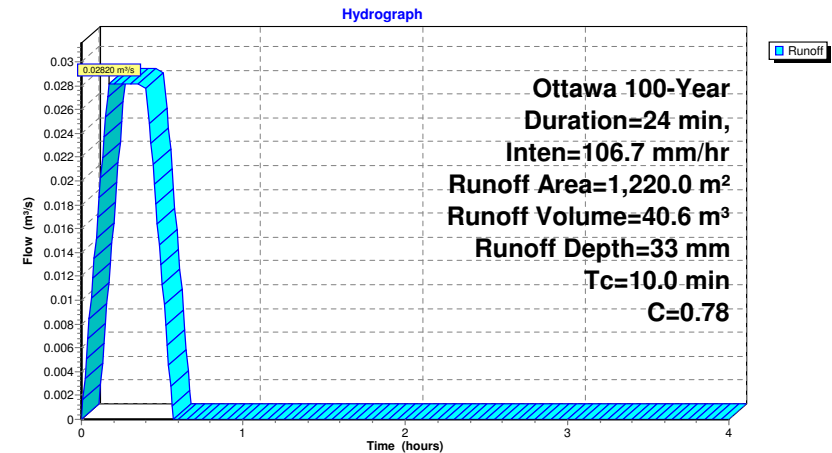
Runoff = 0.02820 m³/s @ 0.17 hrs, Volume= 40.6 m³, Depth= 33 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=24 min, Inten=106.7 mm/hr

Area (m²)	C	Description
1,220.0	0.78	
1,220.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-102: Proposed to Ditch



Summary for Subcatchment A-103: Proposed to Ditch

Runoff = 0.03859 m³/s @ 0.17 hrs, Volume= 55.6 m³, Depth= 32 mm

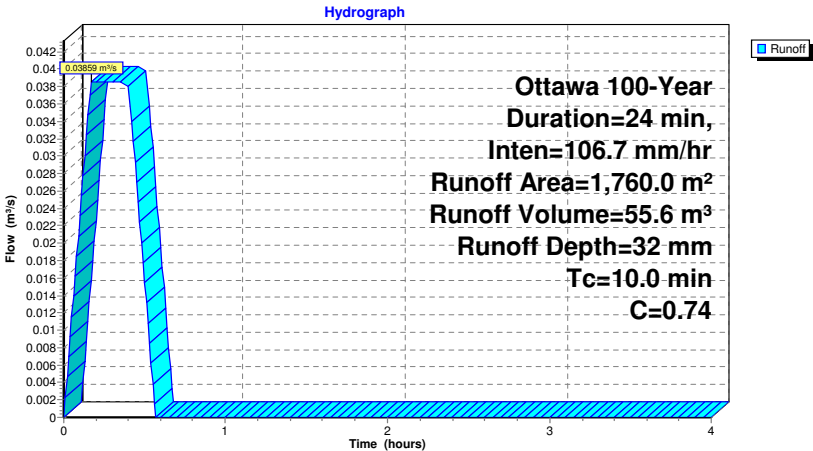
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Ottawa 100-Year Duration=24 min, Inten=106.7 mm/hr

Area (m²)	C	Description
1,760.0	0.74	
1,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-103: Proposed to Ditch



Summary for Pond B1: Bioswale 1

Inflow Area = 1,880.0 m², 0.00% Impervious, Inflow Depth = 32 mm for 100-Year event

Inflow = 0.04178 m³/s @ 0.17 hrs, Volume= 60.2 m³

Outflow = 0.01361 m³/s @ 0.51 hrs, Volume= 49.9 m³, Atten= 67%, Lag= 20.5 min

Primary = 0.01361 m³/s @ 0.51 hrs, Volume= 49.9 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Peak Elev= 89.940 m @ 0.51 hrs Surf.Area= 138.0 m² Storage= 43.0 m³

Plug-Flow detention time= 28.3 min calculated for 49.9 m³ (83% of inflow)

Center-of-Mass det. time= 25.9 min (42.9 - 17.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	199.2 m³	Custom Stage Data (Prismatic) Listed below

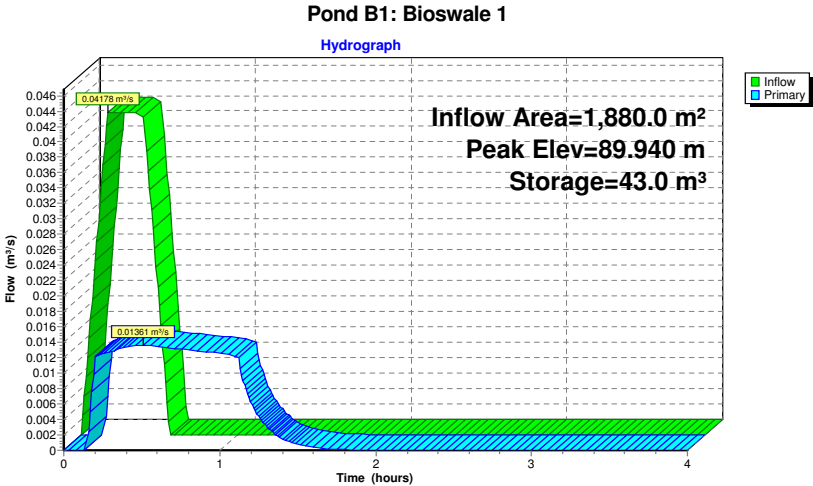
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	55.0	0.0	0.0
90.000	150.0	49.2	49.2
91.000	150.0	150.0	199.2

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.730 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01361 m³/s @ 0.51 hrs HW=89.939 m (Free Discharge)

2=HYDROVEX 100-VHV-1 (Custom Controls 0.01361 m³/s)

1=Single OPSD 400.01 (Passes 0.01361 m³/s of 0.20778 m³/s potential flow)



Summary for Pond B2: Bioswale 2

Inflow Area = 1,220.0 m², 0.00% Impervious, Inflow Depth = 33 mm for 100-Year event
Inflow = 0.02820 m³/s @ 0.17 hrs, Volume= 40.6 m³
Outflow = 0.01351 m³/s @ 0.49 hrs, Volume= 32.7 m³, Atten= 52%, Lag= 19.0 min
Primary = 0.01351 m³/s @ 0.49 hrs, Volume= 32.7 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.831 m @ 0.49 hrs Surf.Area= 90.3 m² Storage= 24.6 m³

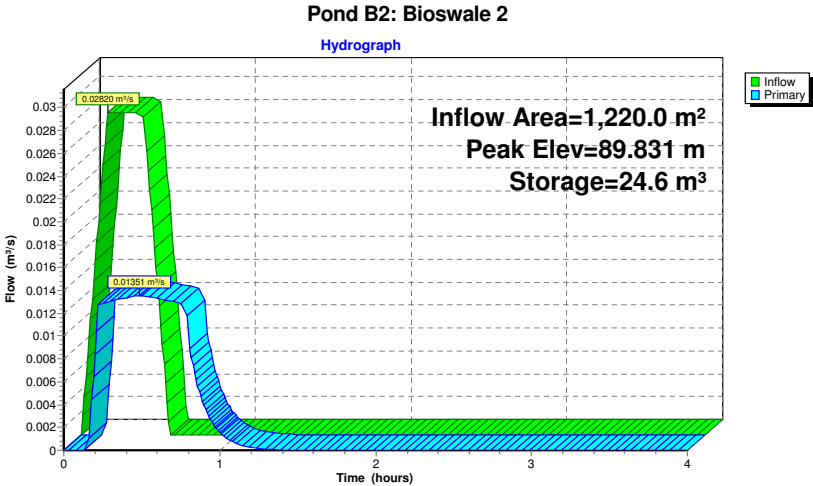
Plug-Flow detention time= 18.3 min calculated for 32.7 m³ (81% of inflow)
Center-of-Mass det. time= 15.6 min (32.6 - 17.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	154.9 m³	Custom Stage Data (Prismatic) Listed below

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	41.0	0.0	0.0
90.000	117.0	37.9	37.9
91.000	117.0	117.0	154.9

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.641 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01351 m³/s @ 0.49 hrs HW=89.831 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01351 m³/s)
1=Single OPSD 400.01 (Passes 0.01351 m³/s of 0.16450 m³/s potential flow)



Summary for Pond B3: Bioswale 3

Inflow Area = 1,760.0 m², 0.00% Impervious, Inflow Depth = 32 mm for 100-Year event
Inflow = 0.03859 m³/s @ 0.17 hrs, Volume= 55.6 m³
Outflow = 0.01433 m³/s @ 0.50 hrs, Volume= 46.0 m³, Atten= 63%, Lag= 20.1 min
Primary = 0.01433 m³/s @ 0.50 hrs, Volume= 46.0 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.916 m @ 0.50 hrs Surf.Area= 125.7 m² Storage= 37.8 m³

Plug-Flow detention time= 24.3 min calculated for 45.9 m³ (83% of inflow)
Center-of-Mass det. time= 22.1 min (39.1 - 17.0)

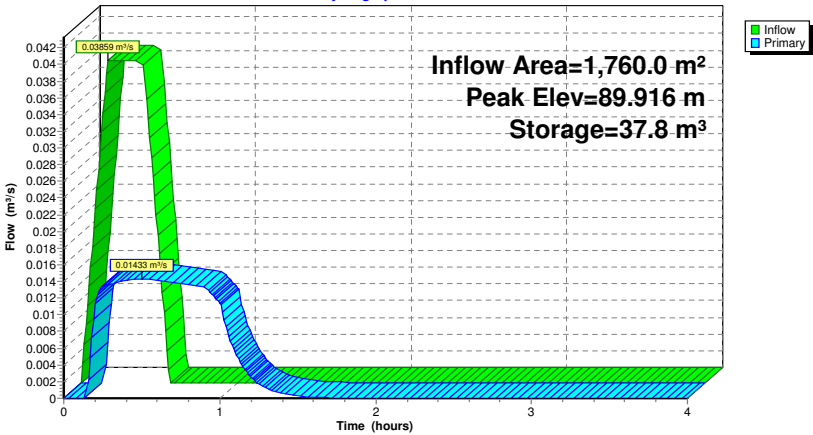
Volume	Invert	Avail.Storage	Storage Description									
#1	89.520 m	187.8 m³	Custom Stage Data (Prismatic) Listed below									
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)									
89.520	49.0	0.0	0.0									
90.000	142.0	45.8	45.8									
91.000	142.0	142.0	187.8									

Device	Routing	Invert	Outlet Devices											
#1	Device 2	89.620 m	Single OPSD 400.01											
			Head (meters)	0.000	0.050	0.100	0.150	0.200	0.250	0.300				
			Disch. (m³/s)	0.000000	0.010000	0.060000	0.120000	0.160000	0.180000	0.200000				
#2	Primary	88.555 m	HYDROVEX 100-VHV-1 X 1.20											
			Head (meters)	0.000	0.200	0.500	1.000	1.500	2.000	3.000	4.000			
			Disch. (m³/s)	0.000000	0.000100	0.007000	0.010500	0.012500	0.014000	0.018000	0.021000	0.026000		

Primary OutFlow Max=0.01433 m³/s @ 0.50 hrs HW=89.916 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01433 m³/s)
1=Single OPSD 400.01 (Passes 0.01433 m³/s of 0.19840 m³/s potential flow)

Pond B3: Bioswale 3

Hydrograph

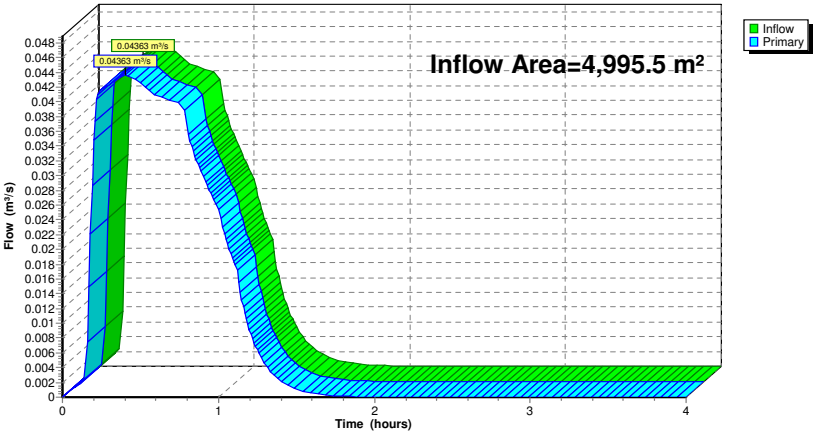


Summary for Link 2L: Ditch

Inflow Area = 4,995.5 m², 0.00% Impervious, Inflow Depth = 27 mm for 100-Year event
Inflow = 0.04363 m³/s @ 0.40 hrs, Volume= 132.7 m³
Primary = 0.04363 m³/s @ 0.40 hrs, Volume= 132.7 m³, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Ditch

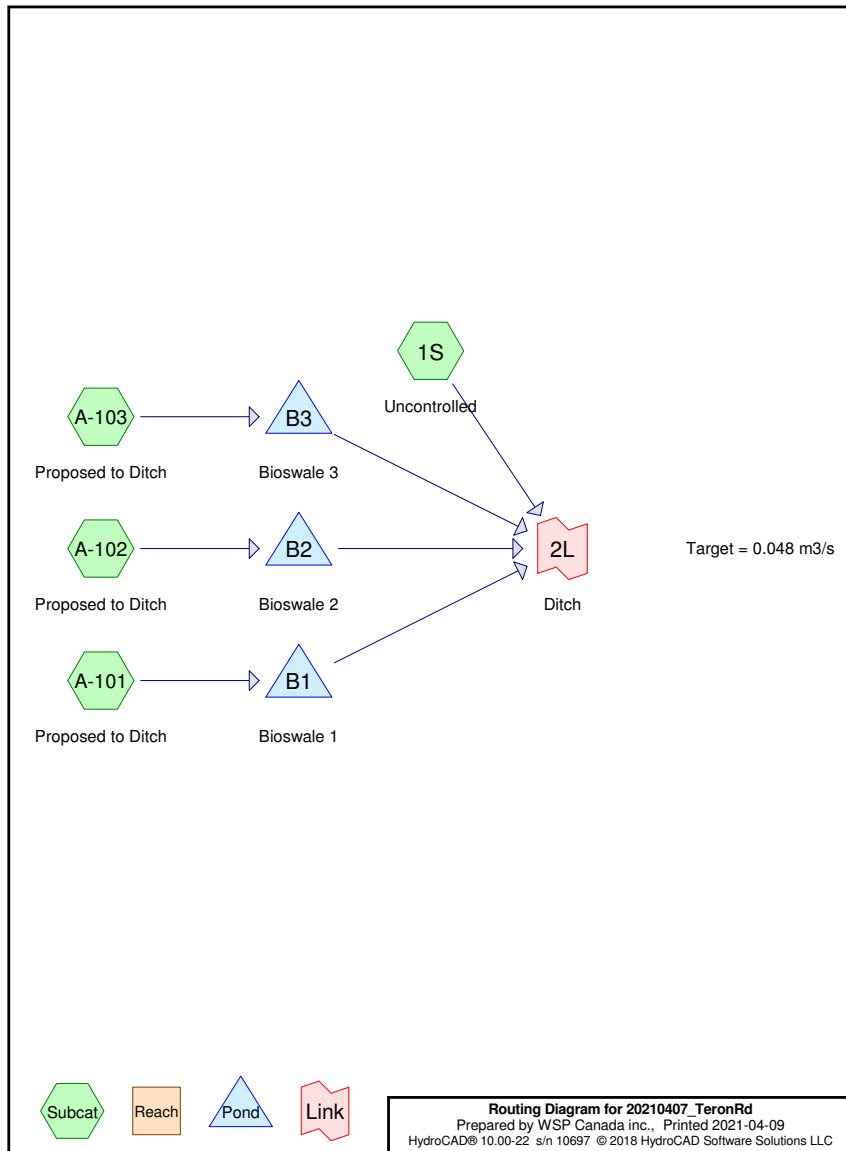
Hydrograph



APPENDIX

D-4

100-Year Analysis (Peak Storage Bioswale 3, $T_c = 30$ Min)



20210407_TeronRd

Prepared by WSP Canada inc.

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Area Listing (selected nodes)

Area (sq-meters)	C	Description (subcatchment-numbers)
135.5	0.70	(1S)
1,880.0	0.75	(A-101)
1,220.0	0.78	(A-102)
1,760.0	0.74	(A-103)
4,995.5	0.75	TOTAL AREA

Time span=0.00-4.00 hrs, dt=0.01 hrs, 401 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Uncontrolled Runoff Area=135.5 m² 0.00% Impervious Runoff Depth=32 mm
Tc=10.0 min C=0.70 Runoff=0.00242 m³/s 4.4 m³

Subcatchment A-101: Proposed to Ditch Runoff Area=1,880.0 m² 0.00% Impervious Runoff Depth=34 mm
Tc=10.0 min C=0.75 Runoff=0.03598 m³/s 64.8 m³

Subcatchment A-102: Proposed to Ditch Runoff Area=1,220.0 m² 0.00% Impervious Runoff Depth=36 mm
Tc=10.0 min C=0.78 Runoff=0.02428 m³/s 43.7 m³

Subcatchment A-103: Proposed to Ditch Runoff Area=1,760.0 m² 0.00% Impervious Runoff Depth=34 mm
Tc=10.0 min C=0.74 Runoff=0.03324 m³/s 59.8 m³

Pond B1: Bioswale 1 Peak Elev=89.948 m Storage=43.8 m³ Inflow=0.03598 m³/s 64.8 m³
Outflow=0.01364 m³/s 54.5 m³

Pond B2: Bioswale 2 Peak Elev=89.826 m Storage=24.1 m³ Inflow=0.02428 m³/s 43.7 m³
Outflow=0.01349 m³/s 35.8 m³

Pond B3: Bioswale 3 Peak Elev=89.920 m Storage=38.2 m³ Inflow=0.03324 m³/s 59.8 m³
Outflow=0.01435 m³/s 50.3 m³

Link 2L: Ditch Inflow=0.04346 m³/s 145.0 m³
Primary=0.04346 m³/s 145.0 m³

Total Runoff Area = 4,995.5 m² Runoff Volume = 172.7 m³ Average Runoff Depth = 35 mm
100.00% Pervious = 4,995.5 m² 0.00% Impervious = 0.0 m²

Summary for Subcatchment 1S: Uncontrolled

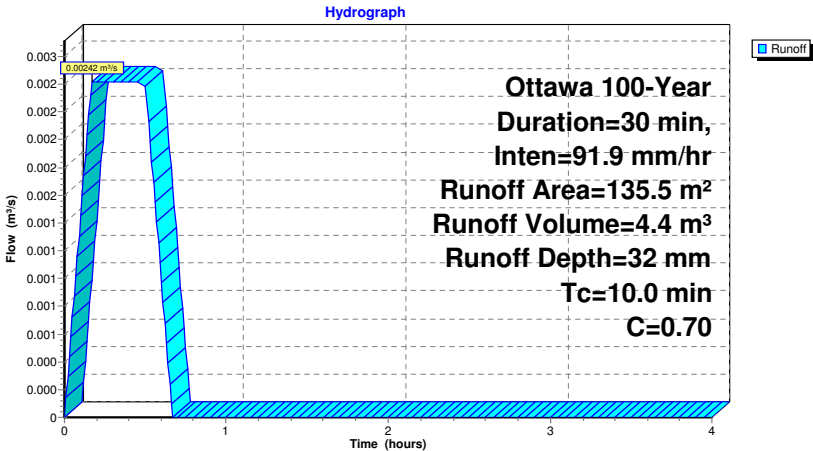
Runoff = 0.00242 m³/s @ 0.17 hrs, Volume= 4.4 m³, Depth= 32 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
135.5	0.70	
135.5		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment 1S: Uncontrolled



Summary for Subcatchment A-101: Proposed to Ditch

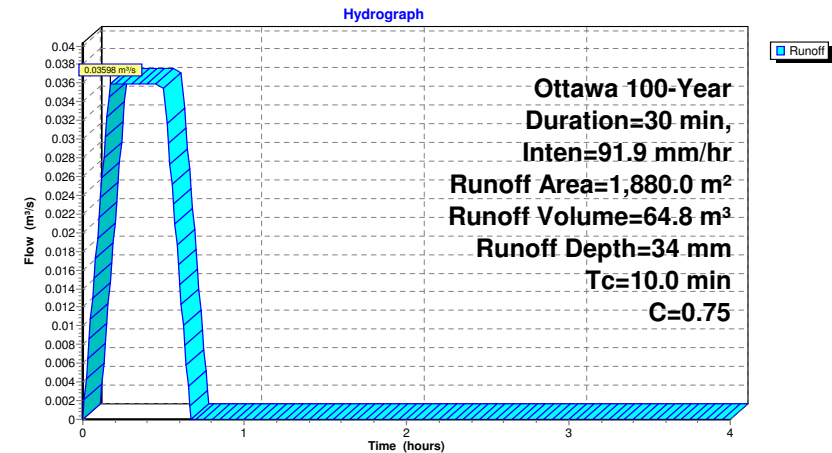
Runoff = 0.03598 m³/s @ 0.17 hrs, Volume= 64.8 m³, Depth= 34 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
1,880.0	0.75	
1,880.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-101: Proposed to Ditch



Summary for Subcatchment A-102: Proposed to Ditch

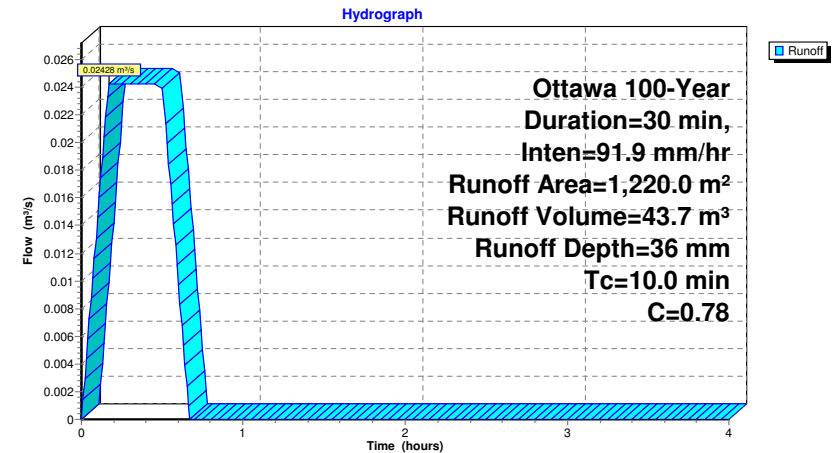
Runoff = 0.02428 m³/s @ 0.17 hrs, Volume= 43.7 m³, Depth= 36 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
1,220.0	0.78	
1,220.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-102: Proposed to Ditch



Summary for Subcatchment A-103: Proposed to Ditch

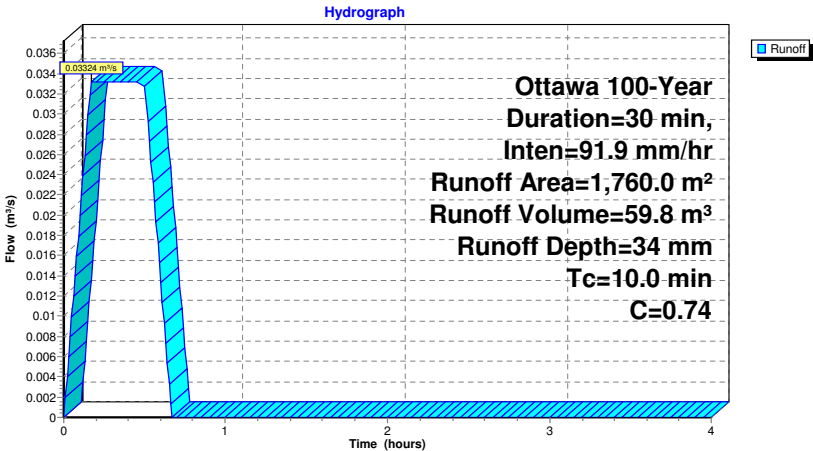
Runoff = 0.03324 m³/s @ 0.17 hrs, Volume= 59.8 m³, Depth= 34 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Ottawa 100-Year Duration=30 min, Inten=91.9 mm/hr

Area (m²)	C	Description
1,760.0	0.74	
1,760.0		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					Direct Entry,

Subcatchment A-103: Proposed to Ditch



Summary for Pond B1: Bioswale 1

Inflow Area = 1,880.0 m², 0.00% Impervious, Inflow Depth = 34 mm for 100-Year event
Inflow = 0.03598 m³/s @ 0.17 hrs, Volume= 64.8 m³
Outflow = 0.01364 m³/s @ 0.60 hrs, Volume= 54.5 m³, Atten= 62%, Lag= 26.0 min
Primary = 0.01364 m³/s @ 0.60 hrs, Volume= 54.5 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.948 m @ 0.60 hrs Surf.Area= 139.6 m² Storage= 43.8 m³

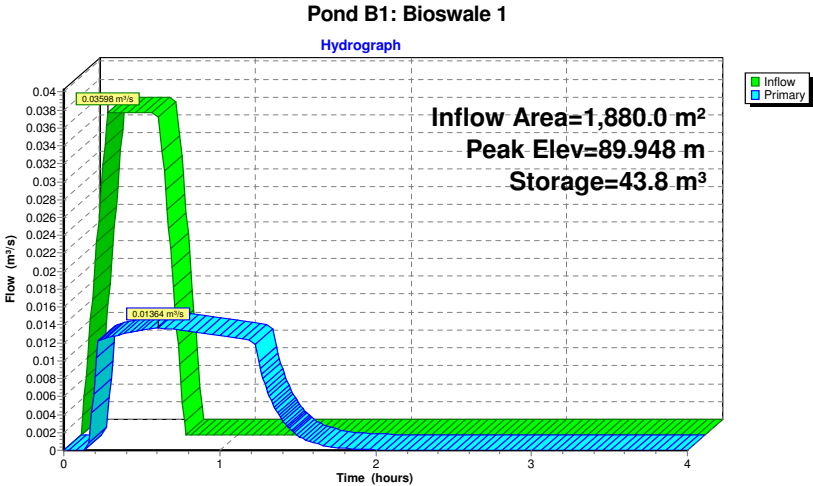
Plug-Flow detention time= 29.4 min calculated for 54.5 m³ (84% of inflow)
Center-of-Mass det. time= 26.7 min (46.7 - 20.0)

Volume	Invert	Avail.Storage	Storage Description
#1	89.520 m	199.2 m³	Custom Stage Data (Prismatic) Listed below

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	55.0	0.0	0.0
90.000	150.0	49.2	49.2
91.000	150.0	150.0	199.2

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.730 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01364 m³/s @ 0.60 hrs HW=89.947 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01364 m³/s)
1=Single OPSD 400.01 (Passes 0.01364 m³/s of 0.21099 m³/s potential flow)



Summary for Pond B2: Bioswale 2

Inflow Area = 1,220.0 m², 0.00% Impervious, Inflow Depth = 36 mm for 100-Year event
Inflow = 0.02428 m³/s @ 0.17 hrs, Volume= 43.7 m³
Outflow = 0.01349 m³/s @ 0.57 hrs, Volume= 35.8 m³, Atten= 44%, Lag= 24.2 min
Primary = 0.01349 m³/s @ 0.57 hrs, Volume= 35.8 m³

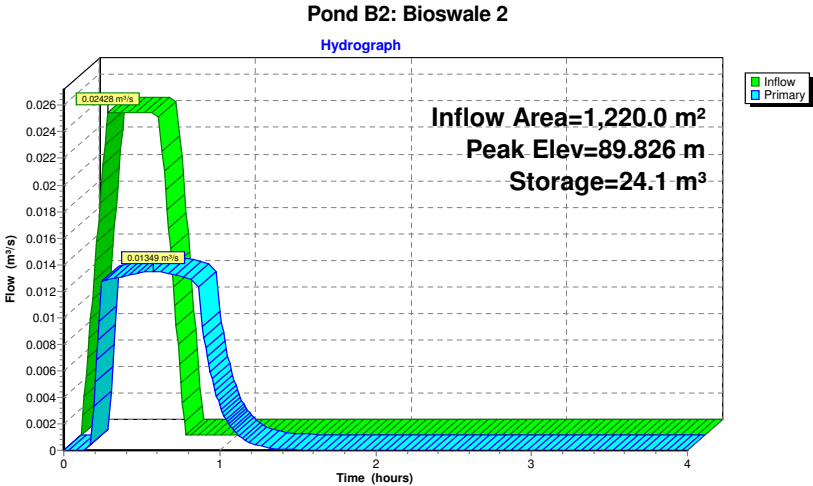
Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.826 m @ 0.57 hrs Surf.Area= 89.4 m² Storage= 24.1 m³

Plug-Flow detention time= 18.7 min calculated for 35.8 m³ (82% of inflow)
Center-of-Mass det. time= 15.6 min (35.6 - 20.0)

Volume Invert Avail.Storage Storage Description			
#1	89.520 m	154.9 m ³	Custom Stage Data (Prismatic) Listed below
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	41.0	0.0	0.0
90.000	117.0	37.9	37.9
91.000	117.0	117.0	154.9

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSP 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m ³ /s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.641 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m ³ /s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01349 m³/s @ 0.57 hrs HW=89.826 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01349 m³/s)
1=Single OPSP 400.01 (Passes 0.01349 m³/s of 0.16222 m³/s potential flow)



Summary for Pond B3: Bioswale 3

Inflow Area = 1,760.0 m², 0.00% Impervious, Inflow Depth = 34 mm for 100-Year event
Inflow = 0.03324 m³/s @ 0.17 hrs, Volume= 59.8 m³
Outflow = 0.01435 m³/s @ 0.59 hrs, Volume= 50.3 m³, Atten= 57%, Lag= 25.5 min
Primary = 0.01435 m³/s @ 0.59 hrs, Volume= 50.3 m³

Routing by Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
Peak Elev= 89.920 m @ 0.59 hrs Surf.Area= 126.5 m² Storage= 38.2 m³

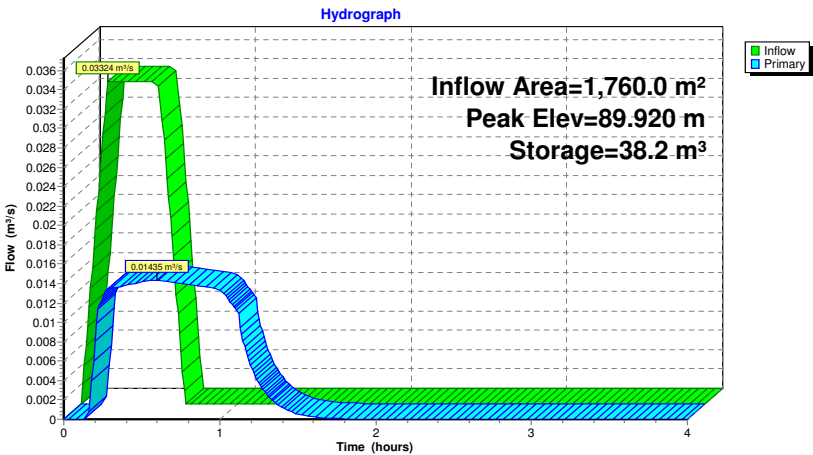
Plug-Flow detention time= 25.4 min calculated for 50.3 m³ (84% of inflow)
Center-of-Mass det. time= 22.7 min (42.7 - 20.0)

Volume Invert Avail.Storage Storage Description			
#1	89.520 m	187.8 m ³	Custom Stage Data (Prismatic) Listed below
Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)
89.520	49.0	0.0	0.0
90.000	142.0	45.8	45.8
91.000	142.0	142.0	187.8

Device	Routing	Invert	Outlet Devices
#1	Device 2	89.620 m	Single OPSD 400.01 Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 Disch. (m ³ /s) 0.000000 0.010000 0.060000 0.120000 0.160000 0.180000 0.200000
#2	Primary	88.555 m	HYDROVEX 100-VHV-1 X 1.20 Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 3.000 4.000 6.000 Disch. (m ³ /s) 0.000000 0.000100 0.007000 0.010500 0.012500 0.014000 0.018000 0.021000 0.026000

Primary OutFlow Max=0.01435 m³/s @ 0.59 hrs HW=89.920 m (Free Discharge)
2=HYDROVEX 100-VHV-1 (Custom Controls 0.01435 m³/s)
1=Single OPSD 400.01 (Passes 0.01435 m³/s of 0.19989 m³/s potential flow)

Pond B3: Bioswale 3

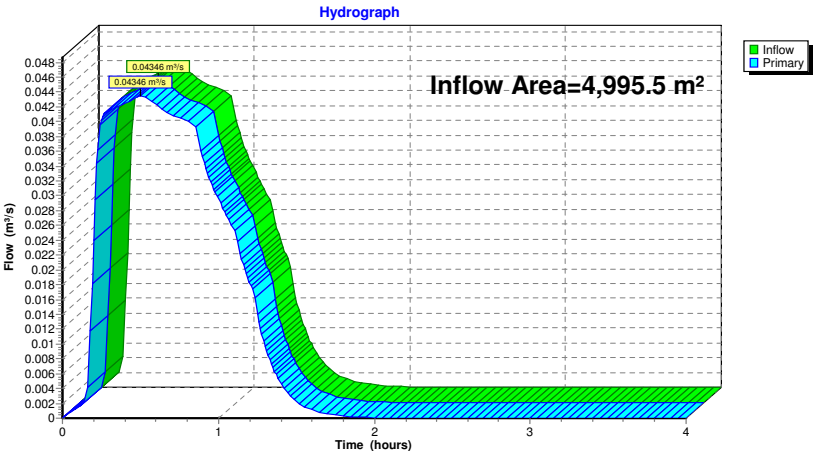


Summary for Link 2L: Ditch

Inflow Area = 4,995.5 m², 0.00% Impervious, Inflow Depth = 29 mm for 100-Year event
Inflow = 0.04346 m³/s @ 0.50 hrs, Volume= 145.0 m³
Primary = 0.04346 m³/s @ 0.50 hrs, Volume= 145.0 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs

Link 2L: Ditch



APPENDIX

E

OGS Sizing

Stormceptor®EF Sizing Report

STORMCEPTOR®

ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/12/2021

Province:	Ontario - Sault Ste Marie	Project Name:	1151 - 1131 Teron Road Res Project
City:	Ottawa	Project Number:	20M-01534-00
Nearest Rainfall Station:	OTTAWA MACDONALD-CARTIER INT'L AP	Designer Name:	Ding Bang Yang
NCDC Rainfall Station Id:	6000	Designer Company:	WSP Canada Inc
Years of Rainfall Data:	37	Designer Email:	winston.yang@wsp.com
Site Name:	1151 - 1131 Teron Road	Designer Phone:	613-690-0538
Drainage Area (ha):	0.17	EOR Name:	
Runoff Coefficient 'c':	0.67	EOR Company:	
Particle Size Distribution:	Fine	EOR Email:	
Target TSS Removal (%):	80.0	EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	89
EF6	91
EF8	92
EF10	93
EF12	93

Recommended Stormceptor EF Model: **EF4**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **89**

Water Quality Runoff Volume Capture (%): **> 90**

Stormceptor® EF Sizing Report

THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor®EF Sizing Report

Upstream Flow Controlled Results

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	51.3	51.3	0.32	19.0	16.0	93	47.7	47.7
2	8.7	60.0	0.63	38.0	32.0	93	8.1	55.8
3	5.8	65.8	0.95	57.0	47.0	93	5.4	61.2
4	4.6	70.4	1.27	76.0	63.0	91	4.2	65.4
5	4.2	74.6	1.58	95.0	79.0	89	3.7	69.1
6	3.2	77.8	1.90	114.0	95.0	88	2.8	71.9
7	2.6	80.4	2.22	133.0	111.0	86	2.2	74.2
8	2.4	82.8	2.53	152.0	127.0	85	2.0	76.2
9	1.9	84.7	2.85	171.0	142.0	83	1.6	77.8
10	1.6	86.3	3.17	190.0	158.0	81	1.3	79.1
11	1.3	87.6	3.48	209.0	174.0	79	1.0	80.1
12	1.1	88.7	3.80	228.0	190.0	77	0.8	80.9
13	1.3	90.0	4.12	247.0	206.0	76	1.0	81.9
14	1.1	91.1	4.43	266.0	222.0	74	0.8	82.7
15	0.6	91.7	4.75	285.0	237.0	73	0.4	83.2
16	0.8	92.5	5.07	304.0	253.0	72	0.6	83.8
17	0.7	93.2	5.38	323.0	269.0	70	0.5	84.2
18	0.5	93.7	5.70	342.0	285.0	69	0.3	84.6
19	0.6	94.3	6.02	361.0	301.0	67	0.4	85.0
20	0.5	94.8	6.33	380.0	317.0	66	0.3	85.3
21	0.2	95.0	6.65	399.0	332.0	64	0.1	85.5
22	0.4	95.4	6.97	418.0	348.0	63	0.3	85.7
23	0.5	95.9	7.28	437.0	364.0	62	0.3	86.0
24	0.4	96.3	7.60	456.0	380.0	60	0.2	86.3
25	0.1	96.4	7.92	475.0	396.0	59	0.1	86.3

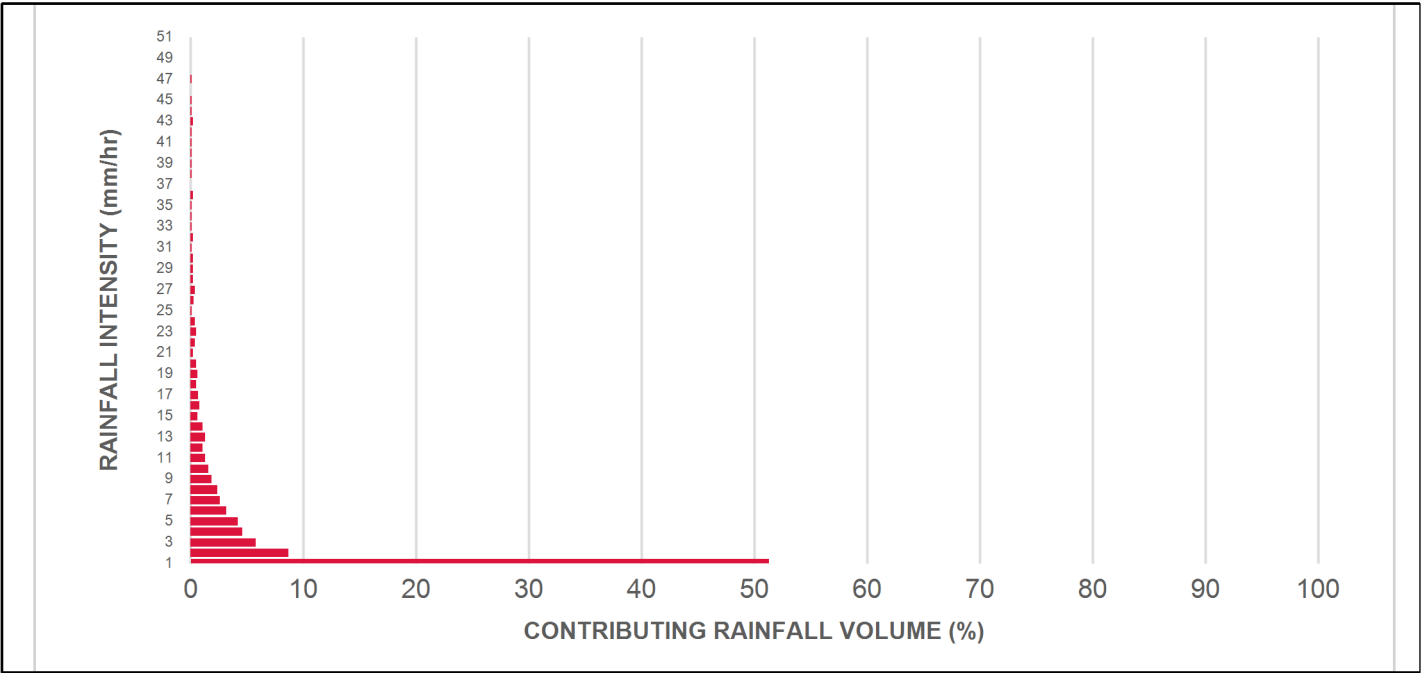
Stormceptor®EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
26	0.3	96.7	8.23	494.0	412.0	58	0.2	86.5
27	0.4	97.1	8.55	513.0	427.0	58	0.2	86.7
28	0.2	97.3	8.87	532.0	443.0	58	0.1	86.8
29	0.2	97.5	9.18	551.0	459.0	57	0.1	86.9
30	0.2	97.7	9.50	570.0	475.0	57	0.1	87.1
31	0.1	97.8	9.82	589.0	491.0	57	0.1	87.1
32	0.2	98.0	10.13	608.0	507.0	57	0.1	87.2
33	0.1	98.1	10.45	627.0	522.0	57	0.1	87.3
34	0.1	98.2	10.77	646.0	538.0	57	0.1	87.3
35	0.1	98.3	11.08	665.0	554.0	57	0.1	87.4
36	0.2	98.5	11.40	684.0	570.0	56	0.1	87.5
37	1.5	100.0	11.72	703.0	586.0	56	0.8	88.4
38	0.1	100.1	12.03	722.0	602.0	56	0.1	88.4
39	0.1	100.2	12.35	741.0	617.0	56	0.1	88.5
40	0.1	100.3	12.67	760.0	633.0	56	0.1	88.5
41	0.1	100.4	12.98	779.0	649.0	56	0.1	88.6
42	0.1	100.5	13.30	798.0	665.0	56	0.1	88.6
43	0.2	100.7	13.62	817.0	681.0	56	0.1	88.7
44	0.1	100.8	13.93	836.0	697.0	56	0.1	88.8
45	0.1	100.9	14.25	855.0	712.0	55	0.1	88.9
46	-0.9	100.0	14.57	874.0	728.0	55	N/A	88.4
47	0.1	100.1	14.88	893.0	744.0	55	0.1	88.4
48	-0.1	100.0	15.20	912.0	760.0	55	N/A	88.4
49	0.0	100.0	15.52	931.0	776.0	55	0.0	88.4
50	0.0	100.0	15.83	950.0	792.0	55	0.0	88.4
Estimated Net Annual Sediment (TSS) Load Reduction =								88 %

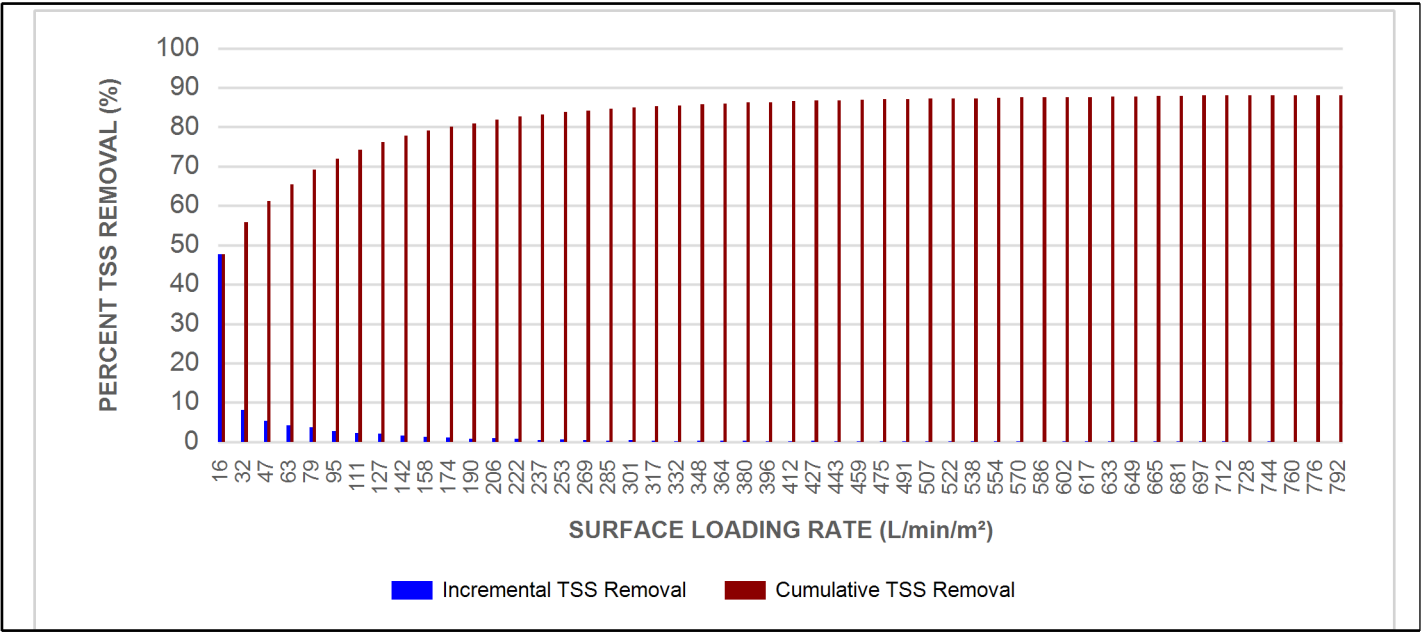


Stormceptor®EF Sizing Report

RAINFALL DATA FROM OTTAWA MACDONALD-CARTIER INT'L AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Stormceptor® EF Sizing Report

Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

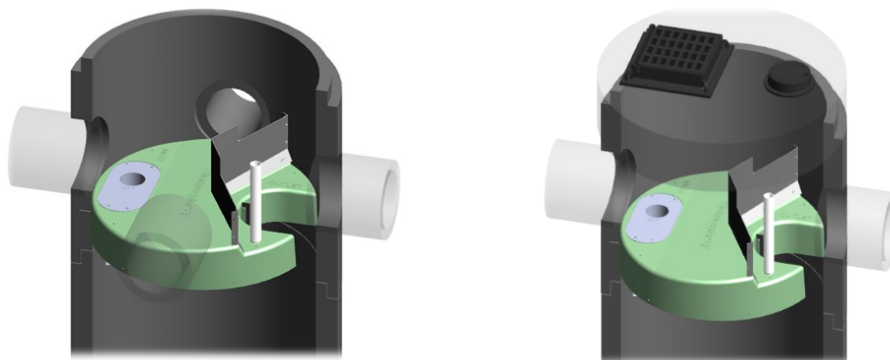
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

DESIGN FLEXIBILITY

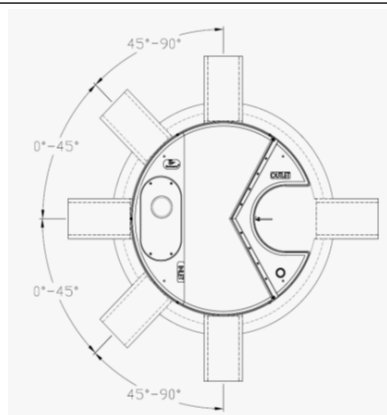
► **Stormceptor® EF and EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



Stormceptor® EF Sizing Report



INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m ³ sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

Stormceptor®EF Sizing Report

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m².