ARCHITECTURE 49

CLUBHOUSE FACILITY DEVELOPMENT, 5650 MITCH OWENS ROAD, OTTAWA, ON SITE SERVICING AND STORMWATER MANAGEMENT REPORT

JUNE 23, 2022





CLUBHOUSE FACILITY DEVELOPMENT, 5650 MITCH OWENS ROAD, OTTAWA, ON SITE SERVICING AND STORMWATER MANAGEMENT REPORT ARCHITECTURE 49

SITE PLAN APPLICATION

PROJECT NO.: 211-13935-00 DATE: JUNE 23, 2022

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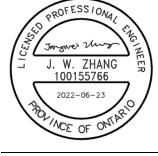
Kathryn Kerker, M.A.Sc. Designer

June 23rd, 2022

APPROVED¹ BY

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Jingwei Zhang, P.Eng. Senior Engineer



June 23rd, 2022

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1 INTRODUCTION

1.1 EXECUTIVE SUMMARY

WSP was retained by Architecture 49 to provide servicing, grading and stormwater management design services in support of the site plan approval for the proposed clubhouse facility development located at 5650 Mitch Owens Road, in the City of Ottawa. The proposed work consists of the construction of a clubhouse and a minor expansion of the paved parking area. The proposed clubhouse will provide educational and meeting rooms, a fitness area, and changerooms including washrooms and showers. This report will provide sufficient detail to demonstrate that the proposed development can be supported by the existing and proposed site infrastructure services (well and septic) and that the servicing design conforms to the applicable standards and guidelines. The report will also include measures to be taken during the construction to minimize erosion and sedimentation. A separate report (5650 Mitch Owens Road - Stormwater Management Report) is provided detailing the stormwater management approach and addressing the quantity control and quality measures in accordance with the applicable guidelines.

Currently, the site is undeveloped except for a paved parking area and two storage sheds. The total property area is 12.95 ha in size. The site sits north-west of the Mitch Owens Rd. and Limebank Rd. intersection and is bounded by St. Mark High School to the east, and a mix of agricultural fields, grassland, and large residential lots.

The subject site is a rectangular shaped property bounded by Mitch Owens Rd. to the north. The site generally slopes towards existing ditches located along the property boundaries, and ultimately discharges to the Keith Moodie Drain. The existing site is currently equipped with a well as well as ditches which drain the site.

The City of Ottawa requires that the design of a drainage and stormwater management system in this development must be prepared in accordance with the following documents:

- Sewer Design Guidelines, City of Ottawa, October 2012;
- Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003;
 and
- Stormwater Management Facility Design Guidelines, City of Ottawa, April 2012

This report was prepared utilizing servicing design criteria obtained from the City of Ottawa and outlines the design for water, sanitary wastewater, and stormwater facilities.

The format of this report matches that of the servicing study checklist found in Section 4 of the City of Ottawa's Servicing Study Guidelines for Development Applications, November 2009

No municipal services are currently available in proximity to the development.

It is proposed that an on-site enhanced grass swale will be provided to collect and attenuate flow rates and control water quality leaving the site.

1.2 SITE LOCATION

The proposed development is located at 5650 Mitch Owens Road, Ottawa, Ontario. The subject site is bounded by St. Mark High School to the east, and a mix of agricultural fields, grassland, and large residential lots. The overall site sits south-west of the Mitch Owens Rd. and Limebank Rd. intersection and is 12.95 ha in size. The location of the proposed development is illustrated in Figure 1. The proposed development will consist of a one storey clubhouse facility located adjacent to the existing parking area measuring less than 600m².



Figure 1: Site Location (GeoOttawa)

2 WATER SERVICE

2.1 EXISTING WATER SERVICE

No City services are currently present on or adjacent to the site. A well is currently located on site but very limited information is available.

2.2 PROPOSED WATER SERVICE

Based on the coordination with Mechanical engineer and the demands of building usage, a 38mm water service is proposed to service the proposed building for domestic use and will tie into the existing well or into any service lead that may already be existing. Very little information is known regarding the well, and slight changes to the water service location may be required as the existing system is uncovered. Refer to Mechanical report for the building fixture demands.

3 SEWER SERVICE

3.1 EXISTING SANITARY SERVICE

No City services are currently present on or adjacent to the site.

3.2 PROPOSED SANITARY SERVICE

A 100 mm sanitary service is proposed to the building and will tie into the proposed septic system. Please see drawing SSD-01 for more information regarding the septic system and sizing of the sanitary service.

4 STORMWATER MANAGEMENT

4.1 STORMWATER MANAGEMENT PLAN OBJECTIVES

The objectives of the stormwater management plan are as follows:

- → Collect and review background information.
- → Determine the site-specific stormwater management requirements to ensure that the proposals are in conformance with the applicable Provincial, Municipal and Conservation Authority stormwater management and development guidelines.
- → Evaluate various stormwater management practices that meet the applicable SWM and development requirements and recommend a preferred strategy specifically related to the applicable quantity and quality control criteria.

4.2 DESIGN CRITERIA

The City of Ottawa and the RVCA were consulted to establish design criteria. Correspondence is included in **Appendix A**.

It was determined that the criteria for the 5650 Mitch Owens Rd. development are as follows:

- → **Stormwater Quantity-** Post-development peak stormwater flows should be controlled to predevelopment peak flow rates for the 2-year through 100-year events (OSDG 8.3.6).
- → **Storm Quality-** Enhanced treatment (80% TSS removal) is required for added driving surface areas.

4.2.1 RAINFALL INFORMATION

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

Where;

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

- A, B, C = regression constants for each return period (defined in section 5.4.2)
- i = rainfall intensity (mm/hour)
- Td = storm duration (minutes)

The IDF parameters/regression constants are per the Ottawa Sewer Design Guidelines (October, 2012).

4.3 PRE-DEVELOPMENT DRAINAGE

4.3.1 GENERAL

Under existing conditions, the site is undeveloped except for a paved parking area and two storage sheds. Vehicular access to the site is available from Mitch Owens Rd. Under existing conditions, the site drains to ditches which run along the site boundaries and between the sports fields. The ditches discharge to the Keith Moodie Drain which runs along the western boundary of the site.

The overall site is an approximately 12.95 ha area. The total modelled area is 11.61 ha as it excludes the undeveloped area that drains directly to the Keith Moodie Drain. The ditch draining subcatchment EX02-03 splits in either direction toward OF2 and OF3. The site subcatchments are shown in Figure 2 with the land use breakdown shown in Table 1.



Figure 2: Existing Conditions Catchment Areas and Runoff Coefficients

Table 1: Existing Land Use Area Breakdown

Name	Area (ha)	Imperviousness (%)	Runoff Coefficient
EX01	1.77	19.5	0.32
EX02	3.81	18.1	0.31
EX02-03	3.76	14.4	0.28
EX03	2.27	12.5	0.27
TOTAL	11.61	16.0	0.29

4.3.2 ALLOWABLE FLOW RATES

As noted in Section 1.4, it is required that post development peak flows are equal to or less than predevelopment peak flows for the 2-year through 100-year events.

A PCSWMM model was created to accurately represent the pre-development peak flow rates for the 2-year through 100-year storm events, with results summarized in Table 2. The peak flows were taken as the maximum of the timeseries summation of the outfalls shown in Figure 2. An example showing the 100-year existing flow from each outlet and the resulting total flow is shown in Figure 3. PCSWMM output is included in **Appendix B1**.

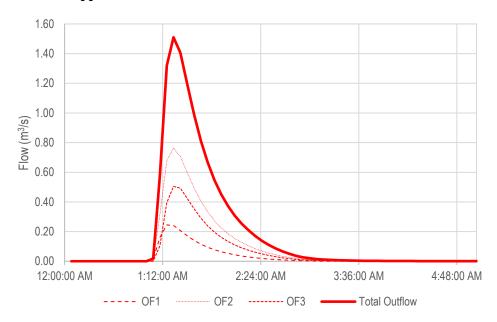


Figure 3: 100-year existing total outflow

Table 2: Pre-Development Peak Flow Rates (3-hr Chicago Storm Events)

Return Period	Peak Flow (m ³ /s)
2-year	0.04
5-year	0.31
10-year	0.55
25-year	0.88
50-year	1.18
100-year	1.51

4.4 POST-DEVELOPMENT CONDITIONS

4.4.1 GENERAL

The proposed development includes a one storey clubhouse, as well as a minor expansion to the parking area to accommodate a fire route. Under proposed conditions the site will continue to be accessed from Mitch Owens Road. An estimated area breakdown of the proposed site layout is summarized in Table 3 and shown on Figure 4.

Table 3: Proposed Land-Use Area Breakdown

Name	Area (ha)	Imperviousness (%)	Runoff Coefficient
PR01	1.78	19.5	0.32
PR02	3.85	20.1	0.32
PR02-03	3.39	10.0	0.25
PR03	2.59	20.5	0.33
Total	11.61	17.1	0.30



Figure 4: Proposed Conditions Catchment Areas and Runoff Coefficients

4.4.2 WATER QUANTITY

As previously noted, it is required that post development discharge rates for the 2-year through 100-year storm events be controlled to pre-development conditions.

An enhanced grass swale is proposed along the west side of the new parking area to control and treat the runoff to the design criteria defined in Section 1.4. Runoff from part of the existing parking area, the new parking area, and the surrounding grassed area will drain to the enhanced grass swale. Two checkdams will be placed within the enhanced grass swale to slow the flow and provide storage.

The checkdams are 300 mm in height with a 150 mm diameter opening at the base. Riverstone is used on both the upstream and downstream sides of the check dam to dissipate energy and prevent erosion. Check dam details are included in the civil drawing package.

The existing conditions PCSWMM model was modified to include the new impervious area, swale, check dams, and flow patterns. As shown in Table 4, the proposed peak flows meet the existing peak flow targets for all return periods from the 2-year to the 100-year. PCSWMM output is included in **Appendix B2**

Table 4: Post-Development Peak Flow Rates (3-hr Chicago Storm Events)

Return Period	Existing Peak Flow (m³/s)	Proposed Peak Flow (m³/s)
2-year	0.04	0.04
5-year	0.31	0.29
10-year	0.55	0.51
25-year	0.88	0.86
50-year	1.18	1.13
100-year	1.51	1.43

4.4.3 WATER QUALITY

As per Section 1.4, enhanced treatment (80% TSS removal) is required for added driving surface areas. As impervious surfaces for the new clubhouse building include only roof and walking paths, no quality control is required.

For the additional parking area, treatment is required. Treatment will be provided by an enhanced grass swale running along the west side of the added parking area. A properly designed enhanced grass swale is able to meet the target quality treatment of 80% TSS removal.

The following design guidance has been applied for the enhanced grass swales as per TRCA guidelines (TRCA, 2010):

- Shape: Grass swales should be designed with a trapezoidal or parabolic cross section. Trapezoidal swales will generally evolve into parabolic swales over time, so the initial trapezoidal cross section design should be checked for capacity and conveyance assuming it is a parabolic cross section. Swale length between culverts should be 5 metres or greater;
- Bottom Width: Grass swales should be designed with a bottom width between 0.75 and 3.0 metres.
 The design width should allow for shallow flows and adequate water quality treatment, while preventing flows from concentrating and creating gullies;
- Longitudinal Slope: Slopes should be between 0.5% and 4%. Check dams should be incorporated on slopes greater than 3%;
- Length: When used to convey and treat road runoff, the length simply parallels the road, and therefore should be equal to, or greater than the contributing roadway length;
- Flow Depth: The maximum flow depth should correspond to two-thirds the height of the vegetation.
 Vegetation in some grass swales may reach heights of 150 mm; therefore, a maximum flow depth of 100 mm is recommended during a 4-hour, 25 mm Chicago storm event; and

— Side Slopes: The side slopes should be as flat as possible to aid in providing pre-treatment for lateral incoming flows and to maximize the swale filtering surface. Steeper side slopes are likely to have erosion gullying from incoming lateral flows. A maximum slope of 2.5:1 (H:V) is recommended and a 4:1 slope is preferred where space permits.

Based on the above design guidance, the enhanced grass swale is designed with 3:1 side slopes and a minimum 1 m bottom width. Calculations showing swale performance during a water quality event (25mm, 4-hour) are included in **Appendix C**. A typical detail for the enhanced grass swale is included in the civil drawing package.

4.5 STORMWATER MANAGEMENT CONCLUSIONS

For stormwater management, runoff from the site will be controlled to pre-development targets, with the 100-year post-development flow of 1.43 m³/s meeting the pre-development 100-year flow of 1.51 m³/s. Control is provided within an enhanced grass swale with two check dams, each of which contains a 150 mm orifice at the base. Quality control for the new paved area is provided by the enhanced grass swale.

5 SEDIMENT AND EROSION CONTROL

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction. Silt fences will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fences will remain in place until the working areas have been stabilized or re-vegetated. A mud mat will be installed at the construction access to reduce risk of mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. Recommendations to the contractor will be included in the erosion and sediment control plan and are summarized below:

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

Prior to start of construction:

- Install silt fence as show in the Grading and Erosion Control Drawing.
- Install mud mat (gravel mat on geotextile) at construction site entrance to reduce mud tracking from site onto road.

During construction:

- Minimize the extent of disturbed areas and the duration of exposure and impacts to existing grading.
- Perimeter vegetation to remain in place until permanent storm water management is in place otherwise, immediately install silt fence when the existing site is disturbed at the perimeter.
- Protect disturbed areas from overland flow by providing temporary swales to the satisfaction of the field engineer.
- Provide temporary cover such as seeding or mulching if disturbed area will not be rehabilitated within 30 days.
- Inspect silt fences weekly and within 24 hours after a storm event. Clean and repair when necessary.
- Drawing to be reviewed and revised as required during construction.
- Erosion control fencing to be also installed around the base of all stockpiles.
- Do not locate topsoil piles and excavation material closer than 2.5m from any paved surface, or one which is to be paved before the pile is removed. All topsoil piles are to be seeded if they are to remain on site long enough for seeds to grow (longer than 30 days).
- Control dust blown off-site by seeding topsoil piles and other areas temporarily (provide watering as required and to the satisfaction of the engineer).
- No alternate methods of erosion protection shall be permitted unless approved by the field engineer.
- During wet conditions, tires of all vehicles/equipment leaving the site are to be scrapped.
- Any mud/material tracked onto the road shall be removed immediately by hand or rubber tire loader.
- Take all necessary steps to prevent building material, construction debris or waste being spilled or tracked onto abutting properties or public streets during construction and proceed immediately to clean up any areas so affected.
- All erosion control structure to remain in place until all disturbed ground surfaces have been stabilized either by paying or restoration of vegetative ground cover.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.

_	The contractor shall implement best management practices, to provide for protection of the area drainage system and the receiving watercourse, during construction activities. The contractor acknowledges that failure to implement appropriate erosion and sediment control measures may be subject to penalties imposed by any applicable regulatory agency.

6 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed development can meet all provided and associated requirements. It is recommended that this report be submitted to the City of Ottawa in support of the application for site plan approval.

A CORRESPONDENCE

Kerker, Kathryn

From: Blanchette, Erin

Sent: June 16, 2022 11:50 AM

To: Kerker, Kathryn

Subject: FW: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

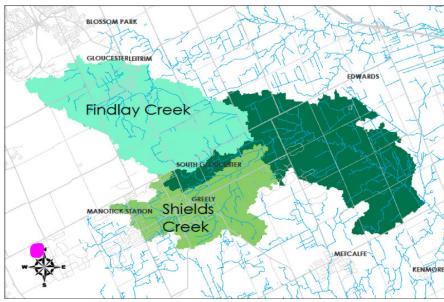
OSU City correspondence below. Thanks for reminding me!

From: Blanchette, Erin Sent: May 12, 2022 2:12 PM

To: Hall, Kevin <Kevin.Hall@ottawa.ca>; McAlpine, Anissa <anissa.mcalpine@ottawa.ca> **Subject:** RE: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

Thanks for the reply Kevin,

It appears as though our site (pink dot) is quite far from the Shields Creek subwatershed, but I will ensure the flow is controlled to the pre-development rates as you mentioned.



Much appreciated,

Erin

From: Hall, Kevin < Kevin. Hall@ottawa.ca>

Sent: April 28, 2022 11:44 AM

To: Blanchette, Erin < Erin.Blanchette@wsp.com>; McAlpine, Anissa < anissa.mcalpine@ottawa.ca>

Subject: RE: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

Frin

Adding more parking for the property should not change our requirements, but it may change your design since you will have more water to control. Stormwater will need to be control post development rates to the pre-development rate. I think this site is withing the boundary of the Shields Creek subwatershed study which will affect the stormwater design.

Fire flow will be based on the fact that the site will be on private services. I believe that the size of the building triggers the need for firefighting storage tanks or not. This may be spelled out in the Ontario Building Code, or you can confirm with Fire Servicies.

Hope this helps.

Kevin Hall, C.E.T.

Senior Project Manager
Development Review - Rural Services
Gestionnaire de projet, Approbation des demandes d'infrastructure
Examen des demandes d'aménagement (Services ruraux)
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27824
Fax 613.580.2576
ottawa.ca/planning / ottawa.ca/urbanisme

I will be working from home for the duration of the COVID-19 situation. Email is the best way to contact me.

From: Blanchette, Erin < Erin.Blanchette@wsp.com>

Sent: April 28, 2022 10:30 AM

To: McAlpine, Anissa anissa.mcalpine@ottawa.ca; Hall, Kevin Kevin.Hall@ottawa.ca **Subject:** RE: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

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Thank you Anissa,

@Hall, Kevin There has been a design change and we are now proposing 630m² of new paved area (previously grass) for a fire route and adjacent parking. I expect this might affect your response to our stormwater management requirements.

Your recommendation on fire flow requirements will also be useful when you get a chance.

Thank you, Erin

From: McAlpine, Anissa anissa.mcalpine@ottawa.ca

Sent: April 25, 2022 12:18 PM

To: Blanchette, Erin < Erin. Blanchette@wsp.com>

Cc: Hall, Kevin < Kevin. Hall@ottawa.ca >

Subject: RE: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

Hello Erin, I am CCing Kevin Hall on this email who should be able to confirm if there are any additional SWM requirements, or Fire flow requirements.

Thanks,

Anissa McAlpine MCIP RPP (she/her)
Planner, Parks and Facilities Planning Services | Services planification des installations et des parcs
City of Ottawa | Ville d'Ottawa
100 Constellation Crescent | 100, croissant Constellation
Ottawa ON K2G 6J8

From: Blanchette, Erin < Erin. Blanchette@wsp.com >

Sent: April 22, 2022 4:55 PM

To: McAlpine, Anissa anissa.mcalpine@ottawa.ca

Subject: Stormwater Quality and Fire Flow Requirements for 5650 Mitch Owens Rd

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Hi Anissa,

I have a two questions I'm hoping you can help me with, or direct me to someone who can assist. We are currently working on a site development project located at 5650 Mitch Owens Rd (near the Limebank Rd intersection). The project is to construct a field house (approximately 600m²) which will be located in the circled area on the site below. There are currently ditches running around the site but major flow paths follow the magenta ditches highlighted below.

1. I have reached out to the RVCA regarding on-site stormwater quality treatment requirements given the proposed work and their response is below. Are there any other elements that need to be considered regarding quality control?



RVCA response: Based on the proposal being a filed house with no proposed parking, we would not require any additional onsite water quality controls as rooftop drainage is considered clean for the purposes of aquatic habitat and water quality.

2. For a proposed structure of this size/function, what fire flow requirements need to be met?

Please let me know if you require any additional information to answer the above. Thank you,

Frin

Erin Blanchette, P.Eng Project Engineer Municipal Engineering



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From: Jamie Batchelor < jamie.batchelor@rvca.ca>

Sent: May 18, 2022 3:40 PM

To: Blanchette, Erin < Erin.Blanchette@wsp.com>

Subject: RE: Stormwater Quality Requirements for 5650 Mitch Owens Rd

Good Afternoon Erin,

I can confirm that the RVCA would require on-site water quality control of 80% TSS removal. Given the proposed changes and the potential impact to the water budget/balance, it is recommended that further pre-consultation occur with RVCA technical staff with respect to the water budget component prior to undertaking the report.

Jamie Batchelor, MCIP, RPP Planner, ext. 1191 Jamie.batchelor@rvca.ca



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From: Blanchette, Erin < Erin.Blanchette@wsp.com>

Sent: Tuesday, May 17, 2022 11:48 AM

To: Jamie Batchelor < jamie.batchelor@rvca.ca>

Subject: RE: Stormwater Quality Requirements for 5650 Mitch Owens Rd

Hi Jamie,

I'm following up on my last email (see below). Should I expect a new set of SWM control requirements given the change?

Thanks in advance and please let me know if you require any additional details. Erin

From: Blanchette, Erin

Sent: April 28, 2022 10:25 AM

To: Jamie Batchelor < <u>jamie.batchelor@rvca.ca</u>> **Cc:** Yang, Winston < <u>Winston.Yang@wsp.com</u>>

Subject: RE: Stormwater Quality Requirements for 5650 Mitch Owens Rd

Hi Jamie,

There has been a design change and we are now proposing 630m² of new paved area (previously grass) for a fire route and adjacent parking.

Could you please indicate the stormwater management controls we may need to adhere to in this case?

Thanks in advance,

Erin

From: Jamie Batchelor < jamie.batchelor@rvca.ca>

Sent: April 14, 2022 3:04 PM

To: Blanchette, Erin < Erin.Blanchette@wsp.com Cerin.Blanchette@wsp.com <a href="mailto:Cerin.Blanchette@ws

Subject: RE: Stormwater Quality Requirements for 5650 Mitch Owens Rd

Good Afternoon Erin,

Based on the proposal being a filed house with no proposed parking, we would not require any additional onsite water quality controls as rooftop drainage is considered clean for the purposes of aquatic habitat and water quality. We would however, strongly recommend that the water balance/budget be completed and it be demonstrated that it will result in minimal impact.

Jamie Batchelor, MCIP, RPP Planner, ext. 1191 Jamie.batchelor@rvca.ca



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From: Blanchette, Erin < Erin.Blanchette@wsp.com>

Sent: Wednesday, April 13, 2022 2:03 PM

To: Jamie Batchelor < <u>jamie.batchelor@rvca.ca</u>> **Cc:** Yang, Winston < <u>Winston.Yang@wsp.com</u>>

Subject: Stormwater Quality Requirements for 5650 Mitch Owens Rd

Hi Jamie,

We are currently working on a site development project within the RVCA boundary located at 5650 Mitch Owens Rd (near the Limebank Rd intersection). The project is to construct a field house (approximately 600m²) which will be located in the circled area on the site below. There are currently ditches running around the site but major flow paths follow the magenta ditches highlighted below.

I am reaching out to ask if any on-site stormwater quality treatment will be required for this site given the proposed work?

Please let me know if you require any additional information.

Thank you,

Erin



Erin Blanchette, E.I.T. Designer Municipal Engineering



T (613) 690-1087 2611 Queensview Drive, Suite 300 Ottawa, Ontario, Canada K2B 8K2

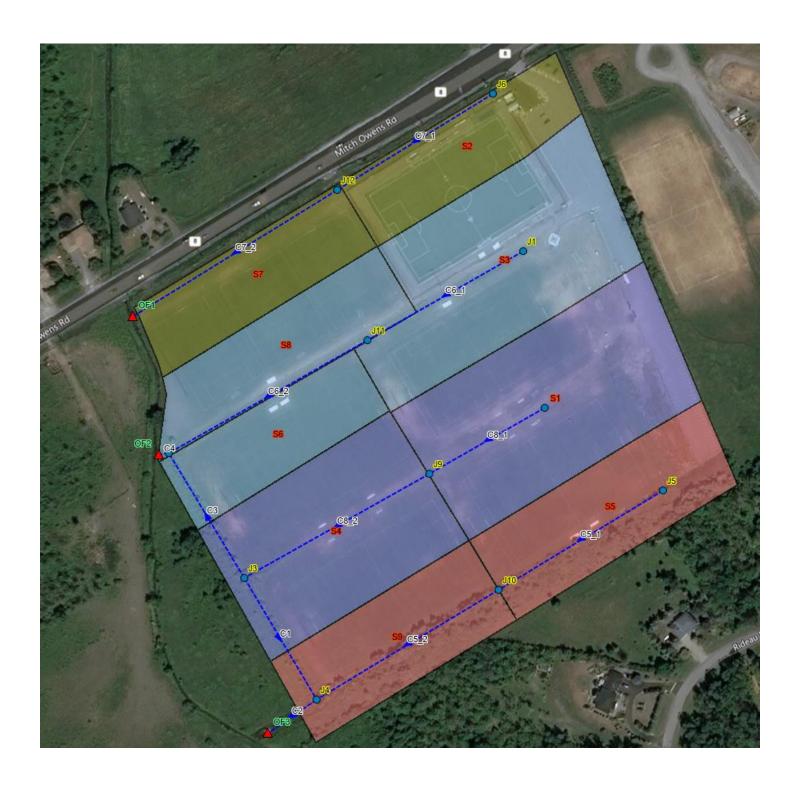
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B MODELLING RESULTS

B-1 EXISTING CONDITIONS PCSWMM OUTPUT



EXISTING CONDITIONS 100-YEAR

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

Element Count

Number of rain gages . 16
Number of subcatchments . 9
Number of nodes . . . 14
Number of links . . . 12
Number of pollutants . 0
Number of land uses . . . 0

Raingage Summary

		Data	Recording	
Name	Data Source	Type	Interval	
	100yr_3hr_Chicago			
100yr_3hr_Chicago_C	limate_Change 100yr_3hr_Chicag	o_Increase_20	percent INTENSITY	10 min.
100yr 6hr Chicago	100yr 6hr Chicago	INTENSITY	10 min.	
100yr_6hr_Chicago_C	limate_Change 100yr_6hr_Chicag	o_Increase_20	percent INTENSITY	10 min.
10yr 3hr Chicago	10yr 3hr Chicago	INTENSITY	10 min.	
10yr 6hr Chicago	10yr 6hr Chicago	INTENSITY	10 min.	
25mm 3hr Chicago	25mm 3hr Chicago	INTENSITY	10 min.	
25mm 4hr Chicago	25mm 4hr Chicago	INTENSITY	10 min.	
25yr 3hr Chicago	25yr 3hr Chicago	INTENSITY	10 min.	
25yr 6hr Chicago	25yr 6hr Chicago	INTENSITY	10 min.	
2yr 3hr Chicago	2yr 3hr Chicago	INTENSITY	10 min.	
2yr 6hr Chicago	2yr 6hr Chicago	INTENSITY	10 min.	
50yr 3hr Chicago	50yr 3hr Chicago	INTENSITY	10 min.	
50yr 6hr Chicago	50yr 6hr Chicago	INTENSITY	10 min.	
5yr 3hr Chicago	5yr 3hr Chicago	INTENSITY	10 min.	
5yr 6hr Chicago		INTENSITY	10 min.	

Name	Area	Width	%Imperv	%Slope Rain Gage	Outlet
S1	2.06	412.22	18.08	1.5000 100yr 3hr Chicago	J8
S2	0.89	178.38	28.89	0.5000 100yr 3hr Chicago	J6
s3	1.99	397.54	25.49	1.0000 100yr_3hr_Chicago	J1
S4	1.70	339.74	10.00	1.2000 100yr_3hr_Chicago	J9
S5	1.20	240.26	14.77	1.5000 100yr_3hr_Chicago	J5
S6	0.83	165.02	10.00	1.2000 100yr_3hr_Chicago	J11
S7	0.88	176.76	10.00	1.2000 100yr_3hr_Chicago	J12
S8	0.99	198.42	10.00	1.2000 100yr_3hr_Chicago	J11
S9	1.07	213.18	10.00	1.2000 100yr_3hr_Chicago	J10

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	93.38	3.00	0.0	
J10	JUNCTION	92.68	3.00	0.0	
J11	JUNCTION	92.74	3.00	0.0	
J12	JUNCTION	92.98	3.00	0.0	
J2	JUNCTION	91.92	3.00	0.0	
J3	JUNCTION	92.50	3.00	0.0	
J4	JUNCTION	92.04	3.00	0.0	
J5	JUNCTION	93.26	3.00	0.0	
J6	JUNCTION	93.85	3.00	0.0	
J8	JUNCTION	93.43	3.00	0.0	
J9	JUNCTION	93.07	3.00	0.0	
OF1	OUTFALL	91.84	0.76	0.0	
OF2	OUTFALL	91.82	1.34	0.0	
OF3	OUTFALL	91.57	1.34	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope B	Roughness
C1	ДЗ	J4	CONDUIT	98.5	0.4689	0.0100
C2	J4	OF3	CONDUIT	41.0	1.1401	0.0100
C3	J3	J2	CONDUIT	102.3	0.5663	0.0100
C4	J2	OF2	CONDUIT	6.6	1.4741	0.0100
C5 1	J5	J10	CONDUIT	134.9	0.4300	0.0100
C5 2	J10	J4	CONDUIT	149.0	0.4302	0.0100
C6 ¹	J1	J11	CONDUIT	125.8	0.5105	0.0100
C6 ²	J11	J2	CONDUIT	160.2	0.5106	0.0100
c7 ¹	J6	J12	CONDUIT	128.2	0.6772	0.0100

C7_2 C8_1 C8_2	J12 J8 J9		J9 CONI		DUIT DUIT DUIT	г 93		0.3	5770 8834 8842	0.0100 0.0100 0.0100
**************************************	on Summary									
Conduit			Full Depth	Area	Rad.	Width	Barre	els	Flo	W
C1 C2 C3 C4 C5_1 C5_2 C6_1 C6_2 C7_1 C7_2 C8_1 C8_2	EXSw	ale8 ale7 ale8 ale7 ale5 ale6 ale6 ale2 ale2 ale1 ale1 ale1	0.71 1.34 0.71 1.34 0.31 0.61	5.47 17.40 5.47 17.40 2.68 5.13	0.41 0.87 0.41 0.87 0.15 0.39	13.20 19.63 13.20 19.63 17.25 12.91		1 1 1 1 1	20.6 169.5 22.6 192.8 5.0	50 59 53 33 55 58 86 66 66
*********** Transect Su	mmary									
Transect EX	Swale1									
	0.0011 0.0246 0.0628 0.1126 0.1743 0.2515 0.3577 0.4855 0.6316 0.8254	0.0313 0.0718 0.1239 0.1883 0.2699 0.3818	0.0385 0.0813 0.1357 0.2028 0.2901 0.4067	0.2179	0.0185 0.0542 0.1017 0.1609 0.2341 0.3344 0.4585 0.6001 0.7823 1.0000					
Hrad:	0.1688 0.3144 0.4457 0.5602 0.6186 0.6646 0.7847 0.8637	0.4709 0.5818 0.6187 0.6872 0.8095	0.6034 0.6070 0.7097 0.8343	0.5170 0.6124 0.6193 0.7345 0.8587	0.1420 0.2870 0.4201 0.5386 0.6143 0.6420 0.7597 0.8619 0.8040 1.0000					
Width:	0.0520 0.1462 0.1994 0.2519 0.3101 0.4054 0.5374 0.6177 0.7304 0.9786	0.3225 0.4353	0.1675 0.2206 0.2730 0.3348 0.4771 0.5722 0.6478	0.1781 0.2310 0.2854 0.3546 0.5027	0.1307 0.1888 0.2414 0.2978 0.3800 0.5200 0.6027 0.6953 0.9732 1.0000					
Transect Ex	Swale2									
	0.0026 0.0323 0.0754 0.1288 0.1932 0.2702 0.3600 0.4640 0.5943 0.7945	0.0068 0.0400 0.0853 0.1408 0.2076 0.2872 0.3795 0.4870 0.6272 0.8443	0.0122 0.0482 0.0955 0.1532 0.2225 0.3046 0.3996 0.5111 0.6630 0.8951	0.0183 0.0568 0.1062 0.1660 0.2379 0.3226 0.4204 0.5364 0.7025 0.9468	0.0250 0.0659 0.1173 0.1794 0.2538 0.3411 0.4419 0.5641 0.7461 1.0000					
Hrad: Width:	0.0393 0.2322 0.4192 0.5917 0.7363 0.8700 1.0073 1.1101 1.0137 0.8692	0.0744 0.2712 0.4551 0.6220 0.7637 0.8968 1.0309 1.1130 0.9885 0.9049	0.1152 0.3089 0.4904 0.6522 0.7911 0.9245 1.0506 1.1137 0.9478 0.9406	0.1528 0.3456 0.5250 0.6814 0.8184 0.9521 1.0707 1.0945 0.9108 0.9727	0.1915 0.3824 0.5591 0.7089 0.8442 0.9797 1.0912 1.0481 0.8747 1.0000					
	0.0652 0.1392 0.1797 0.2174 0.2620 0.3100	0.0921 0.1476 0.1872 0.2260 0.2714 0.3196	0.1058 0.1560 0.1946 0.2345 0.2808 0.3289	0.1195 0.1644 0.2021 0.2433 0.2901 0.3382	0.1307 0.1723 0.2096 0.2526 0.3001 0.3475					

Area: Could Could		0.3568 0.4172 0.5857 0.9140	0.3674 0.4368 0.6339 0.9330	0.3797 0.4582 0.6991 0.9515	0.3919 0.4894 0.7711 0.9734	0.4042 0.5376 0.8527 1.0000
0.0010		EXSwale3				
0.0188		0.0195 0.0572 0.1147 0.1925 0.2894 0.4055 0.5415 0.6999	0.0255 0.0672 0.1287 0.2103 0.3110 0.4311 0.5718 0.7324	0.0323 0.0778 0.1435 0.2290 0.3334 0.4575 0.6035 0.7652	0.0399 0.0893 0.1591 0.2484 0.3566 0.4847 0.6354 0.7982	0.0482 0.1015 0.1754 0.2686 0.3807 0.5126 0.6675 0.8314
0.2061 0.2228 0.2404 0.2580 0.2730 0.2879 0.3954 0.3229 0.3410 0.3594 0.3771 0.3934 0.4103 0.4293 0.4491 0.4662 0.4838 0.5006 0.5155 0.5314 0.6319 0.6195 0.6491 0.6016 0.6170 0.6319 0.6195 0.6491 0.6766 0.7078 0.7368 0.7958 0.7950 0.8247 0.8542 0.80836 0.9129 0.9421 0.9711 1.0000	нгац:					
0.0557	Width.	0.2061 0.2879 0.3771 0.4662 0.5490 0.6319 0.7369	0.2228 0.3054 0.3934 0.4838 0.5666 0.6195 0.7658	0.2404 0.3229 0.4103 0.5006 0.5841 0.6491 0.7950	0.2580 0.3410 0.4293 0.5155 0.6016 0.6786 0.8247	0.2730 0.3594 0.4481 0.5314 0.6170 0.7078 0.8542
Area: 0.0011		0.1625 0.2778 0.3985 0.5104 0.6209 0.7387 0.8570 0.9497	0.1890 0.3014 0.4215 0.5347 0.6429 0.7610 0.9230 0.9564	0.2109 0.3238 0.4445 0.5582 0.6660 0.7833 0.9297 0.9626	0.2318 0.3461 0.4665 0.5788 0.6918 0.8057 0.9364 0.9680	0.2538 0.3719 0.4881 0.5994 0.7163 0.8308 0.9431 0.9733
0.0011		EXSwale4				
0.0167		0.0307 0.1007 0.1836 0.2762 0.3785 0.4919 0.6155 0.7472	0.0421 0.1165 0.2014 0.2959 0.4004 0.5158 0.6413 0.7743	0.0557 0.1327 0.2196 0.3159 0.4226 0.5401 0.6674 0.8016	0.0702 0.1492 0.2381 0.3364 0.4453 0.5648 0.6938 0.8291	0.0853 0.1662 0.2570 0.3572 0.4684 0.5899 0.7204 0.8570
0.0677		0.0896 0.1945 0.3145 0.4276 0.5285 0.6250 0.7224 0.8350	0.1014 0.2197 0.3372 0.4490 0.5475 0.6446 0.7442 0.8577	0.1182 0.2444 0.3605 0.4707 0.5671 0.6641 0.7667 0.8802	0.1430 0.2683 0.3836 0.4921 0.5870 0.6829 0.7892 0.9017	0.1688 0.2917 0.4062 0.5105 0.6064 0.7016 0.8122 0.9232
Area: 0.0006	widin:	0.3434 0.5184 0.5845 0.6467 0.7171 0.7879 0.8529 0.8954	0.4159 0.5309 0.5979 0.6597 0.7322 0.8011 0.8626 0.9032	0.4717 0.5434 0.6097 0.6720 0.7461 0.8142 0.8713 0.9112	0.4920 0.5568 0.6213 0.6844 0.7595 0.8280 0.8798 0.9199	0.5059 0.5704 0.6333 0.7005 0.7732 0.8418 0.8876 0.9286
0.0006 0.0025 0.0056 0.0098 0.0150 0.0209 0.0275 0.0349 0.0429 0.0517 0.0611 0.0712 0.0820 0.0936 0.1059 0.1188 0.1325 0.1468 0.1618 0.1774 0.1937 0.2106 0.2281 0.2465 0.2656 0.2855 0.3061 0.3273 0.3492 0.3720 0.3958 0.4205 0.4461 0.4727 0.5003 0.5287 0.5581 0.5883 0.6195 0.6514 0.6840 0.7172 0.7508 0.7850 0.8196 0.8547 0.8901 0.9260 0.9623 1.0000 0.8547 0.8901 0.9260 0.9623 1.0000 0.1315 0.1558 0.1793 0.2024 0.2251 0.2473 0.2692 0.2905 0.3107 0.3313 0.3528 0.3741 0.3964 0.4187 0.4407 0.4627 0.4844 0.5024 0.5203 0.5384 0.5573 0.5793 0.6012 0.6176 0.6325		EXSwale5				
		0.0209 0.0611 0.1188 0.1937 0.2855 0.3958 0.5287 0.6840 0.8547 0.0198 0.1315 0.2473 0.3528 0.4627 0.5573	0.0275 0.0712 0.1325 0.2106 0.3061 0.4205 0.5581 0.7172 0.8901 0.0396 0.1558 0.2692 0.3741 0.4844 0.5793	0.0349 0.0820 0.1468 0.2281 0.3273 0.4461 0.5883 0.7508 0.9260 0.0594 0.1793 0.2905 0.3964 0.5024 0.6012	0.0429 0.0936 0.1618 0.2465 0.3492 0.4727 0.6195 0.7850 0.9623 0.0821 0.2024 0.3107 0.4187 0.5203 0.6176	0.0517 0.1059 0.1774 0.2656 0.3720 0.5003 0.6514 0.8196 1.0000 0.1061 0.2251 0.3313 0.4407 0.5384 0.6325

Width:	0.7237	0.7411	0.7586	0.7763	0.7972
	0.8231	0.8487	0.8741	0.9006	0.9288
	0.9569	0.9847	1.0124	1.0398	1.0000
	0.0313	0.0627	0.0940	0.1196	0.1415
	0.1595	0.1774	0.1953	0.2129	0.2304
	0.2480	0.2655	0.2834	0.3023	0.3207
	0.3381	0.3555	0.3718	0.3879	0.4040
	0.4201	0.4362	0.4557	0.4754	0.4951
	0.5141	0.5302	0.5463	0.5674	0.5903
	0.6137	0.6385	0.6632	0.6873	0.7108
	0.7333	0.7558	0.7783	0.8009	0.8199
	0.8336	0.8472	0.8609	0.8733	0.8837
	0.8942	0.9046	0.9150	0.9255	1.0000
Transect :					
Urad.	0.0006	0.0026	0.0057	0.0097	0.0146
	0.0204	0.0272	0.0352	0.0442	0.0541
	0.0649	0.0765	0.0890	0.1024	0.1166
	0.1317	0.1477	0.1648	0.1829	0.2017
	0.2211	0.2411	0.2617	0.2829	0.3048
	0.3275	0.3510	0.3755	0.4008	0.4269
	0.4539	0.4811	0.5085	0.5360	0.5636
	0.5914	0.6193	0.6474	0.6756	0.7041
	0.7327	0.7615	0.7906	0.8199	0.8494
	0.8791	0.9090	0.9391	0.9694	1.0000
Hrad:	0.0154	0.0307	0.0492	0.0671	0.0842
	0.1002	0.1136	0.1275	0.1432	0.1604
	0.1776	0.1947	0.2116	0.2282	0.2448
	0.2604	0.2738	0.2873	0.3042	0.3246
	0.3447	0.3645	0.3844	0.4045	0.4201
	0.4345	0.4490	0.4635	0.4781	0.4928
	0.5135	0.5413	0.5690	0.5965	0.6240
	0.6512	0.6784	0.7054	0.7322	0.7572
	0.7821	0.8068	0.8314	0.8559	0.8802
	0.9044	0.9285	0.9525	0.9763	1.0000
Width:	0.0424	0.0847	0.1165	0.1454	0.1742
	0.2043	0.2403	0.2763	0.3090	0.3379
	0.3661	0.3939	0.4217	0.4494	0.4772
	0.5065	0.5405	0.5746	0.6024	0.6224
	0.6424	0.6624	0.6819	0.7003	0.7264
	0.7546	0.7828	0.8110	0.8392	0.8674
	0.8849	0.8896	0.8944	0.8991	0.9039
	0.9087	0.9134	0.9182	0.9231	0.9301
	0.9371	0.9441	0.9511	0.9581	0.9651
	0.9721	0.9790	0.9860	0.9930	1.0000
Transect :	EXSwale7				
Area:	0.0021	0.0066	0.0132	0.0216	0.0320
	0.0434	0.0559	0.0692	0.0833	0.0981
	0.1135	0.1292	0.1453	0.1617	0.1785
	0.1956	0.2131	0.2308	0.2490	0.2674
	0.2862	0.3054	0.3248	0.3446	0.3647
	0.3852	0.4059	0.4271	0.4485	0.4704
	0.4927	0.5153	0.5384	0.5619	0.5858
	0.6101	0.6348	0.6598	0.6852	0.7111
	0.7377	0.7651	0.7933	0.8221	0.8513
	0.8806	0.9102	0.9399	0.9699	1.0000
Hrad:	0.0181	0.0365	0.0539	0.0694	0.0898
midel.	0.1110	0.1314	0.1543	0.1764	0.1979
	0.2222	0.2475	0.2724	0.2969	0.3210
	0.3447	0.3680	0.3911	0.4138	0.4362
	0.4585	0.4806	0.5025	0.5241	0.5454
	0.5666	0.5876	0.6074	0.6266	0.6456
	0.6644	0.6820	0.6994	0.7170	0.7359
	0.7546	0.7731	0.7916	0.8100	0.8182
	0.8257	0.8336	0.8416	0.8560	0.8803
	0.9045	0.9285	0.9525	0.9763	1.0000
Width:	0.1168	0.1839	0.2470	0.3152	0.3601
	0.3951	0.4298	0.4534	0.4769	0.5005
	0.5154	0.5266	0.5378	0.5490	0.5602
	0.5713	0.5825	0.5937	0.6049	0.6161
	0.6271	0.6380	0.6489	0.6598	0.6707
	0.6816	0.6925	0.7045	0.7171	0.7297
	0.7425	0.7565	0.7706	0.7844	0.7967
	0.8090	0.8213	0.8336	0.8459	0.8691
	0.8936	0.9181	0.9429	0.9608	0.9673
	0.9739	0.9804	0.9869	0.9935	1.0000
Transect :	EXSwale8				
	0.0010	0.0039	0.0084	0.0141	0.0209
	0.0288	0.0377	0.0477	0.0586	0.0706
	0.0834	0.0971	0.1117	0.1272	0.1437
	0.1608	0.1787	0.1974	0.2168	0.2368
	0.2571	0.2777	0.2987	0.3201	0.3418
	0.3638	0.3861	0.4087	0.4317	0.4549
	0.4785	0.5024	0.5267	0.5512	0.5761
	0.6013	0.6268	0.6527	0.6790	0.7056

	0.7326 0.8751	0.7600 0.9052	0.7880 0.9358	0.8165 0.9670	0.8456
Hrad:	0.0751	0.3032	0.5550	0.3070	1.0000
	0.0173	0.0347	0.0567	0.0769	0.0980
	0.1183	0.1381	0.1575	0.1765	0.1954
	0.2173	0.2365	0.2555	0.2743	0.2947
	0.3159	0.3368	0.3575	0.3778	0.4049
	0.4320	0.4588	0.4853	0.5115	0.5380
	0.5642	0.5902	0.6159	0.6414	0.6666
	0.6916	0.7164	0.7410	0.7654	0.7895
	0.8124	0.8351	0.8576	0.8800	0.9022
	0.9225	0.9390	0.9555	0.9720	0.9886
	1.0051	1.0217	1.0383	1.0379	1.0000
Width:					
	0.0568	0.1131	0.1489	0.1847	0.2154
	0.2457	0.2755	0.3052	0.3349	0.3642
	0.3870	0.4138	0.4406	0.4675	0.4912
	0.5129	0.5345	0.5561	0.5778	0.5887
	0.5988	0.6090	0.6191	0.6292	0.6385
	0.6478	0.6571	0.6664	0.6757	0.6850
	0.6943	0.7036	0.7128	0.7221	0.7314
	0.7418	0.7521	0.7625	0.7729	0.7833
	0.7952	0.8105	0.8259	0.8412	0.8565
	0.8718	0.8871	0.9025	0.9321	1.0000

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

Analysis Options

Flow Units CMS Process Models: Rainfall/Runoff YES

 Process Models:
 Rainfall/Runoff
 YES

 RDII
 NO

 Snowmelt
 NO

 Groundwater
 NO

 Flow Routing
 YES

 Ponding Allowed
 YES

 Water Quality
 NO

 Infiltration Method
 HORTON

 Flow Routing Method
 DYNWAVE

 Starting Date
 11/10/2013 00:00:00

 Ending Date
 11/10/2013 06:00:00

 Antecedent Dry Days
 0.0

 Report Time Step
 00:05:00

 Wet Time Step
 00:05:00

 Routing Time Step
 1.00 sec

 Variable Time Step
 YES

 Maximum Trials
 20

 Number of Threads
 2

 Head Tolerance
 0.001500 m

**************************************	Volume hectare-m	Depth mm
Total Precipitation Evaporation Loss Infiltration Loss Surface Runoff Final Storage Continuity Error (%)	0.832 0.000 0.491 0.343 0.003 -0.631	71.677 0.000 42.290 29.587 0.252

**************************************	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow Wet Weather Inflow	0.000 0.343	0.000 3.434
Groundwater Inflow RDII Inflow External Inflow	0.000 0.000 0.000	0.000 0.000 0.000
External Outflow Flooding Loss	0.343	3.431 0.000
Evaporation Loss Exfiltration Loss	0.000	0.000
Initial Stored Volume Final Stored Volume Continuity Error (%)	0.000 0.000 0.059	0.000 0.002

Highest Continuity Errors Node J3 (2.35%) Node J9 (-1.88%)

Time-Step Critical Elements ********************************* None

Routing Time Step Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
S1	71.68	0.00	0.00	41.12	30.78	0.63	0.34	0.429
S2	71.68	0.00	0.00	37.97	33.70	0.30	0.14	0.470
S3	71.68	0.00	0.00	38.51	33.26	0.66	0.35	0.464
S4	71.68	0.00	0.00	44.77	27.16	0.46	0.22	0.379
S5	71.68	0.00	0.00	42.47	29.45	0.35	0.19	0.411
S6	71.68	0.00	0.00	44.77	27.16	0.22	0.11	0.379
S7	71.68	0.00	0.00	44.77	27.16	0.24	0.12	0.379
S8	71.68	0.00	0.00	44.77	27.16	0.27	0.13	0.379
S9	71.68	0.00	0.00	44.77	27.16	0.29	0.14	0.379

Node	Type	Average Depth Meters	Depth		Occi	of Max urrence hr:min	Max Depth
J1	JUNCTION	0.01	0.10	93.48	0	01:15	0.10
J10	JUNCTION	0.02	0.13	92.81	0	01:15	0.13
J11	JUNCTION	0.02	0.13	92.87	0	01:15	0.13
J12	JUNCTION	0.02	0.11	93.09	0	01:16	0.11
J2	JUNCTION	0.02	0.11	92.03	0	01:20	0.11
J3	JUNCTION	0.02	0.10	92.60	0	01:24	0.10
J4	JUNCTION	0.02	0.10	92.14	0	01:21	0.10
J5	JUNCTION	0.01	0.08	93.34	0	01:14	0.08
J6	JUNCTION	0.02	0.08	93.93	0	01:15	0.08
J8	JUNCTION	0.01	0.09	93.52	0	01:12	0.09
J9	JUNCTION	0.01	0.05	93.12	0	01:15	0.05
OF1	OUTFALL	0.02	0.11	91.94	0	01:16	0.11
OF2	OUTFALL	0.02	0.11	91.93	0	01:20	0.11
OF3	OUTFALL	0.02	0.10	91.67	0	01:21	0.10

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Occi days	of Max urrence hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	0.345	0.345	0	01:15	0.661	0.661	-0.092
J10	JUNCTION	0.140	0.324	0	01:14	0.289	0.645	-0.068
J11	JUNCTION	0.238	0.580	0	01:15	0.494	1.16	-0.111
J12	JUNCTION	0.116	0.252	0	01:15	0.24	0.541	0.105
Ј2	JUNCTION	0.000	0.764	0	01:19	0	1.73	0.058
J3	JUNCTION	0.000	0.557	0	01:15	0	1.12	2.411
J4	JUNCTION	0.000	0.513	0	01:21	0	1.16	0.163
J5	JUNCTION	0.186	0.186	0	01:10	0.354	0.354	-0.490
J6	JUNCTION	0.139	0.139	0	01:15	0.301	0.301	-0.061
J8	JUNCTION	0.338	0.338	0	01:10	0.634	0.634	-0.184
J9	JUNCTION	0.223	0.561	0	01:12	0.461	1.1	-1.842
OF1	OUTFALL	0.000	0.250	0	01:16	0	0.54	0.000
OF2	OUTFALL	0.000	0.764	0	01:20	0	1.73	0.000
OF3	OUTFALL	0.000	0.512	0	01:21	Ō	1.16	0.000

No nodes were surcharged.

No nodes were flooded.

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pont	CMS	CMS	10^6 ltr
OF1	82.93	0.030	0.250	0.540
OF2	82.52	0.097	0.764	1.733
OF3	82.35	0.065	0.512	1.158
System	82.60	0.192	1.511	3.431

Link	Type	Maximum Flow CMS	0ccu	of Max urrence hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	0.217	0	01:24	1.05	0.01	0.14
C2	CHANNEL	0.512	0	01:21	1.56	0.00	0.07
C3	CHANNEL	0.242	0	01:24	1.08	0.01	0.15
C4	CHANNEL	0.764	0	01:20	1.92	0.00	0.08
C5 1	CHANNEL	0.184	0	01:14	0.55	0.04	0.35
C5 ²	CHANNEL	0.323	0	01:17	1.38	0.02	0.19
C6 ⁻ 1	CHANNEL	0.343	0	01:15	0.96	0.02	0.20
C6_2	CHANNEL	0.581	0	01:16	1.54	0.04	0.21
C7_1	CHANNEL	0.137	0	01:15	0.92	0.01	0.12
C7_2	CHANNEL	0.250	0	01:16	1.38	0.01	0.14
C8_1	CHANNEL	0.339	0	01:12	1.02	0.06	0.29
C8_2	CHANNEL	0.557	0	01:15	0.60	0.03	0.31

	Adjusted						in Flo			
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.17	0.00	0.00	0.03	0.80	0.00	0.00	0.03	0.00
C2	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.26	0.00
C3	1.00	0.17	0.00	0.00	0.04	0.79	0.00	0.00	0.12	0.00
C4	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.26	0.00
C5 1	1.00	0.17	0.00	0.00	0.82	0.01	0.00	0.00	0.82	0.00
C5 2	1.00	0.17	0.00	0.00	0.20	0.63	0.00	0.00	0.25	0.00
C6 ⁻ 1	1.00	0.17	0.00	0.00	0.74	0.09	0.00	0.00	0.81	0.00
C6 ²	1.00	0.17	0.00	0.00	0.61	0.22	0.00	0.00	0.77	0.00
C7 ⁻ 1	1.00	0.17	0.00	0.00	0.52	0.31	0.00	0.00	0.81	0.00
C7 ⁻ 2	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.21	0.00
C8 ¹	1.00	0.17	0.00	0.00	0.58	0.25	0.00	0.00	0.56	0.00
C8_2	1.00	0.17	0.00	0.00	0.80	0.03	0.00	0.00	0.80	0.00

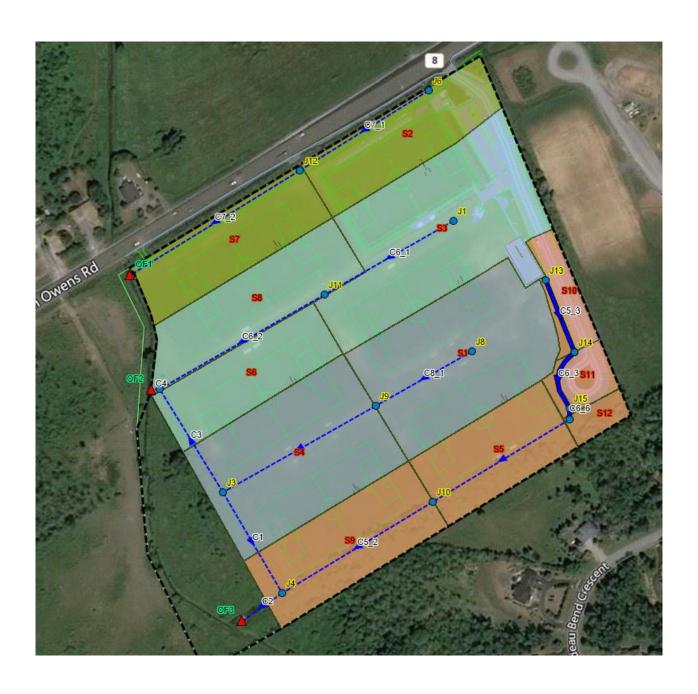
No conduits were surcharged.

Analysis begun on: Thu Jun 23 09:50:27 2022 Analysis ended on: Thu Jun 23 09:50:28 2022 Total elapsed time: 00:00:01

APPENDIX

B-2 PROPOSED CONDITIONS PCSWMM OUTPUT

APPENDIX



PROPOSED CONDITIONS 100-YEAR

ROPOSED CONDITI	ONS 100-YE	AR							
EPA STORM WATER MAN	AGEMENT MODEL	- VERSIO	N 5.1 (Bui	ld 5.1.012) –				
********** Element Count *********** Number of rain gage Number of subcatchm Number of nodes Number of links Number of pollutant Number of land uses	ents 13 19 19 s 0								
****************** Raingage Summary									
******				Data	Record	ing			
Name	Data Source			Туре	Interv	al			
100yr_3hr_Chicago C 100yr_3hr_Chicago C 100yr_6hr_Chicago C 100yr_6hr_Chicago C 10yr_6hr_Chicago C 10yr_6hr_Chicago C 25mm_3hr_Chicago C 25mm_3hr_Chicago C 25yr_3hr_Chicago C 25yr_3hr_Chicago C 25yr_6hr_Chicago C 2yr_3hr_Chicago C 2yr_3hr_Chicago C 2yr_3hr_Chicago C 2yr_3hr_Chicago C 2yr_3hr_Chicago C 3yr_3hr_Chicago C 3yr_3hr_Chicago C 3yr_6hr_Chicago C 3yr_6hr_Chicago C 3yr_6hr_Chicago C 3yr_6hr_Chicago C 3yr_6hr_Chicago C	limate_Change 100yr 6hr Ch	100yr_3h: icago	r_Chicago_	INTENSITY	Opercent 10 min	INTENS			
**************************************	У *	Width	% Two o ver	%Clana	Bain Ca	70	,	Outlot	
Name			%Imperv 10.00					Outlet J8	
S11_1 S11_2 S12 S2 S3_1 S3_1 S3_2 S4 S5 S6 S7 S8 S9	0.25 0.00 0.14 0.89 2.04 0.29 1.70 0.84 0.83 0.88 0.99	49.60 0.00 31.09 178.38 264.62 48.30 339.74 168.80 165.02 176.76 198.42 213.18	10.00 53.83 10.00 10.00 28.89 10.00 10.00 10.00 10.00	1.2000 1.5000 0.5000 1.0000 1.2000 1.2000 1.2000 1.2000 1.2000	100yr_31 100yr_31 100yr_31 100yr_31 100yr_31 100yr_31 100yr_31 100yr_31 100yr_31 100yr_31	hr_Chichr	ago	714 714 75 76 71 71 71 75 71 71 71 71	
************ Node Summary *********									
Name	Type	:	1111010	Max. Depth	Ponded Area	Exter: Inflo			
J1 J10 J11 J12 J13 J14 J15 J16 J17 J2 J3 J4 J5 J6 J8 J9 OF1 OF2 OF3	JUNCTION JUN		92.74 92.98 94.40 93.98 93.44 93.44 94.08 91.92 92.50 92.04	2.00 3.00 3.00 3.00	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				
Link Summary									
							0.03	Roughness	

C2	J4	OF3	CONDUIT	41.0	1.1401	0.0100
C3	J3	J2	CONDUIT	102.3	0.5663	0.0100
C4	J2	OF2	CONDUIT	6.6	1.4741	0.0100
C5 1	J5	J10	CONDUIT	134.9	0.4300	0.0100
C5 2	J10	J4	CONDUIT	149.0	0.4302	0.0100
C5_2 C5_3	J13	J17	CONDUIT	65.0	0.4923	0.0350
C6 1	J1	J11	CONDUIT	125.8	0.5105	0.0100
C6_2	J11	J2	CONDUIT	160.2	0.5106	0.0100
C6 3	J14	J15	CONDUIT	54.9	1.1667	0.0350
C6 ⁶	J16	J5	CONDUIT	8.8	2.0507	0.0350
C7 1	J6	J12	CONDUIT	128.2	0.6772	0.0100
C7 ²	J12	OF1	CONDUIT	168.7	0.6770	0.0100
C8 1	J8	Ј9	CONDUIT	93.1	0.3834	0.0100
C8 2	J9	J3	CONDUIT	148.9	0.3842	0.0100
C5 4	J17	J14	ORIFICE			
OR1	J15	J16	ORIFICE			
W1	J15	J16	WEIR			
W2	J17	J14	WEIR			

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	EXSwale8	0.71	5.47	0.41	13.20	1	20.60
C2	EXSwale7	1.34	17.40	0.87	19.63	1	169.59
C3	EXSwale8	0.71	5.47	0.41	13.20	1	22.63
C4	EXSwale7	1.34	17.40	0.87	19.63	1	192.83
C5_1	EXSwale5	0.31	2.68	0.15	17.25	1	5.05
C5_2	EXSwale6	0.61	5.13	0.39	12.91	1	18.08
C5_3	TRAPEZOIDAL	0.60	1.68	0.35	4.60	1	1.67
C6_1	ExSwale2	0.56	5.53	0.21	26.45	1	13.86
C6_2	ExSwale2	0.56	5.53	0.21	26.45	1	13.86
C6_3	TRAPEZOIDAL	0.60	2.88	0.42	6.60	1	5.02
C6_6	TRAPEZOIDAL	0.60	2.88	0.42	6.60	1	6.65
C7_1	EXSwale1	0.76	5.75	0.34	16.59	1	23.16
C7_2	EXSwale1	0.76	5.75	0.34	16.59	1	23.16
C8_1	EXSwale3	0.24	3.55	0.14	25.47	1	5.89
C8_2	EXSwale4	0.24	10.20	0.16	62.64	1	18.77

Transect EGS					
Area:					
	102 0.02				0.0550
	672 0.07 342 0.14				0.1200 0.1950
	112 0.14 112 0.22				
					0.2800
	982 0.31				0.3750
	952 0.41				0.4800
0.5					0.5950
0.6					0.7200
	462 0.77				0.8550
0.8	832 0.91	.18 0.	9408 0	.9702	1.0000
Hrad:	302 0.05	.0.2	0873 0	.1143	0.1405
0.0					0.1405
0.1					0.2014
0.2					
0.3					0.4711 0.5665
0.4					0.6580
0.5					0.8380
0.6					0.7464
0.7					0.0320
	337 0.95				1.0000
Width:	337 0.93	0.	9670 0	. 3033	1.0000
0.3	467 0.36	.00	3733 0	.3867	0.4000
0.4					0.4667
0.4					0.5333
0.5					0.6000
0.6					0.6667
0.6					0.7333
0.7					0.8000
	133 0.82				0.8667
	800 0.89				0.9333
0.9					1.0000
0.9	407 0.50		9755 0	. 3007	1.0000
Transect EXSwal	e1				
Area:					
	011 0.00	0.43	0084 0	.0131	0.0185
	246 0.03				0.0542
	628 0.07				0.1017
0.1					0.1609
0.1					0.2341
0.2					0.3344
0.3					0.4585
	855 0.51				0.6001
	316 0.66				0.7823
0.8			9122 0	.9560	1.0000

Hrad:					
Width:	0.0222 0.1688 0.3144 0.4457 0.5602 0.6186 0.6646 0.7847 0.8637 0.8436	0.0521 0.1999 0.3413 0.4709 0.5818 0.6187 0.6872 0.8095 0.8505 0.8830	0.0846 0.2299 0.3680 0.4955 0.6034 0.6070 0.7097 0.8343 0.8333	0.1142 0.2588 0.3942 0.5170 0.6124 0.6193 0.7345 0.8587 0.7832 0.9612	0.142 0.287 0.420 0.538 0.614 0.642 0.759 0.861 0.804
wreth.	0.0520 0.1462 0.1994 0.2519 0.3101 0.4054 0.5374 0.6177 0.7304	0.0836 0.1569 0.2101 0.2623 0.3225 0.4353 0.5548 0.6328 0.7811 0.9839	0.0993 0.1675 0.2206 0.2730 0.3348 0.4771 0.5722 0.6478 0.8403 0.9893	0.1150 0.1781 0.2310 0.2854 0.3546 0.5027 0.5876 0.6629 0.9445 0.9946	0.130 0.188 0.241 0.297 0.380 0.520 0.602 0.695 0.973
Transect Area:	ExSwale2				
Hrad:	0.0026 0.0323 0.0754 0.1288 0.1932 0.2702 0.3600 0.4640 0.5943 0.7945	0.0068 0.0400 0.0853 0.1408 0.2076 0.2872 0.3795 0.4870 0.6272 0.8443	0.0122 0.0482 0.0955 0.1532 0.2225 0.3046 0.3996 0.5111 0.6630 0.8951	0.0183 0.0568 0.1062 0.1660 0.2379 0.3226 0.4204 0.5364 0.7025 0.9468	0.025 0.065 0.117 0.179 0.253 0.341 0.441 0.564 0.746
iirad.	0.0393 0.2322 0.4192 0.5917 0.7363 0.8700 1.0073 1.1101 1.0137 0.8692	0.0744 0.2712 0.4551 0.6220 0.7637 0.8968 1.0309 1.1130 0.9885 0.9049	0.1152 0.3089 0.4904 0.6522 0.7911 0.9245 1.0506 1.1137 0.9478	0.1528 0.3456 0.5250 0.6814 0.8184 0.9521 1.0707 1.0945 0.9108 0.9727	0.191 0.382 0.559 0.708 0.844 0.979 1.091 1.048 0.874 1.000
Width:	0.0652 0.1392 0.1797 0.2174 0.2620 0.3100 0.3568 0.4172 0.5857 0.9140	0.0921 0.1476 0.1872 0.2260 0.2714 0.3196 0.3674 0.4368 0.6339 0.9330	0.1058 0.1560 0.1946 0.2345 0.2808 0.3289 0.3797 0.4582 0.6991 0.9515	0.1195 0.1644 0.2021 0.2433 0.2901 0.3382 0.3919 0.4894 0.7711 0.9734	0.130 0.172 0.209 0.252 0.300 0.347 0.404 0.537 0.852 1.000
Transect Area:					
77 d	0.0010 0.0195 0.0572 0.1147 0.1925 0.2894 0.4055 0.5415 0.6999 0.8647	0.0033 0.0255 0.0672 0.1287 0.2103 0.3110 0.4311 0.5718 0.7324 0.8983	0.0063 0.0323 0.0778 0.1435 0.2290 0.3334 0.4575 0.6035 0.7652 0.9320	0.0100 0.0399 0.0893 0.1591 0.2484 0.3566 0.4847 0.6354 0.7982 0.9659	0.014 0.048 0.101 0.175 0.268 0.380 0.512 0.667 0.831
Hrad:	0.0188 0.1197 0.2061 0.2879 0.3771 0.4662 0.5490 0.6319 0.7369 0.8836	0.0431 0.1348 0.2228 0.3054 0.3934 0.4838 0.5666 0.6195 0.7658 0.9129	0.0646 0.1532 0.2404 0.3229 0.4103 0.5006 0.5841 0.6491 0.7950 0.9421	0.0848 0.1720 0.2580 0.3410 0.4293 0.5155 0.6016 0.6786 0.8247 0.9711	0.104 0.189 0.273 0.359 0.448 0.531 0.617 0.707 0.854
Width:	0.0557 0.1625 0.2778 0.3985 0.5104 0.6209 0.7387 0.8570 0.9497 0.9786	0.0770 0.1890 0.3014 0.4215 0.5347 0.6429 0.7610 0.9230 0.9564 0.9840	0.0976 0.2109 0.3238 0.4445 0.5582 0.6660 0.7833 0.9297 0.9626 0.9893	0.1177 0.2318 0.3461 0.4665 0.5788 0.6918 0.8057 0.9364 0.9680 0.9947	0.137 0.253 0.371 0.488 0.599 0.716 0.830 0.943 0.973

Transect EXSwale4
Area:

0.0011 0.0307 0.1007 0.1836 0.2762 0.3785 0.4919 0.6155 0.7472 0.8851	0.0039 0.0421 0.1165 0.2014 0.2959 0.4004 0.5158 0.6413 0.7743	0.0083 0.0557 0.1327 0.2196 0.3159 0.4226 0.5401 0.6674 0.8016 0.9420	0.0142 0.0702 0.1492 0.2381 0.3364 0.4453 0.5648 0.6938 0.8291 0.9708	0.0215 0.0853 0.1662 0.2570 0.3572 0.4684 0.5899 0.7204 0.8570 1.0000
0.0167 0.0896 0.1945 0.3145 0.4276 0.5285 0.6250 0.7224 0.8350 0.9446	0.0322 0.1014 0.2197 0.3372 0.4490 0.5475 0.6446 0.7442 0.8577	0.0492 0.1182 0.2444 0.3605 0.4707 0.5671 0.6641 0.7667 0.8802 0.9892	0.0642 0.1430 0.2683 0.3836 0.4921 0.5870 0.6829 0.7892 0.9017 1.0098	0.0788 0.1688 0.2917 0.4062 0.5105 0.6064 0.7016 0.8122 0.9232 1.0000
0.0677 0.3434 0.5184 0.5845 0.6467 0.7171 0.7879 0.8529 0.8954	0.1210 0.4159 0.5309 0.5979 0.6597 0.7322 0.8011 0.8626 0.9032 0.9452	0.1683 0.4717 0.5434 0.6097 0.6720 0.7461 0.8142 0.8713 0.9112 0.9523	0.2210 0.4920 0.5568 0.6213 0.6844 0.7595 0.8280 0.8798 0.9199 0.9613	0.2737 0.5059 0.5704 0.6333 0.7005 0.7732 0.8418 0.8876 0.9286 1.0000
Transect EXSwale5 Area: 0.0006 0.0209 0.0611 0.1188 0.1937 0.2855 0.3958 0.5287 0.6840	0.0025 0.0275 0.0712 0.1325 0.2106 0.3061 0.4205 0.5581 0.7172 0.8901	0.0056 0.0349 0.0820 0.1468 0.2281 0.3273 0.4461 0.5883 0.7508	0.0098 0.0429 0.0936 0.1618 0.2465 0.3492 0.4727 0.6195 0.7850 0.9623	0.0150 0.0517 0.1059 0.1774 0.2656 0.3720 0.5003 0.6514 0.8196 1.0000
Hrad: 0.0198 0.1315 0.2473 0.3528 0.4627 0.5573 0.6471 0.7237 0.8231 0.9569	0.0396 0.1558 0.2692 0.3741 0.4844 0.5793 0.6609 0.7411 0.8487 0.9847	0.0594 0.1793 0.2905 0.3964 0.5024 0.6012 0.6751 0.7586 0.8741 1.0124	0.0821 0.2024 0.3107 0.4187 0.5203 0.6176 0.6903 0.7763 0.9006 1.0398	0.1061 0.2251 0.3313 0.4407 0.5384 0.6325 0.7064 0.7972 0.9288 1.0000
Width: 0.0313 0.1595 0.2480 0.3381 0.4201 0.5141 0.6137 0.7333 0.8336 0.8942	0.0627 0.1774 0.2655 0.3555 0.4362 0.5302 0.6385 0.7558 0.8472 0.9046	0.0940 0.1953 0.2834 0.3718 0.4557 0.5463 0.6632 0.7783 0.8609 0.9150	0.1196 0.2129 0.3023 0.3879 0.4754 0.5674 0.6873 0.8009 0.8733 0.9255	0.1415 0.2304 0.3207 0.4040 0.4951 0.5903 0.7108 0.8199 0.8837 1.0000
Transect EXSwale6 Area: 0.0006 0.0204 0.0649 0.1317 0.2211 0.3275 0.4539 0.5914 0.7327 0.8791	0.0026 0.0272 0.0765 0.1477 0.2411 0.3510 0.4811 0.6193 0.7615 0.9090	0.0057 0.0352 0.0890 0.1648 0.2617 0.3755 0.5085 0.6474 0.7906 0.9391	0.0097 0.0442 0.1024 0.1829 0.2829 0.4008 0.5360 0.6756 0.8199 0.9694	0.0146 0.0541 0.1166 0.2017 0.3048 0.4269 0.5636 0.7041 0.8494 1.0000
Hrad: 0.0154 0.1002 0.1776 0.2604 0.3447 0.4345 0.5135 0.6512 0.7821 0.9044 Width:	0.0307 0.1136 0.1947 0.2738 0.3645 0.4490 0.5413 0.6784 0.8068 0.9285	0.0492 0.1275 0.2116 0.2873 0.3844 0.4635 0.5690 0.7054 0.8314 0.9525	0.0671 0.1432 0.2282 0.3042 0.4045 0.4781 0.5965 0.7322 0.8559 0.9763	0.0842 0.1604 0.2448 0.3246 0.4201 0.4928 0.6240 0.7572 0.8802 1.0000
0.2043 0.3661	0.2403	0.2763 0.4217	0.3090 0.4494	0.3379

	0.5065 0.6424 0.7546 0.8849 0.9087 0.9371 0.9721	0.5405 0.6624 0.7828 0.8896 0.9134 0.9441 0.9790	0.5746 0.6819 0.8110 0.8944 0.9182 0.9511 0.9860	0.6024 0.7003 0.8392 0.8991 0.9231 0.9581 0.9930	0.6224 0.7264 0.8674 0.9039 0.9301 0.9651 1.0000
Transect Area:	EXSwale7				
	0.0021 0.0434 0.1135 0.1956 0.2862 0.3852 0.4927 0.6101 0.7377 0.8806	0.0066 0.0559 0.1292 0.2131 0.3054 0.4059 0.5153 0.6348 0.7651 0.9102	0.0132 0.0692 0.1453 0.2308 0.3248 0.4271 0.5384 0.6598 0.7933 0.9399	0.0216 0.0833 0.1617 0.2490 0.3446 0.4485 0.5619 0.6852 0.8221 0.9699	0.0320 0.0981 0.1785 0.2674 0.3647 0.4704 0.5858 0.7111 0.8513 1.0000
Hrad:	0.0181 0.1110 0.2222 0.3447 0.4585 0.5666 0.6644 0.7546 0.8257	0.0365 0.1314 0.2475 0.3680 0.4806 0.5876 0.6820 0.7731 0.8336	0.0539 0.1543 0.2724 0.3911 0.5025 0.6074 0.6994 0.7916 0.8416	0.0694 0.1764 0.2969 0.4138 0.5241 0.6266 0.7170 0.8100 0.8560	0.0898 0.1979 0.3210 0.4362 0.5454 0.6456 0.7359 0.8182 0.8803
Width:	0.9045	0.9285	0.9525	0.9763	1.0000
	0.1168 0.3951 0.5154 0.5713 0.6271 0.6816 0.7425 0.8090 0.8936 0.9739	0.1839 0.4298 0.5266 0.5825 0.6380 0.6925 0.7565 0.8213 0.9181 0.9804	0.2470 0.4534 0.5378 0.5937 0.6489 0.7045 0.7706 0.8336 0.9429 0.9869	0.3152 0.4769 0.5490 0.6049 0.6598 0.7171 0.7844 0.8459 0.9608	0.3601 0.5005 0.5602 0.6161 0.6707 0.7297 0.7967 0.8691 0.9673
Transect Area:	EXSwale8				
Alea.	0.0010 0.0288 0.0834 0.1608 0.2571 0.3638 0.4785 0.6013 0.7326 0.8751	0.0039 0.0377 0.0971 0.1787 0.2777 0.3861 0.5024 0.6268 0.7600 0.9052	0.0084 0.0477 0.1117 0.1974 0.2987 0.4087 0.5267 0.6527 0.7880 0.9358	0.0141 0.0586 0.1272 0.2168 0.3201 0.4317 0.5512 0.6790 0.8165 0.9670	0.0209 0.0706 0.1437 0.2368 0.3418 0.4549 0.5761 0.7056 0.8456 1.0000
Hrad:	0.0173	0.0347	0.0567	0.0769	0.0980
	0.1183 0.2173 0.3159 0.4320 0.5642 0.6916 0.8124 0.9225 1.0051	0.1381 0.2365 0.3368 0.4588 0.5902 0.7164 0.8351 0.9390 1.0217	0.1575 0.2555 0.3575 0.4853 0.6159 0.7410 0.8576 0.9555	0.1765 0.2743 0.3778 0.5115 0.6414 0.7654 0.8800 0.9720 1.0379	0.1954 0.2947 0.4049 0.5380 0.6666 0.7895 0.9022 0.9886 1.0000
Width:	0.0568	0.1131	0.1489	0.1847	0.2154
	0.2457 0.3870 0.5129 0.5988 0.6478 0.6943 0.7418 0.7952	0.2755 0.4138 0.5345 0.6090 0.6571 0.7036 0.7521 0.8105 0.8871	0.3052 0.4406 0.5561 0.6191 0.6664 0.7128 0.7625 0.8259	0.3349 0.4675 0.5778 0.6292 0.6757 0.7221 0.7729 0.8412 0.9321	0.3642 0.4912 0.5887 0.6385 0.6850 0.7314 0.7833 0.8565 1.0000

NOTE: The summary statistics displayed in this report are based on results found at every computational time step, not just on results from each reporting time step.

**************************************	Volume hectare-m	Depth mm
Total Precipitation Evaporation Loss Infiltration Loss	0.832 0.000 0.487	71.677 0.000 41.966
Surface Runoff Final Storage Continuity Error (%)	0.347 0.003 -0.626	29.890 0.270

******** Flow Routing Continuity ************************************	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow Wet Weather Inflow Groundwater Inflow RDII Inflow External Inflow External Outflow Flooding Loss Evaporation Loss Exfiltration Loss Initial Stored Volume Final Stored Volume	0.000 0.347 0.000 0.000 0.000 0.346 0.000 0.000 0.000	0.000 3.470 0.000 0.000 0.000 3.465 0.000 0.000 0.000
Continuity Error (%)	0.065	0.000

Highest Continuity Errors Node J3 (2.53%) Node J9 (-2.08%)

None

Highest Flow Instability Indexes

All links are stable.

****** Routing Time Step Summary **********

Minimum Time Step :
Average Time Step :
Maximum Time Step :
Percent in Steady State :
Average Iterations per Step : 0.50 sec 1.00 sec 1.00 sec 0.00 Percent Not Converging 0.00

Subcatchment Runoff Summary

	Total Precip	Total Runon	Total Evap	Total Infil	Total Runoff	Total Runoff	Peak Runoff	Runoff Coeff
Subcatchment	mm	mm	mm	mm	mm	10^6 ltr	CMS	
S1	71.68	0.00	0.00	44.41	27.56	0.47	0.24	0.385
S11 1	71.68	0.00	0.00	25.49	46.15	0.11	0.08	0.644
S12	71.68	0.00	0.00	44.09	27.92	0.04	0.02	0.390
S2	71.68	0.00	0.00	37.97	33.70	0.30	0.14	0.470
S3 1	71.68	0.00	0.00	38.18	33.48	0.68	0.30	0.467
s3 ²	71.68	0.00	0.00	19.72	51.88	0.15	0.10	0.724
S4_	71.68	0.00	0.00	44.77	27.16	0.46	0.22	0.379
S5	71.68	0.00	0.00	44.41	27.56	0.23	0.12	0.385
S6	71.68	0.00	0.00	44.77	27.16	0.22	0.11	0.379
S7	71.68	0.00	0.00	44.77	27.16	0.24	0.12	0.379
S8	71.68	0.00	0.00	44.77	27.16	0.27	0.13	0.379

71.68 0.00 0.00 44.77 27.16 0.29 0.14 0.379

Node Depth Summary

S9

		Average	Maximum	Maximum	Time	of Max	Reported
		Depth	Depth	HGL	0cci	irrence	Max Depth
Node	Type	Meters	Meters	Meters	days	hr:min	Meters
J1	JUNCTION	0.02	0.09	93.47	0	01:15	0.09
J10	JUNCTION	0.03	0.14	92.82	0	01:21	0.14
J11	JUNCTION	0.02	0.12	92.86	0	01:16	0.12
J12	JUNCTION	0.02	0.11	93.09	0	01:16	0.11
J13	JUNCTION	0.02	0.15	94.55	0	01:15	0.15
J14	JUNCTION	0.09	0.19	94.17	0	01:16	0.19
J15	JUNCTION	0.10	0.46	93.90	0	01:19	0.46
J16	JUNCTION	0.01	0.07	93.51	0	01:19	0.07
J17	JUNCTION	0.07	0.41	94.49	0	01:16	0.40
J2	JUNCTION	0.02	0.11	92.03	0	01:21	0.11
J3	JUNCTION	0.02	0.09	92.59	0	01:25	0.09
J4	JUNCTION	0.02	0.10	92.14	0	01:23	0.10
J5	JUNCTION	0.02	0.09	93.35	0	01:20	0.09
J6	JUNCTION	0.02	0.08	93.93	0	01:15	0.08
J8	JUNCTION	0.01	0.07	93.50	0	01:11	0.07
J9	JUNCTION	0.01	0.05	93.12	0	01:15	0.05
OF1	OUTFALL	0.02	0.11	91.94	0	01:16	0.11
OF2	OUTFALL	0.02	0.11	91.93	0	01:21	0.11
OF3	OUTFALL	0.02	0.10	91.67	0	01:23	0.10

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	0ccu	rrence	Lateral Inflow Volume 10^6 ltr	Inflow Volume	Error
J1	JUNCTION	0.302	0.302	0	01:15	0.682	0.682	-0.040
J10	JUNCTION	0.140	0.395	0	01:20	0.289	0.826	-0.063
J11	JUNCTION	0.238	0.534	0	01:15	0.494	1.18	-0.113
J12	JUNCTION	0.116	0.252	0	01:15	0.24	0.541	0.105
J13	JUNCTION	0.103	0.103	0	01:15	0.15	0.15	-0.914
J14	JUNCTION	0.076	0.165	0	01:15	0.114	0.265	-0.255
J15	JUNCTION	0.000	0.164	0	01:16	0	0.265	0.462
J16	JUNCTION	0.000	0.143	0	01:19	0	0.264	0.007
J17	JUNCTION	0.000	0.102	0	01:15	0	0.152	0.947
J2	JUNCTION	0.000	0.689	0	01:20	0	1.66	0.055
J3	JUNCTION	0.000	0.457	0	01:15	0	0.947	2.597
J4	JUNCTION	0.000	0.557	0	01:22	0	1.27	0.138
J5	JUNCTION	0.142	0.270	0	01:19	0.272	0.536	-0.110
J6	JUNCTION	0.139	0.139	0	01:15	0.301	0.301	-0.061
J8	JUNCTION	0.242	0.242	0	01:10	0.466	0.466	-0.191
J9	JUNCTION	0.223	0.462	0	01:12	0.461	0.928	-2.033
OF1	OUTFALL	0.000	0.250	0	01:16	0	0.54	0.000
OF2	OUTFALL	0.000	0.688	0	01:21	0	1.66	0.000
OF3	OUTFALL	0.000	0.555	0	01:23	0	1.26	0.000

No nodes were surcharged.

No nodes were flooded.

	Flow	Avq	Max	Total
	Freq	Flow	Flow	Volume
Outfall Node	Pcnt	CMS	CMS	10^6 ltr
OF1	82.93	0.030	0.250	0.540
OF2	82.51	0.093	0.688	1.660
OF3	82.33	0.071	0.555	1.265
System	82.59	0.194	1.464	3.465

Link Flow Summary

		Maximum	Time	of Max	Maximum	Max/	Max/
		Flow	Occu	rrence	Veloc	Full	Full
Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
C1	CHANNET	0 170		01.25	0.91	0.01	0.14
C2	CHANNEL			01:23		0.00	0.08
C3		0.195		01:25			
C4	CHANNEL			01:21			0.08
C5_1	CHANNEL	0.266	0	01:20	0.60	0.05	0.38
C5 2	CHANNEL	0.387	0	01:21	1.40	0.02	0.20
C5 3	CONDUIT	0.102	0	01:15	0.35	0.06	0.47
C6 ⁻ 1	CHANNEL	0.299	0	01:15	0.90	0.02	0.19
C6_2	CHANNEL	0.533	0	01:16	1.48	0.04	0.20
C6_3	CONDUIT	0.164	0	01:16	0.34	0.03	0.45
C6 6	CONDUIT	0.143	0	01:19	0.55	0.02	0.13
C7 ⁻ 1	CHANNEL	0.137	0	01:15	0.92	0.01	0.12
C7 ²	CHANNEL	0.250	0	01:16	1.38	0.01	0.14
C8 1	CHANNEL	0.239	0	01:12	0.89	0.04	0.26
C8 2	CHANNEL	0.457	0	01:15	0.57	0.02	0.28
C5 4	ORIFICE	0.028	0	01:17			1.00
OR1	ORIFICE	0.031	0	01:19			1.00
W1	WEIR	0.113	0	01:19			0.16
W2	WEIR	0.067	0	01:16			0.11

****** Flow Classification Summary

	Adjusted			Fract	ion of	Time	in Flo	w Clas	Class		
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.17	0.00	0.00	0.11	0.72	0.00	0.00	0.11	0.00	
C2	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.13	0.00	
C3	1.00	0.17	0.00	0.00	0.04	0.79	0.00	0.00	0.21	0.00	
C4	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.30	0.00	
C5 1	1.00	0.17	0.00	0.00	0.83	0.00	0.00	0.00	0.82	0.00	
C5_2	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	
C5_3	1.00	0.15	0.00	0.00	0.85	0.00	0.00	0.00	0.82	0.00	
C6_1	1.00	0.17	0.00	0.00	0.70	0.13	0.00	0.00	0.81	0.00	
C6_2	1.00	0.17	0.00	0.00	0.58	0.26	0.00	0.00	0.75	0.00	
C6_3	1.00	0.17	0.00	0.00	0.83	0.00	0.00	0.00	0.81	0.00	
C6_6	1.00	0.17	0.01	0.00	0.82	0.00	0.00	0.00	0.82	0.00	
C7_1	1.00	0.17	0.00	0.00	0.52	0.31	0.00	0.00	0.81	0.00	
C7_2	1.00	0.17	0.00	0.00	0.00	0.83	0.00	0.00	0.21	0.00	
C8_1	1.00	0.17	0.00	0.00	0.60	0.23	0.00	0.00	0.58	0.00	
C8_2	1.00	0.17	0.00	0.00	0.80	0.03	0.00	0.00	0.80	0.00	

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Thu Jun 23 14:23:43 2022 Analysis ended on: Thu Jun 23 14:23:44 2022 Total elapsed time: 00:00:01

APPENDIX

ENHANCED GRASS SWALE CALCULATIONS



Designed by: Checked by: Approved by: Drawing Ref: Kathryn Kerker Jingwei Zhang Jingwei Zhang _

2022-06-17 2022-06-17 2022-06-17

SWALE CALCULATION SHEET

5650 MITCH OWENS ROAD - 25 mm, 4 hour storm

Check for satisfaction of criteria for enhanced grass swales (TRCA, 2010)

Standard Design Calculation Sheet (Rational Method)

	ocation		Duainana Avasa			Drainage Areas Rational Method Runoff						Swale Data					Comment	
	-ocation		Draillage Areas			Individual	Accum.	Runoff	Rainfall	Q	Side	Bottom	Depth	Slope	Length	Q	Vel.	
Swale Name	From	То	Rund	off Coeffic	cients	AC	AC	Coefficient	Intensity		Slope	Width						
			0.25	0.70	0.90			С	i									
			ha	ha	ha				mm/h	L/s	x:1	m	m	%	m	L/s	m/s	
C5_3	J13	J17	0.10		0.19	0.20	0.20	0.68	35.1	19	3	1.00	0.06	0.50	65	19	0.3	OK
C6_3	J14	J15	0.11		0.13	0.15	0.35	0.64	33.5	32	3	3.00	0.03	1.00	55	32	0.3	OK

Notes:

The slope of open channels will depend on various factors including roadway longitudinal grade and natural topography;

The minimum allowable ditch/swale slope is 0.5% (1% is desirable);

Date:

Date:

Date:

For Runoff Coefficient (C), grassed area = 0.25, gravel area = 0.7, paved area = 0.9

Also for C, add 10% for 25-year storm event, 20% for 50-year storm event and 25% for 100-year storm event (update this in appropriate drainage cell)

A minimum time of concentration of 10min shall be used

Rainfall intensity determined by MOE Stormwater Management Planning and Design Manual (2003) i = 43C + 5.9

Maximum velocity = 0.5m/s, Flow depth below 0.1m preferred

Channel protection in the form of sodding, gabion, armour stone, riprap, asphalt, and concrete lining may be required depending on design flow and velocities; and

Roughness Coefficient (n) = 0.035

Permissible velocities for channels lined with grass are included in Appendix 6-C of the Ottawa Sewer Design Guidelines.

Depths will be greater where checkdams are used