



**Project Eagle, Port Colborne,
Ontario, Stormwater
Management Report**

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PROJECT EAGLE, PORT COLBORNE, ONTARIO, STORMWATER MANAGEMENT REPORT

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1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) has been retained to assist with the engineering services related to the proposed development located in Port Colborne, Ontario. The Site is proposed to be developed in phases.

This Stormwater Management (SWM) Report has been completed in support of a Site Plan Application of the proposed development. Throughout this SWM report, the entire development area including all development phases is referred to as the “Site”. This report discusses the stormwater management strategy for the Site that has been developed to mitigate potential impacts of the proposed development on adjacent water features.

1.1 OVERVIEW

The proposed Site is located in Port Colborne, Lots 16-19, Concession 5, Ontario in the Township of Humberstone (Township). The Site is bounded by open spaces, mainly utility corridors, pasture and fallow lands, Welland Canal to the west, pasture and agricultural lands to the east, open spaces, mainly pasture, and CN Rail line (CNR) to the north, and agricultural lands to the south.

It is proposed to develop the 77.96 ha Site as an industrial area consisting of industrial buildings, loading areas, parking spaces, tank yards, roadways, and stormwater management facilities (SWMF). The described are illustrated in Figures 1 and 2, attached.

1.2 STUDY APPROACH

A Stormwater Management strategy for the Site has been developed to mitigate against potential offsite water quality and quantity impacts associated with the development of the subject lands.

The SWM design involved the following study components:

- Complete a hydrologic study to determine the existing Site conditions with respect to topography, soils information, and existing land uses.
- Prepare an existing and proposed development condition hydrologic model using SWMHYMO to determine runoff volumes and peak flow rates towards Lyon's Creek Drain and Welland Canal.
- Complete the design of the Stormwater Management Facilities (SWMF) to provide sufficient water quality and water quantity control to meet the SWM design criteria and achieve target rates to downstream receivers.
- Evaluate the capacity of downstream receivers and overland flow conveyance and develop an Erosion and Sediment Control (ESC) plan.
- Summarize the study through detail design and recommendations.



1.3 BACKGROUND

The following report and primary guidance documents were referenced in the completion of the proposed SWM design:

- *Geotechnical Investigation, Project Eagle, Port Colborne, ON*, Stantec Consulting Ltd., July 5, 2024.
- *Development and Design Manual 2024 Schedule C – Storm Sewer System and Stormwater Management Facilities*, City of Port Colborne, January 2024.
- *Highway 140 Land Holdings Preliminary Assessment Report (PAR)*, MTE Consultants Inc., November 02, 2023.
- *140 Lands, Port Colborne ON Preliminary Geotechnical Report*, MTE Consultants Inc., December 07, 2023.
- *140 Lands, Port Colborne, Ontario, Hydrogeological Information Review*, MTE Consultants Inc., October 31, 2023.
- *Niagara Region Stormwater Management Guidelines*, WSP E & I Canada Limited, December 01, 2022.
- *Notice of Complete Application, Notice of Public Meeting, Proposed Zoning By-law Amendment Nyon Oil Inc.*, City of Port Colborne, October 07, 2020.
- *Erosion and Sediment Control Guide for Urban Construction*, Toronto and Region Conservation Authority, 2019.
- *Niagara Peninsula Conservation Authority Stormwater Management Guidelines*, AECOM, 2010.
- *Stormwater Management Planning and Design (SWMPD) Manual*, Ministry of the Environment, Conservation and Parks (MECP), March 2003.

1.4 STORMWATER MANAGEMENT DESIGN CRITERIA

The SWM criteria for the subject lands were established through the above-mentioned documentation.

The SWM criteria are as follows:

- **Water Quality** – Provide sufficient permanent pool and extended detention volume to meet the Ministry of the Environment, Conservation and Parks, (MECP) *Enhanced* (80% TSS Removal) criteria and promote the at-source removal of potential contaminants.
- **Water Quantity** – Provide sufficient water quantity control to maintain post-development peak flow rates to the 2-year pre-development level for all storms up to and including the 100-year design storm for all flows to the Lyon's Creek Drain with consideration for passing the Regulatory Flood event (i.e.,



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Hurricane Hazel). For facilities draining to the Welland Canal, design flows are not to exceed the capacity of the receiving conveyance channels.

- **Erosion Control** – Provide sufficient extended detention for the 25 mm storm event with a minimum 24-hour drawdown period.
- **Erosion and Sediment Control** – Provide appropriate erosion and sediment control during construction/area grading to protect adjacent properties and downstream watercourses/features from potential siltation.



2.0 EXISTING CONDITIONS

2.1 EXISTING TOPOGRAPHY AND SURFACE DRAINAGE

The existing Site topography can be described as moderately flat, as shown in Figure 1, attached. The Site lands are generally split by a drainage divide running east to west. Based on topography mapping, the ground surface is highest at the middle portion of the Site (i.e., the drainage divide) near elevation 192.7 m AMSL (Above Mean Sea Level) and slopes down to approximately 178.5 m AMSL in the southeast, 177.5 m AMSL in the southwest, and 178.0 m AMSL in the north. Thus, the overall grade change is about 15.2 m.

There are three predominant drainage zones within the Site (i.e., flows to the north, southeast, and southwest). The north half of the Site drains northwest, ultimately discharging to the Welland Canal via an existing 900 mm culvert, and the south half primarily drains overland to the southeast towards the adjacent Lyon's Creek Drain, with a portion flowing southwest, ultimately towards the Welland Canal.

2.2 EXISTING LANDUSE

The lands within the Site were utilized for soil disposal during the excavation of the Welland Canal. Existing development on the lands is limited to driveways. An existing hydro corridor crosses the north half from north to northwest.

Existing conditions drainage information is presented on Figure 1, attached.

2.3 GEOTECHNICAL AND HYDROGEOLOGICAL INFORMATION

As identified in the *Geotechnical Investigation*, the subsurface and deposit soils for the Site are predominantly comprised of clayey silt. The majority of soils were characterized as Hydrologic Soil Group D.

As indicated in the *Hydrogeological Information Review*, groundwater elevation was measured in three monitoring wells between October 12 and October 26, 2023. Groundwater levels on October 26, 2023, were measured to be 3.8 to 5.0 m BGS (Below Ground Surface).



3.0 STORMWATER MANAGEMENT DESIGN

3.1 HYDROLOGIC MODELING

A hydrologic model was prepared using SWMHYMO to simulate drainage conditions for the development (Site), and its tributary area, under existing and proposed development conditions. The model was employed to predict and design SWM systems to confirm the criteria identified above are achieved.

Model results were obtained for the existing and proposed conditions for the following events:

- The City of London 25 mm, 4-hour Chicago Storm.
- The 2-, 5-, 10-, 25-, 50-, and 100-year, 3-hour Chicago distributions derived using the City of Port Colborne IDF Curve parameters provided in Table 1.
- The 48-hour Regulatory Flood event (i.e., Hurricane Hazel).

Table 1: Rainfall Events – City of Port Colborne IDF Parameters

Return Period	A	B	C
2 Year	755	8.0	0.789
5 Year	830	7.3	0.777
10 Year	860	6.5	0.763
25 Year	900	5.2	0.745
50 Year	960	5.1	0.736
100 Year	1020	4.7	0.731

3.2 EXISTING CONDITIONS HYDROLOGIC MODEL

A hydrologic model was prepared to simulate existing conditions for the Site. Input and output files for the SWMHYMO model as well as the Existing Conditions Schematic are provided in the attachments. Soil Conservation Service (SCS) Curve Numbers and catchment parameters were calculated for each existing catchment based on land use and soil type and are also included in the attachments.

Delineation of existing drainage catchments is provided on Figure 1, Existing Storm Drainage Conditions and is summarized below:

- **Catchment 100:** 33.14 ha of open space area in the northern portion of the Site draining north then west towards the Welland Canal.
- **Catchment 101:** 31.29 ha of open space area in the southeast portion of the Site draining south then east via sheet and shallow flow along the length of the southern boundary limits and southeast towards the Lyon's Creek drain, ultimately draining southwest towards the Welland Canal.



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- **Catchment 102:** 9.10 ha of open space area in the southwest portion of the Site draining south towards the municipal drain, ultimately draining west towards the Welland Canal.
- **Catchment 103:** 4.45 ha of open space area in the west portion of the Site draining west towards the Welland Canal.
- **Catchment 300:** 10.68 ha of open space area located northwest of the Site draining into the north ditch, ultimately towards the Welland Canal through an existing culvert.
- **Catchment 301:** 25.55 ha of open space area located west of the Site, along the Welland Canal, draining north to south through the canal roadside ditch that leads into the Welland Canal.
- **Catchment 302:** 23.13 ha of open space area located southwest of the Site draining south to a municipal drain that connects to the Welland Canal.
- **Catchment 303:** 7.80 ha open space area located southeast of the Site draining southeast to the Lyon's Creek Drain.

Catchments 300, 301, 302 and 303 contribute external flows to the receiving watercourses.

3.3 PROPOSED CONDITIONS HYDROLOGIC MODEL

A hydrologic model was prepared to simulate proposed conditions for the Site to estimate the size of the SWMFs. Input and output files for the SWMHYMO model as well as the Proposed Conditions Schematic are provided in the attachments. Soil Conservation Service (SCS) Curve Numbers and catchment parameters were calculated for each proposed catchment based on land use and soil type and are also included in the attachments.

The proposed development incorporates an industrial area with 100% imperviousness and 4 SWMFs. The SWMFs will provide water quality and quantity control for the entire Site development.

The delineation of the proposed drainage catchments is provided on Figure 2, Proposed Storm Drainage Conditions and is summarized as follows:

- **Catchment 201:** 31.02 ha of proposed industrial buildings, roadways, and parking spaces draining to on-site SWMF No. 1.
- **Catchment 202:** 12.00 ha of proposed tank yards, roadways, and medium-voltage electrical substation draining to on-site SWMF No. 2.
- **Catchment 203:** 28.00 ha of future development area, parking spaces, industrial buildings, and roadways draining to on-site SWMF No. 3.
- **Catchment 204:** 5.44 ha of proposed high-voltage electrical substation and wastewater treatment effluent from the north portion of Phase 1 tank yard on the east, draining to on-site SWMF No. 4.



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- **Catchment 205:** 1.50 ha of proposed high-voltage electrical substation draining south to SWMF No. 2.
- **Catchment 300:** 10.68 ha of open space area located northwest of the Site draining into the north ditch, ultimately towards the Welland Canal through an upsized culvert.
- **Catchment 301:** 25.55 ha of open space area located west of the Site, along the Welland Canal, draining north to south through the canal roadside ditch that leads into the Welland Canal.
- **Catchment 302:** 23.13 ha of open space area located southwest of the Site draining south to a municipal drain that connects to the Welland Canal.
- **Catchment 303:** 7.80 ha open space area located along the southeast corner of the Site draining southeast to Lyon's Creek.

3.4 PROPOSED SWM STRATEGY

The proposed SWM strategy for the Site lands incorporates minor system conveyance via storm sewer networks and major system conveyance via proposed private roads and swales to the proposed SWMFs for water quality and quantity control. The SWM strategy has been developed in accordance with the objectives and criteria previously listed.

3.4.1 Stormwater Management Facility Design

Runoff from each catchment will drain to the proposed SWMF of the same catchment, except for Catchment 205, which drains to SWMF No. 2 located in Catchment 202. The proposed SWMFs are designed to provide water quantity and quantity control. The delineation of SWMFs is summarized as follows:

- **SWMF No. 1:** Elevations of 179.6 m AMSL top of the pond, 179.3 m AMSL top of active storage, 178.2 m AMSL permanent pool, and 177.9 m AMSL bottom of SWMF. SWMF No. 1 is proposed to be a wetland facility, drained by a multi-stage outlet consisting of an orifice, weir, and overflow weir.
- **SWMF No. 2:** Elevations of 180.8 m AMSL top of the pond, 180.5 m AMSL top of active storage, 179.6 m AMSL permanent pool, and 178.5 m AMSL bottom of SWMF. SWMF No. 2 is proposed to be a wet pond, drained by a multi-stage outlet consisting of an orifice, inverted pipe, ditch inlet catchbasin (DICB), weir, and overflow weir.
- **SWMF No. 3:** Elevations of 179.3 m AMSL top of the pond, 179.0 m AMSL top of active storage, 178.0 m AMSL permanent pool, and 177.0 m AMSL bottom of SWMF. SWMF No. 3 is proposed to be a wet pond, drained by a multi-stage outlet consisting of an orifice, inverted pipe, DICBs, weir, and overflow weir.
- **SWMF No. 4:** Elevations of 182.8 m AMSL top of the pond, 182.55 m AMSL top of active storage, 181.95 m AMSL permanent pool, and 180.95 m AMSL bottom of SWMF. SWMF No. 4 is proposed to



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be a wet pond, drained by a multi-stage outlet consisting of an orifice, inverted pipe, weirs, and overflow DICB.

Four oil-grit separators (OGS) will be installed, one upstream of each proposed facility, to provide pre-treatment controls to reduce expected cleanout requirements of the SWMFs. The OGS details are attached.

Design characteristics for the proposed SWMFs are discussed below, with design calculations provided in the attachments.

3.4.2 Stormwater Management – SWMF No. 1

SWMF No. 1 has been sized to accommodate drainage from 31.02 ha of the southeast portion of the development. The proposed wetland facility is drained by an outlet pipe structure and a weir, discharging to Lyon's Creek Drain via headwater drainage feature (HDF) H1, ultimately to the Welland Canal.

An oil-grit separator (OGS) (CDS 5678 or approved equivalent) will be provided upstream of the proposed facility to provide pre-treatment for the SWMF. An emergency overflow weir has been provided to convey flows exceeding the capacity of the SWM system to the Lyon's Creek Drain, through the proposed facility. A forebay has not been proposed for this SWMF due to grading constraints, and it is understood that this will make future maintenance more cumbersome as cleanout will involve the whole pond.

Quality control for reducing TSS and nutrients will be achieved through a combination of dilution in the permanent pool, extended detention of active design volumes, and filtration through wetland vegetation. A diverse mix of plant species, including trees, shrubs, and herbaceous ground cover, will be used to enhance treatment performance, stabilize banks, and provide habitat benefits. These species are selected to withstand both periods of ponding and drought. Careful consideration of plant selection and placement helps mitigate temperature increases, improve overall function, and enhance aesthetics and safety. It is recommended that planting be initiated immediately after pond grading is completed. Please refer to the Landscape Plans within the Engineering Drawing set for planting requirements.

The table below summarizes the various characteristics of the proposed SWMF No. 1 and discharges to the Lyon's Creek Drain.



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Table 2: Characteristics of SWMF No. 1

Permanent Pool	
Volume Required (m ³)	3722
Volume Provided (m ³)	5022
Extended Detention	
Quality Volume Required (Enhanced) (m ³)	1241
25mm Peak Release Rate (m ³ /s)	0.17
25mm Detention Time (hr.)	49
Outlet Structure	
Pipe No. 1 Invert/Diameter	178.2 m / 900 mm
Weir Spillway Invert/ Length	178.5 m / 2 m
Pipe No. 2 Invert/ Diameter	177.9 m / 1350 mm
Overflow Weir Invert/ Length/ Side Slopes (H:V)	179.3 m / 52 m / 20:1

As shown in the table below, water quantity targets have been met as the post development peak flow rates are below the target existing 2-year discharges established through existing conditions modeling. This is to provide overcontrol for the uncontrolled area being released from the proposed municipal right of way. This strategy is discussed further under separate cover, *Proposed Municipal Road, Project Eagle, Port Colborne, Ontario*, Stantec Consulting Ltd., March 2025.

Table 3: SWM Performance Characteristics – SWMF No. 1

Storm Event	25 mm	2-year	5-year	10-year	25-year	50-year	100-year	Hurricane Hazel
Existing Flows Towards Southeast (m ³ /s)	1.459	2.678	3.357	3.899	4.749	5.423	6.085	4.576
Proposed Flows to the SWMF (m ³ /s)	5.704	7.802	9.334	10.616	12.806	14.133	15.724	4.564
Proposed Flows from the SWMF (m ³ /s)	0.166	0.464	0.646	0.810	1.055	1.291	1.501	2.934
Maximum Storage Volume (m ³)	5,764	8,187	9,328	10,200	11,470	12,560	13,530	22,560
Maximum Ponding Depth (m)	0.32	0.45	0.50	0.55	0.61	0.66	0.70	1.10
Maximum Ponding Elevation (m)	178.52	178.65	178.70	178.75	178.81	178.86	178.90	179.30
Drawdown Time (hours)	48.87	51.21	51.83	52.14	52.55	52.79	53.00	54.13



3.4.3 Stormwater Management – SWMF No. 2

SWMF No. 2 is a wet facility constructed to manage runoff from 13.5 ha in the west and southwest portions of the development. The facility features an orifice outlet structure with a weir and a ditch inlet catch basin. In order to maintain baseflow to the HDF H2S2 located south of the proposed SWMF No. 2 (i.e., the southern municipal drain), a 450 mm pipe is proposed to convey the outflows from the pond to the southern municipal drain. Outflows in excess of the conveyance capacity of the 450 mm pipe are directed by pipe to the Welland Canal.

To reduce maintenance frequency, an oil-grit separator (OGS) (CDS 4045 or an approved equivalent) is installed upstream of the proposed facility as a pre-treatment device. An emergency overflow weir has been provided to convey flows exceeding the capacity of the SWM system to the southern municipal drain, through the proposed facility.

The table below outlines the characteristics and discharge details of SWMF No. 2.

Table 4: Characteristics of SWMF No. 2

Permanent Pool	
Volume Required (m ³)	3173
Volume Provided (m ³)	5771
Depth in Forebay (includes sediment accumulation zone) (m)	1.1
Extended Detention	
Quality Volume Required (Enhanced) (m ³)	540
25mm Peak Release Rate (m ³ /s)	0.10
25mm Detention Time (hr.)	26
Forebay	
Required Settling Length (m)	28.5
Required Dispersion Length (m)	49.4
Provided Forebay Length (m)	68
Velocity (m/s)	0.07
Cleanout Frequency, Included OGS Factor (year)	59.6
Forebay Surface Area / Total Permanent Pool Surface Area	32.4%
Outlet Structure	
Orifice Invert/Diameter	179.6 m / 400 mm
Weir Spillway Invert/ Length	179.9 m / 0.5 m
Pipe No. 1 Invert/ Diameter	178.7 m / 525 mm
DICB Lid Elevation / Width	179.9 m / 1.2 m
Pipe No. 2 Invert/ Diameter	178.65 m / 750 mm
Overflow Weir Invert/ Length/ Side Slopes (H:V)	180.5 m / 20 m / 20:1



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Post-development peak flow rates meet the water quantity targets up to and including the 100-year storm event, as summarized in the following table.

Table 5: SWM Performance Characteristics – SWMF No. 2

Storm Event	25 mm	2-year	5-year	10-year	25-year	50-year	100-year	Hurricane Hazel
Existing Flows Towards Southwest (m ³ /s)	0.472	0.881	1.121	1.320	1.638	1.882	2.130	1.326
Proposed Flows to the SWMF (m ³ /s)	2.483	3.395	4.062	4.620	5.573	6.151	6.843	1.986
Proposed Flows from the SWMF to the drain (m ³ /s)	0.102	0.334	0.509	0.641	0.641	0.641	0.641	0.641
Proposed Flows from the SWMF to the canal (m ³ /s)	0.000	0.000	0.000	0.004	0.256	0.494	0.712	1.200
Proposed Total Flows from the SWMF (m ³ /s)	0.102	0.334	0.509	0.645	0.897	1.135	1.353	1.841
Maximum Storage Volume (m ³)	2,328	3,217	3,607	3,907	4,335	4,681	4,998	5,678
Maximum Ponding Depth (m)	0.29	0.40	0.44	0.48	0.53	0.57	0.60	0.68
Maximum Ponding Elevation (m)	179.89	180.00	180.04	180.08	180.13	180.17	180.20	180.28
Drawdown Time (hours)	25.59	26.84	27.05	27.21	27.37	27.46	27.54	27.66

3.4.4 Stormwater Management – SWMF No. 3

SWMF No. 3 is a wet facility designed for drainage from 28.00 ha in the northern part of the development. This facility is equipped with an orifice outlet structure, a weir, and two ditch inlet catch basins, discharging to a drainage channel that outlets to the Welland Canal through a culvert.

To reduce maintenance frequency, an oil-grit separator (OGS) (CDS 5668 or an approved equivalent) is placed upstream of the proposed facility as a pre-treatment device. An emergency overflow weir has been provided to convey flows exceeding the capacity of the SWM system to the drainage channel, through the proposed facility, ultimately discharging to the Welland Canal.

The table below details the characteristics and discharge specifics of SWMF No. 3.



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Table 6: Characteristics of SWMF No. 3

Permanent Pool	
Volume Required (m ³)	6580
Volume Provided (m ³)	11491
Depth in Forebay (includes sediment accumulation zone) (m)	1.0
Extended Detention	
Quality Volume Required (Enhanced) (m ³)	1120
25mm Peak Release Rate (m ³ /s)	0.14
25mm Detention Time (hr.)	46
Forebay	
Required Settling Length (m)	47.2
Required Dispersion Length (m)	112.7
Provided Forebay Length (m)	123
Velocity (m/s)	0.15
Cleanout Frequency, Included OGS Factor (year)	55.7
Forebay Surface Area / Total Permanent Pool Surface Area	26.2%
Outlet Structure	
Orifice Invert/Diameter	178 m / 500 mm
Weir Spillway Invert/ Length	178.5 m / 3 m
Pipe No. 1 Invert/ Diameter	178 m / 1800 mm
2 DICBs Lid Elevation / Width	178.5 m / 1.2 m
Pipe No. 2 Invert/ Diameter	177.48 m / 750 mm
Pipe No. 3 Invert/ Diameter	177.51 m / 750 mm
Overflow Weir Invert/ Length/ Side Slopes (H:V)	179 m / 46.5 m / 20

Post-development peak flow rates meet the water quantity targets as shown in the following table.



Table 7: SWM Performance Characteristics – SWMF No. 3

Storm Event	25 mm	2-year	5-year	10-year	25-year	50-year	100-year	Hurricane Hazel
Existing Flows Towards North (m ³ /s)	0.876	1.751	2.256	2.673	3.326	3.877	4.413	4.747
Proposed Flows to the SWMF (m ³ /s)	5.149	7.042	8.425	9.583	11.559	12.757	14.193	4.120
Proposed Flows from the SWMF (m ³ /s)	0.141	0.255	0.488	0.682	1.065	1.450	1.826	3.833
Maximum Storage Volume (m ³)	5,218	7,969	8,880	9,515	10,380	11,090	11,730	14,380
Maximum Ponding Depth (m)	0.33	0.49	0.54	0.58	0.63	0.67	0.71	0.85
Maximum Ponding Elevation (m)	178.33	178.49	178.54	178.58	178.63	178.67	178.71	178.85
Drawdown Time(hours)	45.8	49.7	50.3	50.7	51.0	51.1	51.3	51.5

3.4.5 Stormwater Management – SWMF No. 4

SWMF No. 4 is a wet facility constructed to manage runoff from 5.44 ha in the west portion of the development. The facility features an orifice outlet structure with two weirs, discharging to the Welland Canal.

The SWMF is proposed to receive effluent from onsite private Industrial Process Wastewater Treatment Plant (WWTP). WWTP estimated clean effluent is anticipated to be discharged at an approximate peak rate of 23.8 l/s. Flow from the WWTP has been considered in designing the SWMF. The discharge rate from the WWTP is to be confirmed upon treatment system design and is not expected to have adverse impact on the capacity of the SWMF.

To reduce maintenance frequency, an oil-grit separator (OGS) (CDS 3030 or an approved equivalent) is placed upstream of the proposed facility as a pre-treatment device. An emergency overflow ditch inlet catchbasin has been provided to convey flows exceeding the capacity of the SWM system to the Welland Canal, through the proposed facility.

The table below outlines the characteristics and discharge details of SWMF No. 4.



PROJECT EAGLE, PORT COLBORNE, ONTARIO, STORMWATER MANAGEMENT REPORT

Stormwater Management Design

Table 8: Characteristics of SWMF No. 4

Permanent Pool	
Volume Required (m ³)	1278
Volume Provided (m ³)	1867
Depth in Forebay (includes sediment accumulation zone) (m)	1.0
Extended Detention	
Quality Volume Required (Enhanced) (m ³)	218
25mm Peak Release Rate (m ³ /s)	0.07
25mm Detention Time (hr.)	46
Forebay	
Required Settling Length (m)	34.7
Required Dispersion Length (m)	30.2
Provided Forebay Length (m)	55
Velocity (m/s)	0.14
Cleanout Frequency, Included OGS Factor (year)	47.9
Forebay Surface Area / Total Permanent Pool Surface Area	32.8%
Outlet Structure	
Orifice Invert/Diameter	181.95 m / 100 mm
Weir Spillways No. 1 and 2 Invert/ Length	182.25 m / 3 m
Pipe No.1 Invert/ Diameter	180.95 m / 1050 mm
Overflow DICB Lid Elevation / Width	182.55 m / 1.2 m
Pipe No. 2 Invert/ Diameter	181.5 m / 600 mm

Post-development peak flow rates meet the water quantity targets up to and including the 100-year storm event, as summarized in the following table.



Table 9: SWM Performance Characteristics – SWMF No. 4

Storm Event	25 mm	2-year	5-year	10-year	25-year	50-year	100-year	Hurricane Hazel
Existing Flows Towards West (m ³ /s)	0.195	0.378	0.489	0.581	0.730	0.847	0.968	0.643
Proposed Flows to the SWMF (m ³ /s)	1.024	1.392	1.661	1.886	2.270	2.502	2.781	0.824
Proposed Flows from the SWMF (m ³ /s)	0.074	0.239	0.346	0.467	0.651	0.807	0.964	0.819
Maximum Storage Volume (m ³)	1,119	1,316	1,438	1,522	1,647	1,755	1,859	1,763
Maximum Ponding Depth (m)	0.32	0.37	0.40	0.42	0.45	0.48	0.51	0.48
Maximum Ponding Elevation (m)	182.27	182.32	182.35	182.37	182.40	182.43	182.46	182.43
Drawdown Time(hours)	45.7	46.0	46.2	46.3	46.3	46.4	46.4	46.4

3.5 OUTLET CAPACITIES

Stantec conducted a survey at the Project Eagle Site to assess the existing capacity of ditches leading to the Lyon's Creek Drain and Welland Canal under current conditions. The survey also determined whether any adjustments were required to safely convey flows to the receiving watercourses. A FlowMaster model was developed to evaluate the capacity of the ditches under both existing conditions and proposed regrading scenarios. The details are provided in the appendices and summarized below.

3.5.1 Eastern Outlet to Lyon's Creek Drain

This HDF, H1 in the MTE environmental study, receives flow from the proposed municipal road and the outlet of SWMF No. 1. The model, developed based on the survey with cross-sections conducted every 25 m under existing conditions, indicates a conveyance capacity of 3.16 m³/s at the critical cross-section.

The expected flow in the 100-year event includes 1.50 m³/s from SWMF No. 1, with 1.17 m³/s of allowable release rate from the proposed municipal road, based on the 2-year target rate of 2.67 m³/s. Therefore, this HDF demonstrates sufficient capacity, as no additional flows exceeding the 2-year storm event target rate are expected to discharge into Lyon's Creek Drain. Further details on the proposed municipal road are provided under separate cover by Stantec Consulting Ltd. in March 2025.

3.5.2 Western Outlet to Lyon's Creek Drain

This drainage feature, H2S2 in the MTE environmental study, receives flow from the outlet of SWMF No. 2. The model, developed based on the survey with cross-sections conducted every 25 m under existing



Stormwater Management Design

conditions, indicates a conveyance capacity of 0.01 m³/s at the critical cross-section. The proposed flows to this drainage feature are retained for the purpose of maintaining baseflow to the feature, as required by the NPCA, and do not exceed the contributing flows under the existing conditions. However, both the existing and proposed flows to this drain exceed its conveyance capacity. Flooding is expected to occur as it does in existing conditions. The expected flow in the 100-year event is 0.64 m³/s from SWMF No. 2.

3.5.3 Northern Outlet to Welland Canal

This swale was not captured in the MTE environmental study and will receive flow from the outlet of SWMF No. 3. The model, developed based on the survey with cross-sections conducted every 50 m under existing conditions, indicates a conveyance capacity of 1.14 m³/s. Additionally, there is an existing 900 mm Corrugated Metal Pipe downstream of the ditch that drains into the Welland Canal.

To accommodate flows from SWMF No. 3 and existing drainage areas, regrading will be required. The proposed regrading involves a depth of 1 m, a bottom width of 6 m, and side slopes of 3:1, resulting in a conveyance capacity of 5.44 m³/s. The regraded ditch will direct flows to a replaced culvert, upsized to a 2130 mm x 1830 mm Concrete Box, which will drain into the Welland Canal. The expected flow in the 100-year event is 1.83 m³/s from SWMF No. 3.

3.5.4 Welland Canal Roadside Ditch

This ditch will not accept any flows from the proposed Site, as the larger flows from SWMF No. 2 and the outflow from SWMF No. 3 and SWMF No. 4 will be discharged directly into the Welland Canal through proposed outlet pipes.

3.6 OVERLAND FLOWS

Overland flow routes (OLFR) to each SWMF and their capacities to safely convey flows have been calculated and are included in the appendices. A summary of the calculations is provided below:

- **SWMF No. 1:** An area of 14.35 ha, including proposed roadways and rooftops, contributes overland flows to west overland flow route, while an area of 5.46 ha, including a portion of the proposed development contributes to north overland flow route. The peak flows of 7.27 m³/s and 2.77 m³/s, respectively, are safely conveyed through the designed riprap routes to the SWMF.
- **SWMF No. 2:** An area of 11.17 ha, including proposed roadways and a portion of the tank yard, contributes overland flows to the overland flow route. The peak flow of 5.66 m³/s is safely conveyed through a riprap route to the SWMF.
- **SWMF No. 3:** An area of 10.21 ha, including proposed roadways and rooftops, contributes overland flows to forebay overland flow route, while an area of 8.79 ha, including a portion of the proposed development contributes to wet cell overland flow route. The peak flows of 5.18 m³/s and 4.46 m³/s, respectively, are safely conveyed through the designed riprap routes to the SWMF.



4.0 EROSION AND SEDIMENT CONTROL PLAN

The erosion and sediment control strategy has been developed and is to be implemented during the construction process to minimize the potential for offsite discharge of sediment and the resultant negative environmental impacts. This plan will focus on the protection of the downstream areas.

4.1 EROSION POTENTIAL

The *Toronto and Region Conservation Authority's Erosion and Sediment Control Guide for Urban Construction (2019)* was used to determine the erosion potential of the Site. The erosion potential is based on slope gradient, slope length, and soil texture and is then used to determine the appropriate erosion control methods, as follows:

- Site Slopes: Generally Gentle (< 2%) – average slope is approximately 1.0%.
- Slope Lengths: Long (generally greater than 30 m).
- Erodibility Classification: High erodibility rate for silt and sandy silt, moderate erodibility rate for clayey silt, and low erodibility rate for sand and gravel soils.

Therefore, based on this classification, the Site has moderate to high erosion potential.

4.2 EROSION AND SEDIMENTATION CONTROL PLAN

The following approach to erosion and sediment control onsite has been prepared to minimize the potential impacts associated with onsite erosion and/or offsite transport of sediment to downstream areas.

Prior to any grading or servicing works commencing onsite, erosion and sedimentation control measures shall be implemented in accordance with the Pre-grading, Erosion, and Sedimentation Control Plans approved as part of the Site Alteration Amendment on July 29, 2024. The erosion and sedimentation controls will include the following items:

- Steep slopes (>3:1) shall have erosion blankets.
- Light and/or heavy-duty silt fencing will be erected on all Site boundaries where there is potential for runoff to be discharged offsite, to protect adjacent downstream lands from migration of sediment in overland flow. The location of this fencing will be adjacent to the limit of grading. Silt fence attached to page wire fencing will be installed periodically throughout the Site adjacent to sensitive areas. Double silt fencing with straw bales between shall be erected at the limit of grading along the entire southern Site limit that is adjacent to the Lyon's Creek Drain. All silt fencing shall be erected before grading begins to protect adjacent and downstream areas from migration of sediment in overland flow.
- Erosion control berms/swales will be located in appropriate (critical) areas to divert flows to temporary sediment basins.



PROJECT EAGLE, PORT COLBORNE, ONTARIO, STORMWATER MANAGEMENT REPORT

Erosion and Sediment Control Plan

- A construction entrance feature (“mud-mat”) will be provided at all Site entrances to minimize the offsite transport of sediment via construction vehicles.
- Swales constructed onsite will have temporary rock check dams to help attenuate flows and encourage deposition of suspended sediment where appropriate.
- All disturbed areas where construction is not expected for 30 days shall be re-vegetated with 50 mm of topsoil and hydro-seeding according to OPSS 572.
- During construction, all catchbasins are to be sealed until proposed roads are paved to prevent sediment deposition in the catchbasin’s sumps and conveyance of silt to the SWMF.
- An Erosion Control Implementation Schedule will be included with the Detailed Erosion and Sedimentation Control Plan, prepared in conjunction with the pregrading application and/or final engineering design.
- Following completion of construction, defined as 90% building construction, and Site stabilization, all erosion and sediment control measures and accumulated sediment are to be removed.

The erosion control measures shall be maintained in good repair during the entire construction period and shall only be removed as contributing drainage areas are restored and stabilized. In addition, the condition of erosion control works, their overall performance, and any repairs, replacement or modifications to the installed item shall be noted in monitoring reports submitted to the Niagara Peninsula Conservation Authority (NPCA) and the City. Monitoring reports should be submitted bi-monthly (quarterly during periods of inactivity or house construction) and should be based on inspection completed bi-weekly or after any significant rainfall events (>25 mm), whichever is more frequent.

4.3 MONITORING, MAINTENANCE AND MITIGATION

Monitoring and maintenance activities are an important part of a SWM Plan to confirm that the designed features continue to operate as intended. A Monitoring Program should be established in consultation with the NPCA, City of Port Colborne, and the Ministry of Environment, Conservation and Parks.



5.0 CONCLUSIONS AND RECOMMENDATIONS

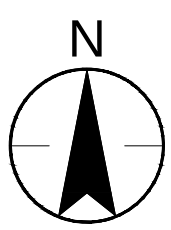
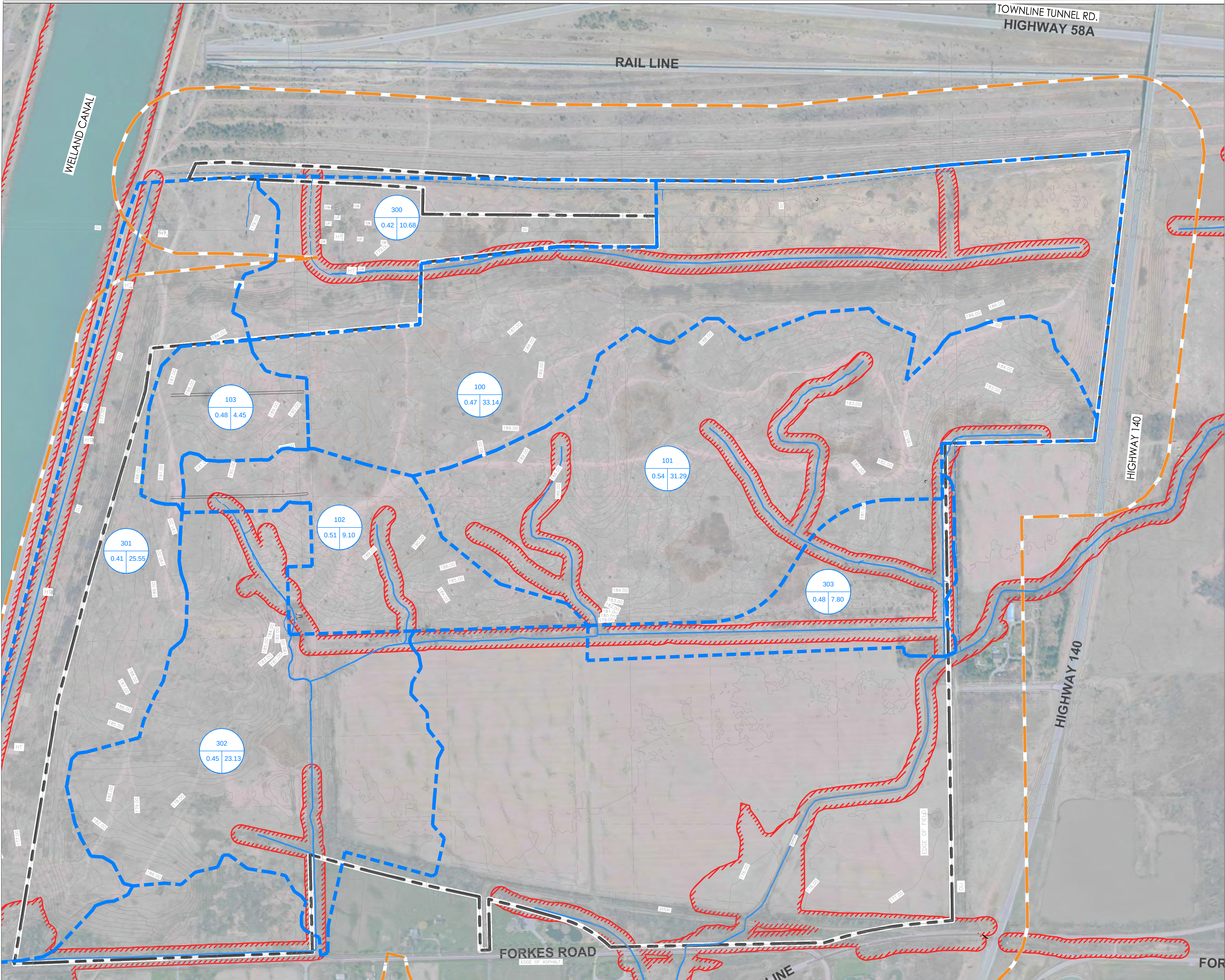
Based on the preceding, the following summary can be drawn for the Site:

- The proposed wet pond SWMFs No. 2, 3, and 4 as well as wetland SWMF No. 1 provide both water quantity and water quality control for the proposed industrial development.
- Sufficient permanent pools in SWMFs No. 1, 2, 3 and 4 are provided to achieve an 'Enhanced' water quality control for the Site in order to meet MECP water quality requirements.
- The proposed SWMFs provide sufficient storage to attenuate post-development discharges to maintain required target flow rates.
- Outlet structures for SWMFs No. 1 and 2 are designed to maintain the baseflow to the downstream drainage features without exceeding the existing target flow rates.
- The regraded north ditch and the proposed upsized culvert have sufficient capacity to convey the contributing flows from the Site and external areas to the Welland Canal.
- The overland flow routes leading to SWMFs No. 1, 2, and 3 have sufficient capacity to safely convey the contributing flows to the SWMFs.
- It is recommended that the erosion and sediment control measures documented herein be implemented.
- A monitoring, maintenance, and mitigation plan will be developed in consultation with NPCA and the City.



ATTACHMENTS:

- **Existing Conditions Drainage Area Figure**
- **Proposed Conditions Drainage Area Figure**
- **NRCS (SCS) Curve Number Determination**
- **SWMHYMO Input Parameters**
- **Model Schematics**
- **SWMF Design**
- **CulvertMaster – Pipes**
- **SWMHYMO Model**
- **OGS Sizing and Forebay Cleanout Frequency**
- **OLF Routes**
- **Erosion Protection**
- **CulvertMaster – Culverts**
- **FlowMaster – Ditches**

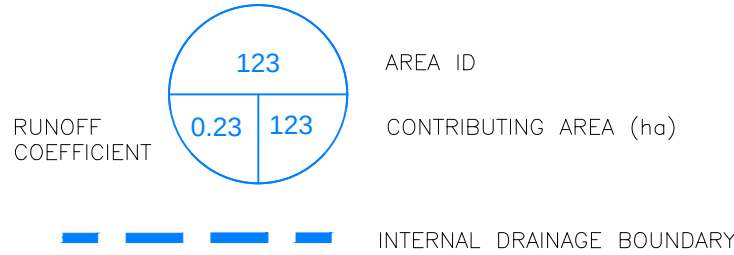


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Notes

Legend



Disclaimer

- Preliminary grading and cut-fill based on conceptual site plan created by others.
- Surface information used for cut fill plan taken from Gray architects and engineers conceptual design plan. Topographic survey required for precise calculations.
- This is a compiled plan and should not be considered a plan of survey.
- Conceptual design expected to outlet to nearby existing creek.
- Existing creek elevations shown are not accurate and are to be field verified to confirmed actual creek bottom elevations.

Revision

Revision	By	Appd.	YY.MM.DD
1. FOR SITE PLAN APPROVAL - SUBMISSION 2	DJL	AKK	24.12.17
Issued	By	Appd.	YY.MM.DD
File Name: 161581318_c.sxd	DJL	AKK	24.12.17
	Dwn.	Chkd.	Disgn.

Permit-Seal

Client/Project



PROJECT EAGLE

Port Colborne, ON Canada

Title

EXISTING STORM DRAINAGE
AREA PLAN

Project No.
161581318

Drawing No.

1

Scale
1:3000

Sheet

1 of 2

Revision

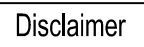
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Legend



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Permit-Seal

Client/Project

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PROJECT EAGLE

Port Colborne, ON Canada

Title

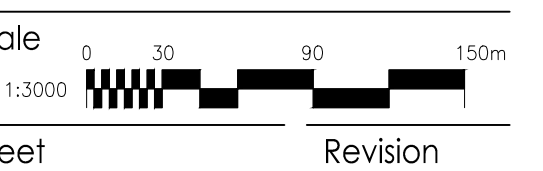
PROPOSED STORM DRAINAGE AREA PLAN

Project No.
161581318

Drawing No.

2

2 of 2



161500301 - Project Eagle

NRCS (SCS) Curve Number Determination

Pre-Development Conditions

TABLE OF CURVE NUMBERS (CN's)									
Land Use		Hydrologic Soil Type							Manning's 'n'
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40
Gravel		76	80.5	85	87	89	90	91	0.30
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17
Crop		66	70	74	78	82	84	86	0.13
Fallow (Bare)		77	82	86	89	91	93	94	0.05
Impervious		98	98	98	98	98	98	98	0.01

Notes:

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. Chin (2000), Water-Resources Engineering, Table 6.13-Curve Numbers for Various Urban Land Uses

HYDROLOGIC SOIL TYPE (%)								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
Internal Catchments								
100							100.0	100
101							100.0	100
102							100.0	100
103							100.0	100
External Catchments								
300							100.0	100
301							100.0	100
302							100.0	100
303							100.0	100

LAND USE (%)									
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious (see note)	Total
Internal Catchments									
100					55		45		100
101					10		90		100
102					25		75		100
103					50		50		100
External Catchments									
300					85		15		100
301					95		5		100
302					68	27	5		100
303					50	15	35		100

CURVE NUMBER (CN)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious	Weighted CN	Pervious CN
Internal Catchments										
100	0.0	0.0	0.0	0.0	44.6	0.0	42.3	0.0	87	87
101	0.0	0.0	0.0	0.0	8.1	0.0	84.6	0.0	93	93
102	0.0	0.0	0.0	0.0	20.3	0.0	70.5	0.0	91	91
103	0.0	0.0	0.0	0.0	40.5	0.0	47.0	0.0	88	88
External Catchments										
300	0.0	0.0	0.0	0.0	68.9	0.0	14.1	0.0	83	83
301	0.0	0.0	0.0	0.0	77.0	0.0	4.7	0.0	82	82
302	0.0	0.0	0.0	0.0	55.1	23.2	4.7	0.0	83	83
303	0.0	0.0	0.0	0.0	40.5	12.9	32.9	0.0	86	86

Notes:

1. AMC II assumed
2. Hydrological Soil Group taken from MTO Drainage Manual for each soil type

161500301 - Project Eagle
NRCS (SCS) Curve Number Determination
Post-Development Conditions

TABLE OF CURVE NUMBERS (CN's)									
Land Use		Hydrologic Soil Type							Manning's 'n'
		A	AB	B	BC	C	CD	D	
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40
Gravel		76	80.5	85	87	89	90	91	0.30
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17
Crop		66	70	74	78	82	84	86	0.13
Fallow (Bare)		77	82	86	89	91	93	94	0.05
Impervious		98	98	98	98	98	98	98	0.01

Notes:

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. Chin (2000), Water-Resources Engineering, Table 6.13-Curve Numbers for Various Urban Land Uses

HYDROLOGIC SOIL TYPE (%)								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
Internal Catchments								
201							100.0	100
202							100.0	100
203							100.0	100
204							100.0	100
205							100.0	100
External Catchments								
300							100.0	100
301							100.0	100
302							100.0	100
303							100.0	100

LAND USE (%)									
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious (see note)	Total
Internal Catchments									
201				1				99	100
202				1				99	100
203				1				99	100
204				1				99	100
205				1				99	100
External Catchments									
300					85		15		100
301					95		5		100
302					68	27	5		100
303					50	15	35		100

CURVE NUMBER (CN)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious	Weighted CN	Pervious CN
Internal Catchments										
201	0.0	0.0	0.0	0.8	0.0	0.0	0.0	97.0	98	80
202	0.0	0.0	0.0	0.8	0.0	0.0	0.0	97.0	98	80
203	0.0	0.0	0.0	0.8	0.0	0.0	0.0	97.0	98	80
204	0.0	0.0	0.0	0.8	0.0	0.0	0.0	97.0	98	80
205	0.0	0.0	0.0	0.8	0.0	0.0	0.0	97.0	98	80
External Catchments										
300	0.0	0.0	0.0	0.0	68.9	0.0	14.1	0.0	83	83
301	0.0	0.0	0.0	0.0	77.0	0.0	4.7	0.0	82	82
302	0.0	0.0	0.0	0.0	55.1	23.2	4.7	0.0	83	83
303	0.0	0.0	0.0	0.0	40.5	12.9	32.9	0.0	86	86

Notes:

1. AMC II assumed
2. Hydrological Soil Group taken from MTO Drainage Manual for each soil type

SWMHYMO Parameters

161500301 - Project Eagle

Pre-Development Conditions

Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	IA (mm)	Slope (%)	Length (m)	R.C	TC (hrs)	TP (hrs)
Internal Catchments										
North Catchment	100	NASHYD	33.14	87	5.00	2.93	625	0.47	0.34	0.23
Southeast Catchment	101	NASHYD	31.29	93	5.00	2.96	496	0.54	0.27	0.18
Southwest Catchment	102	NASHYD	9.10	91	5.00	4.99	286	0.51	0.16	0.11
West Catchment	103	NASHYD	4.45	88	5.00	2.12	221	0.48	0.16	0.10
External Catchments										
External Undeveloped Area Located Northwest of the Site	300	NASHYD	10.68	83	5.00	2.94	427	0.42	0.26	0.17
External Undeveloped Area Located West of the Site	301	NASHYD	25.55	82	5.00	1.41	1771	0.41	1.14	0.76
External Undeveloped Area Located Southwest of the Site	302	NASHYD	23.13	83	5.00	2.65	675	0.45	0.39	0.26
External Undeveloped Area Located Southeast of the Site	303	NASHYD	7.80	86	5.00	1.18	379	0.48	0.28	0.19

Notes:

<i>TIMP</i>	→	Total percent impervious
<i>XIMP</i>	→	Percent impervious directly connected
Time of Concentration calculated using the Airport Method (For areas less than 100 ha, and RC less than 0.4)	→	$T_c = [3.26 (1.1-C) L^{0.5}] / S^{0.33}$ Where: C = Runoff Coefficient according to MTO Design chart 1.07 L = Length of Overland Flow (m) S = Slope (%)
Time of Concentration calculated using the Bransby Williams Method (For areas less than 100 ha, and RC greater than 0.4)	→	$T_c = 0.057 \cdot L / [(Sw^{0.2}) \cdot (A^{0.1})]$ Where: tc = time of concentration, minutes L = catchment or watershed length, m Sw = catchment or watershed slope, % A = catchment or watershed area, ha
Time to Peak (hr)	→	$T_p = T_c(N-1)/N$ Where: N = number of linear resevoirs (N=3)

SWMHYMO Parameters
161500301 - Project Eagle

Post-Development Conditions

Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length P (m)	Length IMP (m)	R.C
Internal Catchments										
Draining to SWMF#1	201	STANDHYD	31.02	80	100	100	2.00	25	110	0.90
Draining to SWMF#2	202	STANDHYD	12.00	80	100	100	2.00	25	110	0.90
Draining to SWMF#3	203	STANDHYD	28.00	80	100	100	2.00	25	110	0.90
Draining to SWMF#4	204	STANDHYD	5.44	80	100	100	2.00	25	110	0.90
Draining to SWMF#2	205	STANDHYD	1.50	80	100	100	2.00	25	110	0.90
Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	IA (mm)	Slope (%)	Length (m)	R.C	TC (hrs)	TP (hrs)
External Catchments										
External Undeveloped Area Located Northwest of the Site	300	NASHYD	10.68	83	5	2.92	338	0.42	0.20	0.14
External Undeveloped Area Located West of the Site	301	NASHYD	25.55	82	5	1.24	1592	0.41	1.05	0.70
External Undeveloped Area Located Southwest of the Site	302	NASHYD	23.13	83	5	2.68	675	0.45	0.38	0.26
External Undeveloped Area Located Southeast of the Site	303	NASHYD	7.80	86	5	1.18	379	0.48	0.28	0.19

Notes:

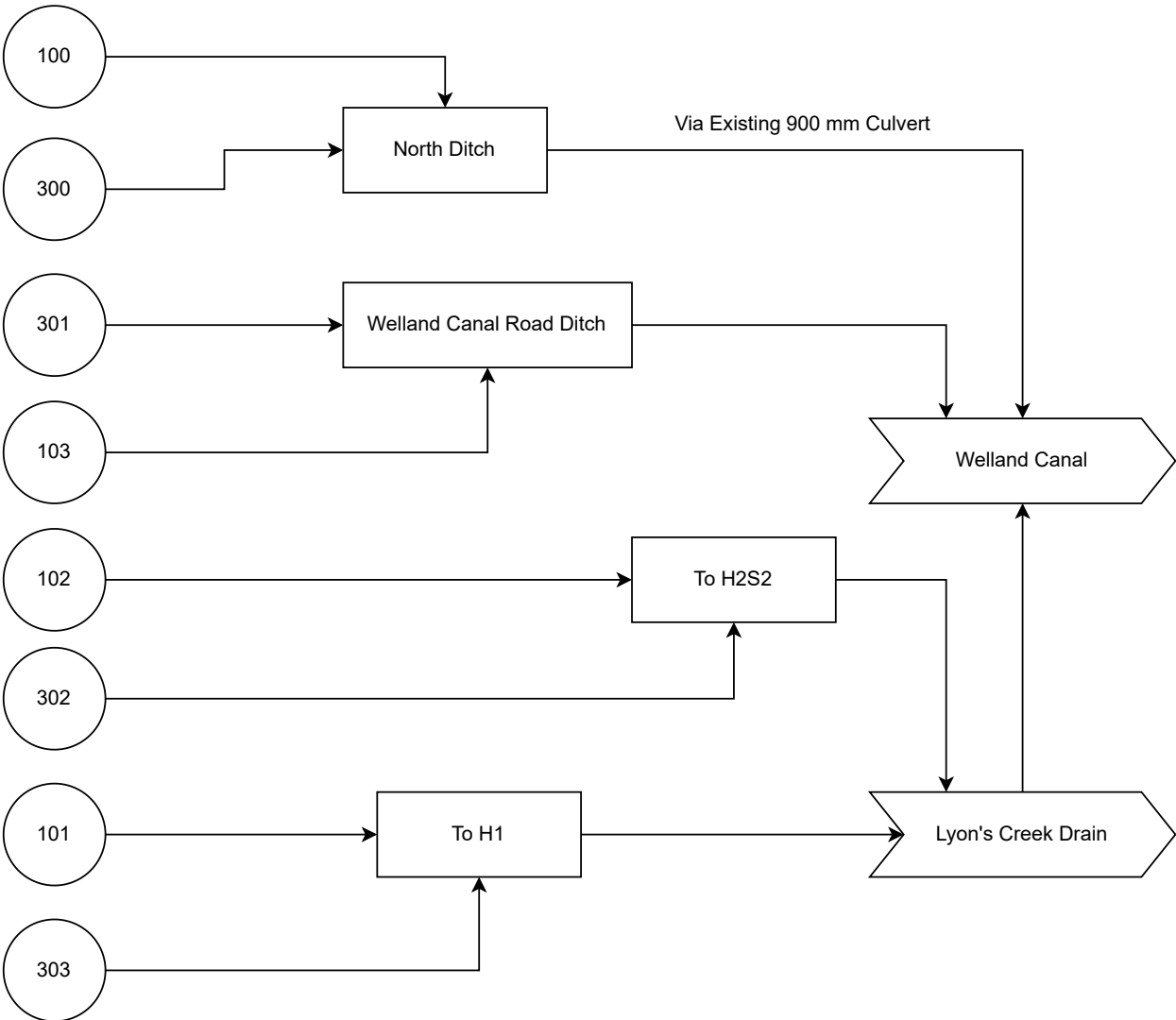
TIMP	➔	Total percent impervious
XIMP	➔	Percent impervious directly connected
Time of Concentration calculated using the Airport Method (For areas less than 100 ha, and RC less than 0.4)	➔	$T_c = [3.26 (1.1-C) L^{0.5}] / S^{0.33}$ Where: C = Runoff Coefficient according to MTO Design chart 1.07 L = Length of Overland Flow (m) S = Slope (%)
Time of Concentration calculated using the Bransby Williams Method (For areas less than 100 ha, and RC greater than 0.4)	➔	$T_c = 0.057 * L / [(Sw^{0.2}) * (A^{0.1})]$ Where: tc = time of concentration, minutes L = catchment or watershed length, m Sw = catchment or watershed slope, % A = catchment or watershed area, ha
Time to Peak (hr)	➔	$T_p = T_c(N-1)/N$ Where: N = number of linear resevoirs (N=3)

Project Eagle

Existing Conditions Schematic
Project Number: 161581318

Project Eagle

Existing Conditions Schematic
Project Number: 161581318



Legend

- NASHYD - Undeveloped Areas
- ADDHYD
- Outlet

Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

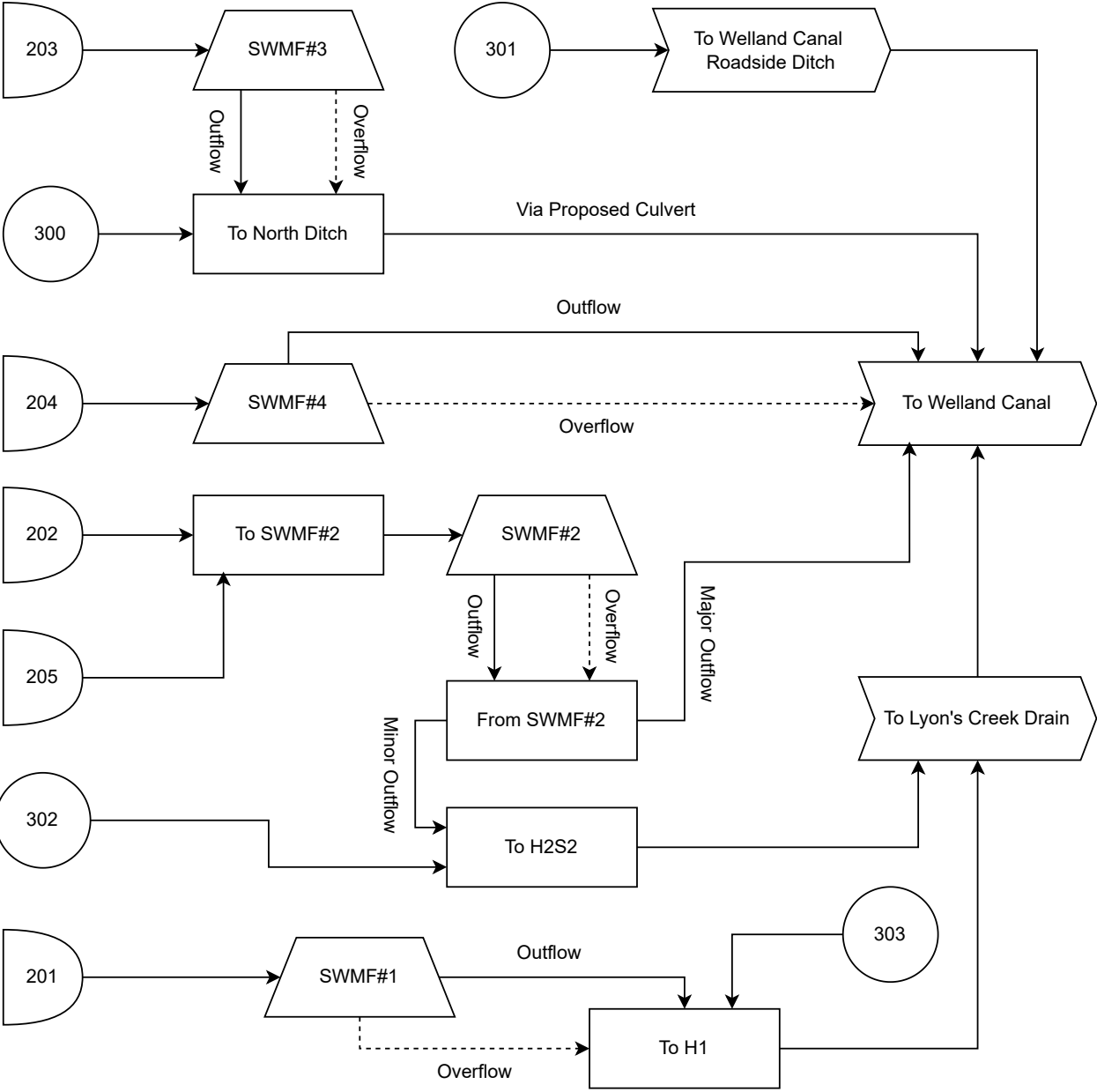
Legend

-  NASHYD - Undeveloped Areas
-  ADDHYD
-  Outlet

Project Eagle

Proposed Conditions Schematic

Project Number: 161581318



Legend:

###

NASHYD - Undeveloped Areas

###

STANDHYD - Developed Areas

###

ROUTE RESERVOIR - SWMF

###

ADDHYD

###

Outlet

161581318 - Project Eagle - SWMF No. 1**Stormwater Quality Volumetric Requirements**

Drainage Area (ha) ²	Total % Imp.	Level	Facility Type	Water Quality Unit Volume Requirements ¹			Water Quality Volume Requirements		
				Total Unit Volume (m ³ /ha)	Permanent Pool (m ³ /ha)	Extended Detention (m ³ /ha)	Permanent Pool (m ³)	Extended Detention (m ³)	Total MOE Volume
31.02	100%	Enhanced	Wetland	160	120	40	3,722	1,241	4,963

¹ Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003)

² Drainage Area for Quality control represents total storm sewer drainage area to SWM Facility and includes the area of the SWM block itself and external area draining onto site (if any)

Stormwater Management Facility Design Calculations

Permanent Pool

Pipe Flows from Rating Curves derived in CulvertMaster, attached

$T = [v_2 - v_1] / [(Q_2 + Q_1) / 2] / 3600$
 where
 T = drawdown time in hours
 v_2 = starting pond volume
 v_1 = ending pond volume
 Q_2 = starting flow
 Q_1 = ending flow

From 0.0 to 0.1 m above the permanent pool
 $T = [v_2 - v_1] / [(Q_2) / 3600]$
 where
 T = drawdown time in hours
 v_2 = starting pond volume
 v_1 = ending pond volume
 Q_2 = starting flow

where
 L = bottom width of spillway
 H = head above weir invert
 S = side slopes (ratio of $H:V$)
 C_{wt} = weir coefficient (triangular)
 C_{wb} = weir coefficient (broad-crested)

Sharp crested semi-circular weir equation

$Q = C^* D^{2.5} (H/D)^{1.88}$
 where
 C = sharp crested semi-circular weir coefficient
 D = diameter of orifice
 H = head above orifice invert
 Note: used when water elevation is below 3/4 of the orifice diameter

$Q = C \cdot A \cdot (2 \cdot g \cdot H)^{0.5}$
 where
 C = orifice coefficient
 A = area of orifice
 g = acceleration due to gravity
 H = head above centre line of orifice
 Note: used when water elevation is known

25 mm	178.52	0.32	5764	48.87	0.166
2-year	178.65	0.45	8187	51.21	0.464
5-year	178.70	0.50	9328	51.83	0.646
10-year	178.75	0.55	10200	52.14	0.810
25-year	178.81	0.61	11470	52.55	1.055
50-year	178.86	0.66	12560	52.79	1.291
100-year	178.90	0.70	13530	53.00	1.502
Hurricane Hazel	179.30	1.10	22560	54.13	2.935

161581318 - Project Eagle - SWMF No. 2**Stormwater Quality Volumetric Requirements**

Drainage Area (ha) ²	Total % Imp.	Level	Facility Type	Water Quality Unit Volume Requirements ¹			Water Quality Volume Requirements		
				Total Unit Volume (m ³ /ha)	Permanent Pool (m ³ /ha)	Extended Detention (m ³ /ha)	Permanent Pool (m ³)	Extended Detention (m ³)	Total MOE Volume
13.50	100%	Enhanced	Wetpond	275	235	40	3,173	540	3,713

¹ Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003)

² Drainage Area for Quality control represents total storm sewer drainage area to SWM Facility and includes the area of the SWM block itself and external area draining onto site (if any)

Stormwater Management Facility Design Calculations

[illegible]

Notes

Pipe Flows from Rating Curves derived in CulvertMaster, attached

Drawdown Time Calculations Greater than 0.1 m above the permanent pool

$$T = (v_2 - v_1) / [(Q_2 + Q_1) / 2] / 3600$$

where

T = drawdown time in hours

v_2 = starting pond volume

v_1 = ending pond volume

Q_2 = starting flow

Q_1 = ending flow

From 0.0 to 0.1 m above the permanent pool
 $T = [v_2 - v_1] / [(Q_2) / 3600]$
 where
 T = drawdown time in hours
 v_2 = starting pond volume
 v_1 = ending pond volume
 Q_2 = starting flow

Weir Equation Used: $Q = C_{wb} \cdot L \cdot H^{1.5} + C_{wt} \cdot S \cdot H^{2.5}$
 where
 L = bottom width of spillway
 H = head above weir invert
 S = side slopes (ratio of H:V)
 C_{wt} = weir coefficient (triangular)
 C_{wb} = weir coefficient (broad-crested)

Sharp crested semi-circular weir equation

Sharp crested semi-circular weir equation

$$Q = C \cdot D^{2.5} \cdot (H/D)^{1.88}$$

where

C = sharp crested semi-circular weir coefficient

D = diameter of orifice

H = head above orifice invert

Note: used when water elevation is below 3/4 of the orifice diameter

Orifice Flow Calculations: Orifice flow equation
 $Q = C \cdot A \cdot (2 \cdot g \cdot H)^{0.5}$
 where
 C = orifice coefficient
 A = area of orifice
 g = acceleration due to gravity
 H = head above centre line of orifice
 Note: used when water elevation is above 3/4 of the orifice diameter

Rainfall Event	Elevation	Depth	Volume	Drawdown	Flow from Table
25 mm	179.89	0.29	2328	25.59	0.102
2-year	180.00	0.40	3217	26.84	0.334
5-year	180.04	0.44	3607	27.05	0.509
10-year	180.08	0.48	3907	27.21	0.646
25-year	180.13	0.53	4335	27.37	0.897
50-year	180.17	0.57	4681	27.46	1.135
100-year	180.20	0.60	4998	27.54	1.353
Hurricane Hazel	180.28	0.68	5678	27.86	1.841
Quality	179.67	0.07	540	11.16	0.009

161581318 - Project Eagle - SWMF No. 2

Sediment Forebay Sizing Calculations

Using MOE - SWMPD Manual (2003)

Settling

$$\text{Dist} = \sqrt{r \cdot Q_p / V_s}$$

$$= 28.5 \quad \text{m}$$

r : 1 = l to w ratio

Q_p = peak SWM outflow during quality storm

V_s = settling velocity for 0.15 mm particles (m/s)

$$r = 2.4$$

$$Q_p = 0.102$$

$$V_s = 0.0003$$

Note 1.

Dispersion Length

$$\text{Dist} = 8Q/dv$$

$$= 49.4 \quad \text{m}$$

y_s = total depth of sediment in forebay (m)

Q = inlet flow (m³/s)

d = depth of perm pool in forebay (m)

v_f = desired vel in forebay (m/s)

$$y_s = 0.5$$

$$Q = 3.395$$

$$d = 1.1$$

$$v_f = 0.5$$

Note 2.

Velocity Checks

$$v = Q/A$$

$$= 0.07 \quad \text{m/s}$$

y = total depth including sediment storage

b = bottom width of (avg) of forebay (m)

Q = inlet flow (m³/s)

A = cross-sectional area (m²)

Target velocity (m/s)

$$y = 1.50$$

$$b = 23$$

$$Q = 3.395$$

$$A = 46.51$$

$$V_{\text{targ}} = 0.15$$

Note 3.

Note 2.

Note 3.

Therefore, **Velocity Target Satisfied**

Cleanout Frequency

Table 5.3 MOEE SWMPP Guidelines

$$\text{cleanout} = \text{Vol} / (\text{load} \cdot A_{\text{sew}} \cdot \text{effic})$$

$$= 11.9 \quad \text{years}$$

A_{sew} = Contributing Sewer Area (ha)

Imp = Percent Impervious (%)

load = Sediment Loading (m³/ha)

effic = Removal Efficiency (%) - Level 1

Targ = Cleanout Frequency Target (years)

Vol = Sediment volume (m³)

$$A_{\text{sew}} = 13.50$$

$$\text{Imp} = 100\%$$

$$\text{load} = 5.8$$

$$\text{effic} = 80\%$$

$$\text{Targ} = 7$$

$$\text{Vol} = 746$$

Note 4.

Therefore, **Cleanout Frequency Satisfied**

Surface Area Check

$$SA_f / SA_{pp} = 32.4\%$$

SA_f = Forebay Surface Area (m²)

SA_{pp} = Total Permanent Pool Surface Area (m²)

Targ = Forebay size (as % of Permanent Pool Area)

$$SA_f = 2,416$$

$$SA_{pp} = 7,458$$

$$\text{Targ} = 33\%$$

Therefore, **Surface Area Target Satisfied**

Notes

1. Taken as the peak outflow of the Water Quality (25 mm) Extended Detention Volume
2. Peak inlet flows to SWM facility based on SWMHYMO modelling (2-year storm)
3. Cross-sectional area based on permanent pool depth (including sediment storage) plus depth of the 2-year storm within the SWMF
4. Volume of bottom 0.5 m depth, the maximum sediment accumulation depth

161500301- Project Eagle - SWMF No. 3**Stormwater Quality Volumetric Requirements**

Drainage Area (ha) ²	Total % Imp.	Level	Facility Type	Water Quality Unit Volume Requirements ¹			Water Quality Volume Requirements		
				Total Unit Volume (m ³ /ha)	Permanent Pool (m ³ /ha)	Extended Detention (m ³ /ha)	Permanent Pool (m ³)	Extended Detention (m ³)	Total MOE Volume
28.00	100%	Enhanced	Wetpond	275	235	40	6,580	1,120	7,700

¹ Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003)

² Drainage Area for Quality control represents total storm sewer drainage area to SWM Facility and includes the area of the SWM block itself and external area draining onto site

161500301- Project Eagle - SWMF No. 3
Stormwater Management Facility Design Calculations

	Rating Curve				Estimated Time (hrs)	Volume Estimation							Active Storage Depth (m)	Elevation (m)	Outlet Structure Controls														Parameters			
	Elevation (m)	Discharge (m³/s)	Storage			Elevation (m)	Forebay Volume (m³)	Total Pond Volume (m³)	Active Storage Volume (m³)	Wetcell Volume (m³)	Volume ha.m	Total			Ext. Detention Orifice (m³/s)	Weir	Pipe #1	Control #1 (m³/s)	DICB Inlet (m³/s)	Pipe #2 (m³/s)	Control #2 (m³/s)	DICB Inlet (m³/s)	Pipe #3 (m³/s)	Control #3 (m³/s)	Emergency Spillway (m³/s)	Total Flow (m³/s)						
			Active (m³)	Total (m³)								Volume (m³)															Volume (excl. sediment) (m³)	Perimeter (m)	Area (m²)			
Max. Sed. Storage	177.00					177.00							177.00															Water Quality Extended Detention Orifice		Pipe #2		
	177.10			867		177.10	266	1,133		867		867		177.10															Orifice Elev (m)	Orifice Coeff.	Invert Elev (m)	Perimeter (m)
	177.20			1,757		177.20	544	2,301		1,757		1,757		177.20															178.00	0.600	177.48	2.356
	177.30			2,670		177.30	833	3,503		2,670		2,670		177.30															Orifice-Midpoint (m)	Perimeter (m)	Pipe Midpoint (m)	Area (m²)
	177.40			3,606		177.40	1134	4,740		3,606		3,606		177.40															178.25	1.571	177.85	0.442
Permanent Pool	177.50			4,565		177.50	1448	6,013		4,565		4,565		177.50	0.000														Orifice Diameter (mm)	Area (m²)	Pipe Diameter (mm)	Slope (%)
	177.60			5,874		177.60	1774	7,322		5,548		5,874		177.60	0.022														500	0.196	750	0.5
	177.70			7,219		177.70	2113	8,667		6,554		7,219		177.70	0.070														Weir Coeff. (Sharp)	Orientation	Manning's n	Inlet Orientation
	177.80			8,601		177.80	2465	10,049		7,585		8,601		177.80	0.142														1.80	Vertical	0.013	Vertical
	177.90			10,021		177.90	2830	11,469		8,639		10,021		177.90	0.234														Weir		Pipe #3	
Top of Active Storage	178.00			11,491		178.00	3212	12,939		9,727		11,491		178.00	0.344														0.312			
	178.10	0.015	1,533	13,023	27.6	178.10		14,472	1,533		0.1533	13,023	178.10	0.015		0.023	0.015				0.468				0.015	Spillway Invert (m)	Top of Berm (m)	Invert Elev (m)	Perimeter (m)			
	178.20	0.057	3,115	14,606	39.7	178.20		16,054	3,115		0.3115	14,606	178.20	0.057		0.092	0.057				0.603				0.057	178.50	179.30	177.51	2.356			
	178.30	0.117	4,749	16,240	45.0	178.30		17,688	4,749		0.4749	16,240	178.30	0.117		0.204	0.117				0.743				0.117	Spillway Length @ Invert (m)	Max. Flow Depth (m)	Pipe Midpoint (m)	Area (m²)			
	178.40	0.202	6,429	17,919	47.9	178.40		19,367	6,429		0.6429	17,919	178.40	0.202		0.357	0.202				0.878				0.202	3	0.80	177.88	0.442			
	178.50	0.261	8,135	19,626	49.9	178.50		21,074	8,135		0.8135	19,626	178.50	0.261		0.551	0.261				0.999				0.261	Side Slopes (ratio of H:V)	Topwidth	Pipe Diameter (mm)	Slope (%)			
	178.60	0.789	9,867	21,358	50.9	178.60		22,806	9,867		0.9867	21,358	178.60	0.309	0.161	0.782	0.470	0.160	1.103	0.160	0.160	1.075	0.160		0.789	3.00	750	0.5				
	178.70	1.743	11,627	23,117	51.2	178.70		24,566	11,627		1.1627	23,117	178.70	0.350	0.456	1.049	0.806	0.468	1.197	0.468	0.468	1.171	0.468		1.743	Weir Coefficient (Rectangle)	Weir Coeff. (Triangle)	Manning's n	Inlet Orientation			
	178.80	3.190	13,413	24,904	51.4	178.80		26,352	13,413		1.3413	24,904	178.80	0.387	0.838	1.350	1.225	0.983	1.285	0.983	0.983	1.261	0.983		3.190	1.70	1.30	0.013	Vertical			
	178.90	4.392	15,223	26,714	51.6	178.90		28,162	15,223		1.5223	26,714	178.90	0.421	1.290	1.682	1.682	1.710	1.366	1.366	1.710	1.344	1.344		4.392	Pipe #1		Emergency Overflow Weir				
Top of the Pond	179.00	4.909	17,061	28,552	51.7	179.00		30,000	17,061		1.7061	28,552	179.00	0.452	1.803	2.043	2.043	2.402	1.444	1.444	2.402	1.422	1.422		4.909	Invert Elev (m)	Perimeter (m)	Spillway Invert (m)	Top of Berm (m)			
	179.10	8.028	18,929	30,420	51.8	179.10		31,868	18,929		1.8929	30,420	179.10	0.481	2.370	2.432	2.432	2.962	1.517	1.517	2.962	1.497	1.497	2.582	8.028	Pipe Midpoint (m)	Area (m²)	Spillway Length @ Invert (m)	Max. Flow Depth (m)			
	179.20	13.536	20,825	32,316	51.8	179.20		33,764	20,825		2.0825	32,316	179.20	0.509	2.987	2.846	2.846	3.583	1.587	1.587	3.583	1.568	1.568	7.536	13.536	178.90	2.545	46.5	0.30			
	179.30	20.842	22,749	34,240	51.9	179.30		35,688	22,749		2.2749	34,240	1.3	179.30	0.535	3.649	3.281	3.281	4.229	1.654	1.654	4.229	1.635	1.635	14.271	20.842	Pipe Diameter (mm)	Slope (%)	Side Slopes (ratio of H:V)	Topwidth		
																										1800	3.5	20.00	58.50			
																										Manning's n	Inlet Orientation	Weir Coefficient (Rectangle)	Weir Coeff. (Triangle)			
																										0.013	Vertical	1.70	1.30			
Notes:															DICB Invert (m)														178.50			
Pipe Flows from Rating Curves derived in CulvertMaster, attached																																

Notes:

Pipe Flows from Rating Curves derived in CulvertMaster, attached

Drawdown Time Calculations Greater than 0.1 m above the permanent pool

$$T = \frac{[v_2 - v_1]}{[(Q_2 + Q_1)/2]/3600}$$

where
T=drawdown time in hours
v₂=starting pond volume
v₁=ending pond volume
Q₂=starting flow
Q₁=ending flow

From 0.0 to 0.1 m above the permanent pool

$$T = \frac{[v_2 - v_1]}{[(Q_2)]/3600}$$

where
T=drawdown time in hours
v₂=starting pond volume
v₂=ending pond volume
Q₂=starting flow

Weir Equation Used: $Q = C_{we} \cdot L \cdot H^{1.5} + C_{wb} \cdot S \cdot H^{2.5}$

where
L = bottom width of spillway
H = head above weir invert
S = side slopes (ratio of H:V)
C_{we} = weir coefficient (triangular)
C_{wb} = weir coefficient (broad-crested)

Sharp crested semi-circular weir equation

Sharp crested semi-circular weir equation
$$Q = C \cdot D^{2.5n} \cdot (H/D)^{1.88}$$

where
C = sharp crested semi-circular weir coefficient
D = diameter of orifice
H = head above orifice invert
Note: used when water elevation is below 3/4 of the orifice diameter

Orifice Flow Calculations: Orifice flow equation

$$Q = C \cdot A \cdot (2 \cdot g \cdot H)^{0.5}$$

where
C = orifice coefficient
A = area of orifice
g = acceleration due to gravity
H = head above centre line of orifice
Note: used when water elevation is above 3/4 of the orifice diameter

Rainfall Event Elevation Depth Volume Drawdown Flow from Table

25 mm	178.33	0.33	5218	45.79	0.141
2-year	178.49	0.49	7969	49.75	0.255
5-year	178.54	0.54	8880	50.34	0.488
10-year	178.58	0.58	9515	50.68	0.682
25-year	178.63	0.63	10380	50.97	1.067
50-year	178.67	0.67	11090	51.13	1.452
100-year	178.71	0.71	11730	51.26	1.827
Hurricane Hazel	178.85	0.85	14380	51.52	3.832
Quality	178.07	0.07	1120	20.15	0.011

161500301- Project Eagle - SWMF No. 3, NE
Sediment Forebay Sizing Calculations
Using MOE - SWMPD Manual (2003)

Settling

$$\text{Dist} = \sqrt{r \cdot Q_p / V_s}$$

= **47.2** **m**

r : 1 = l to w ratio
 Q_p = peak SWM outflow during quality storm
 V_s = settling velocity for 0.15 mm particles (m/s)

r = 4.7
 Q_p = 0.141 Note 1.
 V_s = 0.0003

Dispersion Length

$$\text{Dist} = 8Q/dv$$

= **112.7** **m**

y_s = total depth of sediment in forebay (m)
 Q = inlet flow (m³/s)
 d = depth of perm pool in forebay
 v_r = desired vel in forebay (m/s)

y_s = 0.5
 Q = 7.042 Note 2.
 d = 1.0
 v_r = 0.5

Velocity Checks

$$v = Q/A$$

= **0.15** **m/s**

y = total depth including sediment storage
 b = bottom width of (avg) of forebay (m)
 Q = inlet flow (m³/s)
 A = cross-sectional area (m²)
Target velocity (m/s)

y = 1.49 Note 3.
 b = 23.45
 Q = 7.042 Note 2.
 A = 47.03 Note 4.
 V_{targ} = 0.15

Therefore, **Velocity Target Satisfied**

Cleanout Frequency

Table 5.3 MOEE SWMPP Guidelines

$$\text{cleanout} = \text{Vol} / (\text{load} \cdot A_{\text{sew}} \cdot \text{effic})$$

= **11.1** **years**

A_{sew} = Contributing Sewer Area (ha)
Imp = Percent Impervious (%)
load = Sediment Loading (m³/ha)
effic = Removal Efficiency (%) - Level 1
Targ = Cleanout Frequency Target (years)
Vol = Sediment volume (m³)

A_{sew} = 28.00
Imp = 100%
load = 5.8
effic = 80%
Targ = 7
Vol = 1448 Note 5.

Therefore, **Cleanout Frequency Satisfied**

Surface Area Check

$$SA_f / SA_{pp} =$$

26.2%

SA_f = Forebay Surface Area (m²)
 SA_{pp} = Total Permanent Pool Surface Area (m²)
Targ = Forebay size (as % of Permanent Pool Area)

SA_f = 3,930
 SA_{pp} = 15,020
Targ = 33%

Therefore, **Surface Area Target Satisfied**

Notes

1. Taken as the peak outflow of the Water Quality (25 mm) Extended Detention Volume
2. Peak inlet flows to SWM facility based on SWMHYMO modelling (2-year storm)
3. Depth including forebay depth (1 m) and 2-year elevation
4. Cross-sectional area based on permanent pool depth (including sediment storage) plus depth of the 2-year storm within the SWMF
5. Volume of bottom 0.5 m depth, the maximum sediment accumulation depth

161500301- Project Eagle - SWMF No. 4**Stormwater Quality Volumetric Requirements**

Drainage Area (ha) ²	Total % Imp.	Level	Facility Type	Water Quality Unit Volume Requirements ¹			Water Quality Volume Requirements		
				Total Unit Volume (m ³ /ha)	Permanent Pool (m ³ /ha)	Extended Detention (m ³ /ha)	Permanent Pool (m ³)	Extended Detention (m ³)	Total MOE Volume
5.44	100%	Enhanced	Wetpond	275	235	40	1,278	218	1,496

¹ Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003)

² Drainage Area for Quality control represents total storm sewer drainage area to SWM Facility and includes the area of the SWM block itself and external area draining onto site

161500301- Project Eagle - SWMF No. 4
Stormwater Management Facility Design Calculations

	Rating Curve				Estimated Detention Time (hrs)	Volume Estimation						Active Storage Depth (m)	Elevation (m)	Outlet Structure Controls																		
	Storage		Active (m²)	Total (m²)		Forebay Volume (m³)	Total Pond Volume (m³)	Active Storage Volume (m³)	Wetcell Volume (m³)	Total				Ext. Detention Orifice (m³/s)	Weir #1 (m³/s)	Weir #2 (m³/s)	Outlet Pipe #1 (m³/s)	Control #1 (m³/s)	Emergency DICB (m³/s)	Emergency Pipe #2 (m³/s)	Control #2 (m³/s)	Total Flow (m³/s)	Parameters									
	Elevation (m)	Discharge (m³/s)								Volume ha.m	Volume (excl. sediment) (m³)																Volume ha.m	Volume (excl. sediment) (m³)				
Max. Sed. Storage	180.95					180.95							180.95										Water Quality Extended Detention Orifice				Weir #1 & #2					
	181.05			106		181.05	37.5	143.6		106.1		106.1		181.05										Orifice Elev (m)	Orifice Coeff.	Spillway Invert (m)	Top of Berm (m)					
	181.15			221		181.15	80.2	300.8		220.6		220.6		181.15										181.95	0.600	182.25	182.80					
	181.25			344		181.25	128.4	472.1		343.7		343.7		181.25										Orifice #1-Midpoint (m)	Perimeter (m)	Spillway Length @ Invert (m)	Max. Flow Depth (m)					
	181.35			476		181.35	182.1	657.7		475.6		475.6		181.35										182.00	0.314	3	0.55					
	181.45			616		181.45	241.7	858.2		616.5		616.5		181.45										Orifice Diameter (mm)	Area (m²)	Side Slopes (ratio of H:V)	Topwidth					
	181.55			832		181.55	307.3	1073.9		766.6		832.2		181.55										100	0.008		3.00					
	181.65			1,064		181.65	379.3	1305.3		926.0		1063.6		181.65										Weir Coeff. (Sharp)	Orientation	Weir Coefficient (Rectangle)	Weir Coeff. (Triangle)					
	181.75			1,311		181.75	458.0	1553.0		1095.0		1311.4		181.75										1.80	Vertical	1.70	1.30					
	181.85			1,576		181.85	544.0	1818.1		1274.0		1576.4		181.85																		
Permanent Pool	181.95			1,867		181.95	640.8	2109.1		1468.3		1867.4		181.95										Outlet Pipe#1				Overflow Pipe #2				
	182.05	0.005	324	2,192	19.3	182.05		2433.4	324.3		0.0324	2191.8	0.10	182.05	0.005			1,599	0.005				0.005	Invert Elev (m)	Perimeter (m)	Invert Elev (m)	Perimeter (m)					
Top of Active Storage	182.15	0.008	674	2,542	34.5	182.15		2783.2	674.1		0.0674	2541.5	0.20	182.15	0.008			1,831	0.008				0.008	180.95	3,299	181.50	1,885					
	182.25	0.010	1,043	2,910	45.6	182.25		3151.8	1042.7		0.1043	2910.2	0.30	182.25	0.010			2,063	0.010				0.010	Pipe Midpoint (m)	Area (m²)	Pipe Midpoint (m)	Area (m²)					
	182.35	0.335	1,431	3,298	46.2	182.35		3539.9	1430.8		0.1431	3298.3	0.40	182.35	0.012	0.161	0.161	2,276	0.335				0.335	181.48	0.866	181.80	0.283					
	182.45	0.926	1,837	3,705	46.4	182.45		3946.6	1837.5		0.1837	3704.9	0.50	182.45	0.014	0.456	0.456	2,439	0.926				0.926	Pipe Diameter (mm)	Slope (%)	Pipe Diameter (mm)	Slope (%)					
	182.55	1.6915	2,261	4,129	46.5	182.55		4370.5	2261.4		0.2261	4128.8	0.60	182.55	0.015	0.838	0.838	2,592	1.692				1.692	1050	2.0	600	2.0					
	182.65	2.757	2,703	4,570	46.5	182.65		4811.9	2702.8		0.2703	4570.2	0.70	182.65	0.017	1.290	1.290	2,736	2.597	0.160	0.776	0.160	2.757	Manning's n	Inlet Orientation	Manning's n	Inlet Orientation					
	182.75	3.341	3,162	5,029	46.6	182.75		5270.8	3161.7		0.3162	5029.1	0.80	182.75	0.018	1.803	1.803	2,873	2.873	0.468	0.827	0.468	3.341	0.013	Vertical	0.013	Vertical					
	Top of the Pond	182.80	3.6247	3,398	5,265	46.6	182.80		5507.1	3398.0		0.3398	5265.4	0.85	182.80	0.019	2.080	2.080	2,938	2,938	0.686	0.851	0.686	3.625	Overflow DICB							
																									DICB Invert (m)				182.55			

Notes:

Pipe Flows from Rating Curves derived in CulvertMaster, attached

Drawdown Time Calculations

Greater than 0.1 m above the permanent pool

$$T = \frac{[v_2 - v_1]}{[(Q_2 + Q_1)/2]/3600}$$

where

T=drawdown time in hours

v₂=starting pond volume

v₁=ending pond volume

Q₂=starting flow

Q₁=ending flow

From 0.0 to 0.1 m above the permanent pool

$$T = \frac{[v_2 - v_1]}{[(Q_2)/3600]}$$

where

T=drawdown time in hours

v₂=starting pond volume

v₁=ending pond volume

Q₂=starting flow

Weir Equation Used: $Q = C_{we} \cdot L \cdot H^{1.5} + C_{we} \cdot S \cdot H^{2.5}$

where

L = bottom width of spillway

H = head above weir invert

S = side slopes (ratio of H:V)

C_{we} = weir coefficient (triangular)

C_{we} = weir coefficient (broad-crested)

Sharp crested semi-circular weir equation

Sharp crested semi-circular weir equation

$$Q = C \cdot D^{2.5n} \cdot (H/D)^{1.88}$$

where

C = sharp crested semi-circular weir coefficient

D = diameter of orifice

H = head above orifice invert

Note: used when water elevation is below 3/4 of the orifice diameter

Orifice Flow Calculations:

Orifice flow equation

$$Q = C \cdot A \cdot (2 \cdot g \cdot H)^{0.5}$$

where

C = orifice coefficient

A = area of orifice

g = acceleration due to gravity

H = head above centre line of orifice

Note: used when water elevation is above 3/4 of the orifice diameter

Rainfall Event	Elevation	Depth	Volume	Drawdown	Flow from Table
25 mm	182.27	0.32	1119	45.72	0.074
2-year	182.32	0.37	1316	46.04	0.239
5-year	182.35	0.40	1438	46.23	0.345
10-year	182.37	0.42	1522	46.26	0.467
25-year	182.40	0.45	1647	46.32	0.649
50-year	182.43	0.48	1755	46.37	0.806
100-year	182.46	0.51	1859	46.41	0.965
Hurricane Hazel	182.43	0.48	1763	46.37	0.818
Quality	182.02	0.07	218	12.95	0.003

161500301 - Project Eagle SWMF No. 4
Sediment Forebay Sizing Calculations
Using MOE - SWMPD Manual (2003)

Settling							
Dist = $\text{sqrt}(r \cdot Q_p / v_s)$				r : 1 = l to w ratio	r =	4.9	
=	34.7	m		Q_p = peak SWM outflow during quality storm	Q_p =	0.074	Note 1.
				v_s = settling velocity for 0.15 mm particles (m/s)	v_s =	0.0003	
Dispersion Length				y_s = total depth of sediment in forebay (m)	y_s =	0.5	
Dist = $8Q/dv$				Q = inlet flow (m^3/s)	Q =	1.886	Note 2.
=	30.2	m		d = depth of perm pool in forebay	d =	1.0	
				v_f = desired vel in forebay (m/s)	v_f =	0.5	
Velocity Checks				y = total depth including sediment storage	y =	1.00	Note 3.
$v = Q/A$				b = bottom width of (avg) of forebay (m)	b =	8.5	
=	0.14	m/s		Q = inlet flow (m^3/s)	Q =	1.886	Note 2.
				A = cross-sectional area (m^2)	A =	13.55	Note 4.
				Target velocity (m/s)	V_{targ} =	0.15	
Therefore,	Velocity Target Satisfied						
Cleanout Frequency				A_{sew} = Contributing Sewer Area (ha)	A_{sew} =	5.44	
Table 5.3 MOEE SWMPP Guidelines				Imp = Percent Impervious (%)	Imp =	100%	
cleanout = $\text{Vol}/(\text{load} \cdot A_{\text{sew}} \cdot \text{effc})$				load = Sediment Loading (m^3/ha)	load =	5.8	
=	9.6	years		effc = Removal Efficiency (%) - Level 1	effc =	80%	
				Targ = Cleanout Frequency Target (years)	Targ =	7	
				Vol = Sediment volume (m^3)	Vol =	242	Note 5.
Therefore,	Cleanout Frequency Satisfied						
Surface Area Check				SA_f = Forebay Surface Area (m^2)	SA_f =	898	
SA_f/SA_{pp} =	32.8%			SA_{pp} = Total Permanent Pool Surface Area (m^2)	SA_{pp} =	2,739	
Therefore,	Surface Area Target Satisfied			Targ = Forebay size (as % of Permanent Pool Area)	Targ =	33%	

Notes

1. Taken as the peak outflow of the Water Quality (25 mm) Extended Detention Volume
2. Peak inlet flows to SWM facility based on SWMHYMO modelling (10-year storm)
3. Forebay depth including sediment storage
4. Cross-sectional area based on depth including forebay depth (1 m)
5. Volume of bottom 0.5 m depth, the maximum sediment accumulation depth

Rating Table Report

SWMF#1 - Pipe 1 - 20241122

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	177.90	179.60	0.10 m

HW Elev. (m)	Discharge (m³/s)
177.90	0.0000
178.00	0.0000
178.10	0.0000
178.20	0.0000
178.30	0.0162
178.40	0.0632
178.50	0.1382
178.60	0.2386
178.70	0.3612
178.80	0.5030
178.90	0.6606
179.00	0.8306
179.10	1.0091
179.20	1.1924
179.30	1.3769
179.40	1.5571
179.50	1.6955
179.60	1.8234

Culvert Calculator Report

SWMF#1 - Pipe 1 - 20241122

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.60 m	Headwater Depth/Height	1.53
Computed Headwater Elev.	179.60 m	Discharge	1.8234 m³/s
Inlet Control HW Elev.	179.60 m	Tailwater Elevation	177.50 m
Outlet Control HW Elev.	179.55 m	Control Type	Inlet Control
Grades			
Upstream Invert	178.20 m	Downstream Invert	178.00 m
Length	6.00 m	Constructed Slope	0.033333 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.62 m
Slope Type	Steep	Normal Depth	0.47 m
Flow Regime	Supercritical	Critical Depth	0.79 m
Velocity Downstream	3.88 m/s	Critical Slope	0.008652 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.91 m
Section Size	900 mm	Rise	0.91 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.55 m	Upstream Velocity Head	0.47 m
Ke	0.20	Entrance Loss	0.09 m
Inlet Control Properties			
Inlet Control HW Elev.	179.60 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.7 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#1 - Pipe 2 - 20241122

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	177.90	179.60	0.10 m

HW Elev. (m)	Discharge (m³/s)
177.90	0.0000
178.00	0.0200
178.10	0.0788
178.20	0.1741
178.30	0.3038
178.40	0.4657
178.50	0.6574
178.60	0.8764
178.70	1.1202
178.80	1.3861
178.90	1.6715
179.00	1.9733
179.10	2.2887
179.20	2.6146
179.30	2.9480
179.40	3.2859
179.50	3.6251
179.60	3.9630

Culvert Calculator Report

SWMF#1 - Pipe 2 - 20241122

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.60 m	Headwater Depth/Height	1.24
Computed Headwater Elev.	179.60 m	Discharge	3.9630 m³/s
Inlet Control HW Elev.	179.59 m	Tailwater Elevation	177.50 m
Outlet Control HW Elev.	179.60 m	Control Type	Entrance Control
Grades			
Upstream Invert	177.90 m	Downstream Invert	177.73 m
Length	8.40 m	Constructed Slope	0.020000 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.87 m
Slope Type	Steep	Normal Depth	0.69 m
Flow Regime	Supercritical	Critical Depth	1.06 m
Velocity Downstream	4.03 m/s	Critical Slope	0.005693 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.37 m
Section Size	1350 mm	Rise	1.37 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.60 m	Upstream Velocity Head	0.53 m
Ke	0.20	Entrance Loss	0.11 m
Inlet Control Properties			
Inlet Control HW Elev.	179.59 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	1.5 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#2 Pipe #1 - 20241016

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	178.70	180.80	0.10 m

HW Elev. (m)	Discharge (m³/s)
178.70	0.0000
178.80	0.0122
178.90	0.0463
179.00	0.0989
179.10	0.1656
179.20	0.2421
179.30	0.3236
179.40	0.4021
179.50	0.4624
179.60	0.5156
179.70	0.5639
179.80	0.6084
179.90	0.6498
180.00	0.6888
180.10	0.7256
180.20	0.7607
180.30	0.7942
180.40	0.8264
180.50	0.8573
180.60	0.8872
180.70	0.9161
180.80	0.9441

Culvert Calculator Report

SWMF#2 Pipe #1 - 20241016

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	180.80 m	Headwater Depth/Height	3.94
Computed Headwater Elev.	180.80 m	Discharge	0.9441 m³/s
Inlet Control HW Elev.	180.80 m	Tailwater Elevation	178.54 m
Outlet Control HW Elev.	180.54 m	Control Type	Inlet Control

Grades			
Upstream Invert	178.70 m	Downstream Invert	178.55 m
Length	8.30 m	Constructed Slope	0.018205 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.53 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.53 m
Velocity Downstream	4.24 m/s	Critical Slope	0.040349 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.53 m
Section Size	525 mm	Rise	0.53 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	180.54 m	Upstream Velocity Head	0.91 m
Ke	0.20	Entrance Loss	0.18 m

Inlet Control Properties			
Inlet Control HW Elev.	180.80 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.2 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#2 Pipe #2 - 20241122

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	178.60	180.80	0.10 m

HW Elev. (m)	Discharge (m³/s)
178.60	0.0000
178.70	0.0034
178.80	0.0315
178.90	0.0861
179.00	0.1636
179.10	0.2604
179.20	0.3727
179.30	0.4959
179.40	0.6248
179.50	0.7558
179.60	0.8822
179.70	0.9968
179.80	1.0948
179.90	1.1895
180.00	1.2803
180.10	1.3674
180.20	1.4509
180.30	1.5309
180.40	1.6046
180.50	1.6709
180.60	1.7346
180.70	1.7961
180.80	1.8556

Culvert Calculator Report

SWMF#2 Pipe #2 - 20241122

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	180.70 m	Headwater Depth/Height	2.69
Computed Headwater Elev.	180.70 m	Discharge	1.7961 m³/s
Inlet Control HW Elev.	180.70 m	Tailwater Elevation	178.56 m
Outlet Control HW Elev.	180.66 m	Control Type	Inlet Control
Grades			
Upstream Invert	178.65 m	Downstream Invert	178.62 m
Length	14.50 m	Constructed Slope	0.002483 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.74 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.74 m
Velocity Downstream	3.98 m/s	Critical Slope	0.020938 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.76 m
Section Size	750 mm	Rise	0.76 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	180.66 m	Upstream Velocity Head	0.79 m
Ke	0.20	Entrance Loss	0.16 m
Inlet Control Properties			
Inlet Control HW Elev.	180.70 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.5 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report SWMF#3 - Pipe #1

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	178.00	179.30	0.10 m

HW Elev. (m)	Discharge (m³/s)
178.00	0.0000
178.10	0.0232
178.20	0.0918
178.30	0.2038
178.40	0.3574
178.50	0.5508
178.60	0.7819
178.70	1.0489
178.80	1.3495
178.90	1.6817
179.00	2.0433
179.10	2.4320
179.20	2.8455
179.30	3.2814

Culvert Calculator Report

SWMF#3 - Pipe #1

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.30 m	Headwater Depth/Height	0.71
Computed Headwater Elev.	179.30 m	Discharge	3.2814 m³/s
Inlet Control HW Elev.	179.21 m	Tailwater Elevation	177.65 m
Outlet Control HW Elev.	179.30 m	Control Type	Entrance Control
Grades			
Upstream Invert	178.00 m	Downstream Invert	177.70 m
Length	8.60 m	Constructed Slope	0.034884 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.64 m
Slope Type	Steep	Normal Depth	0.47 m
Flow Regime	Supercritical	Critical Depth	0.89 m
Velocity Downstream	4.03 m/s	Critical Slope	0.003336 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.83 m
Section Size	1800 mm	Rise	1.83 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.30 m	Upstream Velocity Head	0.35 m
Ke	0.20	Entrance Loss	0.07 m
Inlet Control Properties			
Inlet Control HW Elev.	179.21 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	2.6 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#3 - Pipe #2

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	177.40	179.30	0.10 m

HW Elev. (m)	Discharge (m³/s)
177.40	0.0000
177.50	0.0001
177.60	0.0218
177.70	0.0698
177.80	0.1417
177.90	0.2344
178.00	0.3444
178.10	0.4679
178.20	0.6030
178.30	0.7431
178.40	0.8783
178.50	0.9993
178.60	1.1026
178.70	1.1970
178.80	1.2845
178.90	1.3664
179.00	1.4436
179.10	1.5169
179.20	1.5869
179.30	1.6539

Culvert Calculator Report

SWMF#3 - Pipe #2

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.30 m	Headwater Depth/Height	2.39
Computed Headwater Elev.	179.30 m	Discharge	1.6539 m³/s
Inlet Control HW Elev.	179.30 m	Tailwater Elevation	177.40 m
Outlet Control HW Elev.	179.23 m	Control Type	Inlet Control
Grades			
Upstream Invert	177.48 m	Downstream Invert	177.41 m
Length	13.10 m	Constructed Slope	0.004962 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.73 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.73 m
Velocity Downstream	3.69 m/s	Critical Slope	0.017586 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.76 m
Section Size	750 mm	Rise	0.76 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.23 m	Upstream Velocity Head	0.67 m
Ke	0.20	Entrance Loss	0.13 m
Inlet Control Properties			
Inlet Control HW Elev.	179.30 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.5 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#3 - Pipe #3

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	177.50	179.30	0.10 m

HW Elev. (m)	Discharge (m³/s)
177.50	0.0000
177.60	0.0130
177.70	0.0538
177.80	0.1193
177.90	0.2065
178.00	0.3120
178.10	0.4322
178.20	0.5637
178.30	0.7041
178.40	0.8412
178.50	0.9684
178.60	1.0747
178.70	1.1713
178.80	1.2606
178.90	1.3439
179.00	1.4224
179.10	1.4968
179.20	1.5676
179.30	1.6354

Culvert Calculator Report

SWMF#3 - Pipe #3

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.30 m	Headwater Depth/Height	2.35
Computed Headwater Elev.	179.30 m	Discharge	1.6354 m³/s
Inlet Control HW Elev.	179.30 m	Tailwater Elevation	177.40 m
Outlet Control HW Elev.	179.26 m	Control Type	Inlet Control
Grades			
Upstream Invert	177.51 m	Downstream Invert	177.43 m
Length	14.60 m	Constructed Slope	0.005000 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.72 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.72 m
Velocity Downstream	3.65 m/s	Critical Slope	0.017180 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.76 m
Section Size	750 mm	Rise	0.76 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.26 m	Upstream Velocity Head	0.66 m
Ke	0.20	Entrance Loss	0.13 m
Inlet Control Properties			
Inlet Control HW Elev.	179.30 m	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	0.5 m²
K	0.00180	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Rating Table Report

SWMF#4 Pipe #1

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	180.95	182.85	0.10 m

HW Elev. (m)	Discharge (m³/s)
180.95	0.0000
181.05	0.0176
181.15	0.0688
181.25	0.1511
181.35	0.2621
181.45	0.3991
181.55	0.5592
181.65	0.7395
181.75	0.9369
181.85	1.1481
181.95	1.3698
182.05	1.5985
182.15	1.8306
182.25	2.0629
182.35	2.2764
182.45	2.4393
182.55	2.5920
182.65	2.7362
182.75	2.8731
182.85	3.0038

Culvert Calculator Report

SWMF#4 Pipe #1

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	182.80 m	Headwater Depth/Height	1.73
Computed Headwater Elev.	182.80 m	Discharge	2.9392 m³/s
Inlet Control HW Elev.	182.80 m	Tailwater Elevation	180.00 m
Outlet Control HW Elev.	182.65 m	Control Type	Inlet Control
Grades			
Upstream Invert	180.95 m	Downstream Invert	180.79 m
Length	7.90 m	Constructed Slope	0.020000 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.81 m
Slope Type	Steep	Normal Depth	0.68 m
Flow Regime	Supercritical	Critical Depth	0.95 m
Velocity Downstream	4.04 m/s	Critical Slope	0.009480 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.07 m
Section Size	1050 mm	Rise	1.07 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	182.65 m	Upstream Velocity Head	0.63 m
Ke	0.20	Entrance Loss	0.13 m
Inlet Control Properties			
Inlet Control HW Elev.	182.80 m	Flow Control	N/A
Inlet Type	Groove end projecting	Area Full	0.9 m²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

Rating Table Report

SWMF#4 Pipe #2 - 20241015

Range Data:

	Minimum	Maximum	Increment
Allowable HW E	180.95	182.85	0.10 m

HW Elev. (m)	Discharge (m³/s)
180.95	0.0000
181.05	0.0000
181.15	0.0000
181.25	0.0000
181.35	0.0000
181.45	0.0000
181.55	0.0033
181.65	0.0288
181.75	0.0767
181.85	0.1433
181.95	0.2250
182.05	0.3173
182.15	0.4160
182.25	0.5163
182.35	0.5972
182.45	0.6623
182.55	0.7215
182.65	0.7761
182.75	0.8272
182.85	0.8753

Culvert Calculator Report

SWMF#4 Pipe #2 - 20241015

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	182.80 m	Headwater Depth/Height	2.13
Computed Headwater Elev.	182.80 m	Discharge	0.8516 m³/s
Inlet Control HW Elev.	182.80 m	Tailwater Elevation	181.45 m
Outlet Control HW Elev.	182.62 m	Control Type	Inlet Control
Grades			
Upstream Invert	181.50 m	Downstream Invert	181.27 m
Length	11.40 m	Constructed Slope	0.020000 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.50 m
Slope Type	Steep	Normal Depth	0.47 m
Flow Regime	Supercritical	Critical Depth	0.57 m
Velocity Downstream	3.34 m/s	Critical Slope	0.015284 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.61 m
Section Size	600 mm	Rise	0.61 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	182.62 m	Upstream Velocity Head	0.46 m
Ke	0.20	Entrance Loss	0.09 m
Inlet Control Properties			
Inlet Control HW Elev.	182.80 m	Flow Control	N/A
Inlet Type	Groove end projecting	Area Full	0.3 m²
K	0.00450	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	3
C	0.03170	Equation Form	1
Y	0.69000		

```
00001> 2 Metric units
00002> #*****
00003> # Project Name: [Project Eagle] Project Number: [161500301]
00004> # Date : 2024-11-21
00005> # Modeller : [AA,MYK]
00006> # Company : Stantec Consulting Ltd. (London)
00007> # License # : 4730904
00008> #*****
00009> #*****
00010> #
00011> # This model represents the hydrologic characteristics of the Existing
00012> # conditions.
00013> # Storm events modeled are:
00014> # 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00015> # 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00016> # Regional Storm Event: 48hr Hurricane Hazel
00017> #
00018> #*****
00019> #-----|
00020> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
00021> # ["1dn25mm.4hr"] <--storm filename, one per line for NSTORM
00022> #-----|
00023> READ STORM STORM_FILENAME=["STORM.001"]
00024> #-----|
00025> #*****
00026> #
00027> # Existing Conditions - Internal Catchments
00028> #
00029> #*****
00030> DESIGN NASHYD ID=[01], NHYD=["100"], DT=[1]min, AREA=[33.14] (ha),
00031> DWF=[0.0] (cms), CN/C=[87], TP=[0.23]hrs,
00032> RAINFALL=[ , , , ] (mm/hr), END=-1
00033> #-----|
00034> DESIGN NASHYD ID=[02], NHYD=["101"], DT=[1]min, AREA=[31.29] (ha),
00035> DWF=[0.0] (cms), CN/C=[93], TP=[0.18]hrs,
00036> RAINFALL=[ , , , ] (mm/hr), END=-1
00037> #-----|
00038> DESIGN NASHYD ID=[03], NHYD=["102"], DT=[1]min, AREA=[9.10] (ha),
00039> DWF=[0.0] (cms), CN/C=[91], TP=[0.11]hrs,
00040> RAINFALL=[ , , , ] (mm/hr), END=-1
00041> #-----|
00042> DESIGN NASHYD ID=[04], NHYD=["103"], DT=[1]min, AREA=[4.45] (ha),
00043> DWF=[0.0] (cms), CN/C=[88], TP=[0.10]hrs,
00044> RAINFALL=[ , , , ] (mm/hr), END=-1
00045> #-----|
00046> #*****
00047> #
00048> # Existing Conditions - External Catchments
00049> #
00050> #*****
00051> DESIGN NASHYD ID=[05], NHYD=["300"], DT=[1]min, AREA=[10.68] (ha),
00052> DWF=[0.0] (cms), CN/C=[83], TP=[0.17]hrs,
00053> RAINFALL=[ , , , ] (mm/hr), END=-1
00054> #-----|
00055> DESIGN NASHYD ID=[06], NHYD=["301"], DT=[1]min, AREA=[25.55] (ha),
00056> DWF=[0.0] (cms), CN/C=[82], TP=[0.76]hrs,
00057> RAINFALL=[ , , , ] (mm/hr), END=-1
00058> #-----|
00059> DESIGN NASHYD ID=[07], NHYD=["302"], DT=[1]min, AREA=[23.13] (ha),
00060> DWF=[0.0] (cms), CN/C=[83], TP=[0.26]hrs,
00061> RAINFALL=[ , , , ] (mm/hr), END=-1
00062> #-----|
00063> DESIGN NASHYD ID=[08], NHYD=["303"], DT=[1]min, AREA=[7.80] (ha),
00064> DWF=[0.0] (cms), CN/C=[86], TP=[0.19]hrs,
00065> RAINFALL=[ , , , ] (mm/hr), END=-1
00066> #-----|
00067> #*****
00068> #
00069> # Existing Conditions - Flows to Headwater Drainage Features
00070> #
00071> #*****
00072> ADD HYD IDsum=[09], NHYD=["ToH1"], IDs to add=[02+08]
00073> #-----|
00074> ADD HYD IDsum=[02], NHYD=["ToH2S2"], IDs to add=[03+07]
00075> #-----|
00076> ADD HYD IDsum=[03], NHYD=["ToNorthDitch"], IDs to add=[01+05]
00077> #-----|
00078> ADD HYD IDsum=[05], NHYD=["ToWellandRDitch"], IDs to add=[04+06]
00079> #-----|
00080> #-----|
00081> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[2]
00082> # ["002YR.HYD"] <--storm filename, one per line for NSTORM ti
00083> #-----|
00084> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[5]
00085> # ["005YR.HYD"] <--storm filename, one per line for NSTORM ti
00086> #-----|
00087> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[10]
00088> # ["10YR.HYD"] <--storm filename, one per line for NSTORM tim
00089> #-----|
00090> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[25]
00091> # ["25YR.HYD"] <--storm filename, one per line for NSTORM tim
00092> #-----|
00093> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[50]
00094> # ["50YR.HYD"] <--storm filename, one per line for NSTORM tim
00095> #-----|
00096> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[100]
00097> # ["100YR.HYD"] <--storm filename, one per line for NSTORM ti
00098> #-----|
00099> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[251]
00100> # ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
00101> #-----|
00102> FINISH
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00001> =====
00002> SSSSS W W M M H H Y Y M M O O 999 999 =====
00003> S W W W M M M H H Y Y M M M O O 9 9 9 9
00004> SSSSS W W W M M M H H Y Y M M M O O ## 9 9 9 9 Ver 4.05
00005> SSSSS W W W M M M H H H H Y Y M M M O O 9999 9999 Sept 2011
00006> S W W M M M H H Y Y M M O O 9 9 9 9
00007> SSSSS W W M M H H Y Y M M O O 9 9 9 9
00008> StortWater Management Hydrologic Model 999 999
00009>
00010> *****
00011> ***** SWHYMO Ver/4.05 *****
00012> ***** A single event and continuous hydrologic simulation model *****
00013> ***** based on the principles of HYMO and its successors *****
00014> ***** OTTHYMO-83 and OTTHYMO-89. *****
00015> *****
00016> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00017> ***** Ottawa, Ontario: (613) 836-3884 *****
00018> ***** Gatineau, Quebec: (819) 243-6858 *****
00019> ***** E-Mail: swmymo@jfsa.Com *****
00020> *****
00021> *****
00022> *****
00023> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00024> ***** Kitchener SERIAL#:4730904 *****
00025> *****
00026> *****
00027> *****
00028> ***** PROGRAM ARRAY DIMENSIONS *****
00029> *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034> *****
00035> *****
00036> ***** DETAILED OUTPUT *****
00037> *****
00038> ***** DATE: 2024-11-21 TIME: 10:41:17 RUN COUNTER: 000132 *****
00039> *****
00040> * Input filename: C:\SWM-MO-1\SWHYMO\PROJEC-1\exist.dat *
00041> * Output filename: C:\SWM-MO-1\SWHYMO\PROJEC-1\exist.out *
00042> * Summary filename: C:\SWM-MO-1\SWHYMO\PROJEC-1\exist.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047> *****
00048> *****
00049> *****
00050> 001:0001-----
00051> *****
00052> *# Project Name: [Project Eagle] Project Number: [161500301]
00053> *# Date : [2024-11-21]
00054> *# Modeller : [AA,MYK]
00055> *# Company : Stantec Consulting Ltd. (London)
00056> *# License # : 4730904
00057> *****
00058> *****
00059> *****
00060> *# This model represents the hydrologic characteristics of the Existing
00061> *# conditions.
00062> *# Storm events modeled are:
00063> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00064> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00065> *# Regional Storm Event: 48hr Hurricane Hazel
00066> *#
00067> *****
00068> *****
00069> | START | Project dir.: C:\SWM-MO-1\SWHYMO\PROJEC-1\
00070> | Rainfall dir.: C:\SWM-MO-1\SWHYMO\PROJEC-1\
00071> | TZERO = .00 hrs on 0
00072> | METOUT= 2 (output = METRIC)
00073> | NRUN= 001
00074> | NSTORM= 1
00075> | # 1=1dn25mm.4hr
00076> *****
00077> 001:0002-----
00078> *****
00079> | READ STORM | Filename: 25mm, 4hr Chicago Storm from London IDF
00080> | Ptotal= 25.05 mm | Comments: 25mm, 4hr Chicago Storm from London IDF
00081> *****
00082> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00083> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00084> .08 1.406 | 1.08 6.875 | 2.08 4.268 | 3.08 1.931
00085> .17 1.497 | 1.17 10.874 | 2.17 3.856 | 3.17 1.851
00086> .25 1.601 | 1.25 25.649 | 2.25 3.521 | 3.25 1.779
00087> .33 1.722 | 1.33 75.607 | 2.33 3.242 | 3.33 1.712
00088> .42 1.866 | 1.42 33.194 | 2.42 3.006 | 3.42 1.650
00089> .50 2.039 | 1.50 18.435 | 2.50 2.804 | 3.50 1.594
00090> .58 2.251 | 1.58 12.551 | 2.58 2.629 | 3.58 1.541
00091> .67 2.519 | 1.67 9.468 | 2.67 2.477 | 3.67 1.492
00092> .75 2.866 | 1.75 7.594 | 2.75 2.342 | 3.75 1.446
00093> .83 3.335 | 1.83 6.343 | 2.83 2.222 | 3.83 1.408
00094> .92 4.007 | 1.92 5.451 | 2.92 2.115 | 3.92 1.364
00095> 1.00 5.048 | 2.00 4.784 | 3.00 2.018 | 4.00 1.326
00096> *****
00097> *****
00098> 001:0003-----
00099> *****
00100> *#
00101> *# Existing Conditions - Internal Catchments
00102> *#
00103> *****
00104> *****
00105> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
00106> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00107> | U.H. Tp(hrs)= .230
00108> *****
00109> Unit Hyd Qpeak (cms)= 5.503
00110> *****
00111> PEAK FLOW (cms)= .876 (i)
00112> TIME TO PEAK (hrs)= 1.617
00113> RUNOFF VOLUME (mm)= 9.016
00114> TOTAL RAINFALL (mm)= 25.048
00115> RUNOFF COEFFICIENT = .360
00116> *****
00117> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00118> *****
00119> *****
00120> 001:0004-----
00121> *****
00122> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
00123> | 02:101 DT= 1.00 | Ia (mm)= 1.180 # of Linear Res. (N)= 3.00
00124> | U.H. Tp(hrs)= .180
00125> *****
00126> Unit Hyd Qpeak (cms)= 6.640
00127> *****
00128> PEAK FLOW (cms)= 1.459 (i)
00129> TIME TO PEAK (hrs)= 1.550
00130> RUNOFF VOLUME (mm)= 12.996
00131> TOTAL RAINFALL (mm)= 25.048
00132> RUNOFF COEFFICIENT = .519
00133> *****
00134> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00135> *****
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00136> *****
00137> 001:0005-----
00138> *****
00139> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
00140> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00141> | U.H. Tp(hrs)= .110
00142> *****
00143> Unit Hyd Qpeak (cms)= 3.160
00144> *****
00145> PEAK FLOW (cms)= .472 (i)
00146> TIME TO PEAK (hrs)= 1.450
00147> RUNOFF VOLUME (mm)= 11.393
00148> TOTAL RAINFALL (mm)= 25.048
00149> RUNOFF COEFFICIENT = .455
00150> *****
00151> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00152> *****
00153> *****
00154> 001:0006-----
00155> *****
00156> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
00157> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00158> | U.H. Tp(hrs)= .100
00159> *****
00160> Unit Hyd Qpeak (cms)= 1.700
00161> *****
00162> PEAK FLOW (cms)= .195 (i)
00163> TIME TO PEAK (hrs)= 1.450
00164> RUNOFF VOLUME (mm)= 9.530
00165> TOTAL RAINFALL (mm)= 25.048
00166> RUNOFF COEFFICIENT = .380
00167> *****
00168> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00169> *****
00170> *****
00171> 001:0007-----
00172> *****
00173> *# Existing Conditions - External Catchments
00174> *#
00175> *#
00176> *****
00177> *****
00178> *****
00179> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
00180> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00181> | U.H. Tp(hrs)= .170
00182> *****
00183> Unit Hyd Qpeak (cms)= 2.400
00184> *****
00185> PEAK FLOW (cms)= .267 (i)
00186> TIME TO PEAK (hrs)= 1.550
00187> RUNOFF VOLUME (mm)= 7.337
00188> TOTAL RAINFALL (mm)= 25.048
00189> RUNOFF COEFFICIENT = .293
00190> *****
00191> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00192> *****
00193> *****
00194> *****
00195> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
00196> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00197> | U.H. Tp(hrs)= .760
00198> *****
00199> Unit Hyd Qpeak (cms)= 1.284
00200> *****
00201> PEAK FLOW (cms)= .234 (i)
00202> TIME TO PEAK (hrs)= 2.350
00203> RUNOFF VOLUME (mm)= 6.992
00204> TOTAL RAINFALL (mm)= 25.048
00205> RUNOFF COEFFICIENT = .279
00206> *****
00207> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00208> *****
00209> *****
00210> 001:0009-----
00211> *****
00212> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00213> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00214> | U.H. Tp(hrs)= .260
00215> *****
00216> Unit Hyd Qpeak (cms)= 3.398
00217> *****
00218> PEAK FLOW (cms)= .452 (i)
00219> TIME TO PEAK (hrs)= 1.667
00220> RUNOFF VOLUME (mm)= 7.337
00221> TOTAL RAINFALL (mm)= 25.048
00222> RUNOFF COEFFICIENT = .293
00223> *****
00224> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00225> *****
00226> *****
00227> 001:0010-----
00228> *****
00229> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00230> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00231> | U.H. Tp(hrs)= .190
00232> *****
00233> Unit Hyd Qpeak (cms)= 1.568
00234> *****
00235> PEAK FLOW (cms)= .217 (i)
00236> TIME TO PEAK (hrs)= 1.567
00237> RUNOFF VOLUME (mm)= 8.544
00238> TOTAL RAINFALL (mm)= 25.048
00239> RUNOFF COEFFICIENT = .341
00240> *****
00241> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00242> *****
00243> *****
00244> 001:0011-----
00245> *****
00246> *#
00247> *# Existing Conditions - Flows to Headwater Drainage Features
00248> *#
00249> *#
00250> *****
00251> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00252> |-----|-----|-----|-----|-----|-----|
00253> | 02:101 ID1 02:101 31.29 1.459 1.55 13.00 .000
00254> | +ID2 08:303 7.80 .217 1.57 8.54 .000
00255> |-----|-----|-----|-----|-----|-----|
00256> | SUM 09:ToH1 39.09 1.674 1.55 12.11 .000
00257> *****
00258> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00259> *****
00260> *****
00261> 001:0012-----
00262> *****
00263> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00264> |-----|-----|-----|-----|-----|-----|
00265> | ID1 03:102 9.10 .472 1.45 11.39 .000
00266> | +ID2 07:302 23.13 .452 1.67 7.34 .000
00267> |-----|-----|-----|-----|-----|-----|
00268> | SUM 02:ToH2S2 32.23 .794 1.53 8.48 .000
00269> *****
00270> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00271> *****
```

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00271>
00272>
00273> 001:001-----
00274>
00275> | ADD HYD (ToNorthDit) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00276> (ha)      (cms)      (hrs)      (mm)      (cms)
00277> ID1 01:100      33.14      .876      1.62      9.02      .000
00278> +ID2 05:300      10.68      .267      1.55      7.34      .000
00279>
00280> SUM 03:ToNorthDit      43.82      1.129      1.60      8.61      .000
00281>
00282> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00283>
00284>
00285> 001:0014-----
00286>
00287> | ADD HYD (ToWellandR) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00288> (ha)      (cms)      (hrs)      (mm)      (cms)
00289> ID1 04:103      4.45      .195      1.45      9.53      .000
00290> +ID2 06:301      25.55      .234      2.35      6.99      .000
00291>
00292> SUM 05:ToWellandR      30.00      .261      2.28      7.37      .000
00293>
00294> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00295>
00296>
00297> 001:0015-----
00298> ** END OF RUN : 1
00299>
00300> *****
00301>
00302>
00303>
00304>
00305>
00306>
00307> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00308> Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00309> TZERO = .00 hrs on
00310> METOUT= 2 (output = METRIC)
00311> NRUN = 002
00312> NSTORM= 1
00313> # 1=002YR.HYD
00314>
00315> 002:0002-----
00316> *****
00317> *# Project Name: [Project Eagle] Project Number: [161500301]
00318> *# Date : 2024-11-21
00319> *# Modeller : [AA,MVK]
00320> *# Company : Stantec Consulting Ltd. (London)
00321> *# License # : 4730904
00322> *****
00323> *#
00324> *#
00325> *# This model represents the hydrologic characteristics of the Existing
00326> *# conditions.
00327> *# Storm events modeled are:
00328> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00329> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00330> *# Regional Storm Event: 48hr Hurricane Hazel
00331> *#
00332> *****
00333>
00334> 002:0002-----
00335>
00336> | READ STORM | Filename: CHICAGO STORM 2 Years, 3hr from Colborne
00337> | Ptotal= 36.37 mm | Comments: CHICAGO STORM 2 Years, 3hr from Colborne
00338>
00339>
00340> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00341> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00342> .08 3.094 | .83 9.551 | 1.58 11.939 | 2.33 4.519
00343> .17 3.326 | .92 12.836 | 1.67 10.023 | 2.42 4.243
00344> .25 3.600 | 1.00 19.669 | 1.75 8.649 | 2.50 4.002
00345> .33 3.930 | 1.08 41.191 | 1.83 7.616 | 2.58 3.789
00346> .42 4.334 | 1.17 99.781 | 1.92 6.813 | 2.67 3.599
00347> .50 4.841 | 1.25 48.700 | 2.00 6.171 | 2.75 3.429
00348> .58 5.497 | 1.33 28.010 | 2.08 5.645 | 2.83 3.276
00349> .67 6.380 | 1.42 19.395 | 2.17 5.207 | 2.92 3.137
00350> .75 7.633 | 1.50 14.781 | 2.25 4.837 | 3.00 3.010
00351>
00352> 002:0003-----
00353> *****
00354> *#
00355> *# Existing Conditions - Internal Catchments
00356> *#
00357> *****
00358>
00359> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
00360> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00361> U.H. Tp(hrs)= .230
00362>
00363> Unit Hyd Qpeak (cms)= 5.503
00364>
00365> PEAK FLOW (cms)= 1.751 (i)
00366> TIME TO PEAK (hrs)= 1.450
00367> RUNOFF VOLUME (mm)= 16.697
00368> TOTAL RAINFALL (mm)= 36.371
00369> RUNOFF COEFFICIENT = .459
00370>
00371> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00372>
00373>
00374> 002:0004-----
00375>
00376> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
00377> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00378> U.H. Tp(hrs)= .180
00379>
00380> Unit Hyd Qpeak (cms)= 6.640
00381>
00382> PEAK FLOW (cms)= 2.678 (i)
00383> TIME TO PEAK (hrs)= 1.367
00384> RUNOFF VOLUME (mm)= 22.523
00385> TOTAL RAINFALL (mm)= 36.371
00386> RUNOFF COEFFICIENT = .619
00387>
00388> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00389>
00390>
00391> 002:0005-----
00392>
00393> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
00394> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00395> U.H. Tp(hrs)= .110
00396>
00397> Unit Hyd Qpeak (cms)= 3.160
00398>
00399> PEAK FLOW (cms)= .881 (i)
00400> TIME TO PEAK (hrs)= 1.283
00401> RUNOFF VOLUME (mm)= 20.269
00402> TOTAL RAINFALL (mm)= 36.371
00403> RUNOFF COEFFICIENT = .557
00404>
00405> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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00406>
00407>
00408> 002:0006-----
00409>
00410> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
00411> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00412> U.H. Tp(hrs)= .100
00413>
00414> Unit Hyd Qpeak (cms)= 1.700
00415>
00416> PEAK FLOW (cms)= .378 (i)
00417> TIME TO PEAK (hrs)= 1.267
00418> RUNOFF VOLUME (mm)= 17.494
00419> TOTAL RAINFALL (mm)= 36.371
00420> RUNOFF COEFFICIENT = .481
00421>
00422> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00423>
00424>
00425> 002:0007-----
00426> *****
00427> *#
00428> *# Existing Conditions - External Catchments
00429> *#
00430> *****
00431>
00432> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
00433> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00434> U.H. Tp(hrs)= .170
00435>
00436> Unit Hyd Qpeak (cms)= 2.400
00437>
00438> PEAK FLOW (cms)= .547 (i)
00439> TIME TO PEAK (hrs)= 1.367
00440> RUNOFF VOLUME (mm)= 13.994
00441> TOTAL RAINFALL (mm)= 36.371
00442> RUNOFF COEFFICIENT = .385
00443>
00444> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00445>
00446>
00447> 002:0008-----
00448>
00449> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
00450> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00451> U.H. Tp(hrs)= .760
00452>
00453> Unit Hyd Qpeak (cms)= 1.284
00454>
00455> PEAK FLOW (cms)= .491 (i)
00456> TIME TO PEAK (hrs)= 2.167
00457> RUNOFF VOLUME (mm)= 13.417
00458> TOTAL RAINFALL (mm)= 36.371
00459> RUNOFF COEFFICIENT = .369
00460>
00461> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00462>
00463>
00464> 002:0009-----
00465>
00466> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00467> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00468> U.H. Tp(hrs)= .260
00469>
00470> Unit Hyd Qpeak (cms)= 3.398
00471>
00472> PEAK FLOW (cms)= .935 (i)
00473> TIME TO PEAK (hrs)= 1.500
00474> RUNOFF VOLUME (mm)= 13.994
00475> TOTAL RAINFALL (mm)= 36.371
00476> RUNOFF COEFFICIENT = .385
00477>
00478> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00479>
00480>
00481> 002:0010-----
00482>
00483> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00484> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00485> U.H. Tp(hrs)= .190
00486>
00487> Unit Hyd Qpeak (cms)= 1.568
00488>
00489> PEAK FLOW (cms)= .436 (i)
00490> TIME TO PEAK (hrs)= 1.400
00491> RUNOFF VOLUME (mm)= 15.954
00492> TOTAL RAINFALL (mm)= 36.371
00493> RUNOFF COEFFICIENT = .439
00494>
00495> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00496>
00497>
00498> 002:0011-----
00499> *****
00500> *#
00501> *# Existing Conditions - Flows to Headwater Drainage Features
00502> *#
00503> *****
00504>
00505> | ADD HYD (ToH1) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00506> (ha)      (cms)      (hrs)      (mm)      (cms)
00507> ID1 02:101      31.29      2.678      1.37      22.52      .000
00508> +ID2 08:303      7.80      .436      1.40      15.95      .000
00509>
00510> SUM 09:ToH1      39.09      3.110      1.37      21.21      .000
00511>
00512> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00513>
00514>
00515> 002:0012-----
00516>
00517> | ADD HYD (ToH2S2) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00518> (ha)      (cms)      (hrs)      (mm)      (cms)
00519> ID1 03:102      9.10      .881      1.28      20.27      .000
00520> +ID2 07:302      23.13      .935      1.50      13.99      .000
00521>
00522> SUM 02:ToH2S2      32.23      1.571      1.35      15.77      .000
00523>
00524> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526>
00527> 002:0013-----
00528>
00529> | ADD HYD (ToNorthDit) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00530> (ha)      (cms)      (hrs)      (mm)      (cms)
00531> ID1 01:100      33.14      1.751      1.45      16.70      .000
00532> +ID2 05:300      10.68      .547      1.37      13.99      .000
00533>
00534> SUM 03:ToNorthDit      43.82      2.272      1.43      16.04      .000
00535>
00536> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00537>
00538>
00539> 002:0014-----
00540>
```

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00541> | ADD HYD (ToWellandR) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00542> -----
00543> | 101 04:103              (ha)      (cms)      (hrs)      (mm)      (cms)
00544> | +ID2 06:301              25.55      .491      2.17      13.42      .000
00545> | =====
00546> | SUM 05:ToWellandR      30.00      .545      2.10      14.02      .000
00547>
00548> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00549>
00550> -----
00551> 002:0015-----
00552> -----
00553> 002:0002-----
00554> ** END OF RUN : 4
00555> -----
00556> *****
00557> -----
00558>
00559>
00560>
00561>
00562> -----
00563> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00564> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00565> | TZERO = .00 hrs on 0
00566> | METOUT= 2 (output= METRIC)
00567> | NRUN = 005
00568> | NSTORM= 1
00569> | # 1=005YR.HYD
00570> -----
00571> 005:0002-----
00572> *****
00573> * Project Name: [Project Eagle] Project Number: [161500301]
00574> * Date : 2024-11-21
00575> * Modeller : [AA,MYK]
00576> * Company : Stantec Consulting Ltd. (London)
00577> * License # : 4730904
00578> *****
00579> *
00580> * # This model represents the hydrologic characteristics of the Existing
00581> * conditions.
00582> * # Storm events modeled are:
00583> * # 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00584> * # 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00585> * # Regional Storm Event: 48hr Hurricane Hazel
00586> *
00587> *
00588> *****
00589>
00590> 005:0002-----
00591> -----
00592> | READ STORM | Filename: CHICAGO STORM 5 Years, 3hr from Colborne
00593> | Ptotal= 42.70 mm | Comments: CHICAGO STORM 5 Years, 3hr from Colborne
00594> -----
00595> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00596> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00597> .08 3.757 | .83 11.211 | 1.58 13.931 | 2.33 5.426
00598> .17 4.031 | .92 14.951 | 1.67 11.750 | 2.42 5.105
00599> .25 4.353 | 1.00 22.713 | 1.75 10.182 | 2.50 4.823
00600> .33 4.739 | 1.08 47.493 | 1.83 9.000 | 2.58 4.573
00601> .42 5.210 | 1.17 118.092 | 1.92 8.078 | 2.67 4.351
00602> .50 5.800 | 1.25 56.211 | 2.00 7.339 | 2.75 4.151
00603> .58 6.560 | 1.33 32.225 | 2.08 6.732 | 2.83 3.971
00604> .67 7.579 | 1.42 22.401 | 2.17 6.225 | 2.92 3.808
00605> .75 9.019 | 1.50 17.161 | 2.25 5.795 | 3.00 3.658
00606>
00607> -----
00608> 005:0003-----
00609> *****
00610> *
00611> * # Existing Conditions - Internal Catchments
00612> *
00613> *****
00614>
00615> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
00616> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00617> | U.H. Tp(hrs)= .230
00618> -----
00619> Unit Hyd Qpeak (cms)= 5.503
00620> -----
00621> PEAK FLOW (cms)= 2.256 (i)
00622> TIME TO PEAK (hrs)= 1.433
00623> RUNOFF VOLUME (mm)= 21.445
00624> TOTAL RAINFALL (mm)= 42.701
00625> RUNOFF COEFFICIENT = .502
00626>
00627> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00628> -----
00629>
00630> 005:0004-----
00631> -----
00632> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
00633> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00634> | U.H. Tp(hrs)= .180
00635> -----
00636> Unit Hyd Qpeak (cms)= 6.640
00637> -----
00638> PEAK FLOW (cms)= 3.357 (i)
00639> TIME TO PEAK (hrs)= 1.367
00640> RUNOFF VOLUME (mm)= 28.142
00641> TOTAL RAINFALL (mm)= 42.701
00642> RUNOFF COEFFICIENT = .659
00643>
00644> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00645> -----
00646>
00647> 005:0005-----
00648> -----
00649> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
00650> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00651> | U.H. Tp(hrs)= .110
00652> -----
00653> Unit Hyd Qpeak (cms)= 3.160
00654> -----
00655> PEAK FLOW (cms)= 1.121 (i)
00656> TIME TO PEAK (hrs)= 1.283
00657> RUNOFF VOLUME (mm)= 25.595
00658> TOTAL RAINFALL (mm)= 42.701
00659> RUNOFF COEFFICIENT = .599
00660>
00661> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00662> -----
00663>
00664> 005:0006-----
00665> -----
00666> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
00667> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00668> | U.H. Tp(hrs)= .100
00669> -----
00670> Unit Hyd Qpeak (cms)= 1.700
00671> -----
00672> PEAK FLOW (cms)= .489 (i)
00673> TIME TO PEAK (hrs)= 1.267
00674> RUNOFF VOLUME (mm)= 22.383
00675> TOTAL RAINFALL (mm)= 42.701
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00676> RUNOFF COEFFICIENT = .524
00677>
00678> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00679> -----
00680>
00681> 005:0007-----
00682> *****
00683> *
00684> * # Existing Conditions - External Catchments
00685> *
00686> *****
00687> -----
00688> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
00689> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00690> | U.H. Tp(hrs)= .170
00691> -----
00692> Unit Hyd Qpeak (cms)= 2.400
00693> -----
00694> PEAK FLOW (cms)= .716 (i)
00695> TIME TO PEAK (hrs)= 1.367
00696> RUNOFF VOLUME (mm)= 18.209
00697> TOTAL RAINFALL (mm)= 42.701
00698> RUNOFF COEFFICIENT = .426
00699>
00700> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00701> -----
00702>
00703> -----
00704> -----
00705> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
00706> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00707> | U.H. Tp(hrs)= .760
00708> -----
00709> Unit Hyd Qpeak (cms)= 1.284
00710> -----
00711> PEAK FLOW (cms)= .640 (i)
00712> TIME TO PEAK (hrs)= 2.150
00713> RUNOFF VOLUME (mm)= 17.508
00714> TOTAL RAINFALL (mm)= 42.701
00715> RUNOFF COEFFICIENT = .410
00716>
00717> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00718> -----
00719>
00720> 005:0009-----
00721> -----
00722> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00723> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00724> | U.H. Tp(hrs)= .260
00725> -----
00726> Unit Hyd Qpeak (cms)= 3.398
00727> -----
00728> PEAK FLOW (cms)= 1.220 (i)
00729> TIME TO PEAK (hrs)= 1.483
00730> RUNOFF VOLUME (mm)= 18.209
00731> TOTAL RAINFALL (mm)= 42.701
00732> RUNOFF COEFFICIENT = .426
00733>
00734> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00735> -----
00736>
00737> 005:0010-----
00738> -----
00739> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00740> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00741> | U.H. Tp(hrs)= .190
00742> -----
00743> Unit Hyd Qpeak (cms)= 1.568
00744> -----
00745> PEAK FLOW (cms)= .565 (i)
00746> TIME TO PEAK (hrs)= 1.383
00747> RUNOFF VOLUME (mm)= 20.563
00748> TOTAL RAINFALL (mm)= 42.701
00749> RUNOFF COEFFICIENT = .482
00750>
00751> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00752> -----
00753>
00754> 005:0011-----
00755> *****
00756> *
00757> * # Existing Conditions - Flows to Headwater Drainage Features
00758> *
00759> *****
00760>
00761> | ADD HYD (ToH1) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00762> -----
00763> | ID1 02:101              31.29      (cms)      (hrs)      (mm)      (cms)
00764> | +ID2 08:303              7.80      .565      1.38      20.56      .000
00765> | =====
00766> | SUM 09:ToH1              39.09      3.919      1.37      26.63      .000
00767>
00768> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00769> -----
00770>
00771> 005:0012-----
00772> -----
00773> | ADD HYD (ToH2S2) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00774> | (ha)      (cms)      (hrs)      (mm)      (cms)
00775> | ID1 03:102              9.10      1.121      1.28      25.59      .000
00776> | +ID2 07:302              23.13      1.220      1.48      18.21      .000
00777> | =====
00778> | SUM 02:ToH2S2              32.23      2.026      1.35      20.29      .000
00779>
00780> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00781> -----
00782>
00783> 005:0013-----
00784> -----
00785> | ADD HYD (ToNorthDit) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00786> | (ha)      (cms)      (hrs)      (mm)      (cms)
00787> | ID1 01:100              33.14      2.256      1.43      21.45      .000
00788> | +ID2 05:300              10.68      .716      1.37      18.21      .000
00789> | =====
00790> | SUM 03:ToNorthDit              43.82      2.940      1.42      20.66      .000
00791>
00792> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00793> -----
00794>
00795> 005:0014-----
00796> -----
00797> | ADD HYD (ToWellandR) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
00798> | (ha)      (cms)      (hrs)      (mm)      (cms)
00799> | ID1 04:103              4.45      .489      1.27      22.38      .000
00800> | +ID2 06:301              25.55      .640      2.15      17.51      .000
00801> | =====
00802> | SUM 05:ToWellandR              30.00      .708      2.10      18.23      .000
00803>
00804> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00805> -----
00806>
00807> 005:0015-----
00808> -----
00809> 005:0002-----
00810> -----
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00811> 005:0002-----
00812> ** END OF RUN : 9
00813> *****
00814> *****
00815> *****
00816> *****
00817> *****
00818> *****
00819> *****
00820> -----
00821> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00822> |-----| Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00823> | TZERO = 00 hrs on 0
00824> | METOUT= 2 (output = METRIC)
00825> | NRUN = 010
00826> | NSTORM= 1
00827> | # 1=10YR.HYD
00828> -----
00829> 010:0002-----
00830> *****
00831> * Project Name: [Project Eagle] Project Number: [161500301]
00832> * Date : 2024-11-21
00833> * Modeler : [AA,MWK]
00834> * Company : Stantec Consulting Ltd. (London)
00835> * License # : 4730904
00836> *****
00837> *****
00838> *#
00839> *# This model represents the hydrologic characteristics of the Existing
00840> *# conditions.
00841> *# Storm events modeled are:
00842> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00843> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00844> *# Regional Storm Event: 48hr Hurricane Hazel
00845> *#
00846> *****
00847> -----
00848> 010:0002-----
00849> -----
00850> | READ STORM | Filename: CHICAGO STORM 10 Years, 3hr from Colborn
00851> | Ptotal= 47.76 mm | Comments: CHICAGO STORM 10 Years, 3hr from Colborn
00852> -----
00853> | TIME | RAIN | TIME | RAIN | TIME | RAIN | TIME | RAIN |
00854> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
00855> |.08 4.368 |.83 12.544 |1.58 15.478 |2.33 6.229 |
00856> |.17 4.675 |.92 16.574 |1.67 13.127 |2.42 5.873 |
00857> |.25 5.035 |1.00 24.913 |1.75 11.431 |2.50 5.560 |
00858> |.33 5.466 |1.08 51.922 |1.83 10.148 |2.58 5.282 |
00859> |.42 5.990 |1.17 133.409 |1.92 9.144 |2.67 5.034 |
00860> |.50 6.643 |1.25 61.515 |2.00 8.335 |2.75 4.810 |
00861> |.58 7.481 |1.33 35.164 |2.08 7.670 |2.83 4.608 |
00862> |.67 8.598 |1.42 24.576 |2.17 7.113 |2.92 4.424 |
00863> |.75 10.168 |1.50 18.949 |2.25 6.638 |3.00 4.256 |
00864> -----
00865> -----
00866> 010:0003-----
00867> *****
00868> *#
00869> *# Existing Conditions - Internal Catchments
00870> *#
00871> *****
00872> -----
00873> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
00874> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00875> |-----| U.H. Tp(hrs)= .230
00876> -----
00877> Unit Hyd Qpeak (cms)= 5.503
00878> -----
00879> PEAK FLOW (cms)= 2.673 (i)
00880> TIME TO PEAK (hrs)= 1.433
00881> RUNOFF VOLUME (mm)= 25.413
00882> TOTAL RAINFALL (mm)= 47.763
00883> RUNOFF COEFFICIENT = .532
00884> -----
00885> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00886> -----
00887> -----
00888> 010:0004-----
00889> -----
00890> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
00891> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00892> |-----| U.H. Tp(hrs)= .180
00893> -----
00894> Unit Hyd Qpeak (cms)= 6.640
00895> -----
00896> PEAK FLOW (cms)= 3.899 (i)
00897> TIME TO PEAK (hrs)= 1.367
00898> RUNOFF VOLUME (mm)= 32.735
00899> TOTAL RAINFALL (mm)= 47.763
00900> RUNOFF COEFFICIENT = .685
00901> -----
00902> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00903> -----
00904> -----
00905> 010:0005-----
00906> -----
00907> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
00908> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00909> |-----| U.H. Tp(hrs)= .110
00910> -----
00911> Unit Hyd Qpeak (cms)= 3.160
00912> -----
00913> PEAK FLOW (cms)= 1.320 (i)
00914> TIME TO PEAK (hrs)= 1.267
00915> RUNOFF VOLUME (mm)= 29.982
00916> TOTAL RAINFALL (mm)= 47.763
00917> RUNOFF COEFFICIENT = .628
00918> -----
00919> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00920> -----
00921> -----
00922> 010:0006-----
00923> -----
00924> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
00925> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00926> |-----| U.H. Tp(hrs)= .100
00927> -----
00928> Unit Hyd Qpeak (cms)= 1.700
00929> -----
00930> PEAK FLOW (cms)= .581 (i)
00931> TIME TO PEAK (hrs)= 1.267
00932> RUNOFF VOLUME (mm)= 26.456
00933> TOTAL RAINFALL (mm)= 47.763
00934> RUNOFF COEFFICIENT = .534
00935> -----
00936> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00937> -----
00938> -----
00939> 010:0007-----
00940> *****
00941> *#
00942> *# Existing Conditions - External Catchments
00943> *#
00944> *****
00945> -----
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00946> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
00947> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00948> |-----| U.H. Tp(hrs)= .170
00949> -----
00950> Unit Hyd Qpeak (cms)= 2.400
00951> -----
00952> PEAK FLOW (cms)= .857 (i)
00953> TIME TO PEAK (hrs)= 1.367
00954> RUNOFF VOLUME (mm)= 21.775
00955> TOTAL RAINFALL (mm)= 47.763
00956> RUNOFF COEFFICIENT = .456
00957> -----
00958> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00959> -----
00960> -----
00961> 010:0008-----
00962> -----
00963> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
00964> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00965> |-----| U.H. Tp(hrs)= .760
00966> -----
00967> Unit Hyd Qpeak (cms)= 1.284
00968> -----
00969> PEAK FLOW (cms)= .764 (i)
00970> TIME TO PEAK (hrs)= 2.150
00971> RUNOFF VOLUME (mm)= 20.979
00972> TOTAL RAINFALL (mm)= 47.763
00973> RUNOFF COEFFICIENT = .439
00974> -----
00975> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00976> -----
00977> -----
00978> 010:0009-----
00979> -----
00980> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00981> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00982> |-----| U.H. Tp(hrs)= .260
00983> -----
00984> Unit Hyd Qpeak (cms)= 3.398
00985> -----
00986> PEAK FLOW (cms)= 1.456 (i)
00987> TIME TO PEAK (hrs)= 1.483
00988> RUNOFF VOLUME (mm)= 21.775
00989> TOTAL RAINFALL (mm)= 47.763
00990> RUNOFF COEFFICIENT = .456
00991> -----
00992> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00993> -----
00994> -----
00995> 010:0010-----
00996> -----
00997> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00998> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
00999> |-----| U.H. Tp(hrs)= .190
01000> -----
01001> Unit Hyd Qpeak (cms)= 1.568
01002> -----
01003> PEAK FLOW (cms)= .671 (i)
01004> TIME TO PEAK (hrs)= 1.383
01005> RUNOFF VOLUME (mm)= 24.429
01006> TOTAL RAINFALL (mm)= 47.763
01007> RUNOFF COEFFICIENT = .511
01008> -----
01009> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01010> -----
01011> -----
01012> 010:0011-----
01013> *****
01014> *#
01015> *# Existing Conditions - Flows to Headwater Drainage Features
01016> *#
01017> *****
01018> -----
01019> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01020> |-----| (ha) (cms) (hrs) (mm) (cms)
01021> | ID1 02:101 31.29 3.899 1.37 32.73 .000
01022> | +ID2 08:303 7.80 .671 1.38 24.43 .000
01023> |-----|
01024> | SUM 09:ToH1 39.09 4.568 1.37 31.08 .000
01025> -----
01026> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01027> -----
01028> -----
01029> 010:0012-----
01030> -----
01031> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01032> |-----| (ha) (cms) (hrs) (mm) (cms)
01033> | ID1 03:102 9.10 1.320 1.27 29.98 .000
01034> | +ID2 07:302 23.13 1.456 1.48 21.78 .000
01035> |-----|
01036> | SUM 02:ToH2S2 32.23 2.400 1.35 24.09 .000
01037> -----
01038> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01039> -----
01040> -----
01041> 010:0013-----
01042> -----
01043> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01044> |-----| (ha) (cms) (hrs) (mm) (cms)
01045> | ID1 01:100 33.14 2.673 1.43 25.41 .000
01046> | +ID2 05:300 10.68 .857 1.37 21.78 .000
01047> |-----|
01048> | SUM 03:ToNorthDit 43.82 3.491 1.42 24.53 .000
01049> -----
01050> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01051> -----
01052> -----
01053> 010:0014-----
01054> -----
01055> | ADD HYD (ToWellandR) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01056> |-----| (ha) (cms) (hrs) (mm) (cms)
01057> | ID1 04:103 4.45 .581 1.27 26.46 .000
01058> | +ID2 06:301 25.55 .764 2.15 20.98 .000
01059> |-----|
01060> | SUM 05:ToWellandR 30.00 .844 2.10 21.79 .000
01061> -----
01062> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01063> -----
01064> -----
01065> 010:0015-----
01066> -----
01067> 010:0002-----
01068> -----
01069> 010:0002-----
01070> -----
01071> 010:0002-----
01072> ** END OF RUN : 24
01073> *****
01074> *****
01075> *****
01076> *****
01077> *****
01078> *****
01079> *****
01080> -----
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01081> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01082> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01083> | TZERO = .00 hrs on 0
01084> | METOUT= 2 (output = METRIC)
01085> | NRUN = 025
01086> | NSTORM= 1
01087> | # 1=25YR.HYD
01088> -----
01089> 025:0002-----
01090> *****
01091> * Project Name: [Project Eagle] Project Number: [161500301]
01092> * Date : 2024-11-21
01093> * Modeler : [AA,MWK]
01094> * Company : Stantec Consulting Ltd. (London)
01095> * License # : 4730904
01096> *****
01097> *****
01098> *
01099> * This model represents the hydrologic characteristics of the Existing
01100> * conditions.
01101> * Storm events modeled are:
01102> * 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01103> * 25 mm/4hr Chicago Storm (Using City of London IDF Parameters)
01104> * Regional Storm Event: 48hr Hurricane Hazel
01105> *
01106> *****
01107> -----
01108> 025:0002-----
01109> -----
01110> | READ STORM | Filename: CHICAGO STORM 25 Years, 3hr from Colborn
01111> | Ptotal= 55.20 mm | Comments: CHICAGO STORM 25 Years, 3hr from Colborn
01112> -----
01113> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
01114> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
01115> | .08 5.275 | .83 14.397 | 1.58 17.590 | 2.33 7.402 |
01116> | .17 5.629 | .92 18.778 | 1.67 15.034 | 2.42 6.998 |
01117> | .25 6.043 | 1.00 27.803 | 1.75 13.180 | 2.50 6.642 |
01118> | .33 6.535 | 1.08 57.841 | 1.83 11.770 | 2.58 6.325 |
01119> | .42 7.131 | 1.17 159.527 | 1.92 10.661 | 2.67 6.041 |
01120> | .50 7.869 | 1.25 68.696 | 2.00 9.764 | 2.75 5.785 |
01121> | .58 8.810 | 1.33 38.966 | 2.08 9.022 | 2.83 5.552 |
01122> | .67 10.056 | 1.42 27.436 | 2.17 8.397 | 2.92 5.340 |
01123> | .75 11.792 | 1.50 21.350 | 2.25 7.863 | 3.00 5.146 |
01124> -----
01125> -----
01126> 025:0003-----
01127> *****
01128> *
01129> * Existing Conditions - Internal Catchments
01130> *
01131> *****
01132> -----
01133> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
01134> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01135> | U.H. Tp(hrs)= .230
01136> -----
01137> | Unit Hyd Qpeak (cms)= 5.503
01138> -----
01139> | PEAK FLOW (cms)= 3.326 (i)
01140> | TIME TO PEAK (hrs)= 1.433
01141> | RUNOFF VOLUME (mm)= 31.466
01142> | TOTAL RAINFALL (mm)= 55.204
01143> | RUNOFF COEFFICIENT = .570
01144> -----
01145> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01146> -----
01147> -----
01148> 025:0004-----
01149> -----
01150> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
01151> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01152> | U.H. Tp(hrs)= .180
01153> -----
01154> | Unit Hyd Qpeak (cms)= 6.640
01155> -----
01156> | PEAK FLOW (cms)= 4.749 (i)
01157> | TIME TO PEAK (hrs)= 1.350
01158> | RUNOFF VOLUME (mm)= 39.605
01159> | TOTAL RAINFALL (mm)= 55.204
01160> | RUNOFF COEFFICIENT = .717
01161> -----
01162> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01163> -----
01164> -----
01165> 025:0005-----
01166> -----
01167> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
01168> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01169> | U.H. Tp(hrs)= .110
01170> -----
01171> | Unit Hyd Qpeak (cms)= 3.160
01172> -----
01173> | PEAK FLOW (cms)= 1.638 (i)
01174> | TIME TO PEAK (hrs)= 1.267
01175> | RUNOFF VOLUME (mm)= 36.589
01176> | TOTAL RAINFALL (mm)= 55.204
01177> | RUNOFF COEFFICIENT = .663
01178> -----
01179> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01180> -----
01181> -----
01182> 025:0006-----
01183> -----
01184> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
01185> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01186> | U.H. Tp(hrs)= .100
01187> -----
01188> | Unit Hyd Qpeak (cms)= 1.700
01189> -----
01190> | PEAK FLOW (cms)= .730 (i)
01191> | TIME TO PEAK (hrs)= 1.267
01192> | RUNOFF VOLUME (mm)= 32.648
01193> | TOTAL RAINFALL (mm)= 55.204
01194> | RUNOFF COEFFICIENT = .591
01195> -----
01196> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01197> -----
01198> -----
01199> 025:0007-----
01200> *****
01201> *
01202> * Existing Conditions - External Catchments
01203> *
01204> *****
01205> -----
01206> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
01207> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01208> | U.H. Tp(hrs)= .170
01209> -----
01210> | Unit Hyd Qpeak (cms)= 2.400
01211> -----
01212> | PEAK FLOW (cms)= 1.084 (i)
01213> | TIME TO PEAK (hrs)= 1.350
01214> | RUNOFF VOLUME (mm)= 27.278
01215> | TOTAL RAINFALL (mm)= 55.204
01216> -----
01217> -----
01218> RUNOFF COEFFICIENT = .494
01219> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01220> -----
01221> 025:0008-----
01222> -----
01223> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
01224> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01225> | U.H. Tp(hrs)= .760
01226> -----
01227> | Unit Hyd Qpeak (cms)= 1.284
01228> -----
01229> | PEAK FLOW (cms)= .956 (i)
01230> | TIME TO PEAK (hrs)= 2.133
01231> | RUNOFF VOLUME (mm)= 26.348
01232> | TOTAL RAINFALL (mm)= 55.204
01233> | RUNOFF COEFFICIENT = .477
01234> -----
01235> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01236> -----
01237> -----
01238> 025:0009-----
01239> -----
01240> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
01241> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01242> | U.H. Tp(hrs)= .260
01243> -----
01244> | Unit Hyd Qpeak (cms)= 3.398
01245> -----
01246> | PEAK FLOW (cms)= 1.830 (i)
01247> | TIME TO PEAK (hrs)= 1.467
01248> | RUNOFF VOLUME (mm)= 27.278
01249> | TOTAL RAINFALL (mm)= 55.204
01250> | RUNOFF COEFFICIENT = .494
01251> -----
01252> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01253> -----
01254> -----
01255> 025:0010-----
01256> -----
01257> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
01258> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01259> | U.H. Tp(hrs)= .190
01260> -----
01261> | Unit Hyd Qpeak (cms)= 1.568
01262> -----
01263> | PEAK FLOW (cms)= .840 (i)
01264> | TIME TO PEAK (hrs)= 1.383
01265> | RUNOFF VOLUME (mm)= 30.342
01266> | TOTAL RAINFALL (mm)= 55.204
01267> | RUNOFF COEFFICIENT = .550
01268> -----
01269> | (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01270> -----
01271> -----
01272> 025:0011-----
01273> *****
01274> *
01275> * Existing Conditions - Flows to Headwater Drainage Features
01276> *
01277> *****
01278> -----
01279> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01280> | (ha) (cms) (hrs) (mm) (cms)
01281> | ID1 02:101 31.29 4.749 1.35 39.60 .000
01282> | +ID2 08:303 7.80 .840 1.38 30.34 .000
01283> | =====
01284> | SUM 09:ToH1 39.09 5.581 1.35 37.76 .000
01285> -----
01286> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01287> -----
01288> -----
01289> 025:0012-----
01290> -----
01291> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01292> | (ha) (cms) (hrs) (mm) (cms)
01293> | ID1 03:102 9.10 1.638 1.27 36.59 .000
01294> | +ID2 07:302 23.13 1.830 1.47 27.28 .000
01295> | =====
01296> | SUM 02:ToH2S2 32.23 2.990 1.35 29.91 .000
01297> -----
01298> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01299> -----
01300> -----
01301> 025:0013-----
01302> -----
01303> | ADD HYD (ToNorthDit ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01304> | (ha) (cms) (hrs) (mm) (cms)
01305> | ID1 01:100 33.14 3.326 1.43 31.47 .000
01306> | +ID2 05:300 10.68 1.084 1.35 27.28 .000
01307> | =====
01308> | SUM 03:ToNorthDit 43.82 4.358 1.40 30.45 .000
01309> -----
01310> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01311> -----
01312> -----
01313> 025:0014-----
01314> -----
01315> | ADD HYD (ToWellandR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01316> | (ha) (cms) (hrs) (mm) (cms)
01317> | ID1 04:103 4.45 .730 1.27 32.65 .000
01318> | +ID2 06:301 25.55 .956 2.13 26.35 .000
01319> | =====
01320> | SUM 05:ToWellandR 30.00 1.054 2.08 27.28 .000
01321> -----
01322> | NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01323> -----
01324> -----
01325> 025:0015-----
01326> -----
01327> 025:0002-----
01328> -----
01329> 025:0002-----
01330> -----
01331> 025:0002-----
01332> -----
01333> 025:0002-----
01334> ** END OF RUN : 49
01335> -----
01336> *****
01337> *****
01338> *****
01339> *****
01340> *****
01341> -----
01342> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01343> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01344> | TZERO = .00 hrs on 0
01345> | METOUT= 2 (output = METRIC)
01346> | NRUN = 050
01347> | NSTORM= 1
01348> | # 1=50YR.HYD
01349> -----
01350> -----
```

```
01351> 050:0002-----
01352> *****
01353> *# Project Name: [Project Eagle] Project Number: [161500301]
01354> *# Date : 2024-11-21
01355> *# Modeller : [AA,MYK]
01356> *# Company : Stantec Consulting Ltd. (London)
01357> *# License # : 4730904
01358> *****
01359> *****
01360> *#
01361> *# This model represents the hydrologic characteristics of the Existing
01362> *# conditions.
01363> *# Storm events modeled are:
01364> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01365> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
01366> *# Regional Storm Event: 48hr Hurricane Hazel
01367> *#
01368> *****
01369> *****
01370> 050:0002-----
01371> -----
01372> | READ STORM | Filename: CHICAGO STORM 50 Years, 3hr from Colborn
01373> | Ptotal= 61.74 mm | Comments: CHICAGO STORM 50 Years, 3hr from Colborn
01374> -----
01375> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01376> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01377> .08 6.075 | .83 16.290 | 1.58 19.828 | 2.33 8.476
01378> .17 6.475 | .92 21.140 | 1.67 16.997 | 2.42 8.022
01379> .25 6.944 | 1.00 31.074 | 1.75 14.937 | 2.50 7.620
01380> .33 7.499 | 1.08 63.899 | 1.83 13.368 | 2.58 7.262
01381> .42 8.171 | 1.17 175.021 | 1.92 12.130 | 2.67 6.941
01382> .50 9.001 | 1.25 75.740 | 2.00 11.127 | 2.75 6.652
01383> .58 10.058 | 1.33 43.302 | 2.08 10.296 | 2.83 6.389
01384> .67 11.453 | 1.42 30.673 | 2.17 9.595 | 2.92 6.149
01385> .75 13.392 | 1.50 23.979 | 2.25 8.996 | 3.00 5.929
01386> -----
01387> -----
01388> 050:0003-----
01389> *****
01390> *#
01391> *# Existing Conditions - Internal Catchments
01392> *#
01393> *****
01394> *****
01395> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
01396> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01397> | U.H. Tp(hrs)= .230
01398> -----
01399> Unit Hyd Qpeak (cms)= 5.503
01400> -----
01401> PEAK FLOW (cms)= 3.877 (i)
01402> TIME TO PEAK (hrs)= 1.433
01403> RUNOFF VOLUME (mm)= 36.957
01404> TOTAL RAINFALL (mm)= 61.742
01405> RUNOFF COEFFICIENT = .599
01406> -----
01407> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01408> -----
01409> -----
01410> 050:0004-----
01411> -----
01412> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
01413> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01414> | U.H. Tp(hrs)= .180
01415> -----
01416> Unit Hyd Qpeak (cms)= 6.640
01417> -----
01418> PEAK FLOW (cms)= 5.423 (i)
01419> TIME TO PEAK (hrs)= 1.350
01420> RUNOFF VOLUME (mm)= 45.729
01421> TOTAL RAINFALL (mm)= 61.742
01422> RUNOFF COEFFICIENT = .741
01423> -----
01424> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01425> -----
01426> -----
01427> 050:0005-----
01428> -----
01429> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
01430> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01431> | U.H. Tp(hrs)= .110
01432> -----
01433> Unit Hyd Qpeak (cms)= 3.160
01434> -----
01435> PEAK FLOW (cms)= 1.882 (i)
01436> TIME TO PEAK (hrs)= 1.267
01437> RUNOFF VOLUME (mm)= 42.514
01438> TOTAL RAINFALL (mm)= 61.742
01439> RUNOFF COEFFICIENT = .689
01440> -----
01441> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01442> -----
01443> -----
01444> 050:0006-----
01445> -----
01446> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
01447> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01448> | U.H. Tp(hrs)= .100
01449> -----
01450> Unit Hyd Qpeak (cms)= 1.700
01451> -----
01452> PEAK FLOW (cms)= .847 (i)
01453> TIME TO PEAK (hrs)= 1.250
01454> RUNOFF VOLUME (mm)= 38.250
01455> TOTAL RAINFALL (mm)= 61.742
01456> RUNOFF COEFFICIENT = .620
01457> -----
01458> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01459> -----
01460> -----
01461> 050:0007-----
01462> *****
01463> *#
01464> *# Existing Conditions - External Catchments
01465> *#
01466> *****
01467> *****
01468> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
01469> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01470> | U.H. Tp(hrs)= .170
01471> -----
01472> Unit Hyd Qpeak (cms)= 2.400
01473> -----
01474> PEAK FLOW (cms)= 1.275 (i)
01475> TIME TO PEAK (hrs)= 1.350
01476> RUNOFF VOLUME (mm)= 32.326
01477> TOTAL RAINFALL (mm)= 61.742
01478> RUNOFF COEFFICIENT = .524
01479> -----
01480> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01481> -----
01482> -----
01483> 050:0008-----
01484> *****
01485> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
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01486> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01487> | U.H. Tp(hrs)= .760
01488> -----
01489> Unit Hyd Qpeak (cms)= 1.284
01490> -----
01491> PEAK FLOW (cms)= 1.131 (i)
01492> TIME TO PEAK (hrs)= 2.133
01493> RUNOFF VOLUME (mm)= 31.286
01494> TOTAL RAINFALL (mm)= 61.742
01495> RUNOFF COEFFICIENT = .507
01496> -----
01497> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01498> -----
01499> -----
01500> 050:0009-----
01501> -----
01502> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
01503> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01504> | U.H. Tp(hrs)= .260
01505> -----
01506> Unit Hyd Qpeak (cms)= 3.398
01507> -----
01508> PEAK FLOW (cms)= 2.154 (i)
01509> TIME TO PEAK (hrs)= 1.467
01510> RUNOFF VOLUME (mm)= 32.326
01511> TOTAL RAINFALL (mm)= 61.742
01512> RUNOFF COEFFICIENT = .524
01513> -----
01514> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01515> -----
01516> -----
01517> 050:0010-----
01518> -----
01519> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
01520> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01521> | U.H. Tp(hrs)= .190
01522> -----
01523> Unit Hyd Qpeak (cms)= 1.568
01524> -----
01525> PEAK FLOW (cms)= .981 (i)
01526> TIME TO PEAK (hrs)= 1.383
01527> RUNOFF VOLUME (mm)= 35.722
01528> TOTAL RAINFALL (mm)= 61.742
01529> RUNOFF COEFFICIENT = .579
01530> -----
01531> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01532> -----
01533> -----
01534> 050:0011-----
01535> *****
01536> *#
01537> *# Existing Conditions - Flows to Headwater Drainage Features
01538> *#
01539> *****
01540> -----
01541> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01542> | (ha) (cms) (hrs) (mm) (cms)
01543> +ID1 02:101 31.29 5.423 1.35 45.73 .000
01544> +ID2 08:303 7.80 .981 1.38 35.72 .000
01545> =====
01546> SUM 09:ToH1 39.09 6.397 1.35 43.73 .000
01547> -----
01548> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01549> -----
01550> -----
01551> 050:0012-----
01552> -----
01553> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01554> | (ha) (cms) (hrs) (mm) (cms)
01555> +ID1 03:102 9.10 1.882 1.27 42.51 .000
01556> +ID2 07:302 23.13 2.154 1.47 32.33 .000
01557> =====
01558> SUM 04:ToH2S2 32.23 3.484 1.35 35.20 .000
01559> -----
01560> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01561> -----
01562> -----
01563> 050:0013-----
01564> -----
01565> | ADD HYD (ToNorthDit ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01566> | (ha) (cms) (hrs) (mm) (cms)
01567> +ID1 01:100 33.14 3.877 1.43 36.96 .000
01568> +ID2 05:300 10.68 1.275 1.35 32.33 .000
01569> =====
01570> SUM 03:ToNorthDit 43.82 5.094 1.40 35.83 .000
01571> -----
01572> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01573> -----
01574> -----
01575> 050:0014-----
01576> -----
01577> | ADD HYD (ToWellandR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01578> | (ha) (cms) (hrs) (mm) (cms)
01579> +ID1 04:103 4.45 .847 1.25 38.25 .000
01580> +ID2 06:301 25.55 1.131 2.13 31.29 .000
01581> =====
01582> SUM 05:ToWellandR 30.00 1.246 2.08 32.32 .000
01583> -----
01584> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01585> -----
01586> -----
01587> 050:0015-----
01588> -----
01589> 050:0002-----
01590> -----
01591> 050:0002-----
01592> -----
01593> 050:0002-----
01594> -----
01595> 050:0002-----
01596> -----
01597> 050:0002-----
01598> ** END OF RUN : 99
01599> -----
01600> *****
01601> *****
01602> *****
01603> *****
01604> *****
01605> *****
01606> *****
01607> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01608> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01609> TZERO = .00 hrs on 0
01610> METOUT= 2 (output= METRIC)
01611> NRUN = 100
01612> NSTORM= 1
01613> # 1=100YR.HYD
01614> -----
01615> 100:0002-----
01616> *****
01617> *# Project Name: [Project Eagle] Project Number: [161500301]
01618> *# Date : 2024-11-21
01619> *# Modeller : [AA,MYK]
01620> *# Company : Stantec Consulting Ltd. (London)
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01621> *# License # : 4730904
01622> *****
01623> *****
01624> *#
01625> *# This model represents the hydrologic characteristics of the Existing
01626> *# conditions.
01627> *# Storm events modeled are:
01628> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01629> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
01630> *# Regional Storm Event: 48hr Hurricane Hazel
01631> *#
01632> *****
01633> *****
01634> 100:0002-----
01635> -----
01636> | READ STORM | Filename: CHICAGO STORM 100 Years, 3hr from Colbor
01637> | Ptotal= 67.44 mm | Comments: CHICAGO STORM 100 Years, 3hr from Colbor
01638> -----
01639> | TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01640> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01641> |.08 6.710 |.83 17.742 |1.58 21.533 |2.33 9.322
01642> |.17 7.147 |.92 22.937 |1.67 18.501 |2.42 8.828
01643> |.25 7.657 |1.00 33.556 |1.75 16.290 |2.50 8.392
01644> |.33 8.261 |1.08 68.925 |1.83 14.603 |2.58 8.003
01645> |.42 8.990 |1.17 193.763 |1.92 13.270 |2.67 7.654
01646> |.50 9.891 |1.25 81.753 |2.00 12.188 |2.75 7.339
01647> |.58 11.034 |1.33 46.644 |2.08 11.291 |2.83 7.052
01648> |.67 12.541 |1.42 33.126 |2.17 10.533 |2.92 6.791
01649> |.75 14.629 |1.50 25.972 |2.25 9.884 |3.00 6.551
01650> -----
01651> -----
01652> 100:0003-----
01653> *****
01654> *#
01655> *# Existing Conditions - Internal Catchments
01656> *#
01657> *****
01658> -----
01659> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
01660> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01661> | U.H. Tp(hrs)= .230
01662> -----
01663> | Unit Hyd Qpeak (cms)= 5.503
01664> -----
01665> | PEAK FLOW (cms)= 4.413 (i)
01666> | TIME TO PEAK (hrs)= 1.417
01667> | RUNOFF VOLUME (mm)= 41.853
01668> | TOTAL RAINFALL (mm)= 67.442
01669> | RUNOFF COEFFICIENT = .621
01670> -----
01671> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01672> -----
01673> -----
01674> 100:0004-----
01675> -----
01676> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
01677> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01678> | U.H. Tp(hrs)= .180
01679> -----
01680> | Unit Hyd Qpeak (cms)= 6.640
01681> -----
01682> | PEAK FLOW (cms)= 6.085 (i)
01683> | TIME TO PEAK (hrs)= 1.380
01684> | RUNOFF VOLUME (mm)= 51.121
01685> | TOTAL RAINFALL (mm)= 67.442
01686> | RUNOFF COEFFICIENT = .758
01687> -----
01688> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01689> -----
01690> -----
01691> 100:0005-----
01692> -----
01693> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
01694> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01695> | U.H. Tp(hrs)= .110
01696> -----
01697> | Unit Hyd Qpeak (cms)= 3.160
01698> -----
01699> | PEAK FLOW (cms)= 2.130 (i)
01700> | TIME TO PEAK (hrs)= 1.267
01701> | RUNOFF VOLUME (mm)= 47.751
01702> | TOTAL RAINFALL (mm)= 67.442
01703> | RUNOFF COEFFICIENT = .708
01704> -----
01705> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01706> -----
01707> -----
01708> 100:0006-----
01709> -----
01710> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
01711> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01712> | U.H. Tp(hrs)= .100
01713> -----
01714> | Unit Hyd Qpeak (cms)= 1.700
01715> -----
01716> | PEAK FLOW (cms)= .968 (i)
01717> | TIME TO PEAK (hrs)= 1.250
01718> | RUNOFF VOLUME (mm)= 43.234
01719> | TOTAL RAINFALL (mm)= 67.442
01720> | RUNOFF COEFFICIENT = .641
01721> -----
01722> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01723> -----
01724> -----
01725> 100:0007-----
01726> *****
01727> *#
01728> *# Existing Conditions - External Catchments
01729> *#
01730> *****
01731> -----
01732> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
01733> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01734> | U.H. Tp(hrs)= .170
01735> -----
01736> | Unit Hyd Qpeak (cms)= 2.400
01737> -----
01738> | PEAK FLOW (cms)= 1.465 (i)
01739> | TIME TO PEAK (hrs)= 1.350
01740> | RUNOFF VOLUME (mm)= 36.861
01741> | TOTAL RAINFALL (mm)= 67.442
01742> | RUNOFF COEFFICIENT = .547
01743> -----
01744> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01745> -----
01746> -----
01747> 100:0008-----
01748> -----
01749> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
01750> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01751> | U.H. Tp(hrs)= .760
01752> -----
01753> | Unit Hyd Qpeak (cms)= 1.284
01754> -----
01755> | PEAK FLOW (cms)= 1.293 (i)
01756> -----
01757> -----
01758> -----
01759> -----
01760> -----
01761> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01762> -----
01763> -----
01764> 100:0009-----
01765> -----
01766> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
01767> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01768> | U.H. Tp(hrs)= .260
01769> -----
01770> | Unit Hyd Qpeak (cms)= 3.398
01771> -----
01772> | PEAK FLOW (cms)= 2.469 (i)
01773> | TIME TO PEAK (hrs)= 1.467
01774> | RUNOFF VOLUME (mm)= 36.861
01775> | TOTAL RAINFALL (mm)= 67.442
01776> | RUNOFF COEFFICIENT = .547
01777> -----
01778> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01779> -----
01780> -----
01781> 100:0010-----
01782> -----
01783> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
01784> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01785> | U.H. Tp(hrs)= .190
01786> -----
01787> | Unit Hyd Qpeak (cms)= 1.568
01788> -----
01789> | PEAK FLOW (cms)= 1.121 (i)
01790> | TIME TO PEAK (hrs)= 1.367
01791> | RUNOFF VOLUME (mm)= 40.529
01792> | TOTAL RAINFALL (mm)= 67.442
01793> | RUNOFF COEFFICIENT = .601
01794> -----
01795> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01796> -----
01797> -----
01798> 100:0011-----
01799> *****
01800> *#
01801> *# Existing Conditions - Flows to Headwater Drainage Features
01802> *#
01803> *****
01804> -----
01805> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01806> | (ha) (cms) (hrs) (mm) (cms)
01807> | ID1 02:101 31.29 6.085 1.35 51.12 .000
01808> | +ID2 08:303 7.80 1.121 1.37 40.53 .000
01809> |=====|
01810> | SUM 09:ToH1 39.09 7.199 1.35 49.01 .000
01811> -----
01812> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01813> -----
01814> -----
01815> 100:0012-----
01816> -----
01817> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01818> | (ha) (cms) (hrs) (mm) (cms)
01819> | ID1 03:102 9.10 2.130 1.27 47.75 .000
01820> | +ID2 07:302 23.13 2.469 1.47 36.86 .000
01821> |=====|
01822> | SUM 02:ToH2S2 32.23 3.970 1.33 39.94 .000
01823> -----
01824> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01825> -----
01826> -----
01827> 100:0013-----
01828> -----
01829> | ADD HYD (ToNorthDit ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01830> | (ha) (cms) (hrs) (mm) (cms)
01831> | ID1 01:100 33.14 4.413 1.42 41.85 .000
01832> | +ID2 05:300 10.68 1.465 1.35 36.86 .000
01833> |=====|
01834> | SUM 03:ToNorthDit 43.82 5.812 1.40 40.64 .000
01835> -----
01836> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01837> -----
01838> -----
01839> 100:0014-----
01840> -----
01841> | ADD HYD (ToWellandR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01842> | (ha) (cms) (hrs) (mm) (cms)
01843> | ID1 04:103 4.45 .968 1.25 43.23 .000
01844> | +ID2 06:301 25.55 1.293 2.13 35.73 .000
01845> |=====|
01846> | SUM 05:ToWellandR 30.00 1.422 2.08 36.84 .000
01847> -----
01848> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01849> -----
01850> -----
01851> 100:0015-----
01852> -----
01853> -----
01854> 100:0002-----
01855> 100:0002-----
01856> -----
01857> 100:0002-----
01858> -----
01859> 100:0002-----
01860> -----
01861> 100:0002-----
01862> -----
01863> 100:0002-----
01864> ** END OF RUN : 250
01865> -----
01866> *****
01867> -----
01868> -----
01869> -----
01870> -----
01871> -----
01872> -----
01873> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01874> |-----| Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01875> | TZERO = .00 hrs on 0
01876> | METOUT= 2 (output = METRIC)
01877> | NRUN = 251
01878> | NSTORM= 1
01879> | # 1=hurhaz48.stm
01880> -----
01881> 251:0002-----
01882> *****
01883> *# Project Name: [Project Eagle] Project Number: [161500301]
01884> *# Date : 2024-11-21
01885> *# Modeller : [AA,MYK]
01886> *# Company : Stantec Consulting Ltd. (London)
01887> *# License # : 4730904
01888> *****
01889> *****
01890> *#
```

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01891> *# This model represents the hydrologic characteristics of the Existing
01892> *# conditions.
01893> *# Storm events modeled are:
01894> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01895> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
01896> *# Regional Storm Event: 48hr Hurricane Hazel
01897> *#
01898> *#-----
01899> *#
01900> 251:0002-----
01901>
01902> | READ STORM | Filename: REGIONAL STORM
01903> | Ptotal= 285.00 mm | Comments: REGIONAL STORM
01904>
01905>
01906>
01907>
01908>
01909>
01910>
01911>
01912>
01913>
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01948>
01949>
01950>
01951>
01952>
01953>
01954>
01955>
01956>
01957> 251:0003-----
01958> *#-----
01959> *#
01960> *# Existing Conditions - Internal Catchments
01961> *#
01962> *#-----
01963>
01964> | DESIGN NASHYD | Area (ha)= 33.14 Curve Number (CN)=87.00
01965> | 01:100 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01966> | U.H. Tp(hrs)= .230
01967>
01968>
01969>
01970>
01971>
01972>
01973>
01974>
01975>
01976>
01977>
01978>
01979> 251:0004-----
01980>
01981> | DESIGN NASHYD | Area (ha)= 31.29 Curve Number (CN)=93.00
01982> | 02:101 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01983> | U.H. Tp(hrs)= .180
01984>
01985>
01986>
01987>
01988>
01989>
01990>
01991>
01992>
01993>
01994>
01995>
01996> 251:0005-----
01997>
01998> | DESIGN NASHYD | Area (ha)= 9.10 Curve Number (CN)=91.00
01999> | 03:102 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02000> | U.H. Tp(hrs)= .110
02001>
02002>
02003>
02004>
02005>
02006>
02007>
02008>
02009>
02010>
02011>
02012>
02013> 251:0006-----
02014>
02015> | DESIGN NASHYD | Area (ha)= 4.45 Curve Number (CN)=88.00
02016> | 04:103 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02017> | U.H. Tp(hrs)= .100
02018>
02019>
02020>
02021>
02022>
02023>
02024>
02025>

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02026>
02027>
02028> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02029>
02030> 251:0007-----
02031> *#-----
02032> *#
02033> *# Existing Conditions - External Catchments
02034> *#
02035> *#-----
02036>
02037> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
02038> | 05:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02039> | U.H. Tp(hrs)= .170
02040>
02041>
02042>
02043>
02044>
02045>
02046>
02047>
02048>
02049>
02050>
02051>
02052> 251:0008-----
02053>
02054> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
02055> | 06:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02056> | U.H. Tp(hrs)= .760
02057>
02058>
02059>
02060>
02061>
02062>
02063>
02064>
02065>
02066>
02067>
02068>
02069> 251:0009-----
02070>
02071> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
02072> | 07:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02073> | U.H. Tp(hrs)= .760
02074>
02075>
02076>
02077>
02078>
02079>
02080>
02081>
02082>
02083>
02084>
02085>
02086> 251:0010-----
02087>
02088> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
02089> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02090> | U.H. Tp(hrs)= .190
02091>
02092>
02093>
02094>
02095>
02096>
02097>
02098>
02099>
02100>
02101>
02102>
02103> 251:0011-----
02104> *#-----
02105> *#
02106> *# Existing Conditions - Flows to Headwater Drainage Features
02107> *#
02108> *#-----
02109>
02110> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02111> | (ha) (cms) (hrs) (mm) (cms)
02112> | ID1 02:101 31.29 4.576 46.00 265.59 .000
02113> | +ID2 08:303 7.80 1.118 46.00 247.41 .000
02114> |
02115> | SUM 09:ToH1 39.09 5.695 46.00 261.96 .000
02116>
02117>
02118>
02119>
02120> 251:0012-----
02121>
02122> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02123> | (ha) (cms) (hrs) (mm) (cms)
02124> | ID1 03:102 9.10 1.326 46.00 260.42 .000
02125> | +ID2 07:302 23.13 3.240 46.03 239.54 .000
02126> |
02127> | SUM 02:ToH2S2 32.23 4.561 46.02 245.44 .000
02128>
02129>
02130>
02131>
02132> 251:0013-----
02133>
02134> | ADD HYD (ToNorthDit ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02135> | (ha) (cms) (hrs) (mm) (cms)
02136> | ID1 01:100 33.14 4.747 46.02 250.03 .000
02137> | +ID2 05:300 10.68 1.514 46.00 239.54 .000
02138> |
02139> | SUM 03:ToNorthDit 43.82 6.261 46.02 247.47 .000
02140>
02141>
02142>
02143>
02144> 251:0014-----
02145>
02146> | ADD HYD (ToWellandR ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02147> | (ha) (cms) (hrs) (mm) (cms)
02148> | ID1 04:103 4.45 1.643 46.00 252.63 .000
02149> | +ID2 06:301 25.55 2.846 46.80 236.91 .000
02150> |
02151> | SUM 05:ToWellandR 30.00 3.309 46.80 239.24 .000
02152>
02153>
02154>
02155>
02156> 251:0015-----
02157>
02158>
02159>
02160> 251:0002-----

```

02161> -----
02162> 251:0002-----
02163> -----
02164> 251:0002-----
02165> -----
02166> 251:0002-----
02167> -----
02168> 251:0002-----
02169> -----
02170> 251:0002-----
02171> FINISH
02172> -----
02173> *****
02174> WARNINGS / ERRORS / NOTES
02175> -----
02176> Simulation ended on 2024-11-21 at 10:41:20
02177> =====
02178> -----
02179> -----

```
00001> 2 Metric units
00002> #*****
00003> # Project Name: [Project Eagle] Project Number: [161500301]
00004> # Date : 2024-11-21
00005> # Modeller : [AA,MVK]
00006> # Company : Stantec Consulting Ltd. (London)
00007> # License # : 4730904
00008> #*****
00009> #*****
00010> #
00011> # This model represents the hydrologic characteristics of the Proposed
00012> # conditions.
00013> # Storm events modeled are:
00014> # 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00015> # 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00016> # Regional Storm Event: 48hr Hurricane Hazel
00017> #
00018> #*****
00019> #-----|-----
00020> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[1]
00021> # ["ldn25mm.4hr"] <--storm filename, one per line for NSTORM
00022> #-----|-----
00023> READ STORM STORM_FILENAME=["STORM.001"]
00024> #-----|-----
00025> #*****
00026> #
00027> # Proposed conditions - Internal Catchments
00028> #
00029> #*****
00030> CALIB STANDHYD ID=[01], NHYD=["201"], DT=[1] (min), AREA=[31.02] (ha),
00031> XIMP=[0.99], TIMP=[0.99], DWF=[0.0] (cms), LOSS=[2],
00032> SCS curve number CN=[80],
00033> Pervious surfaces: IAPER=[5] (mm), SLPP=[2] (%),
00034> LGP=[25] (m), MNP=[0.24], SCP=[0] (min),
00035> Impervious surfaces: IAIMP=[2] (mm), SLPI=[2] (%),
00036> LGI=[110] (m), MNI=[0.013], SCI=[0] (min)
00037> RAINFALL=[ , , , ] (mm/hr), END=-1
00038> #-----|-----
00039> CALIB STANDHYD ID=[02], NHYD=["202"], DT=[1] (min), AREA=[12.00] (ha),
00040> XIMP=[0.99], TIMP=[0.99], DWF=[0.0] (cms), LOSS=[2],
00041> SCS curve number CN=[80],
00042> Pervious surfaces: IAPER=[5] (mm), SLPP=[2] (%),
00043> LGP=[25] (m), MNP=[0.24], SCP=[0] (min),
00044> Impervious surfaces: IAIMP=[2] (mm), SLPI=[2] (%),
00045> LGI=[110] (m), MNI=[0.013], SCI=[0] (min)
00046> RAINFALL=[ , , , ] (mm/hr), END=-1
00047> #-----|-----
00048> CALIB STANDHYD ID=[03], NHYD=["203"], DT=[1] (min), AREA=[28.00] (ha),
00049> XIMP=[0.99], TIMP=[0.99], DWF=[0.0] (cms), LOSS=[2],
00050> SCS curve number CN=[80],
00051> Pervious surfaces: IAPER=[5] (mm), SLPP=[2] (%),
00052> LGP=[25] (m), MNP=[0.24], SCP=[0] (min),
00053> Impervious surfaces: IAIMP=[2] (mm), SLPI=[2] (%),
00054> LGI=[110] (m), MNI=[0.013], SCI=[0] (min)
00055> RAINFALL=[ , , , ] (mm/hr), END=-1
00056> #-----|-----
00057> CALIB STANDHYD ID=[04], NHYD=["204"], DT=[1] (min), AREA=[5.44] (ha),
00058> XIMP=[0.99], TIMP=[0.99], DWF=[0.02381] (cms), LOSS=[2],
00059> SCS curve number CN=[80],
00060> Pervious surfaces: IAPER=[5] (mm), SLPP=[2] (%),
00061> LGP=[25] (m), MNP=[0.24], SCP=[0] (min),
00062> Impervious surfaces: IAIMP=[2] (mm), SLPI=[2] (%),
00063> LGI=[110] (m), MNI=[0.013], SCI=[0] (min)
00064> RAINFALL=[ , , , ] (mm/hr), END=-1
00065> #-----|-----
00066> CALIB STANDHYD ID=[05], NHYD=["205"], DT=[1] (min), AREA=[1.50] (ha),
00067> XIMP=[0.99], TIMP=[0.99], DWF=[0.0] (cms), LOSS=[2],
00068> SCS curve number CN=[80],
00069> Pervious surfaces: IAPER=[5] (mm), SLPP=[2] (%),
00070> LGP=[25] (m), MNP=[0.24], SCP=[0] (min),
00071> Impervious surfaces: IAIMP=[2] (mm), SLPI=[2] (%),
00072> LGI=[110] (m), MNI=[0.013], SCI=[0] (min)
00073> RAINFALL=[ , , , ] (mm/hr), END=-1
00074> #-----|-----
00075> #*****
00076> #
00077> # Proposed conditions - SWMF#1
00078> #
00079> #*****
00080> ROUTE RESERVOIR IDout=[06], NHYD=["SWMF#1"], IDin=[01],
00081> RDT=[1] (min),
00082> TABLE of ( OUTFLOW-STORAGE ) values
00083> (cms) - (ha-m)
00084> [ 0.0 , 0.0 ]
00085> [ 0.016 , 0.1780 ]
00086> [ 0.063 , 0.3614 ]
00087> [ 0.138 , 0.5503 ]
00088> [ 0.346 , 0.7448 ]
00089> [ 0.665 , 0.9448 ]
00090> [ 1.062 , 1.1504 ]
00091> [ 1.521 , 1.3618 ]
00092> [ 2.289 , 1.8018 ]
00093> [ 2.948 , 2.2653 ]
00094> [ 6.164 , 2.5140 ]
00095> [ 11.997 , 2.7762 ]
00096> [ 19.770 , 3.0443 ]
00097> [ 1 , -1 ] (max twenty pts)
00098> IDovf=[07], NHYDovf=["Overflow-SE"]
00099> #-----|-----
00100> #*****
00101> #
00102> # Proposed conditions - External Undeveloped Area Located Southeast of the Sit
00103> #
00104> #*****
00105> DESIGN NASHYD ID=[08], NHYD=["303"], DT=[1] min, AREA=[7.80] (ha),
00106> DWF=[0.0] (cms), CN/C=[86], TP=[0.19] hrs,
00107> RAINFALL=[ , , , ] (mm/hr), END=-1
00108> #-----|-----
00109> #*****
00110> #
00111> # Proposed Conditions - Flows to Headwater Drainage Feature H1
00112> #
00113> #*****
00114> ADD HYD IDsum=[09], NHYD=["ToH1"], IDs to add=[06+07+08]
00115> #-----|-----
00116> #*****
00117> #
00118> # Proposed conditions - SWMF#2
00119> #
00120> #*****
00121> ADD HYD IDsum=[06], NHYD=["ToSWMF#2"], IDs to add=[02+05]
00122> #-----|-----
00123> ROUTE RESERVOIR IDout=[07], NHYD=["SWMF#2"], IDin=[06],
00124> RDT=[1] (min),
00125> TABLE of ( OUTFLOW-STORAGE ) values
00126> (cms) - (ha-m)
00127> [ 0.0 , 0.0 ]
00128> [ 0.013 , 0.0766 ]
00129> [ 0.049 , 0.1562 ]
00130> [ 0.106 , 0.2382 ]
00131> [ 0.336 , 0.3225 ]
00132> [ 0.727 , 0.4087 ]
00133> [ 1.333 , 0.4970 ]
00134> [ 1.982 , 0.5874 ]
00135> [ 2.164 , 0.6799 ]
00136> [ 2.345 , 0.7745 ]
00137> [ 3.689 , 0.8712 ]
00138> [ 6.218 , 0.9700 ]
00139> [ 9.668 , 1.0709 ]
00140> [ -1 , -1 ] (max twenty pts)
00141> IDovf=[08], NHYDovf=["Overflow-SW"]
00142> #-----|-----
00143> ADD HYD IDsum=[05], NHYD=["FromSWMF#2"], IDs to add=[07+08]
00144> #-----|-----
00145> COMPUTE DUALHYD IDin=[05], CINLET=[0.6411] (cms), NINLET=[1],
00146> MAJID=[01], MajNHYD=["ToWelland"],
00147> MINID=[02], MinNHYD=["ToHWF"],
00148> TMSTO=[0] (cu-m)
00149> #-----|-----
00150> #*****
00151> #
00152> # Proposed conditions - External Undeveloped Area Located Southwest of the Sit
00153> #
00154> #*****
00155> DESIGN NASHYD ID=[05], NHYD=["302"], DT=[1] min, AREA=[23.13] (ha),
00156> DWF=[0.0] (cms), CN/C=[83], TP=[0.26] hrs,
00157> RAINFALL=[ , , , ] (mm/hr), END=-1
00158> #-----|-----
00159> #*****
00160> #
00161> # Proposed Conditions - Flows to Headwater Drainage Feature H2S2
00162> #
00163> #*****
00164> ADD HYD IDsum=[06], NHYD=["ToH2S2"], IDs to add=[02+05]
00165> #-----|-----
00166> #*****
00167> #
00168> # Proposed conditions - SWMF#3
00169> #
00170> #*****
00171> ROUTE RESERVOIR IDout=[05], NHYD=["SWMF#3"], IDin=[03],
00172> RDT=[1] (min),
00173> TABLE of ( OUTFLOW-STORAGE ) values
00174> (cms) - (ha-m)
00175> IDovf=[06], NHYDovf=["Overflow-NE"]
00176> #-----|-----
00177> #
00178> #
00179> # Proposed conditions - External Undeveloped Area Located Northwest of the Sit
00180> #
00181> #*****
00182> DESIGN NASHYD ID=[03], NHYD=["302"], DT=[1] min, AREA=[10.68] (ha),
00183> DWF=[0.0] (cms), CN/C=[83], TP=[0.14] hrs,
00184> RAINFALL=[ , , , ] (mm/hr), END=-1
00185> #-----|-----
00186> #*****
00187> #
00188> # Proposed Conditions - Flows to North Ditch
00189> #
00190> #*****
00191> ADD HYD IDsum=[02], NHYD=["ToNorthDitch"], IDs to add=[03+05+06]
00192> #-----|-----
00193> #*****
00194> #
00195> # Proposed conditions - SWMF#4
00196> #
00197> #*****
00198> ROUTE RESERVOIR IDout=[06], NHYD=["SWMF#4"], IDin=[04],
00199> RDT=[1] (min),
00200> TABLE of ( OUTFLOW-STORAGE ) values
00201> (cms) - (ha-m)
00202> [ 0.0 , 0.0 ]
00203> [ 0.005 , 0.0324 ]
00204> [ 0.008 , 0.0674 ]
00205> [ 0.010 , 0.1043 ]
00206> [ 0.335 , 0.1431 ]
00207> [ 0.926 , 0.1837 ]
00208> [ 1.692 , 0.2261 ]
00209> [ 2.757 , 0.2703 ]
00210> [ 3.341 , 0.3162 ]
00211> [ 3.625 , 0.3398 ]
00212> [ -1 , -1 ] (max twenty pts)
00213> IDovf=[07], NHYDovf=["Overflow-NW"]
00214> #-----|-----
00215> #*****
00216> #
00217> # Proposed conditions - External Undeveloped Area Located West of the Site
00218> #
00219> #*****
00220> DESIGN NASHYD ID=[01], NHYD=["301"], DT=[1] min, AREA=[25.55] (ha),
00221> DWF=[0.0] (cms), CN/C=[82], TP=[0.70] hrs,
00222> RAINFALL=[ , , , ] (mm/hr), END=-1
00223> #-----|-----
00224> #*****
00225> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[2]
00226> # ["002YR.HYD"] <--storm filename, one per line for NSTORM ti
00227> #-----|-----
00228> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[5]
00229> # ["005YR.HYD"] <--storm filename, one per line for NSTORM ti
00230> #-----|-----
00231> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[10]
00232> # ["10YR.HYD"] <--storm filename, one per line for NSTORM tim
00233> #-----|-----
00234> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[25]
00235> # ["25YR.HYD"] <--storm filename, one per line for NSTORM tim
00236> #-----|-----
00237> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[50]
00238> # ["50YR.HYD"] <--storm filename, one per line for NSTORM tim
00239> #-----|-----
00240> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[100]
00241> # ["100YR.HYD"] <--storm filename, one per line for NSTORM ti
00242> #-----|-----
00243> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[251]
00244> # ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
00245> #-----|-----
00246> FINISH
00247> #
00248> #
00249> #
00250> #
00251> #
00252> #
00253> #
00254> #
00255> #
00256> #
00257> #
00258> #
00259> #
00260> #
00261> #
00262> #
00263> #
00264> #
00265> #
00266> #
00267> #
00268> #
00269> #
```

```
00001> =====
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999
00004> S W W M M M H H Y Y M M M O O 9 9 9 9
00005> SSSSS W W M M M H H H Y Y M M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M M H H Y Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y Y M M O O 9 9 9
00008> ***** # 4730904 *****
00009> StormWater Management Hydrologic Model 999 999
00010>
00011> *****
00012> ***** SWHYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhyom@fsa.com *****
00021> *****
00022>
00023> *****
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** Kitchener SERIAL#:4730904 *****
00026> *****
00027> *****
00028> *****
00029> ***** PROGRAM ARRAY DIMENSIONS *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034>
00035>
00036> ***** D E T A I L E D O U T P U T *****
00037> *****
00038> ***** DATE: 2024-11-22 TIME: 13:32:38 RUN COUNTER: 000554 *****
00039> *****
00040> * Input filename: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\prop.dat *
00041> * Output filename: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\prop.out *
00042> * Summary filename: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\prop.sum *
00043> * User comments: *
00044> * 1: *****
00045> * 2: *****
00046> * 3: *****
00047> *****
00048>
00049>
00050> 001:0001-----
00051> *# Project Name: [Project Eagle] Project Number: [161500301]
00052> *# Date : [2024-11-22]
00053> *# Modeller : [AA,MYK]
00054> *# Company : Stantec Consulting Ltd. (London)
00055> *# License # : 4730904
00056> *****
00057> *****
00058> *****
00059> *****
00060> *# This model represents the hydrologic characteristics of the Proposed
00061> *# conditions.
00062> *# Storm events modeled are:
00063> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00064> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00065> *# Regional Storm Event: 48hr Hurricane Hazel
00066> *#
00067> *****
00068> *****
00069> | START | Project dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
00070> | Rainfall dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
00071> | TZERO = .00 hrs on 0
00072> | METOUT= 2 (output = METRIC)
00073> | NRUN = 001
00074> | NSTORM= 1
00075> | # 1=1dn25mm.4hr
00076> *****
00077> 001:0002-----
00078> *****
00079> | READ STORM | Filename: 25mm, 4hr Chicago Storm from London IDF
00080> | Ptotal= 25.05 mm | Comments: 25mm, 4hr Chicago Storm from London IDF
00081> *****
00082> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00083> hrs mm/hr hrs mm/hr hrs mm/hr hrs mm/hr
00084> .08 1.406 | 1.08 6.875 | 2.08 4.268 | 3.08 1.931
00085> .17 1.497 | 1.17 10.874 | 2.17 3.856 | 3.17 1.851
00086> .25 1.601 | 1.25 25.649 | 2.25 3.521 | 3.25 1.779
00087> .33 1.722 | 1.33 75.607 | 2.33 3.242 | 3.33 1.712
00088> .42 1.866 | 1.42 33.194 | 2.42 3.006 | 3.42 1.650
00089> .50 2.039 | 1.50 18.435 | 2.50 2.804 | 3.50 1.594
00090> .58 2.251 | 1.58 12.551 | 2.58 2.629 | 3.58 1.541
00091> .67 2.519 | 1.67 9.468 | 2.67 2.477 | 3.67 1.492
00092> .75 2.866 | 1.75 7.594 | 2.75 2.342 | 3.75 1.446
00093> .83 3.335 | 1.83 6.343 | 2.83 2.222 | 3.83 1.404
00094> .92 4.007 | 1.92 5.451 | 2.92 2.115 | 3.92 1.364
00095> 1.00 5.048 | 2.00 4.784 | 3.00 2.018 | 4.00 1.326
00096> *****
00097> *****
00098> 001:0003-----
00099> *# *****
00100> *#
00101> *# Proposed conditions - Internal Catchments
00102> *#
00103> *# *****
00104> *****
00105> | CALIB STANDHYD | Area (ha)= 31.02
00106> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00107> *****
00108> *****
00109> Surface Area (ha)= 30.71 IMPERVIOUS PERVIOUS (i)
00110> Dep. Storage (mm)= 2.00 .31
00111> Average Slope (%)= 2.00 5.00
00112> Length (m)= 110.00 25.00
00113> Mannings n = .013 .240
00114>
00115> Max.eff.Inten.(mm/hr)= 75.61 6.65
00116> over (min) 2.00 18.00
00117> Storage Coeff. (min)= 2.46 (ii) 17.82 (ii)
00118> Unit Hyd. Tpeak (min)= 2.00 18.00
00119> Unit Hyd. peak (cms)= .49 .06
00120> *****
00121> PEAK FLOW (cms)= 5.70 .00 *TOTALS*
00122> TIME TO PEAK (hrs)= 1.33 1.72 1.333
00123> RUNOFF VOLUME (mm)= 23.05 4.81 22.865
00124> TOTAL RAINFALL (mm)= 25.05 25.05 25.048
00125> RUNOFF COEFFICIENT = .92 .19 .913
00126>
00127> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00128> CN* = 80.0 Ia = Dep. Storage (Above)
00129> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00130> THAN THE STORAGE COEFFICIENT.
00131> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00132>
00133>
00134> 001:0004-----
00135> *****
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00136> | CALIB STANDHYD | Area (ha)= 12.00
00137> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00138> *****
00139> ***** IMPERVIOUS PERVIOUS (i)
00140> Surface Area (ha)= 11.88 .12
00141> Dep. Storage (mm)= 2.00 5.00
00142> Average Slope (%)= 2.00 2.00
00143> Length (m)= 110.00 25.00
00144> Mannings n = .013 .240
00145>
00146> Max.eff.Inten.(mm/hr)= 75.61 6.65
00147> over (min) 2.00 18.00
00148> Storage Coeff. (min)= 2.46 (ii) 17.82 (ii)
00149> Unit Hyd. Tpeak (min)= 2.00 18.00
00150> Unit Hyd. peak (cms)= .49 .06
00151> *****
00152> PEAK FLOW (cms)= 2.21 .00 *TOTALS*
00153> TIME TO PEAK (hrs)= 1.33 1.72 1.333
00154> RUNOFF VOLUME (mm)= 23.05 4.81 22.865
00155> TOTAL RAINFALL (mm)= 25.05 25.05 25.048
00156> RUNOFF COEFFICIENT = .92 .19 .913
00157>
00158> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00159> CN* = 80.0 Ia = Dep. Storage (Above)
00160> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00161> THAN THE STORAGE COEFFICIENT.
00162> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00163> *****
00164> *****
00165> 001:0005-----
00166> *****
00167> | CALIB STANDHYD | Area (ha)= 28.00
00168> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00169> *****
00170> ***** IMPERVIOUS PERVIOUS (i)
00171> Surface Area (ha)= 27.72 .28
00172> Dep. Storage (mm)= 2.00 5.00
00173> Average Slope (%)= 2.00 2.00
00174> Length (m)= 110.00 25.00
00175> Mannings n = .013 .240
00176>
00177> Max.eff.Inten.(mm/hr)= 75.61 6.65
00178> over (min) 2.00 18.00
00179> Storage Coeff. (min)= 2.46 (ii) 17.82 (ii)
00180> Unit Hyd. Tpeak (min)= 2.00 18.00
00181> Unit Hyd. peak (cms)= .49 .06
00182> *****
00183> PEAK FLOW (cms)= 5.15 .00 *TOTALS*
00184> TIME TO PEAK (hrs)= 1.33 1.72 1.333
00185> RUNOFF VOLUME (mm)= 23.05 4.81 22.865
00186> TOTAL RAINFALL (mm)= 25.05 25.05 25.048
00187> RUNOFF COEFFICIENT = .92 .19 .913
00188>
00189> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00190> CN* = 80.0 Ia = Dep. Storage (Above)
00191> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00192> THAN THE STORAGE COEFFICIENT.
00193> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00194> *****
00195> *****
00196> 001:0006-----
00197> *****
00198> | CALIB STANDHYD | Area (ha)= 5.44
00199> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00200> *****
00201> ***** IMPERVIOUS PERVIOUS (i)
00202> Surface Area (ha)= 5.39 .05
00203> Dep. Storage (mm)= 2.00 5.00
00204> Average Slope (%)= 2.00 2.00
00205> Length (m)= 110.00 25.00
00206> Mannings n = .013 .240
00207>
00208> Max.eff.Inten.(mm/hr)= 75.61 6.65
00209> over (min) 2.00 18.00
00210> Storage Coeff. (min)= 2.46 (ii) 17.82 (ii)
00211> Unit Hyd. Tpeak (min)= 2.00 18.00
00212> Unit Hyd. peak (cms)= .49 .06
00213> *****
00214> PEAK FLOW (cms)= 1.00 .00 *TOTALS*
00215> TIME TO PEAK (hrs)= 1.33 1.72 1.333
00216> RUNOFF VOLUME (mm)= 23.05 4.81 22.865
00217> TOTAL RAINFALL (mm)= 25.05 25.05 25.048
00218> RUNOFF COEFFICIENT = .92 .19 .913
00219>
00220> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00221> CN* = 80.0 Ia = Dep. Storage (Above)
00222> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00223> THAN THE STORAGE COEFFICIENT.
00224> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00225> ACTUAL QPEAK: PEAK( 1.00 ) + QBASE( .02 ) = 1.02 (cms)
00226>
00227> *****
00228> *****
00229> *****
00230> | CALIB STANDHYD | Area (ha)= 1.50
00231> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00232> *****
00233> ***** IMPERVIOUS PERVIOUS (i)
00234> Surface Area (ha)= 1.49 .01
00235> Dep. Storage (mm)= 2.00 5.00
00236> Average Slope (%)= 2.00 2.00
00237> Length (m)= 110.00 25.00
00238> Mannings n = .013 .240
00239>
00240> Max.eff.Inten.(mm/hr)= 75.61 6.65
00241> over (min) 2.00 18.00
00242> Storage Coeff. (min)= 2.46 (ii) 17.82 (ii)
00243> Unit Hyd. Tpeak (min)= 2.00 18.00
00244> Unit Hyd. peak (cms)= .49 .06
00245> *****
00246> PEAK FLOW (cms)= .28 .00 *TOTALS*
00247> TIME TO PEAK (hrs)= 1.33 1.72 1.333
00248> RUNOFF VOLUME (mm)= 23.05 4.81 22.865
00249> TOTAL RAINFALL (mm)= 25.05 25.05 25.048
00250> RUNOFF COEFFICIENT = .92 .19 .913
00251>
00252> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00253> CN* = 80.0 Ia = Dep. Storage (Above)
00254> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00255> THAN THE STORAGE COEFFICIENT.
00256> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00257> *****
00258> *****
00259> 001:0008-----
00260> *# *****
00261> *#
00262> *# Proposed conditions - SWMP#1
00263> *# *****
00264> *****
00265> *****
00266> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00267> | IN:01: (201 ) | *****
00268> | OUT:06: (SWMP#1) | *****
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00948> *****
00949> *****
00950> *****
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00972> *****
00973> *****
00974> *****
00975> *****
00976> *****
00977> *****
00978> *****
00979> *****
00980> *****
00981> *****
00982> *****
00983> *****
0
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```
00271> .000 .0000E+00 | 1.521 .1362E+01
00272> .016 .1780E+00 | 2.289 .1802E+01
00273> .063 .3614E+00 | 2.948 .2265E+01
00274> .138 .5503E+00 | 6.164 .2514E+01
00275> .346 .7448E+00 | 11.997 .2776E+01
00276> .665 .9448E+00 | 19.770 .3044E+01
00277> 1.062 .1150E+01 | .000 .0000E+00
00278>
00279> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00280> ----- (ha) (cms) (hrs) (mm)
00281> INFLOW >01: (201 ) 31.02 5.704 1.333 22.865
00282> OUTFLOW<06: (SWMF#1) 31.02 .166 3.100 22.864
00283> OVERFLOW<07: (Overfl) .00 .000 .000 .000
00284>
00285> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00286> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00287> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00288>
00289> PEAK FLOW REDUCTION [Qout/Qin] (%)= 2.909
00290> TIME SHIFT OF PEAK FLOW (min)= 106.00
00291> MAXIMUM STORAGE USED (ha.m.)=.5764E+00
00292>
00293>
00294>
00295> 001:0009-----
00296> *****
00297> *#
00298> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
00299> *****
00300> *****
00301>
00302> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00303> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00304> U.H. Tp(hrs)= .190
00305>
00306> Unit Hyd Qpeak (cms)= 1.568
00307>
00308> PEAK FLOW (cms)= .217 (i)
00309> TIME TO PEAK (hrs)= 1.567
00310> RUNOFF VOLUME (mm)= 8.544
00311> TOTAL RAINFALL (mm)= 25.048
00312> RUNOFF COEFFICIENT = .341
00313>
00314> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00315>
00316>
00317> 001:0010-----
00318> *****
00319> *#
00320> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
00321> *#
00322> *****
00323>
00324> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00325> ----- (ha) (cms) (hrs) (mm) (cms)
00326> ID1 06:SWMF#1 31.02 .166 3.10 22.86 .000
00327> +ID2 07:Overflow-S .00 .000 .00 .00 .000
00328> +ID3 08:303 7.80 .217 1.57 8.54 .000
00329>
00330> SUM 09:ToH1 38.82 .318 1.60 19.99 .000
00331>
00332> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00333>
00334>
00335> 001:0011-----
00336> *****
00337> *#
00338> *# Proposed conditions - SWMF#2
00339> *#
00340> *****
00341>
00342> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00343> ----- (ha) (cms) (hrs) (mm) (cms)
00344> ID1 02:202 12.00 2.207 1.33 22.87 .000
00345> +ID2 05:205 1.50 .276 1.33 22.87 .000
00346>
00347> SUM 06:ToSWMF#2 13.50 2.483 1.33 22.87 .000
00348>
00349> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00350>
00351>
00352> 001:0012-----
00353> *****
00354> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00355> | IN>06: (ToSWMF) |
00356> | OUT<07: (SWMF#2) |
00357>
00358> ===== OUTFLOW STORAGE TABLE =====
00359> OUTFLOW STORAGE | OUTFLOW STORAGE
00360> (cms) (ha.m.) | (cms) (ha.m.)
00361> .000 .0000E+00 | 1.982 .5874E+00
00362> .013 .7660E-01 | 2.164 .6799E+00
00363> .049 .1562E+00 | 2.345 .7745E+00
00364> .106 .2382E+00 | 3.689 .8712E+00
00365> .336 .3225E+00 | 6.218 .9700E+00
00366> .727 .4087E+00 | 9.668 .1071E+01
00367> 1.333 .4970E+00 | .000 .0000E+00
00368>
00369> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00370> ----- (ha) (cms) (hrs) (mm)
00371> INFLOW >06: (ToSWMF) 13.50 2.483 1.333 22.865
00372> OUTFLOW<07: (SWMF#2) 13.50 .102 2.533 22.865
00373> OVERFLOW<08: (Overfl) .00 .000 .000 .000
00374>
00375> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00376> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00377> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00378>
00379> PEAK FLOW REDUCTION [Qout/Qin] (%)= 4.119
00380> TIME SHIFT OF PEAK FLOW (min)= 72.00
00381> MAXIMUM STORAGE USED (ha.m.)=.2382E+00
00382>
00383> 001:0013-----
00384> *****
00385> | ADD HYD (FromSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00386> ----- (ha) (cms) (hrs) (mm) (cms)
00387> ID1 07:SWMF#2 13.50 .102 2.53 22.86 .000
00388> +ID2 08:Overflow-S .00 .000 .00 .00 .000
00389>
00390> SUM 05:FromSWMF#2 13.50 .102 2.53 22.86 .000
00391>
00392> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00393>
00394>
00395> 001:0014-----
00396> *****
00397> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
00398> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = .641 (cms)
00399> Total minor system capacity = .641 (cms)
00400> Total major system storage [TMJSTO] = 0 (cu.m.)
00401>
00402> ID: NHYD AREA QPEAK TPEAK R.V. DWF
00403> (ha) (cms) (hrs) (mm) (cms)
00404> 05:FromSW 13.50 .102 2.533 22.865 .000
00405>
00406> MAJOR SYST 01:ToWell .00 .000 .000 .000 .000
00407> MINOR SYST 02:ToHWF 13.50 .102 2.533 22.865 .000
00408>
00409> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00410>
00411>
00412> 001:0015-----
00413> *****
00414> *#
00415> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
00416> *#
00417> *****
00418>
00419> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00420> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00421> U.H. Tp(hrs)= .260
00422>
00423> Unit Hyd Qpeak (cms)= 3.398
00424>
00425> PEAK FLOW (cms)= .452 (i)
00426> TIME TO PEAK (hrs)= 1.667
00427> RUNOFF VOLUME (mm)= 7.337
00428> TOTAL RAINFALL (mm)= 25.048
00429> RUNOFF COEFFICIENT = .293
00430>
00431> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00432>
00433>
00434> 001:0016-----
00435> *****
00436> *#
00437> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
00438> *#
00439> *****
00440>
00441> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00442> ----- (ha) (cms) (hrs) (mm) (cms)
00443> ID1 02:ToHWF 13.50 .102 2.53 22.86 .000
00444> +ID2 05:302 23.13 .452 1.67 7.34 .000
00445>
00446> SUM 06:ToH2S2 36.63 .537 1.68 13.06 .000
00447>
00448> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00449>
00450>
00451> 001:0017-----
00452> *****
00453> *#
00454> *# Proposed conditions - SWMF#3
00455> *#
00456> *****
00457>
00458> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00459> | IN>03: (203 ) |
00460> | OUT<05: (SWMF#3) |
00461>
00462> ===== OUTFLOW STORAGE TABLE =====
00463> OUTFLOW STORAGE | OUTFLOW STORAGE
00464> (cms) (ha.m.) | (cms) (ha.m.)
00465> .000 .0000E+00 | 1.743 .1163E+01
00466> .015 .1533E+00 | 3.190 .1341E+01
00467> .057 .3115E+00 | 4.392 .1522E+01
00468> .117 .4749E+00 | 4.909 .1706E+01
00469> .202 .6429E+00 | 8.028 .1893E+01
00470> .261 .8135E+00 | 13.536 .2082E+01
00471> .789 .9867E+00 | 20.842 .2275E+01
00472>
00473> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00474> ----- (ha) (cms) (hrs) (mm)
00475> INFLOW >03: (203 ) 28.00 .141 3.217 22.865
00476> OUTFLOW<05: (SWMF#3) 28.00 .141 3.217 22.864
00477> OVERFLOW<06: (Overfl) .00 .000 .000 .000
00478>
00479> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00480> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00481> PERCENTAGE OF TIME OVERFLOWING (%)= .00
00482>
00483> PEAK FLOW REDUCTION [Qout/Qin] (%)= 2.733
00484> TIME SHIFT OF PEAK FLOW (min)= 113.00
00485> MAXIMUM STORAGE USED (ha.m.)=.2218E+00
00486>
00487> 001:0018-----
00488> *****
00489> *#
00490> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
00491> *#
00492> *****
00493>
00494> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
00495> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00496> U.H. Tp(hrs)= .140
00497>
00498> Unit Hyd Qpeak (cms)= 2.914
00499>
00500> PEAK FLOW (cms)= .296 (i)
00501> TIME TO PEAK (hrs)= 1.500
00502> RUNOFF VOLUME (mm)= 7.337
00503> TOTAL RAINFALL (mm)= 25.048
00504> RUNOFF COEFFICIENT = .293
00505>
00506> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00507>
00508>
00509> 001:0019-----
00510> *****
00511> *#
00512> *# Proposed Conditions - Flows to North Ditch
00513> *#
00514> *****
00515>
00516> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00517> ----- (ha) (cms) (hrs) (mm) (cms)
00518> ID1 03:300 10.68 .296 1.50 7.34 .000
00519> +ID2 05:SWMF#3 28.00 .141 3.22 22.86 .000
00520> +ID3 06:Overflow-N .00 .000 .00 .00 .000
00521>
00522> SUM 02:ToNorthDit 38.68 .378 1.52 18.58 .000
00523>
00524> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00525>
00526>
00527> 001:0020-----
00528> *****
00529> *#
00530> *# Proposed conditions - SWMF#4
00531> *#
00532> *****
00533>
00534> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00535> | IN>04: (204 ) |
00536> | OUT<06: (SWMF#4) |
00537>
00538> ===== OUTFLOW STORAGE TABLE =====
00539> OUTFLOW STORAGE | OUTFLOW STORAGE
00540> (cms) (ha.m.) | (cms) (ha.m.)
00541>
00542> **** NOTE: DWF was added to inflow before routing.
00543> As a result the R.V. has changed.
00544>
```

```
00541> .000 .0000E+00 | .926 .1837E+00
00542> .005 .3240E-01 | 1.692 .2261E+00
00543> .008 .6740E-01 | 2.757 .2703E+00
00544> .010 .1043E+00 | 3.341 .3162E+00
00545> .335 .1431E+00 | 3.625 .3398E+00
00546>
00547> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00548> (ha) (cms) (hrs) (mm)
00549> INFLOW >04: (204 ) 5.44 1.024 1.333 32.792
00550> OUTFLOW<06: (SWMF#4) 5.44 .074 2.300 32.777
00551> OVERFLOW<07: (Overfl) .00 .000 .000 .000
00552>
00553> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00554> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00555> PERCENTAGE OF TIME OVERFLOWING (%) = .00
00556>
00557> PEAK FLOW REDUCTION [Qout/Qin] (%) = 7.267
00558> TIME SHIFT OF PEAK FLOW (min)= 58.00
00559> MAXIMUM STORAGE USED (ha.m.)=.1119E+00
00560>
00561>
00562> -----
00563> 001:0002-----
00564> *****
00565> *#
00566> *# Proposed conditions - External Undeveloped Area Located West of the Site
00567> *#
00568> *****
00569>
00570> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
00571> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00572> | U.H. Tp(hrs)= .700
00573>
00574> Unit Hyd Qpeak (cms) = 1.394
00575>
00576> PEAK FLOW (cms) = .247 (i)
00577> TIME TO PEAK (hrs) = 2.267
00578> RUNOFF VOLUME (mm) = 6.992
00579> TOTAL RAINFALL (mm) = 25.048
00580> RUNOFF COEFFICIENT = .279
00581>
00582> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00583>
00584> -----
00585> 001:0022-----
00586> ** END OF RUN : 1
00587>
00588> *****
00589>
00590>
00591>
00592>
00593>
00594>
00595> | START | Project dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
00596> | Rainfall dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
00597> | TZERO = .00 hrs on 0
00598> | METOUT= 2 (output = METRIC)
00599> | NRUN = 002
00600> | NSTORM= 1
00601> | # 1=002YR.HYD
00602> -----
00603> 002:0002-----
00604> *****
00605> *# Project Name: [Project Eagle] Project Number: [161500301]
00606> *# Date : 2024-11-21
00607> *# Modeller : [AA,MYK]
00608> *# Company : Stantec Consulting Ltd. (London)
00609> *# License # : 4730904
00610> *****
00611> *****
00612> *#
00613> *# This model represents the hydrologic characteristics of the Proposed
00614> *# conditions.
00615> *# Storm events modeled are:
00616> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00617> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
00618> *# Regional Storm Event: 48hr Hurricane Hazel
00619> *#
00620> *****
00621> -----
00622> 002:0002-----
00623> -----
00624> | READ STORM | Filename: CHICAGO STORM 2 Years, 3hr from Colborne
00625> | Ptotal= 36.37 mm | Comments: CHICAGO STORM 2 Years, 3hr from Colborne
00626>
00627> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00628> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00629> .08 3.094 | .83 9.551 | 1.58 11.939 | 2.33 4.519
00630> .17 3.326 | .92 12.836 | 1.67 10.023 | 2.42 4.243
00631> .25 3.600 | 1.00 19.669 | 1.75 8.649 | 2.50 4.002
00632> .33 3.930 | 1.08 41.191 | 1.83 7.616 | 2.58 3.789
00633> .42 4.334 | 1.17 99.781 | 1.92 6.813 | 2.67 3.599
00634> .50 4.841 | 1.25 48.700 | 2.00 6.171 | 2.75 3.429
00635> .58 5.497 | 1.33 28.010 | 2.08 5.645 | 2.83 3.276
00636> .67 6.380 | 1.42 19.395 | 2.17 5.207 | 2.92 3.137
00637> .75 7.633 | 1.50 14.781 | 2.25 4.837 | 3.00 3.010
00638>
00639>
00640> 002:0003-----
00641> *****
00642> *#
00643> *# Proposed conditions - Internal Catchments
00644> *#
00645> *****
00646> -----
00647> | CALIB STANDHYD | Area (ha)= 31.02
00648> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00649>
00650> IMPERVIOUS PERVIOUS (i)
00651> Surface Area (ha)= 30.71 .31
00652> Dep. Storage (mm)= 2.00 5.00
00653> Average Slope (%) = 2.00 2.00
00654> Length (m)= 110.00 25.00
00655> Mannings n = .013 .240
00656>
00657> Max.eff.Inten.(mm/hr)= 99.78 19.28
00658> over (min) = 2.00 12.00
00659> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00660> Unit Hyd. Tpeak (min)= 2.00 12.00
00661> Unit Hyd. peak (cms)= .52 .09
00662>
00663> PEAK FLOW (cms)= 7.80 .01 *TOTALS*
00664> TIME TO PEAK (hrs)= 1.17 1.42 1.167 (iii)
00665> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00666> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00667> RUNOFF COEFFICIENT = .95 .29 .938
00668>
00669> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00670> CN* = 80.0 Ia = Dep. Storage (Above)
00671> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00672> THAN THE STORAGE COEFFICIENT.
00673> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00674>
00675> -----
00676> 002:0004-----
00677> -----
00678> | CALIB STANDHYD | Area (ha)= 12.00
00679> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00680>
00681> IMPERVIOUS PERVIOUS (i)
00682> Surface Area (ha)= 11.88 .12
00683> Dep. Storage (mm)= 2.00 5.00
00684> Average Slope (%) = 2.00 2.00
00685> Length (m)= 110.00 25.00
00686> Mannings n = .013 .240
00687>
00688> Max.eff.Inten.(mm/hr)= 99.78 19.28
00689> over (min) = 2.00 12.00
00690> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00691> Unit Hyd. Tpeak (min)= 2.00 12.00
00692> Unit Hyd. peak (cms)= .52 .09
00693>
00694> PEAK FLOW (cms)= 3.02 .00 *TOTALS*
00695> TIME TO PEAK (hrs)= 1.17 1.42 1.167 (iii)
00696> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00697> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00698> RUNOFF COEFFICIENT = .95 .29 .938
00699>
00700> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00701> CN* = 80.0 Ia = Dep. Storage (Above)
00702> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00703> THAN THE STORAGE COEFFICIENT.
00704> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00705>
00706> -----
00707> 002:0005-----
00708> -----
00709> | CALIB STANDHYD | Area (ha)= 28.00
00710> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00711>
00712> IMPERVIOUS PERVIOUS (i)
00713> Surface Area (ha)= 27.72 .28
00714> Dep. Storage (mm)= 2.00 5.00
00715> Average Slope (%) = 2.00 2.00
00716> Length (m)= 110.00 25.00
00717> Mannings n = .013 .240
00718>
00719> Max.eff.Inten.(mm/hr)= 99.78 19.28
00720> over (min) = 2.00 12.00
00721> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00722> Unit Hyd. Tpeak (min)= 2.00 12.00
00723> Unit Hyd. peak (cms)= .52 .09
00724>
00725> PEAK FLOW (cms)= 7.04 .01 *TOTALS*
00726> TIME TO PEAK (hrs)= 1.17 1.42 1.167 (iii)
00727> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00728> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00729> RUNOFF COEFFICIENT = .95 .29 .938
00730>
00731> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00732> CN* = 80.0 Ia = Dep. Storage (Above)
00733> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00734> THAN THE STORAGE COEFFICIENT.
00735> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00736>
00737> -----
00738> 002:0006-----
00739> -----
00740> | CALIB STANDHYD | Area (ha)= 5.44
00741> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00742>
00743> IMPERVIOUS PERVIOUS (i)
00744> Surface Area (ha)= 5.39 .05
00745> Dep. Storage (mm)= 2.00 5.00
00746> Average Slope (%) = 2.00 2.00
00747> Length (m)= 110.00 25.00
00748> Mannings n = .013 .240
00749>
00750> Max.eff.Inten.(mm/hr)= 99.78 19.28
00751> over (min) = 2.00 12.00
00752> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00753> Unit Hyd. Tpeak (min)= 2.00 12.00
00754> Unit Hyd. peak (cms)= .52 .09
00755>
00756> PEAK FLOW (cms)= 1.37 .00 *TOTALS*
00757> TIME TO PEAK (hrs)= 1.17 1.42 1.167 (iii)
00758> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00759> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00760> RUNOFF COEFFICIENT = .95 .29 .938
00761>
00762> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00763> CN* = 80.0 Ia = Dep. Storage (Above)
00764> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00765> THAN THE STORAGE COEFFICIENT.
00766> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00767> ACTUAL QPEAK: PEAK( 1.37) + QBASE( .02) = 1.39 (cms)
00768>
00769> -----
00770> 002:0007-----
00771> -----
00772> | CALIB STANDHYD | Area (ha)= 1.50
00773> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00774>
00775> IMPERVIOUS PERVIOUS (i)
00776> Surface Area (ha)= 1.49 .01
00777> Dep. Storage (mm)= 2.00 5.00
00778> Average Slope (%) = 2.00 2.00
00779> Length (m)= 110.00 25.00
00780> Mannings n = .013 .240
00781>
00782> Max.eff.Inten.(mm/hr)= 99.78 19.28
00783> over (min) = 2.00 12.00
00784> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00785> Unit Hyd. Tpeak (min)= 2.00 12.00
00786> Unit Hyd. peak (cms)= .52 .09
00787>
00788> PEAK FLOW (cms)= .38 .00 *TOTALS*
00789> TIME TO PEAK (hrs)= 1.17 1.42 1.167 (iii)
00790> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00791> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00792> RUNOFF COEFFICIENT = .95 .29 .938
00793>
00794> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00795> CN* = 80.0 Ia = Dep. Storage (Above)
00796> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00797> THAN THE STORAGE COEFFICIENT.
00798> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00799>
00800> -----
00801> 002:0008-----
00802> *****
00803> *#
00804> *# Proposed conditions - SWMF#1
00805> *#
00806> *****
00807> -----
00808> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00809> | IN>01: (201 ) |
00810> | OUT<06: (SWMF#1) | ***** OUTFLOW STORAGE TABLE *****
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00811> -----
00812> OUTFLOW STORAGE | OUTFLOW STORAGE
00813> (cms) (ha.m.) | (cms) (ha.m.)
00814> .000 .0000E+00 | 1.521 .1362E+01
00815> .016 .1780E+00 | 2.289 .1802E+01
00816> .063 .3614E+00 | 2.948 .2265E+01
00817> .138 .5503E+00 | 6.164 .2514E+01
00818> .346 .7448E+00 | 11.997 .2776E+01
00819> .665 .9448E+00 | 19.770 .3044E+01
00820> 1.062 .1150E+01 | .000 .0000E+00
00821> -----
00822> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00823> (ha) (cms) (hrs) (mm)
00824> INFLOW >01: (201 ) 31.02 7.802 1.167 34.131
00825> OUTFLOW<06: (SWMF#1) 31.02 464 2.133 34.129
00826> OVERFLOW<07: (Overfl) .00 .000 .000 .000
00827> -----
00828> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00829> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00830> PERCENTAGE OF TIME OVERFLOWING (%) = .00
00831> -----
00832> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.946
00833> TIME SHIFT OF PEAK FLOW (min)= 58.00
00834> MAXIMUM STORAGE USED (ha.m.)=.8187E+00
00835> -----
00836> -----
00837> 002:0009-----
00838> *#-----
00839> *#-----
00840> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
00841> *#-----
00842> *#-----
00843> -----
00844> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
00845> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00846> | U.H. Tp(hrs)= .190
00847> -----
00848> Unit Hyd Qpeak (cms)= 1.568
00849> -----
00850> PEAK FLOW (cms)= .436 (i)
00851> TIME TO PEAK (hrs)= 1.400
00852> RUNOFF VOLUME (mm)= 15.954
00853> TOTAL RAINFALL (mm)= 36.371
00854> RUNOFF COEFFICIENT = .439
00855> -----
00856> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00857> -----
00858> -----
00859> 002:0010-----
00860> *#-----
00861> *#-----
00862> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
00863> *#-----
00864> *#-----
00865> -----
00866> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00867> (ha) (cms) (hrs) (mm) (cms)
00868> | ID1 06:SWMF#1 31.02 464 2.13 34.13 .000
00869> | +ID2 07:Overflow-S .00 .000 .00 .00 .000
00870> | +ID3 08:303 7.80 .436 1.40 15.95 .000
00871> -----
00872> SUM 09:ToH1 38.82 .752 1.45 30.48 .000
00873> -----
00874> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00875> -----
00876> -----
00877> 002:0011-----
00878> *#-----
00879> *#-----
00880> *# Proposed conditions - SWMF#2
00881> *#-----
00882> *#-----
00883> -----
00884> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00885> (ha) (cms) (hrs) (mm) (cms)
00886> | ID1 02:202 12.00 3.018 1.17 34.13 .000
00887> | +ID2 05:205 1.50 .377 1.17 34.13 .000
00888> -----
00889> SUM 06:ToSWMF#2 13.50 3.395 1.17 34.13 .000
00890> -----
00891> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00892> -----
00893> -----
00894> 002:0012-----
00895> *#-----
00896> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
00897> | IN>06: (ToSWMF) |
00898> | OUT<07: (SWMF#2) |
00899> -----
00900> OUTFLOW STORAGE | OUTFLOW STORAGE
00901> (cms) (ha.m.) | (cms) (ha.m.)
00902> .000 .0000E+00 | 1.982 .5874E+00
00903> .013 .7660E+01 | 2.164 .6799E+00
00904> .049 .1562E+00 | 2.345 .7745E+00
00905> .106 .2382E+00 | 3.689 .8712E+00
00906> .336 .3225E+00 | 6.218 .9700E+00
00907> .727 .4087E+00 | 9.668 .1071E+01
00908> 1.333 .4970E+00 | .000 .0000E+00
00909> -----
00910> ROUTING RESULTS AREA QPEAK TPEAK R.V.
00911> (ha) (cms) (hrs) (mm)
00912> INFLOW >06: (ToSWMF) 13.50 3.395 1.167 34.131
00913> OUTFLOW<07: (SWMF#2) 13.50 .334 1.750 34.130
00914> OVERFLOW<08: (Overfl) .00 .000 .000 .000
00915> -----
00916> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00917> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
00918> PERCENTAGE OF TIME OVERFLOWING (%) = .00
00919> -----
00920> PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.835
00921> TIME SHIFT OF PEAK FLOW (min)= 35.00
00922> MAXIMUM STORAGE USED (ha.m.)=.3217E+00
00923> -----
00924> -----
00925> 002:0013-----
00926> *#-----
00927> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00928> (ha) (cms) (hrs) (mm) (cms)
00929> | ID1 07:SWMF#2 13.50 .334 1.75 34.13 .000
00930> | +ID2 08:Overflow-S .00 .000 .00 .00 .000
00931> -----
00932> SUM 05:FromSWMF#2 13.50 .334 1.75 34.13 .000
00933> -----
00934> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00935> -----
00936> -----
00937> 002:0014-----
00938> *#-----
00939> *#-----
00940> *# COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
00941> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
00942> | Total minor system capacity = .641 (cms)
00943> | Total major system storage [TMJSTO] = 0. (cu.m.)
00944> -----
00945> ID: NHYD AREA QPEAK TPEAK R.V. DWF
(ha) (cms) (hrs) (mm) (cms)

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00946> TOTAL HYD. 05:FromSW 13.50 .334 1.750 34.130 .000
00947> -----
00948> MAJOR SYST 01:ToHwfl 1.00 .000 .000 .000 .000
00949> MINOR SYST 02:ToHWF 13.50 .334 1.750 34.130 .000
00950> -----
00951> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00952> -----
00953> -----
00954> 002:0015-----
00955> *#-----
00956> *#-----
00957> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
00958> *#-----
00959> *#-----
00960> -----
00961> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
00962> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
00963> | U.H. Tp(hrs)= .260
00964> -----
00965> Unit Hyd Qpeak (cms)= 3.398
00966> -----
00967> PEAK FLOW (cms)= .935 (i)
00968> TIME TO PEAK (hrs)= 1.500
00969> RUNOFF VOLUME (mm)= 13.994
00970> TOTAL RAINFALL (mm)= 36.371
00971> RUNOFF COEFFICIENT = .385
00972> -----
00973> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00974> -----
00975> -----
00976> 002:0016-----
00977> *#-----
00978> *#-----
00979> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
00980> *#-----
00981> *#-----
00982> -----
00983> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
00984> (ha) (cms) (hrs) (mm) (cms)
00985> | ID1 02:ToHWF 13.50 .334 1.75 34.13 .000
00986> | +ID2 05:302 23.13 .935 1.50 13.99 .000
00987> -----
00988> SUM 06:ToH2S2 36.63 1.245 1.52 21.41 .000
00989> -----
00990> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00991> -----
00992> -----
00993> -----
00994> *#-----
00995> *#-----
00996> *# Proposed conditions - SWMF#3
00997> *#-----
00998> *#-----
00999> *#-----
1000> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
1001> | IN>03: (203 ) |
1002> | OUT<05: (SWMF#3) |
1003> -----
1004> OUTFLOW STORAGE | OUTFLOW STORAGE
1005> (cms) (ha.m.) | (cms) (ha.m.)
1006> .000 .0000E+00 | 1.743 .1163E+01
1007> .015 .1533E+00 | 3.190 .1341E+01
1008> .057 .3115E+00 | 4.392 .1522E+01
1009> .117 .4749E+00 | 4.909 .1706E+01
1010> .202 .6429E+00 | 8.028 .1893E+01
1011> .261 .8135E+00 | 13.536 .2082E+01
1012> .789 .9867E+00 | 20.842 .2275E+01
1013> -----
1014> ROUTING RESULTS AREA QPEAK TPEAK R.V.
1015> (ha) (cms) (hrs) (mm)
1016> INFLOW >03: (203 ) 28.00 7.042 1.167 34.131
1017> OUTFLOW<05: (SWMF#3) 28.00 .255 2.833 34.129
1018> OVERFLOW<06: (Overfl) .00 .000 .000 .000
1019> -----
1020> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
1021> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
1022> PERCENTAGE OF TIME OVERFLOWING (%) = .00
1023> -----
1024> PEAK FLOW REDUCTION [Qout/Qin] (%) = 3.625
1025> TIME SHIFT OF PEAK FLOW (min)= 100.00
1026> MAXIMUM STORAGE USED (ha.m.)=.7969E+00
1027> -----
1028> -----
1029> 002:0018-----
1030> *#-----
1031> *#-----
1032> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
1033> *#-----
1034> *#-----
1035> -----
1036> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
1037> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
1038> | U.H. Tp(hrs)= .140
1039> -----
1040> Unit Hyd Qpeak (cms)= 2.914
1041> -----
1042> PEAK FLOW (cms)= .603 (i)
1043> TIME TO PEAK (hrs)= 1.333
1044> RUNOFF VOLUME (mm)= 13.994
1045> TOTAL RAINFALL (mm)= 36.371
1046> RUNOFF COEFFICIENT = .385
1047> -----
1048> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
1049> -----
1050> -----
1051> 002:0019-----
1052> *#-----
1053> *#-----
1054> *# Proposed Conditions - Flows to North Ditch
1055> *#-----
1056> *#-----
1057> -----
1058> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
1059> (ha) (cms) (hrs) (mm) (cms)
1060> | ID1 03:300 10.68 .603 1.33 13.99 .000
1061> | +ID2 05:SWMF#3 28.00 .255 2.83 34.13 .000
1062> | +ID3 06:Overflow-N .00 .000 .00 .00 .000
1063> -----
1064> SUM 02:ToNorthDit 38.68 .783 1.35 28.57 .000
1065> -----
1066> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
1067> -----
1068> -----
1069> 002:0020-----
1070> *#-----
1071> *#-----
1072> *# Proposed conditions - SWMF#4
1073> *#-----
1074> *#-----
1075> -----
1076> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
1077> | IN>04: (204 ) |
1078> | OUT<06: (SWMF#4) |
1079> -----
1080> OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)

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01081> **** NOTE: DWF was added to inflow before routing.
01082> As a result the R.V. has changed.
01083> .000 .0000E+00 | .926 .1837E+00
01084> .005 .3240E-01 | 1.692 .2261E+00
01085> .008 .6740E-01 | 2.757 .2703E+00
01086> .010 .1043E+00 | 3.341 .3162E+00
01087> .335 .1431E+00 | 3.625 .3398E+00
01088>
01089> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01090> (ha) (cms) (hrs) (mm)
01091> INFLOW >04: (204 ) 5.44 1.392 1.167 41.589
01092> OUTFLOW<06: (SWMF#4) 5.44 .239 1.533 41.575
01093> OVERFLOW<07: (Overfl) .00 .000 .000 .000
01094>
01095> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01096> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01097> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01098>
01099> PEAK FLOW REDUCTION [Qout/Qin] (%) = 17.166
01100> TIME SHIFT OF PEAK FLOW (min)= 22.00
01101> MAXIMUM STORAGE USED (ha.m.)=.1316E+00
01102>
01103>
01104> -----
01105> 002:0021-----
01106> *****
01107> *#
01108> *# Proposed conditions - External Undeveloped Area Located West of the Site
01109> *#
01110> *****
01111> -----
01112> | DESIGN NASHDY | Area (ha)= 25.55 Curve Number (CN)=82.00
01113> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01114> | U.H. Tp(hrs)= .700
01115>
01116> Unit Hyd Qpeak (cms)= 1.394
01117>
01118> PEAK FLOW (cms)= .520 (i)
01119> TIME TO PEAK (hrs)= 2.083
01120> RUNOFF VOLUME (mm)= 13.417
01121> TOTAL RAINFALL (mm)= 36.371
01122> RUNOFF COEFFICIENT = .369
01123>
01124> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01125>
01126> -----
01127> 002:0022-----
01128> *****
01129> 002:0002-----
01130> ** END OF RUN : 4
01131>
01132> *****
01133> *****
01134> *****
01135> *****
01136> *****
01137> *****
01138> *****
01139> | START | Project dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
01140> | Rainfall dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
01141> | TZERO = .00 hrs on 0
01142> | METOUT= 2 (output = METRIC)
01143> | NRUN = 005
01144> | NSTORM= 1
01145> | # 1=005YR.HYD
01146>
01147> 005:0002-----
01148> *****
01149> *# Project Name: [Project Eagle] Project Number: [161500301]
01150> *# Date : 2024-11-21
01151> *# Modeller : [AA,MVK]
01152> *# Company : Stantec Consulting Ltd. (London)
01153> *# License # : 4730904
01154> *****
01155> *****
01156> *#
01157> *# This model represents the hydrologic characteristics of the Proposed
01158> *# conditions.
01159> *# Storm events modeled are:
01160> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01161> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
01162> *# Regional Storm Event: 48hr Hurricane Hazel
01163> *#
01164> *****
01165> *****
01166> 005:0002-----
01167> -----
01168> | READ STORM | Filename: CHICAGO STORM 5 Years, 3hr from Colborne
01169> | Ptotal= 42.70 mm | Comments: CHICAGO STORM 5 Years, 3hr from Colborne
01170> -----
01171> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01172> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01173> .08 3.757 | .83 11.211 | 1.58 13.931 | 2.33 5.426
01174> .17 4.031 | .92 14.951 | 1.67 11.750 | 2.42 5.105
01175> .25 4.353 | 1.00 22.713 | 1.75 10.182 | 2.50 4.823
01176> .33 4.739 | 1.08 47.493 | 1.83 9.000 | 2.58 4.573
01177> .42 5.210 | 1.17 118.092 | 1.92 8.078 | 2.67 4.351
01178> .50 5.800 | 1.25 56.211 | 2.00 7.339 | 2.75 4.151
01179> .58 6.560 | 1.33 32.225 | 2.08 6.732 | 2.83 3.971
01180> .67 7.579 | 1.42 22.401 | 2.17 6.225 | 2.92 3.808
01181> .75 9.019 | 1.50 17.161 | 2.25 5.795 | 3.00 3.658
01182>
01183> -----
01184> 005:0003-----
01185> *****
01186> *#
01187> *# Proposed conditions - Internal Catchments
01188> *#
01189> *****
01190> -----
01191> | CALIB STANDHYD | Area (ha)= 31.02
01192> | 01:201 DT= 1.00 | Total Imp (%) = 99.00 Dir. Conn. (%) = 99.00
01193>
01194> IMPERVIOUS PERVIOUS (i)
01195> Surface Area (ha)= 30.71 .31
01196> Dep. Storage (mm)= 2.00 5.00
01197> Average Slope (%) = 2.00 2.00
01198> Length (m) = 110.00 25.00
01199> Mannings n = .013 .240
01200>
01201> Max.eff.Inten.(mm/hr)= 118.09 27.64
01202> over (min) 2.00 11.00
01203> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
01204> Unit Hyd. Tpeak (min)= 2.00 11.00
01205> Unit Hyd. peak (cms)= .55 .10
01206>
01207> PEAK FLOW (cms)= 9.33 .01 9.334 (iii)
01208> TIME TO PEAK (hrs)= 1.17 1.167
01209> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
01210> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
01211> RUNOFF COEFFICIENT = .95 .33 .947
01212>
01213> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01214> CN* = 80.0 Ia = Dep. Storage (Above)
01215> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01216>
01217> THAN THE STORAGE COEFFICIENT.
01218> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01219>
01220> 005:0004-----
01221> -----
01222> | CALIB STANDHYD | Area (ha)= 12.00
01223> | 02:202 DT= 1.00 | Total Imp (%) = 99.00 Dir. Conn. (%) = 99.00
01224>
01225> IMPERVIOUS PERVIOUS (i)
01226> Surface Area (ha)= 11.88 .12
01227> Dep. Storage (mm)= 2.00 5.00
01228> Average Slope (%) = 2.00 2.00
01229> Length (m) = 110.00 25.00
01230> Mannings n = .013 .240
01231>
01232> Max.eff.Inten.(mm/hr)= 118.09 27.64
01233> over (min) 2.00 11.00
01234> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
01235> Unit Hyd. Tpeak (min)= 2.00 11.00
01236> Unit Hyd. peak (cms)= .55 .10
01237>
01238> PEAK FLOW (cms)= 3.61 .01 *TOTALS*
01239> TIME TO PEAK (hrs)= 1.17 1.167 3.611 (iii)
01240> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
01241> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
01242> RUNOFF COEFFICIENT = .95 .33 .947
01243>
01244> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01245> CN* = 80.0 Ia = Dep. Storage (Above)
01246> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01247> THAN THE STORAGE COEFFICIENT.
01248> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01249>
01250> -----
01251> 005:0005-----
01252> -----
01253> | CALIB STANDHYD | Area (ha)= 28.00
01254> | 03:203 DT= 1.00 | Total Imp (%) = 99.00 Dir. Conn. (%) = 99.00
01255>
01256> IMPERVIOUS PERVIOUS (i)
01257> Surface Area (ha)= 27.72 .28
01258> Dep. Storage (mm)= 2.00 5.00
01259> Average Slope (%) = 2.00 2.00
01260> Length (m) = 110.00 25.00
01261> Mannings n = .013 .240
01262>
01263> Max.eff.Inten.(mm/hr)= 118.09 27.64
01264> over (min) 2.00 11.00
01265> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
01266> Unit Hyd. Tpeak (min)= 2.00 11.00
01267> Unit Hyd. peak (cms)= .55 .10
01268>
01269> PEAK FLOW (cms)= 8.42 .01 *TOTALS*
01270> TIME TO PEAK (hrs)= 1.17 1.167 8.425 (iii)
01271> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
01272> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
01273> RUNOFF COEFFICIENT = .95 .33 .947
01274>
01275> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01276> CN* = 80.0 Ia = Dep. Storage (Above)
01277> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01278> THAN THE STORAGE COEFFICIENT.
01279> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01280>
01281> -----
01282> 005:0006-----
01283> -----
01284> | CALIB STANDHYD | Area (ha)= 5.44
01285> | 04:204 DT= 1.00 | Total Imp (%) = 99.00 Dir. Conn. (%) = 99.00
01286>
01287> IMPERVIOUS PERVIOUS (i)
01288> Surface Area (ha)= 5.39 .05
01289> Dep. Storage (mm)= 2.00 5.00
01290> Average Slope (%) = 2.00 2.00
01291> Length (m) = 110.00 25.00
01292> Mannings n = .013 .240
01293>
01294> Max.eff.Inten.(mm/hr)= 118.09 27.64
01295> over (min) 2.00 11.00
01296> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
01297> Unit Hyd. Tpeak (min)= 2.00 11.00
01298> Unit Hyd. peak (cms)= .55 .10
01299>
01300> PEAK FLOW (cms)= 1.64 .00 *TOTALS*
01301> TIME TO PEAK (hrs)= 1.17 1.167 1.637 (iii)
01302> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
01303> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
01304> RUNOFF COEFFICIENT = .95 .33 .947
01305>
01306> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01307> CN* = 80.0 Ia = Dep. Storage (Above)
01308> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01309> THAN THE STORAGE COEFFICIENT.
01310> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01311> ACTUAL QPEAK: PEAK( 1.64 ) + QBASE( .02 ) = 1.66 (cms)
01312>
01313> -----
01314> 005:0007-----
01315> -----
01316> | CALIB STANDHYD | Area (ha)= 1.50
01317> | 05:205 DT= 1.00 | Total Imp (%) = 99.00 Dir. Conn. (%) = 99.00
01318>
01319> IMPERVIOUS PERVIOUS (i)
01320> Surface Area (ha)= 1.49 .01
01321> Dep. Storage (mm)= 2.00 5.00
01322> Average Slope (%) = 2.00 2.00
01323> Length (m) = 110.00 25.00
01324> Mannings n = .013 .240
01325>
01326> Max.eff.Inten.(mm/hr)= 118.09 27.64
01327> over (min) 2.00 11.00
01328> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
01329> Unit Hyd. Tpeak (min)= 2.00 11.00
01330> Unit Hyd. peak (cms)= .55 .10
01331>
01332> PEAK FLOW (cms)= .45 .00 *TOTALS*
01333> TIME TO PEAK (hrs)= 1.17 1.167 .451 (iii)
01334> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
01335> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
01336> RUNOFF COEFFICIENT = .95 .33 .947
01337>
01338> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01339> CN* = 80.0 Ia = Dep. Storage (Above)
01340> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01341> THAN THE STORAGE COEFFICIENT.
01342> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01343>
01344> -----
01345> 005:0008-----
01346> *****
01347> *#
01348> *# Proposed conditions - SWMF#1
01349> *#
01350> *****

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01351> -----
01352> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01353> | IN>01: (201 ) |
01354> | OUT<06: (SWMF#1) | ===== OUTFLOW STORAGE TABLE =====
01355> -----
01356> OUTFLOW STORAGE | OUTFLOW STORAGE
01357> (cms) (ha.m.) | (cms) (ha.m.)
01358> .000 .0000E+00 | 1.521 .1362E+01
01359> .016 .1780E+00 | 2.289 .1802E+01
01360> .063 .3614E+00 | 2.948 .2265E+01
01361> .138 .5503E+00 | 6.164 .2514E+01
01362> .346 .7448E+00 | 11.997 .2776E+01
01363> .665 .9448E+00 | 19.770 .3044E+01
01364> 1.062 .1150E+01 | .000 .0000E+00
01365> -----
01366> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01367> (ha) (cms) (hrs) (mm)
01368> INFLOW >01: (201 ) 31.02 9.334 1.167 40.434
01369> OUTFLOW<06: (SWMF#1) 31.02 .646 1.983 40.432
01370> OVERFLOW<07: (Overfl) .00 .000 .000 .000
01371> -----
01372> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01373> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01374> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01375> -----
01376> PEAK FLOW REDUCTION [Qout/Qin] (%) = 6.920
01377> TIME SHIFT OF PEAK FLOW (min) = 49.00
01378> MAXIMUM STORAGE USED (ha.m.) = .9328E+00
01379> -----
01380> -----
01381> 005:0009-----
01382> *****
01383> *#
01384> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
01385> *#
01386> *****
01387> -----
01388> | DESIGN NASHYD | Area (ha) = 7.80 Curve Number (CN)=86.00
01389> | 08:303 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01390> -----
01391> U.H. Tp(hrs) = .190
01392> -----
01393> Unit Hyd Qpeak (cms) = 1.568
01394> PEAK FLOW (cms) = .565 (i)
01395> TIME TO PEAK (hrs) = 1.383
01396> RUNOFF VOLUME (mm) = 20.563
01397> TOTAL RAINFALL (mm) = 42.701
01398> RUNOFF COEFFICIENT = .482
01399> -----
01400> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01401> -----
01402> -----
01403> 005:0010-----
01404> *****
01405> *#
01406> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
01407> *#
01408> *****
01409> -----
01410> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01411> (ha) (cms) (hrs) (mm) (cms)
01412> ID1 06:SWMF#1 31.02 .646 1.98 40.43 .000
01413> +ID2 07:Overflow-S .00 .000 .00 .00 .000
01414> +ID3 08:303 7.80 .565 1.38 20.56 .000
01415> -----
01416> SUM 09:ToH1 38.82 1.067 1.47 36.44 .000
01417> -----
01418> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01419> -----
01420> -----
01421> 005:0011-----
01422> *****
01423> *#
01424> *# Proposed conditions - SWMF#2
01425> *#
01426> *****
01427> -----
01428> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01429> (ha) (cms) (hrs) (mm) (cms)
01430> ID1 02:202 12.00 3.611 1.17 40.43 .000
01431> +ID2 05:205 1.50 .451 1.17 40.43 .000
01432> -----
01433> SUM 06:ToSWMF#2 13.50 4.062 1.17 40.43 .000
01434> -----
01435> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01436> -----
01437> -----
01438> 005:0012-----
01439> *****
01440> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01441> | IN>06: (ToSWMF) |
01442> | OUT<07: (SWMF#2) | ===== OUTFLOW STORAGE TABLE =====
01443> -----
01444> OUTFLOW STORAGE | OUTFLOW STORAGE
01445> (cms) (ha.m.) | (cms) (ha.m.)
01446> .000 .0000E+00 | 1.982 .5874E+00
01447> .013 .7660E+00 | 2.164 .6799E+00
01448> .049 .1562E+00 | 2.345 .7745E+00
01449> .106 .2382E+00 | 3.689 .8712E+00
01450> .336 .3225E+00 | 6.218 .9700E+00
01451> .727 .4087E+00 | 9.668 .1071E+01
01452> 1.333 .4970E+00 | .000 .0000E+00
01453> -----
01454> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01455> (ha) (cms) (hrs) (mm)
01456> INFLOW >06: (ToSWMF) 13.50 4.062 1.167 40.434
01457> OUTFLOW<07: (SWMF#2) 13.50 .509 1.600 40.433
01458> OVERFLOW<08: (Overfl) .00 .000 .000 .000
01459> -----
01460> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01461> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01462> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01463> -----
01464> PEAK FLOW REDUCTION [Qout/Qin] (%) = 12.536
01465> TIME SHIFT OF PEAK FLOW (min) = 26.00
01466> MAXIMUM STORAGE USED (ha.m.) = .3607E+00
01467> -----
01468> -----
01469> 005:0013-----
01470> *****
01471> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01472> (ha) (cms) (hrs) (mm) (cms)
01473> ID1 07:SWMF#2 13.50 .509 1.60 40.43 .000
01474> +ID2 08:Overflow-S .00 .000 .00 .00 .000
01475> -----
01476> SUM 05:FromSWMF#2 13.50 .509 1.60 40.43 .000
01477> -----
01478> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01479> -----
01480> -----
01481> 005:0014-----
01482> *****
01483> | COMPUTE DUALHYD | Average inlet capacities [CNLET] = .641 (cms)
01484> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
01485> -----
01486> Total minor system capacity = .641 (cms)
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01486> Total major system storage [TMJSTO] = 0.(cu.m.)
01487> -----
01488> ID: NHYD AREA QPEAK TPEAK R.V. DWF
01489> (ha) (cms) (hrs) (mm) (cms)
01490> TOTAL HYD. 05:FromSW 13.50 .509 1.600 40.433 .000
01491> -----
01492> MAJOR SYST 01:ToWell .00 .000 .000 .000 .000
01493> MINOR SYST 02:ToHWF 13.50 .509 1.600 40.433 .000
01494> -----
01495> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01496> -----
01497> -----
01498> 005:0015-----
01499> *****
01500> *#
01501> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
01502> *#
01503> *****
01504> -----
01505> | DESIGN NASHYD | Area (ha) = 23.13 Curve Number (CN)=83.00
01506> | 05:302 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01507> -----
01508> U.H. Tp(hrs) = .260
01509> -----
01510> Unit Hyd Qpeak (cms) = 3.398
01511> PEAK FLOW (cms) = 1.220 (i)
01512> TIME TO PEAK (hrs) = 1.483
01513> RUNOFF VOLUME (mm) = 18.209
01514> TOTAL RAINFALL (mm) = 42.701
01515> RUNOFF COEFFICIENT = .426
01516> -----
01517> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01518> -----
01519> -----
01520> 005:0016-----
01521> *****
01522> *#
01523> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
01524> *#
01525> *****
01526> -----
01527> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01528> (ha) (cms) (hrs) (mm) (cms)
01529> ID1 02:ToHWF 13.50 .509 1.60 40.43 .000
01530> +ID2 05:302 23.13 1.220 1.48 18.21 .000
01531> -----
01532> SUM 06:ToH2S2 36.63 1.715 1.50 26.40 .000
01533> -----
01534> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01535> -----
01536> -----
01537> 005:0017-----
01538> *****
01539> *#
01540> *# Proposed conditions - SWMF#3
01541> *#
01542> *****
01543> -----
01544> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01545> | IN>03: (203 ) |
01546> | OUT<05: (SWMF#3) | ===== OUTFLOW STORAGE TABLE =====
01547> -----
01548> OUTFLOW STORAGE | OUTFLOW STORAGE
01549> (cms) (ha.m.) | (cms) (ha.m.)
01550> .000 .0000E+00 | 1.743 .1163E+01
01551> .015 .1533E+00 | 3.190 .1341E+01
01552> .057 .3115E+00 | 4.392 .1522E+01
01553> .117 .4749E+00 | 4.909 .1706E+01
01554> .202 .6429E+00 | 8.028 .1893E+01
01555> .261 .8135E+00 | 13.536 .2082E+01
01556> .789 .9867E+00 | 20.842 .2275E+01
01557> -----
01558> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01559> (ha) (cms) (hrs) (mm)
01560> INFLOW >03: (203 ) 28.00 8.425 1.167 40.434
01561> OUTFLOW<05: (SWMF#3) 28.00 .488 2.167 40.432
01562> OVERFLOW<06: (Overfl) .00 .000 .000 .000
01563> -----
01564> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01565> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
01566> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01567> -----
01568> PEAK FLOW REDUCTION [Qout/Qin] (%) = 5.794
01569> TIME SHIFT OF PEAK FLOW (min) = 60.00
01570> MAXIMUM STORAGE USED (ha.m.) = .8880E+00
01571> -----
01572> -----
01573> 005:0018-----
01574> *****
01575> *#
01576> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
01577> *#
01578> *****
01579> -----
01580> | DESIGN NASHYD | Area (ha) = 10.68 Curve Number (CN)=83.00
01581> | 03:300 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res.(N)= 3.00
01582> -----
01583> U.H. Tp(hrs) = .140
01584> -----
01585> Unit Hyd Qpeak (cms) = 2.914
01586> PEAK FLOW (cms) = .790 (i)
01587> TIME TO PEAK (hrs) = 1.333
01588> RUNOFF VOLUME (mm) = 18.209
01589> TOTAL RAINFALL (mm) = 42.701
01590> RUNOFF COEFFICIENT = .426
01591> -----
01592> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01593> -----
01594> -----
01595> 005:0019-----
01596> *****
01597> *#
01598> *# Proposed Conditions - Flows to North Ditch
01599> *#
01600> *****
01601> -----
01602> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01603> (ha) (cms) (hrs) (mm) (cms)
01604> ID1 03:300 10.68 .790 1.33 18.21 .000
01605> +ID2 05:SWMF#3 28.00 .488 2.17 40.43 .000
01606> +ID3 06:Overflow-N .00 .000 .00 .00 .000
01607> -----
01608> SUM 02:ToNorthDit 38.68 1.013 1.33 34.30 .000
01609> -----
01610> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01611> -----
01612> -----
01613> 005:0020-----
01614> *****
01615> *#
01616> *# Proposed conditions - SWMF#4
01617> *#
01618> *****
01619> -----
01620> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
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01621> | IN>04: (204 ) |
01622> | OUT<06: (SWMF#4) |
01623> | ===== OUTFLOW STORAGE TABLE =====
01624> | (cms) (ha.m.) | (cms) (ha.m.) |
01625> | **** NOTE: DWF was added to inflow before routing.
01626> | As a result the R.V. has changed.
01627> | .000 .0000E+00 | .926 .1837E+00
01628> | .005 .3240E-01 | 1.692 .2261E+00
01629> | .008 .6740E-01 | 2.757 .2703E+00
01630> | .010 .1043E+00 | 3.341 .3162E+00
01631> | .335 .1431E+00 | 3.625 .3398E+00
01632>
01633> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01634> |-----| (ha) (cms) (hrs) (mm)
01635> | INFLOW >04: (204 ) 5.44 1.661 1.167 47.630
01636> | OUTFLOW<06: (SWMF#4) 5.44 .346 1.450 47.615
01637> | OVERFLOW<07: (Overfl) .00 .000 .000 .000
01638>
01639> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01640> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01641> PERCENTAGE OF TIME OVERFLOWING (%) = .00
01642>
01643>
01644> PEAK FLOW REDUCTION [Qout/Qin](%) = 20.805
01645> TIME SHIFT OF PEAK FLOW (min)= 17.00
01646> MAXIMUM STORAGE USED (ha.m.)=.1438E+00
01647>
01648>
01649> 005:0021-----
01650> |*****|
01651> |#|
01652> |#| Proposed conditions - External Undeveloped Area Located West of the Site
01653> |#|
01654> |*****|
01655>
01656> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
01657> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01658> | U.H. Tp(hrs)= .700
01659>
01660> Unit Hyd Qpeak (cms)= 1.394
01661>
01662> PEAK FLOW (cms)= .678 (i)
01663> TIME TO PEAK (hrs)= 2.083
01664> RUNOFF VOLUME (mm)= 17.508
01665> TOTAL RAINFALL (mm)= 42.701
01666> RUNOFF COEFFICIENT = .410
01667>
01668> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01669>
01670>
01671> 005:0022-----
01672>
01673> 005:0002-----
01674>
01675> 005:0002-----
01676> ** END OF RUN : 9
01677>
01678>
01679>
01680>
01681>
01682>
01683>
01684>
01685> | START | Project dir.: C:\SWMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
01686> | Rainfall dir.: C:\SWMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
01687> | TZERO = .00 hrs on 0
01688> | METOUT= 2 (output = METRIC)
01689> | NRUN = 010
01690> | NSTORM= 1
01691> | # 1=10YR.HYD
01692>
01693> 010:0002-----
01694> |*****|
01695> |#| Project Name: [Project Eagle] Project Number: [161500301]
01696> |#| Date : 2024-11-21
01697> |#| Modeller : [AA,MYK]
01698> |#| Company : Stantec Consulting Ltd. (London)
01699> |#| License # : 4730904
01700> |*****|
01701> |*****|
01702> |#|
01703> |#| This model represents the hydrologic characteristics of the Proposed
01704> |#| conditions.
01705> |#| Storm events modeled are:
01706> |#| 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01707> |#| 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
01708> |#| Regional Storm Event: 48hr Hurricane Hazel
01709> |#|
01710> |*****|
01711>
01712> 010:0002-----
01713>
01714> | READ STORM | Filename: CHICAGO STORM 10 Years, 3hr from Colborn
01715> | Ptotal= 47.76 mm | Comments: CHICAGO STORM 10 Years, 3hr from Colborn
01716>
01717> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01718> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01719> | .08 4.368 | .83 12.544 | 1.58 15.478 | 2.33 6.229
01720> | .17 4.675 | .92 16.574 | 1.67 13.127 | 2.42 5.873
01721> | .25 5.035 | 1.00 24.913 | 1.75 11.431 | 2.50 5.560
01722> | .33 5.466 | 1.08 51.922 | 1.83 10.148 | 2.58 5.282
01723> | .42 5.990 | 1.17 133.409 | 1.92 9.144 | 2.67 5.034
01724> | .50 6.643 | 1.25 61.515 | 2.00 8.335 | 2.75 4.810
01725> | .58 7.481 | 1.33 35.164 | 2.08 7.670 | 2.83 4.608
01726> | .67 8.598 | 1.42 24.576 | 2.17 7.113 | 2.92 4.424
01727> | .75 10.168 | 1.50 18.949 | 2.25 6.638 | 3.00 4.256
01728>
01729>
01730> 010:0003-----
01731> |*****|
01732> |#|
01733> |#| Proposed conditions - Internal Catchments
01734> |#|
01735> |*****|
01736>
01737> | CALIB STANDHYD | Area (ha)= 31.02
01738> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01739>
01740> IMPERVIOUS PERVIOUS (i)
01741> | Surface Area (ha)= 30.71 .31
01742> | Dep. Storage (mm)= 2.00 5.00
01743> | Average Slope (%)= 2.00 2.00
01744> | Length (m)= 110.00 25.00
01745> | Mannings n = .013 .240
01746>
01747> Max.eff.Inten.(mm/hr)= 133.41 35.92
01748> | over (min) 2.00 10.00
01749> | Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
01750> | Unit Hyd. Tpeak (min)= 2.00 10.00
01751> | Unit Hyd. peak (cms)= .57 .11
01752>
01753> PEAK FLOW (cms)= 10.61 .02 *TOTALS*
01754> | TIME TO PEAK (hrs)= 1.17 1.35 1.167 (iii)
01755> | RUNOFF VOLUME (mm)= 45.76 17.21 45.477
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01756> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
01757> RUNOFF COEFFICIENT = .96 .36 .952
01758>
01759> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01760> CN* = 80.0 Ia = Dep. Storage (Above)
01761> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01762> THAN THE STORAGE COEFFICIENT.
01763> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01764>
01765>
01766> 010:0004-----
01767>
01768> | CALIB STANDHYD | Area (ha)= 12.00
01769> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01770>
01771> IMPERVIOUS PERVIOUS (i)
01772> | Surface Area (ha)= 11.88 .12
01773> | Dep. Storage (mm)= 2.00 5.00
01774> | Average Slope (%)= 2.00 2.00
01775> | Length (m)= 110.00 25.00
01776> | Mannings n = .013 .240
01777>
01778> Max.eff.Inten.(mm/hr)= 133.41 35.92
01779> | over (min) 2.00 10.00
01780> | Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
01781> | Unit Hyd. Tpeak (min)= 2.00 10.00
01782> | Unit Hyd. peak (cms)= .57 .11
01783>
01784> PEAK FLOW (cms)= 4.10 .01 *TOTALS*
01785> | TIME TO PEAK (hrs)= 1.17 1.35 4.107 (iii)
01786> | RUNOFF VOLUME (mm)= 45.76 17.21 45.477
01787> | TOTAL RAINFALL (mm)= 47.76 47.76 47.763
01788> | RUNOFF COEFFICIENT = .96 .36 .952
01789>
01790> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01791> CN* = 80.0 Ia = Dep. Storage (Above)
01792> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01793> THAN THE STORAGE COEFFICIENT.
01794> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01795>
01796>
01797> 010:0005-----
01798>
01799> | CALIB STANDHYD | Area (ha)= 28.00
01800> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01801>
01802> IMPERVIOUS PERVIOUS (i)
01803> | Surface Area (ha)= 27.72 .28
01804> | Dep. Storage (mm)= 2.00 5.00
01805> | Average Slope (%)= 2.00 2.00
01806> | Length (m)= 110.00 25.00
01807> | Mannings n = .013 .240
01808>
01809> Max.eff.Inten.(mm/hr)= 133.41 35.92
01810> | over (min) 2.00 10.00
01811> | Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
01812> | Unit Hyd. Tpeak (min)= 2.00 10.00
01813> | Unit Hyd. peak (cms)= .57 .11
01814>
01815> PEAK FLOW (cms)= 9.58 .02 *TOTALS*
01816> | TIME TO PEAK (hrs)= 1.17 1.35 9.583 (iii)
01817> | RUNOFF VOLUME (mm)= 45.76 17.21 45.477
01818> | TOTAL RAINFALL (mm)= 47.76 47.76 47.763
01819> | RUNOFF COEFFICIENT = .96 .36 .952
01820>
01821> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01822> CN* = 80.0 Ia = Dep. Storage (Above)
01823> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01824> THAN THE STORAGE COEFFICIENT.
01825> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01826>
01827>
01828> 010:0006-----
01829>
01830> | CALIB STANDHYD | Area (ha)= 5.44
01831> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01832>
01833> IMPERVIOUS PERVIOUS (i)
01834> | Surface Area (ha)= 5.39 .05
01835> | Dep. Storage (mm)= 2.00 5.00
01836> | Average Slope (%)= 2.00 2.00
01837> | Length (m)= 110.00 25.00
01838> | Mannings n = .013 .240
01839>
01840> Max.eff.Inten.(mm/hr)= 133.41 35.92
01841> | over (min) 2.00 10.00
01842> | Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
01843> | Unit Hyd. Tpeak (min)= 2.00 10.00
01844> | Unit Hyd. peak (cms)= .57 .11
01845>
01846> PEAK FLOW (cms)= 1.86 .00 *TOTALS*
01847> | TIME TO PEAK (hrs)= 1.17 1.35 1.862 (iii)
01848> | RUNOFF VOLUME (mm)= 45.76 17.21 45.477
01849> | TOTAL RAINFALL (mm)= 47.76 47.76 47.763
01850> | RUNOFF COEFFICIENT = .96 .36 .952
01851>
01852> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01853> CN* = 80.0 Ia = Dep. Storage (Above)
01854> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01855> THAN THE STORAGE COEFFICIENT.
01856> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01857> ACTUAL QPEAK: PEAK( 1.86) + QBASE( .02) = 1.89 (cms)
01858>
01859>
01860> 010:0007-----
01861>
01862> | CALIB STANDHYD | Area (ha)= 1.50
01863> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01864>
01865> IMPERVIOUS PERVIOUS (i)
01866> | Surface Area (ha)= 1.49 .01
01867> | Dep. Storage (mm)= 2.00 5.00
01868> | Average Slope (%)= 2.00 2.00
01869> | Length (m)= 110.00 25.00
01870> | Mannings n = .013 .240
01871>
01872> Max.eff.Inten.(mm/hr)= 133.41 35.92
01873> | over (min) 2.00 10.00
01874> | Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
01875> | Unit Hyd. Tpeak (min)= 2.00 10.00
01876> | Unit Hyd. peak (cms)= .57 .11
01877>
01878> PEAK FLOW (cms)= .51 .00 *TOTALS*
01879> | TIME TO PEAK (hrs)= 1.17 1.35 .513 (iii)
01880> | RUNOFF VOLUME (mm)= 45.76 17.21 45.477
01881> | TOTAL RAINFALL (mm)= 47.76 47.76 47.763
01882> | RUNOFF COEFFICIENT = .96 .36 .952
01883>
01884> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01885> CN* = 80.0 Ia = Dep. Storage (Above)
01886> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01887> THAN THE STORAGE COEFFICIENT.
01888> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01889>
01890>
```

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01891> 010:0008-----
01892> *****
01893> *#
01894> *# Proposed conditions - SWMF#1
01895> *#
01896> *****
01897> -----
01898> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01899> | IN>01:(201 ) |
01900> | OUT<06:(SWMF#1) |
01901> |===== OUTFLOW STORAGE TABLE =====|
01902> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01903> | (cms) (ha.m.) | (cms) (ha.m.) |
01904> | .000 .0000E+00 | 1.521 .1362E+01 |
01905> | .016 .1780E+00 | 2.289 .1802E+01 |
01906> | .063 .3614E+00 | 2.948 .2265E+01 |
01907> | .138 .5503E+00 | 6.164 .2514E+01 |
01908> | .346 .7448E+00 | 11.997 .2776E+01 |
01909> | .665 .9448E+00 | 19.770 .3044E+01 |
01910> | 1.062 .1150E+01 | .000 .0000E+00 |
01911> ROUTING RESULTS AREA QPEAK TPEAK R.V.
01912> ----- (ha) (cms) (hrs) (mm)
01913> | INFLOW >01: (201 ) | 31.02 10.616 1.167 45.477
01914> | OUTFLOW<06: (SWMF#1) | 31.02 .810 1.883 45.474
01915> | OVERFLOW<07: (Overflow) | .00 .000 .000 .000
01916>
01917> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
01918> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
01919> PERCENTAGE OF TIME OVERFLOWING (%)= .00
01920>
01921>
01922> PEAK FLOW REDUCTION [Qout/Qin] (%)= 7.633
01923> TIME SHIFT OF PEAK FLOW (min)= 42.00
01924> MAXIMUM STORAGE USED (ha.m.)=.1020E+01
01925>
01926> -----
01927> 010:0009-----
01928> *****
01929> *#
01930> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
01931> *#
01932> *****
01933> -----
01934> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
01935> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
01936> | U.H. Tp(hrs)= .190
01937>
01938> Unit Hyd Qpeak (cms)= 1.568
01939>
01940> PEAK FLOW (cms)= .671 (i)
01941> TIME TO PEAK (hrs)= 1.383
01942> RUNOFF VOLUME (mm)= 24.429
01943> TOTAL RAINFALL (mm)= 47.763
01944> RUNOFF COEFFICIENT = .511
01945>
01946> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01947>
01948> -----
01949> 010:0010-----
01950> *****
01951> *#
01952> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
01953> *#
01954> *****
01955> -----
01956> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01957> |----- (ha) (cms) (hrs) (mm) (cms)
01958> | ID1 06:SWMF#1 | 31.02 .810 1.88 45.47 .000
01959> | +ID2 07:Overflow-S | .00 .000 .00 .00 .000
01960> | +ID3 08:303 | 7.80 .671 1.38 24.43 .000
01961> |-----
01962> | SUM 09:ToH1 | 38.82 1.321 1.45 41.25 .000
01963>
01964> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01965>
01966> -----
01967> 010:0011-----
01968> *****
01969> *#
01970> *# Proposed conditions - SWMF#2
01971> *#
01972> *****
01973> -----
01974> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
01975> |----- (ha) (cms) (hrs) (mm) (cms)
01976> | ID1 02:202 | 12.00 4.107 1.17 45.48 .000
01977> | +ID2 05:205 | 1.50 .513 1.17 45.48 .000
01978> |-----
01979> | SUM 06:ToSWMF#2 | 13.50 4.620 1.17 45.48 .000
01980>
01981> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01982>
01983> -----
01984> 010:0012-----
01985> *****
01986> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
01987> | IN>06:(ToSWMF) |
01988> | OUT<07:(SWMF#2) |
01989> |===== OUTFLOW STORAGE TABLE =====|
01990> | OUTFLOW STORAGE | OUTFLOW STORAGE |
01991> | (cms) (ha.m.) | (cms) (ha.m.) |
01992> | .000 .0000E+00 | 1.982 .5874E+00 |
01993> | .013 .7660E+01 | 2.164 .6799E+00 |
01994> | .049 .1562E+00 | 2.345 .7745E+00 |
01995> | .106 .2382E+00 | 3.689 .8712E+00 |
01996> | .336 .3225E+00 | 6.218 .9700E+00 |
01997> | .727 .4087E+00 | 9.668 .1071E+01 |
01998> | 1.333 .4970E+00 | .000 .0000E+00 |
01999>
02000> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02001> ----- (ha) (cms) (hrs) (mm)
02002> | INFLOW >06: (ToSWMF) | 13.50 4.620 1.167 45.477
02003> | OUTFLOW<07: (SWMF#2) | 13.50 .645 1.533 45.476
02004> | OVERFLOW<08: (Overflow) | .00 .000 .000 .000
02005>
02006> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02007> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02008> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02009>
02010>
02011> PEAK FLOW REDUCTION [Qout/Qin] (%)= 13.970
02012> TIME SHIFT OF PEAK FLOW (min)= 22.00
02013> MAXIMUM STORAGE USED (ha.m.)=.3907E+00
02014>
02015> 010:0013-----
02016> *****
02017> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02018> |----- (ha) (cms) (hrs) (mm) (cms)
02019> | ID1 07:SWMF#2 | 13.50 .645 1.53 45.48 .000
02020> | +ID2 08:Overflow-S | .00 .000 .00 .00 .000
02021> |-----
02022> | SUM 05:FromSWMF#2 | 13.50 .645 1.53 45.48 .000
02023>
02024> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02025>
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02026> -----
02027> 010:0014-----
02028> *****
02029> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
02030> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
02031> | Total minor system capacity = .641 (cms)
02032> | Total major system storage [TMJSTO] = 0.(cu.m.)
02033>
02034> ID: NHYD AREA QPEAK TPEAK R.V. DWF
02035> (ha) (cms) (hrs) (mm) (cms)
02036> TOTAL HYD. 05:FromSW 13.50 .645 1.533 45.476 .000
02037>
02038> MAJOR SYST 01:ToWell 1.00 .004 1.533 45.476 .000
02039> MINOR SYST 02:ToHWF 13.50 .641 1.500 45.476 .000
02040>
02041> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02042>
02043> -----
02044> 010:0015-----
02045> *****
02046> *#
02047> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
02048> *#
02049> *****
02050> -----
02051> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
02052> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02053> | U.H. Tp(hrs)= .260
02054>
02055> Unit Hyd Qpeak (cms)= 3.398
02056>
02057> PEAK FLOW (cms)= 1.456 (i)
02058> TIME TO PEAK (hrs)= 1.483
02059> RUNOFF VOLUME (mm)= 21.775
02060> TOTAL RAINFALL (mm)= 47.763
02061> RUNOFF COEFFICIENT = .456
02062>
02063> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02064>
02065> -----
02066> 010:0016-----
02067> *****
02068> *#
02069> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
02070> *#
02071> *****
02072> -----
02073> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02074> |----- (ha) (cms) (hrs) (mm) (cms)
02075> | ID1 02:ToHWF | 13.50 .641 1.50 45.48 .000
02076> | +ID2 05:302 | 23.13 1.456 1.48 21.78 .000
02077> |-----
02078> | SUM 06:ToH2S2 | 36.63 2.096 1.48 30.51 .000
02079>
02080> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02081>
02082> -----
02083> 010:0017-----
02084> *****
02085> *#
02086> *# Proposed conditions - SWMF#3
02087> *#
02088> *****
02089> -----
02090> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02091> | IN>03:(203 ) |
02092> | OUT<05:(SWMF#3) |
02093> |===== OUTFLOW STORAGE TABLE =====|
02094> | OUTFLOW STORAGE | OUTFLOW STORAGE |
02095> | (cms) (ha.m.) | (cms) (ha.m.) |
02096> | .000 .0000E+00 | 1.743 .1163E+01 |
02097> | .015 .1533E+00 | 3.190 .1341E+01 |
02098> | .057 .3115E+00 | 4.392 .1522E+01 |
02099> | .117 .4749E+00 | 4.909 .1706E+01 |
02100> | .202 .6429E+00 | 8.028 .1893E+01 |
02101> | .261 .8135E+00 | 13.536 .2082E+01 |
02102> | .789 .9867E+00 | 20.842 .2275E+01 |
02103>
02104> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02105> ----- (ha) (cms) (hrs) (mm)
02106> | INFLOW >03: (203 ) | 28.00 9.583 1.167 45.477
02107> | OUTFLOW<05: (SWMF#3) | 28.00 .682 1.950 45.475
02108> | OVERFLOW<06: (Overflow) | .00 .000 .000 .000
02109>
02110> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02111> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02112> PERCENTAGE OF TIME OVERFLOWING (%)= .00
02113>
02114>
02115> PEAK FLOW REDUCTION [Qout/Qin] (%)= 7.112
02116> TIME SHIFT OF PEAK FLOW (min)= 47.00
02117> MAXIMUM STORAGE USED (ha.m.)=.9515E+00
02118>
02119> 010:0018-----
02120> *****
02121> *#
02122> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
02123> *#
02124> *****
02125> -----
02126> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
02127> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02128> | U.H. Tp(hrs)= .140
02129>
02130> Unit Hyd Qpeak (cms)= 2.914
02131>
02132> PEAK FLOW (cms)= .948 (i)
02133> TIME TO PEAK (hrs)= 1.317
02134> RUNOFF VOLUME (mm)= 21.775
02135> TOTAL RAINFALL (mm)= 47.763
02136> RUNOFF COEFFICIENT = .456
02137>
02138> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02139>
02140> -----
02141> 010:0019-----
02142> *****
02143> *#
02144> *# Proposed Conditions - Flows to North Ditch
02145> *#
02146> *****
02147> -----
02148> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02149> |----- (ha) (cms) (hrs) (mm) (cms)
02150> | ID1 03:300 | 10.68 .948 1.32 21.78 .000
02151> | +ID2 05:SWMF#3 | 28.00 .682 1.95 45.48 .000
02152> | +ID3 06:Overflow-N | .00 .000 .00 .00 .000
02153> |-----
02154> | SUM 02:ToNorthDit | 38.68 1.227 1.40 38.93 .000
02155>
02156> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02157>
02158> -----
02159> 010:0020-----
02160> *****
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02161> *#
02162> *# Proposed conditions - SWMF#4
02163> *#
02164> *#*****
02165>
02166> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02167> | IN>04: (204 ) |
02168> | OUT<06: (SWMF#4) |
02169> |*****|
02170> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02171> | IN>04: (204 ) |
02172> | OUT<06: (SWMF#4) |
02173> |*****|
02174> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02175> | IN>04: (204 ) |
02176> | OUT<06: (SWMF#4) |
02177> |*****|
02178>
02179> ROUTING RESULTS
02180> |*****|
02181> | INFLow >04: (204 ) |
02182> | OUTFlow <06: (SWMF#4) |
02183> | OVERFLOW<07: (Overflow) |
02184>
02185> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02186> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02187> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02188>
02189> PEAK FLOW REDUCTION [Qout/Qin] (%) = 24.783
02190> TIME SHIFT OF PEAK FLOW (min)= 13.00
02191> MAXIMUM STORAGE USED (ha.m.)=.1522E+00
02192>
02193>
02194>
02195> 010:0021-----
02196> *#*****
02197> *#
02198> *# Proposed conditions - External Undeveloped Area Located West of the Site
02199> *#
02200> *#*****
02201>
02202> | DESIGN NASHDY | Area (ha)= 25.55 Curve Number (CN)=82.00
02203> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02204> | U.H. Tp(hrs)= .700
02205>
02206> Unit Hyd Qpeak (cms)= 1.394
02207>
02208> PEAK FLOW (cms)= .809 (i)
02209> TIME TO PEAK (hrs)= 2.067
02210> RUNOFF VOLUME (mm)= 20.979
02211> TOTAL RAINFALL (mm)= 47.763
02212> RUNOFF COEFFICIENT = .439
02213>
02214> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02215>
02216>
02217> 010:0022-----
02218>
02219> 010:0002-----
02220>
02221> 010:0002-----
02222>
02223> 010:0002-----
02224> ** END OF RUN : 24
02225>
02226> *****
02227>
02228>
02229>
02230>
02231>
02232>
02233> | START | Project dir.: C:\SWMF#4\SWMHYMO\PROJECT-1\2ND_SU-1\
02234> | | Rainfall dir.: C:\SWMF#4\SWMHYMO\PROJECT-1\2ND_SU-1\
02235> | TZERO = .00 hrs on 0
02236> | METOUT= 2 (output= METRIC)
02237> | NRUN = 025
02238> | NSTORM= 1
02239> | # 1=25YR.HYD
02240>
02241> 025:0002-----
02242> *#*****
02243> *# Project Name: [Project Eagle] Project Number: [161500301]
02244> *# Date : 2024-11-21
02245> *# Modeller : [AA,MWK]
02246> *# Company : Stantec Consulting Ltd. (London)
02247> *# License # : 4730904
02248> *#*****
02249> *#*****
02250> *#
02251> *# This model represents the hydrologic characteristics of the Proposed
02252> *# conditions.
02253> *# Storm events modeled are:
02254> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
02255> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
02256> *# Regional Storm Event: 48hr Hurricane Hazel
02257> *#
02258> *#*****
02259>
02260> 025:0002-----
02261>
02262> | READ STORM | Filename: CHICAGO STORM 25 Years, 3hr from Colborn
02263> | Ptotal= 55.20 mm | Comments: CHICAGO STORM 25 Years, 3hr from Colborn
02264>
02265>
02266> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02267> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02268> .08 5.275 | .83 14.397 | 1.58 17.590 | 2.33 7.402
02269> .17 5.629 | .92 18.778 | 1.67 15.034 | 2.42 6.998
02270> .25 6.043 | 1.00 27.803 | 1.75 13.180 | 2.50 6.642
02271> .33 6.535 | 1.08 57.841 | 1.83 11.770 | 2.58 6.325
02272> .42 7.131 | 1.17 159.527 | 1.92 10.661 | 2.67 6.041
02273> .50 7.869 | 1.25 68.696 | 2.00 9.764 | 2.75 5.785
02274> .58 8.810 | 1.33 38.966 | 2.08 9.022 | 2.83 5.552
02275> .67 10.056 | 1.42 27.436 | 2.17 8.397 | 2.92 5.340
02276> .75 11.792 | 1.50 21.350 | 2.25 7.863 | 3.00 5.146
02277>
02278> 025:0002-----
02279> *#*****
02280> *#
02281> *# Proposed conditions - Internal Catchments
02282> *#
02283> *#*****
02284>
02285> | CALIB STANDHYD | Area (ha)= 31.02
02286> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02287>
02288>
02289> IMPERVIOUS PERVIOUS (i)
02290> Surface Area (ha)= 30.71 .31
02291> Dep. Storage (mm)= 2.00 5.00
02292> Average Slope (%)= 2.00 2.00
02293> Length (m)= 110.00 25.00
02294> Mannings n = .013 .240
02295>
02296> Max.eff.Inten.(mm/hr)= 159.53 48.77
02297>
02298>
02299>
02300>
02301>
02302>
02303>
02304>
02305>
02306>
02307>
02308>
02309>
02310>
02311>
02312>
02313>
02314> 025:0004-----
02315>
02316> | CALIB STANDHYD | Area (ha)= 12.00
02317> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02318>
02319>
02320> IMPERVIOUS PERVIOUS (i)
02321> Surface Area (ha)= 11.88 .12
02322> Dep. Storage (mm)= 2.00 5.00
02323> Average Slope (%)= 2.00 2.00
02324> Length (m)= 110.00 25.00
02325> Mannings n = .013 .240
02326>
02327> Max.eff.Inten.(mm/hr)= 159.53 48.77
02328>
02329> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
02330> Unit Hyd. Tpeak (min)= 2.00 9.00
02331> Unit Hyd. peak (cms)= .59 .13
02332>
02333> *TOTALS*
02334> PEAK FLOW (cms)= 4.95 .01 4.954 (iii)
02335> TIME TO PEAK (hrs)= 1.17 1.30 1.167
02336> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
02337> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
02338> RUNOFF COEFFICIENT = .96 .40 .958
02339>
02340>
02341> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02342> CN* = 80.0 Ia = Dep. Storage (Above)
02343> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02344> THAN THE STORAGE COEFFICIENT.
02345> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02346>
02347> 025:0005-----
02348>
02349> | CALIB STANDHYD | Area (ha)= 28.00
02350> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02351>
02352>
02353> IMPERVIOUS PERVIOUS (i)
02354> Surface Area (ha)= 27.72 .28
02355> Dep. Storage (mm)= 2.00 5.00
02356> Average Slope (%)= 2.00 2.00
02357> Length (m)= 110.00 25.00
02358> Mannings n = .013 .240
02359>
02360> Max.eff.Inten.(mm/hr)= 159.53 48.77
02361>
02362> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
02363> Unit Hyd. Tpeak (min)= 2.00 9.00
02364> Unit Hyd. peak (cms)= .59 .13
02365>
02366> *TOTALS*
02367> PEAK FLOW (cms)= 11.55 .02 11.559 (iii)
02368> TIME TO PEAK (hrs)= 1.17 1.30 1.167
02369> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
02370> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
02371> RUNOFF COEFFICIENT = .96 .40 .958
02372>
02373>
02374> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02375> CN* = 80.0 Ia = Dep. Storage (Above)
02376> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02377> THAN THE STORAGE COEFFICIENT.
02378> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02379>
02380> 025:0006-----
02381>
02382> | CALIB STANDHYD | Area (ha)= 5.44
02383> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02384>
02385>
02386> IMPERVIOUS PERVIOUS (i)
02387> Surface Area (ha)= 5.39 .05
02388> Dep. Storage (mm)= 2.00 5.00
02389> Average Slope (%)= 2.00 2.00
02390> Length (m)= 110.00 25.00
02391> Mannings n = .013 .240
02392>
02393> Max.eff.Inten.(mm/hr)= 159.53 48.77
02394>
02395> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
02396> Unit Hyd. Tpeak (min)= 2.00 9.00
02397> Unit Hyd. peak (cms)= .59 .13
02398>
02399> *TOTALS*
02400> PEAK FLOW (cms)= 2.24 .00 2.246 (iii)
02401> TIME TO PEAK (hrs)= 1.17 1.30 1.167
02402> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
02403> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
02404> RUNOFF COEFFICIENT = .96 .40 .958
02405>
02406>
02407> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02408> CN* = 80.0 Ia = Dep. Storage (Above)
02409> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02410> THAN THE STORAGE COEFFICIENT.
02411> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02412> ACTUAL QPEAK: PEAK( 2.25) + QBASE( .02) = 2.27 (cms)
02413>
02414>
02415> | CALIB STANDHYD | Area (ha)= 1.50
02416> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02417>
02418>
02419> IMPERVIOUS PERVIOUS (i)
02420> Surface Area (ha)= 1.49 .01
02421> Dep. Storage (mm)= 2.00 5.00
02422> Average Slope (%)= 2.00 2.00
02423> Length (m)= 110.00 25.00
02424> Mannings n = .013 .240
02425>
02426> Max.eff.Inten.(mm/hr)= 159.53 48.77
02427>
02428> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
02429> Unit Hyd. Tpeak (min)= 2.00 9.00
02430> Unit Hyd. peak (cms)= .59 .13
02431>
02432> *TOTALS*
02433> PEAK FLOW (cms)= .62 .00 .619 (iii)
02434> TIME TO PEAK (hrs)= 1.17 1.30 1.167
02435> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
02436> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
02437> RUNOFF COEFFICIENT = .96 .40 .958
```

```
02431> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02432> CN* = 80.0 Ia = Dep Storage (Above)
02433>
02434> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02435> THAN THE STORAGE COEFFICIENT.
02436> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02437>
02438> -----
02439> 025:0008-----
02440> *****
02441> *#
02442> *# Proposed conditions - SWMF#1
02443> *#
02444> *****
02445> -----
02446> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02447> | IN>01: (201 ) |
02448> | OUT<06: (SWMF#1) |
02449> -----
02450> | OUTFLOW STORAGE | OUTFLOW STORAGE |
02451> | (cms) (ha.m.) | (cms) (ha.m.) |
02452> | .000 .0000E+00 | 1.521 .1362E+01 |
02453> | .016 .1780E+00 | 2.289 .1802E+01 |
02454> | .063 .3614E+00 | 2.948 .2265E+01 |
02455> | .138 .5503E+00 | 6.164 .2514E+01 |
02456> | .346 .7448E+00 | 11.997 .2776E+01 |
02457> | .665 .9448E+00 | 19.770 .3044E+01 |
02458> | 1.062 .1150E+01 | .000 .0000E+00 |
02459>
02460> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02461> ----- (ha) (cms) (hrs) (mm)
02462> INFLOW >01: (201 ) 31.02 12.806 1.167 52.893
02463> OUTFLOW<06: (SWMF#1) 31.02 1.055 1.800 52.890
02464> OVERFLOW<07: (Overfl) .00 .000 .000 .000
02465>
02466> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02467> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02468> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02469>
02470> PEAK FLOW REDUCTION [Qout/Qin] (%) = 8.239
02471> TIME SHIFT OF PEAK FLOW (min)= 38.00
02472> MAXIMUM STORAGE USED (ha.m.)=.1147E+01
02473>
02474> -----
02475> 025:0009-----
02476> *****
02477> *#
02478> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
02479> *#
02480> *****
02481> -----
02482> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
02483> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02484> | U.H. Tp(hrs)= .190
02485>
02486> Unit Hyd Qpeak (cms)= 1.568
02487>
02488> PEAK FLOW (cms)= .840 (i)
02489> TIME TO PEAK (hrs)= 1.383
02490> RUNOFF VOLUME (mm)= 30.342
02491> TOTAL RAINFALL (mm)= 55.204
02492> RUNOFF COEFFICIENT = .550
02493>
02494> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02495>
02496> -----
02497> 025:0010-----
02498> *****
02499> *#
02500> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
02501> *#
02502> *****
02503> -----
02504> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02505> | (cms) (ha.m.) | (cms) (ha.m.) |
02506> | ID1 06:SWMF#1 31.02 1.055 1.80 52.89 .000
02507> | +ID2 07:Overflow-S .00 .000 .00 .00 .000
02508> | +ID3 08:303 7.80 .840 1.38 30.34 .000
02509> |
02510> | SUM 09:ToH1 38.82 1.745 1.43 48.36 .000
02511>
02512> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02513>
02514> -----
02515> 025:0011-----
02516> *****
02517> *#
02518> *# Proposed conditions - SWMF#2
02519> *#
02520> *****
02521> -----
02522> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02523> | (cms) (ha.m.) | (cms) (ha.m.) |
02524> | ID1 02:202 12.00 4.954 1.17 52.89 .000
02525> | +ID2 05:205 1.50 .619 1.17 52.89 .000
02526> |
02527> | SUM 06:ToSWMF#2 13.50 5.573 1.17 52.89 .000
02528>
02529> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02530>
02531> -----
02532> 025:0012-----
02533> *****
02534> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02535> | IN>06: (ToSWMF) |
02536> | OUT<07: (SWMF#2) |
02537> -----
02538> | OUTFLOW STORAGE | OUTFLOW STORAGE |
02539> | (cms) (ha.m.) | (cms) (ha.m.) |
02540> | .000 .0000E+00 | 1.982 .5874E+00 |
02541> | .013 .7660E-01 | 2.164 .6799E+00 |
02542> | .049 .1562E+00 | 2.345 .7745E+00 |
02543> | .106 .2382E+00 | 3.689 .8712E+00 |
02544> | .336 .3225E+00 | 6.218 .9700E+00 |
02545> | .727 .4087E+00 | 9.668 .1071E+01 |
02546> | 1.333 .4970E+00 | .000 .0000E+00 |
02547>
02548> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02549> ----- (ha) (cms) (hrs) (mm)
02550> INFLOW >06: (ToSWMF) 13.50 5.573 1.167 52.893
02551> OUTFLOW<07: (SWMF#2) 13.50 .897 1.467 52.891
02552> OVERFLOW<08: (Overfl) .00 .000 .000 .000
02553>
02554> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02555> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02556> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02557>
02558> PEAK FLOW REDUCTION [Qout/Qin] (%) = 16.088
02559> TIME SHIFT OF PEAK FLOW (min)= 18.00
02560> MAXIMUM STORAGE USED (ha.m.)=.4353E+00
02561>
02562> -----
02563> 025:0013-----
02564> *****
02565> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02566> | (cms) (ha.m.) | (cms) (ha.m.) |
02567> | ID1 07:SWMF#2 13.50 .897 1.47 52.89 .000
02568> | +ID2 08:Overflow-S .00 .000 .00 .00 .000
02569> |
02570> | SUM 05:FromSWMF#2 13.50 .897 1.47 52.89 .000
02571>
02572> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02573>
02574> -----
02575> 025:0014-----
02576> *****
02577> *#
02578> *# COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
02579> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
02580> | TotalHyd 05:FromSW | Total minor system capacity = .641 (cms)
02581> | TotalHyd 05:FromSW | Total major system storage [TMJSTO] = 0.(cu.m.)
02582>
02583> ID: NHYD AREA QPEAK TPEAK R.V. DWF
02584> ----- (ha) (cms) (hrs) (mm) (cms)
02585> TOTAL HYD. 05:FromSW 13.50 .897 1.467 52.891 .000
02586>
02587> MAJOR SYST 01:ToWell .73 .256 1.467 52.891 .000
02588> MINOR SYST 02:ToHWF 12.77 .641 1.267 52.892 .000
02589>
02590> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02591>
02592> -----
02593> 025:0015-----
02594> *****
02595> *#
02596> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
02597> *#
02598> *****
02599> -----
02600> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
02601> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02602> | U.H. Tp(hrs)= .260
02603>
02604> Unit Hyd Qpeak (cms)= 3.398
02605>
02606> PEAK FLOW (cms)= 1.830 (i)
02607> TIME TO PEAK (hrs)= 1.467
02608> RUNOFF VOLUME (mm)= 27.278
02609> TOTAL RAINFALL (mm)= 55.204
02610> RUNOFF COEFFICIENT = .494
02611>
02612> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02613>
02614> -----
02615> 025:0016-----
02616> *****
02617> *#
02618> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
02619> *#
02620> *****
02621> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02622> | (cms) (ha.m.) | (cms) (ha.m.) |
02623> | ID1 02:ToHWF 12.77 .641 1.27 52.89 .000
02624> | +ID2 05:302 23.13 1.830 1.47 27.28 .000
02625> |
02626> | SUM 06:ToH2S2 35.90 2.471 1.47 36.39 .000
02627>
02628> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02629>
02630> -----
02631> 025:0017-----
02632> *****
02633> *#
02634> *# Proposed conditions - SWMF#3
02635> *#
02636> *****
02637> -----
02638> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02639> | IN>03: (203 ) |
02640> | OUT<05: (SWMF#3) |
02641> -----
02642> | OUTFLOW STORAGE | OUTFLOW STORAGE |
02643> | (cms) (ha.m.) | (cms) (ha.m.) |
02644> | .000 .0000E+00 | 1.743 .1163E+01 |
02645> | .015 .1533E+00 | 3.190 .1341E+01 |
02646> | .057 .3115E+00 | 4.392 .1522E+01 |
02647> | .117 .4749E+00 | 4.909 .1706E+01 |
02648> | .202 .6429E+00 | 8.028 .1893E+01 |
02649> | .261 .8135E+00 | 13.536 .2082E+01 |
02650> | .789 .9867E+00 | 20.842 .2275E+01 |
02651>
02652> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02653> ----- (ha) (cms) (hrs) (mm)
02654> INFLOW >03: (203 ) 28.00 11.559 1.167 52.893
02655> OUTFLOW<05: (SWMF#3) 28.00 1.065 1.717 52.890
02656> OVERFLOW<06: (Overfl) .00 .000 .000 .000
02657>
02658> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02659> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02660> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02661>
02662> PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.214
02663> TIME SHIFT OF PEAK FLOW (min)= 33.00
02664> MAXIMUM STORAGE USED (ha.m.)=.1038E+01
02665>
02666> -----
02667> 025:0018-----
02668> *****
02669> *#
02670> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
02671> *#
02672> *****
02673> -----
02674> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
02675> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02676> | U.H. Tp(hrs)= .140
02677>
02678> Unit Hyd Qpeak (cms)= 2.914
02679>
02680> PEAK FLOW (cms)= 1.203 (i)
02681> TIME TO PEAK (hrs)= 1.317
02682> RUNOFF VOLUME (mm)= 27.278
02683> TOTAL RAINFALL (mm)= 55.204
02684> RUNOFF COEFFICIENT = .494
02685>
02686> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02687>
02688> -----
02689> 025:0019-----
02690> *****
02691> *#
02692> *# Proposed Conditions - Flows to North Ditch
02693> *#
02694> *****
02695> -----
02696> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
02697> | (cms) (ha.m.) | (cms) (ha.m.) |
02698> | ID1 03:300 10.68 1.203 1.32 27.28 .000
02699> | +ID2 05:SWMF#3 28.00 1.065 1.72 52.89 .000
02700> | +ID3 06:Overflow-N .00 .000 .00 .00 .000
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02701> =====
02702> SUM 02:ToNorthDit 38.68 1.835 1.37 45.82 .000
02703>
02704> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02705>
02706> -----
02707> 025:0020-----
02708> *#-----
02709> *#
02710> *# Proposed conditions - SWMF#4
02711> *#
02712> *#-----
02713> -----
02714> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02715> | IN>04: (204 ) |
02716> | OUT<06: (SWMF#4) | =====
02717> | OUTFLOW STORAGE | OUTFLOW STORAGE |
02718> | (cms) (ha.m.) | (cms) (ha.m.) |
02719> **** NOTE: DWF was added to inflow before routing.
02720> As a result the R.V. has changed.
02721> .000 .0000E+00 | .926 .1837E+00
02722> .005 .3240E-01 | 1.692 .2261E+00
02723> .008 .6740E-01 | 2.757 .2703E+00
02724> .010 .1043E+00 | 3.341 .3162E+00
02725> .335 .1431E+00 | 3.625 .3398E+00
02726>
02727> ROUTING RESULTS AREA QPEAK TPEAK R.V.
02728> (ha) (cms) (hrs) (mm)
02729> INFLOW >04: (204 ) 5.44 2.270 1.167 59.747
02730> OUTFLOW<06: (SWMF#4) 5.44 .651 1.333 59.733
02731> OVERFLOW<07: (Overfl) .00 .000 .000 .000
02732>
02733> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02734> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02735> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02736>
02737> PEAK FLOW REDUCTION [Qout/Qin] (%) = 28.670
02738> TIME SHIFT OF PEAK FLOW (min)= 10.00
02739> MAXIMUM STORAGE USED (ha.m.)=.1647E+00
02740>
02741> -----
02742> 025:0002-----
02743> *#-----
02744> *#
02745> *#
02746> *# Proposed conditions - External Undeveloped Area Located West of the Site
02747> *#
02748> *#-----
02749> *#
02750> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
02751> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
02752> | U.H. Tp(hrs)= .700
02753>
02754> Unit Hyd Qpeak (cms)= 1.394
02755>
02756> PEAK FLOW (cms)= 1.012 (i)
02757> TIME TO PEAK (hrs)= 2.067
02758> RUNOFF VOLUME (mm)= 26.348
02759> TOTAL RAINFALL (mm)= 55.204
02760> RUNOFF COEFFICIENT = .477
02761>
02762> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02763>
02764> -----
02765> 025:0022-----
02766> -----
02767> 025:0002-----
02768> -----
02769> 025:0002-----
02770> -----
02771> 025:0002-----
02772> -----
02773> 025:0002-----
02774> ** END OF RUN : 49
02775>
02776> -----
02777> -----
02778> -----
02779> -----
02780> -----
02781> -----
02782> -----
02783> | SPARC | Project dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
02784> | Rainfall dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
02785> | TZERO = .00 hrs on 0
02786> | METOUT= 2 (output = METRIC)
02787> | NRUN = 050
02788> | NSTORM= 1
02789> | # 1=50YR.HYD
02790>
02791> 050:0002-----
02792> *#-----
02793> *# Project Name: [Project Eagle] Project Number: [161500301]
02794> *# Date : 2024-11-21
02795> *# Modeller : [AA,MJK]
02796> *# Company : Stantec Consulting Ltd. (London)
02797> *# License # : 4730904
02798> *#-----
02799> *#-----
02800> *#
02801> *# This model represents the hydrologic characteristics of the Proposed
02802> *# conditions.
02803> *# Storm events modeled are:
02804> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
02805> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
02806> *# Regional Storm Event: 48hr Hurricane Hazel
02807> *#
02808> *#-----
02809> *#
02810> 050:0002-----
02811> -----
02812> | READ STORM | Filename: CHICAGO STORM 50 Years, 3hr from Colborn
02813> | Ptotal= 61.74 mm | Comments: CHICAGO STORM 50 Years, 3hr from Colborn
02814>
02815> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
02816> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
02817> .08 6.075 | .83 16.290 | 1.58 19.828 | 2.33 8.476
02818> .17 6.475 | .92 21.140 | 1.67 16.997 | 2.42 8.022
02819> .25 6.944 | 1.00 31.074 | 1.75 14.937 | 2.50 7.620
02820> .33 7.499 | 1.08 63.899 | 1.83 13.368 | 2.58 7.262
02821> .42 8.171 | 1.17 175.021 | 1.92 12.130 | 2.67 6.941
02822> .50 9.001 | 1.25 75.740 | 2.00 11.127 | 2.75 6.652
02823> .58 10.058 | 1.33 43.302 | 2.08 10.296 | 2.83 6.389
02824> .67 11.453 | 1.42 30.673 | 2.17 9.595 | 2.92 6.149
02825> .75 13.392 | 1.50 23.979 | 2.25 8.996 | 3.00 5.929
02826>
02827> -----
02828> 050:0002-----
02829> *#-----
02830> *#
02831> *# Proposed conditions - Internal Catchments
02832> *#
02833> *#-----
02834> *#
02835> | CALIB STANDHYD | Area (ha)= 31.02

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02836> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02837> -----
02838> IMPERVIOUS PERVIOUS (i)
02839> Surface Area (ha)= 30.71 .31
02840> Dep. Storage (mm)= 2.00 5.00
02841> Average Slope (%)= 2.00 2.00
02842> Length (m)= 110.00 25.00
02843> Mannings n = .013 .240
02844>
02845> Max.eff.Inten.(mm/hr)= 175.02 60.55
02846> over (min) 2.00 8.00
02847> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
02848> Unit Hyd. Tpeak (min)= 2.00 8.00
02849> Unit Hyd. peak (cms)= .61 .14
02850>
02851> PEAK FLOW (cms)= 14.12 .03 *TOTALS*
02852> TIME TO PEAK (hrs)= 1.17 1.28 14.133 (iii)
02853> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
02854> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
02855> RUNOFF COEFFICIENT = .97 .43 .962
02856>
02857> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02858> CN* = 80.0 Ia = Dep. Storage (Above)
02859> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02860> THAN THE STORAGE COEFFICIENT.
02861> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02862>
02863> -----
02864> 050:0004-----
02865> -----
02866> | CALIB STANDHYD | Area (ha)= 12.00
02867> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02868> -----
02869> IMPERVIOUS PERVIOUS (i)
02870> Surface Area (ha)= 11.88 .12
02871> Dep. Storage (mm)= 2.00 5.00
02872> Average Slope (%)= 2.00 2.00
02873> Length (m)= 110.00 25.00
02874> Mannings n = .013 .240
02875>
02876> Max.eff.Inten.(mm/hr)= 175.02 60.55
02877> over (min) 2.00 8.00
02878> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
02879> Unit Hyd. Tpeak (min)= 2.00 8.00
02880> Unit Hyd. peak (cms)= .61 .14
02881>
02882> PEAK FLOW (cms)= 5.46 .01 *TOTALS*
02883> TIME TO PEAK (hrs)= 1.17 1.28 5.467 (iii)
02884> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
02885> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
02886> RUNOFF COEFFICIENT = .97 .43 .962
02887>
02888> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02889> CN* = 80.0 Ia = Dep. Storage (Above)
02890> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02891> THAN THE STORAGE COEFFICIENT.
02892> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02893>
02894> -----
02895> 050:0005-----
02896> -----
02897> | CALIB STANDHYD | Area (ha)= 28.00
02898> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02899> -----
02900> IMPERVIOUS PERVIOUS (i)
02901> Surface Area (ha)= 27.72 .28
02902> Dep. Storage (mm)= 2.00 5.00
02903> Average Slope (%)= 2.00 2.00
02904> Length (m)= 110.00 25.00
02905> Mannings n = .013 .240
02906>
02907> Max.eff.Inten.(mm/hr)= 175.02 60.55
02908> over (min) 2.00 8.00
02909> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
02910> Unit Hyd. Tpeak (min)= 2.00 8.00
02911> Unit Hyd. peak (cms)= .61 .14
02912>
02913> PEAK FLOW (cms)= 12.74 .03 *TOTALS*
02914> TIME TO PEAK (hrs)= 1.17 1.28 12.757 (iii)
02915> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
02916> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
02917> RUNOFF COEFFICIENT = .97 .43 .962
02918>
02919> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02920> CN* = 80.0 Ia = Dep. Storage (Above)
02921> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02922> THAN THE STORAGE COEFFICIENT.
02923> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02924>
02925> -----
02926> 050:0006-----
02927> -----
02928> | CALIB STANDHYD | Area (ha)= 5.44
02929> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02930> -----
02931> IMPERVIOUS PERVIOUS (i)
02932> Surface Area (ha)= 5.39 .05
02933> Dep. Storage (mm)= 2.00 5.00
02934> Average Slope (%)= 2.00 2.00
02935> Length (m)= 110.00 25.00
02936> Mannings n = .013 .240
02937>
02938> Max.eff.Inten.(mm/hr)= 175.02 60.55
02939> over (min) 2.00 8.00
02940> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
02941> Unit Hyd. Tpeak (min)= 2.00 8.00
02942> Unit Hyd. peak (cms)= .61 .14
02943>
02944> PEAK FLOW (cms)= 2.48 .01 *TOTALS*
02945> TIME TO PEAK (hrs)= 1.17 1.28 2.479 (iii)
02946> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
02947> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
02948> RUNOFF COEFFICIENT = .97 .43 .962
02949>
02950> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02951> CN* = 80.0 Ia = Dep. Storage (Above)
02952> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02953> THAN THE STORAGE COEFFICIENT.
02954> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02955> ACTUAL QPEAK: PEAK( 2.48) + QBASE( .02) = 2.50 (cms)
02956>
02957> -----
02958> -----
02959> -----
02960> | CALIB STANDHYD | Area (ha)= 1.50
02961> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
02962> -----
02963> IMPERVIOUS PERVIOUS (i)
02964> Surface Area (ha)= 1.49 .01
02965> Dep. Storage (mm)= 2.00 5.00
02966> Average Slope (%)= 2.00 2.00
02967> Length (m)= 110.00 25.00
02968> Mannings n = .013 .240
02969>
02970> Max.eff.Inten.(mm/hr)= 175.02 60.55

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02971>      over (min)      2.00      8.00
02972>      Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
02973>      Unit Hyd. Tpeak (min)= 2.00      8.00
02974>      Unit Hyd. Tpeak (cms)= .61      .14
02975>
02976>      PEAK FLOW (cms)= .68      .00      *.TOTALS*
02977>      TIME TO PEAK (hrs)= 1.17      1.28      1.167
02978>      RUNOFF VOLUME (mm)= 59.74      26.78      59.412
02979>      TOTAL RAINFALL (mm)= 61.74      61.74      61.742
02980>      RUNOFF COEFFICIENT = .97      .43      .962
02981>
02982>      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02983>      CN* = 80.0 Ia = Dep. Storage (Above)
02984>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02985>      THAN THE STORAGE COEFFICIENT.
02986>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02987>
02988>
02989> 050:0008-----
02990> *****
02991> *#
02992> *# Proposed conditions - SWMF#1
02993> *#
02994> *****
02995>
02996> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
02997> | IN>01:(201 ) |
02998> | OUT<06:(SWMF#1) |
02999> ===== OUTFLOW STORAGE TABLE =====
03000> OUTFLOW STORAGE | OUTFLOW STORAGE
03001> (cms) (ha.m.) | (cms) (ha.m.)
03002> .000 .0000E+00 | 1.521 .1362E+01
03003> .016 .1780E+00 | 2.289 .1802E+01
03004> .063 .3614E+00 | 2.948 .2265E+01
03005> .138 .5503E+00 | 6.164 .2514E+01
03006> .346 .7448E+00 | 11.997 .2776E+01
03007> .665 .9448E+00 | 19.770 .3044E+01
03008> 1.062 .1150E+01 | .000 .0000E+00
03009>
03010> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03011> (ha) (cms) (hrs) (mm)
03012> INFLOW >01: (201 ) 31.02 14.133 1.167 59.412
03013> OUTFLOW<06: (SWMF#1) 31.02 1.291 1.750 59.409
03014> OVERFLOW<07: (Overfl) .00 .000 .000 .000
03015>
03016> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03017> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
03018> PERCENTAGE OF TIME OVERFLOWING (%) = .00
03019>
03020> PEAK FLOW REDUCTION [Qout/Qin](%) = 9.134
03021> TIME SHIFT OF PEAK FLOW (min)= 35.00
03022> MAXIMUM STORAGE USED (ha.m.)=.1256E+01
03023>
03024>
03025> 050:0009-----
03026> *****
03027> *#
03028> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
03029> *#
03030> *****
03031>
03032> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
03033> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03034> | U.H. Tp(hrs)= .190
03035>
03036> Unit Hyd Qpeak (cms)= 1.568
03037>
03038> PEAK FLOW (cms)= .981 (i)
03039> TIME TO PEAK (hrs)= 1.383
03040> RUNOFF VOLUME (mm)= 35.722
03041> TOTAL RAINFALL (mm)= 61.742
03042> RUNOFF COEFFICIENT = .579
03043>
03044> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03045>
03046>
03047> 050:0010-----
03048> *****
03049> *#
03050> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
03051> *#
03052> *****
03053>
03054> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03055> (ha) (cms) (hrs) (mm) (cms)
03056> ID1 06:SWMF#1 31.02 1.291 1.75 59.41 .000
03057> +ID2 07:Overflow-S .00 .000 .00 .00 .000
03058> +ID3 08:303 7.80 .981 1.38 35.72 .000
03059>
03060> SUM 09:ToH1 38.82 2.115 1.43 54.65 .000
03061>
03062> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03063>
03064>
03065> 050:0011-----
03066> *****
03067> *#
03068> *# Proposed conditions - SWMF#2
03069> *#
03070> *****
03071>
03072> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03073> (ha) (cms) (hrs) (mm) (cms)
03074> ID1 02:202 12.00 5.467 1.17 59.41 .000
03075> +ID2 05:205 1.50 .683 1.17 59.41 .000
03076>
03077> SUM 06:ToSWMF#2 13.50 6.151 1.17 59.41 .000
03078>
03079> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03080>
03081>
03082> 050:0012-----
03083> *****
03084> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03085> | IN>06:(ToSWMF) |
03086> | OUT<07:(SWMF#2) |
03087> ===== OUTFLOW STORAGE TABLE =====
03088> OUTFLOW STORAGE | OUTFLOW STORAGE
03089> (cms) (ha.m.) | (cms) (ha.m.)
03090> .000 .0000E+00 | 1.982 .5874E+00
03091> .013 .7660E+01 | 2.164 .6799E+00
03092> .049 .1562E+00 | 2.345 .7745E+00
03093> .106 .2382E+00 | 3.689 .8712E+00
03094> .336 .3225E+00 | 6.218 .9700E+00
03095> .727 .4087E+00 | 9.668 .1071E+01
03096> 1.333 .4970E+00 | .000 .0000E+00
03097>
03098> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03099> (ha) (cms) (hrs) (mm)
03100> INFLOW >06: (ToSWMF) 13.50 6.151 1.167 59.412
03101> OUTFLOW<07: (SWMF#2) 13.50 1.135 1.433 59.410
03102> OVERFLOW<08: (Overfl) .00 .000 .000 .000
03103>
03104> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03105> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
03106> PERCENTAGE OF TIME OVERFLOWING (%) = .00

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03106>
03107>
03108> PEAK FLOW REDUCTION [Qout/Qin](%) = 18.450
03109> TIME SHIFT OF PEAK FLOW (min)= 16.00
03110> MAXIMUM STORAGE USED (ha.m.)=.4681E+00
03111>
03112> -----
03113> 050:0013-----
03114>
03115> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03116> (ha) (cms) (hrs) (mm) (cms)
03117> ID1 07:SWMF#2 13.50 1.135 1.43 59.41 .000
03118> +ID2 08:Overflow-S 1.00 .000 .00 .00 .000
03119>
03120> SUM 05:FromSWMF#2 13.50 1.135 1.43 59.41 .000
03121>
03122> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03123>
03124>
03125> 050:0014-----
03126>
03127> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
03128> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
03129> *# Total minor system capacity = .641 (cms)
03130> *# Total major system storage [TMJSTO] = 0.(cu.m.)
03131>
03132> ID: NHYD AREA QPEAK TPEAK R.V. DWF
03133> (ha) (cms) (hrs) (mm) (cms)
03134> TOTAL HYD. 05:FromSW 13.50 1.135 1.433 59.410 .000
03135>
03136> MAJOR SYST 01:ToWell 1.54 .494 1.433 59.410 .000
03137> MINOR SYST 02:ToHWF 11.96 .641 1.233 59.410 .000
03138>
03139> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03140>
03141>
03142> 050:0015-----
03143> *****
03144> *#
03145> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
03146> *#
03147> *****
03148>
03149> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
03150> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03151> | U.H. Tp(hrs)= .260
03152>
03153> Unit Hyd Qpeak (cms)= 3.398
03154>
03155> PEAK FLOW (cms)= 2.154 (i)
03156> TIME TO PEAK (hrs)= 1.467
03157> RUNOFF VOLUME (mm)= 32.326
03158> TOTAL RAINFALL (mm)= 61.742
03159> RUNOFF COEFFICIENT = .524
03160>
03161> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03162>
03163>
03164> 050:0016-----
03165> *****
03166> *#
03167> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
03168> *#
03169> *****
03170>
03171> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03172> (ha) (cms) (hrs) (mm) (cms)
03173> ID1 02:ToHWF 11.96 .641 1.23 59.41 .000
03174> +ID2 05:302 23.13 2.154 1.47 32.33 .000
03175>
03176> SUM 06:ToH2S2 35.09 2.795 1.47 41.56 .000
03177>
03178> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03179>
03180>
03181> 050:0017-----
03182> *****
03183> *#
03184> *# Proposed conditions - SWMF#3
03185> *#
03186> *****
03187>
03188> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03189> | IN>03:(203 ) |
03190> | OUT<05:(SWMF#3) |
03191> ===== OUTFLOW STORAGE TABLE =====
03192> OUTFLOW STORAGE | OUTFLOW STORAGE
03193> (cms) (ha.m.) | (cms) (ha.m.)
03194> .000 .0000E+00 | 1.743 .1163E+01
03195> .015 .1533E+00 | 3.190 .1341E+01
03196> .057 .3115E+00 | 4.392 .1522E+01
03197> .117 .4749E+00 | 4.909 .1706E+01
03198> .202 .6429E+00 | 8.028 .1893E+01
03199> .261 .8135E+00 | 11.533 .2082E+01
03200> .789 .9867E+00 | 20.842 .2275E+01
03201>
03202> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03203> (ha) (cms) (hrs) (mm)
03204> INFLOW >03: (203 ) 28.00 12.757 1.167 59.412
03205> OUTFLOW<05: (SWMF#3) 28.00 1.450 1.617 59.409
03206> OVERFLOW<06: (Overfl) .00 .000 .000 .000
03207>
03208> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03209> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
03210> PERCENTAGE OF TIME OVERFLOWING (%) = .00
03211>
03212> PEAK FLOW REDUCTION [Qout/Qin](%) = 11.366
03213> TIME SHIFT OF PEAK FLOW (min)= 27.00
03214> MAXIMUM STORAGE USED (ha.m.)=.1109E+01
03215>
03216>
03217> 050:0018-----
03218> *****
03219> *#
03220> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
03221> *#
03222> *****
03223>
03224> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
03225> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03226> | U.H. Tp(hrs)= .140
03227>
03228> Unit Hyd Qpeak (cms)= 2.914
03229>
03230> PEAK FLOW (cms)= 1.414 (i)
03231> TIME TO PEAK (hrs)= 1.317
03232> RUNOFF VOLUME (mm)= 32.326
03233> TOTAL RAINFALL (mm)= 61.742
03234> RUNOFF COEFFICIENT = .524
03235>
03236> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03237>
03238>
03239> 050:0019-----
03240> *****

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03241> *#
03242> *# Proposed Conditions - Flows to North Ditch
03243> *#
03244> *#*****
03245>
03246> | ADD HYD (ToNorthDit) | ID: NHYD      AREA      QPEAK      TPEAK      R.V.      DWF
03247> |-----|-----|-----|-----|-----|-----|
03248> | I01 03:300              | (ha)      (cms)      (hrs)      (mm)      (cms)
03249> | +I02 05:SWMF#3          | 10.68     1.414     1.32     32.33   .000
03250> | +I03 06:Overflow-N      | 28.00     1.450     1.62     59.41   .000
03251> |-----|-----|-----|-----|-----|
03252> | SUM 02:ToNorthDit      | 38.68     2.494     1.38     51.93   .000
03253>
03254> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03255>
03256>
03257> 050:0020-----
03258> *#*****
03259> *#
03260> *# Proposed conditions - SWMF#4
03261> *#
03262> *#*****
03263>
03264> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03265> | IN>04: (204 ) |
03266> | OUT<06: (SWMF#4) | ===== OUTFLOW STORAGE TABLE =====
03267> |-----|-----|-----|-----|
03268> | OUTFLOW STORAGE | OUTFLOW STORAGE |
03269> | (cms) (ha.m.) | (cms) (ha.m.) |
03270> |-----|-----|-----|-----|
03271> | **** NOTE: DWF was added to inflow before routing.
03272> | As a result the R.V. has changed.
03273> |
03274> | .000 .0000E+00 | .926 .1837E+00
03275> | .005 .3240E-01 | 1.692 .2261E+00
03276> | .008 .6740E-01 | 2.757 .2703E+00
03277> | .010 .1043E+00 | 3.341 .3162E+00
03278> | .335 .1431E+00 | 3.625 .3398E+00
03279>
03280> ROUTING RESULTS      AREA      QPEAK      TPEAK      R.V.
03281> |-----|-----|-----|-----|
03282> | INFLOW >04: (204 ) | 5.44     2.502     1.167     66.135
03283> | OUTFLOW<06: (SWMF#4) | 5.44     .807     1.300     66.119
03284> | OVERFLOW<07: (Overflow) | .00      .000     .000     .000
03285>
03286> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03287> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
03288> PERCENTAGE OF TIME OVERFLOWING (%) = .00
03289>
03290> PEAK FLOW REDUCTION [Qout/Qin] (%) = 32.254
03291> TIME SHIFT OF PEAK FLOW (min) = 8.00
03292> MAXIMUM STORAGE USED (ha.m.) = .1755E+00
03293>
03294> 050:0021-----
03295> *#*****
03296> *# Proposed conditions - External Undeveloped Area Located West of the Site
03297> *#
03298> *#*****
03299> *#
03300> | DESIGN NASHYD | Area (ha) = 25.55 Curve Number (CN)=82.00
03301> | I01:301 DT= 1.00 | Ia (mm) = 1.500 # of Linear Res. (N)= 3.00
03302> |-----|-----|-----|-----|
03303> | U.H. Tp(hrs) = .700
03304>
03305> Unit Hyd Qpeak (cms) = 1.394
03306>
03307> PEAK FLOW (cms) = 1.197 (i)
03308> TIME TO PEAK (hrs) = 2.050
03309> RUNOFF VOLUME (mm) = 31.286
03310> TOTAL RAINFALL (mm) = 61.742
03311> RUNOFF COEFFICIENT = .507
03312>
03313> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03314>
03315> 050:0022-----
03316> *#*****
03317> *#
03318> *#
03319> *#
03320> *#
03321> *#
03322> *#
03323> *#
03324> *#
03325> *#
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03375> *#
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03376> .67 12.541 | 1.42 33.126 | 2.17 10.533 | 2.92 6.791
03377> .75 14.629 | 1.50 25.972 | 2.25 9.884 | 3.00 6.551
03378>
03379>
03380> 100:0003-----
03381> *#*****
03382> *#
03383> *# Proposed conditions - Internal Catchments
03384> *#
03385> *#*****
03386>
03387> | CALIB STANDHYD | Area (ha) = 31.02
03388> | I01:201 DT= 1.00 | Total Imp(%) = 99.00 Dir. Conn.(%) = 99.00
03389>
03390>
03391> IMPERVIOUS PERVIOUS (i)
03392> Surface Area (ha) = 30.71 .31
03393> Dep. Storage (mm) = 2.00 5.00
03394> Average Slope (%) = 2.00 2.00
03395> Length (m) = 110.00 25.00
03396> Mannings n = .013 .240
03397>
03398> Max.eff.Inten.(mm/hr) = 193.76 71.28
03399> over (min) = 2.00 8.00
03400> Storage Coeff. (min) = 1.69 (ii) 7.63 (ii)
03401> Unit Hyd. Tpeak (min) = 2.00 8.00
03402> Unit Hyd. peak (cms) = .62 .15
03403>
03404> PEAK FLOW (cms) = 15.71 .04 *TOTALS*
03405> TIME TO PEAK (hrs) = 1.17 1.28 15.724 (iii)
03406> RUNOFF VOLUME (mm) = 65.44 30.96 65.097
03407> TOTAL RAINFALL (mm) = 67.44 67.44 67.442
03408> RUNOFF COEFFICIENT = .97 .46 .965
03409>
03410> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03411> CN* = 80.0 Ia = Dep. Storage (Above)
03412> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03413> THAN THE STORAGE COEFFICIENT.
03414> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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03416> 100:0004-----
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03511> -----
03512> | CALIB STANDHYD | Area (ha)= 1.50
03513> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
03514> -----
03515> IMPERVIOUS PERVIOUS (i)
03516> Surface Area (ha)= 1.49 .01
03517> Dep. Storage (mm)= 2.00 5.00
03518> Average Slope (%)= 2.00 2.00
03519> Length (m)= 110.00 25.00
03520> Mannings n = .013 .240
03521> -----
03522> Max.eff.Inten.(mm/hr)= 193.76 71.28
03523> over (min)= 2.00 8.00
03524> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
03525> Unit Hyd. Tpeak (min)= 2.00 8.00
03526> Unit Hyd. peak (cms)= .62 .15
03527> -----
03528> PEAK FLOW (cms)= .76 .00 *TOTALS*
03529> TIME TO PEAK (hrs)= 1.17 1.28 1.167 (iii)
03530> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
03531> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
03532> RUNOFF COEFFICIENT = .97 .46 .965
03533> -----
03534> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
03535> CN* = 80.0 Ia = Dep. Storage (Above)
03536> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03537> THAN THE STORAGE COEFFICIENT.
03538> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03539> -----
03540> -----
03541> 100:0008-----
03542> *#-----
03543> *#
03544> *# Proposed conditions - SWMF#1
03545> *#
03546> *#-----
03547> -----
03548> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03549> | IN>01:(201 ) |
03550> | OUT<06:(SWMF#1) |
03551> -----
03552> OUTFLOW STORAGE TABLE
03553> OUTFLOW STORAGE | OUTFLOW STORAGE
03554> (cms) (ha.m.) | (cms) (ha.m.)
03555> .000 .0000E+00 | 1.521 .1362E+01
03556> .016 .1780E+00 | 2.289 .1802E+01
03557> .063 .3614E+00 | 2.948 .2265E+01
03558> .138 .5503E+00 | 6.164 .2514E+01
03559> .346 .7448E+00 | 11.997 .2776E+01
03560> .665 .9448E+00 | 19.770 .3044E+01
03561> 1.062 .1150E+01 | .000 .0000E+00
03562> -----
03563> ROUTING RESULTS AREA QPEAK TPEAK R.V.
03564> (ha) (cms) (hrs) (mm)
03565> INFLOW>01:(201 ) 31.02 15.724 1.167 65.097
03566> OUTFLOW<06:(SWMF#1) 31.02 1.501 1.700 65.094
03567> OVERFLOW<07:(Overfl) .00 .000 .000 .000
03568> -----
03569> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03570> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
03571> PERCENTAGE OF TIME OVERFLOWING (%)= .00
03572> -----
03573> PEAK FLOW REDUCTION [Qout/Qin] (%)= 9.548
03574> TIME SHIFT OF PEAK FLOW (min)= .1353E+01
03575> MAXIMUM STORAGE USED (ha.m.)= .1353E+01
03576> -----
03577> 100:0009-----
03578> *#-----
03579> *#
03580> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
03581> *#
03582> *#-----
03583> -----
03584> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
03585> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
03586> | U.H. Tp(hrs)= .190
03587> -----
03588> Unit Hyd Qpeak (cms)= 1.568
03589> -----
03590> PEAK FLOW (cms)= 1.121 (i)
03591> TIME TO PEAK (hrs)= 1.367
03592> RUNOFF VOLUME (mm)= 40.529
03593> TOTAL RAINFALL (mm)= 67.442
03594> RUNOFF COEFFICIENT = .601
03595> -----
03596> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03597> -----
03598> -----
03599> 100:0010-----
03600> *#-----
03601> *#
03602> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
03603> *#
03604> *#-----
03605> -----
03606> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03607> (ha) (cms) (hrs) (mm) (cms)
03608> ID1 06:SWMF#1 31.02 1.501 1.70 65.09 .000
03609> +ID2 07:Overflow-S .00 .000 .00 .00 .000
03610> +ID3 08:303 7.80 1.121 1.37 40.53 .000
03611> -----
03612> SUM 09:ToH1 38.82 2.471 1.43 60.16 .000
03613> -----
03614> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03615> -----
03616> -----
03617> 100:0011-----
03618> *#-----
03619> *#
03620> *# Proposed conditions - SWMF#2
03621> *#
03622> *#-----
03623> -----
03624> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
03625> (ha) (cms) (hrs) (mm) (cms)
03626> ID1 02:202 12.00 6.083 1.17 65.10 .000
03627> +ID2 05:205 1.50 .760 1.17 65.10 .000
03628> -----
03629> SUM 06:ToSWMF#2 13.50 6.843 1.17 65.10 .000
03630> -----
03631> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03632> -----
03633> -----
03634> 100:0012-----
03635> *#-----
03636> *#
03637> *# Proposed conditions - Flows to Headwater Drainage Feature H2S2
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04601> *#
0460
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03781>
03782> PEAK FLOW (cms)= 1.626 (i)
03783> TIME TO PEAK (hrs)= 1.317
03784> RUNOFF VOLUME (mm)= 36.861
03785> TOTAL RAINFALL (mm)= 67.442
03786> RUNOFF COEFFICIENT = .547
03787>
03788> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03789>
03790> -----
03791> 100:0019-----
03792> *****
03793> *#
03794> *# Proposed Conditions - Flows to North Ditch
03795> *#
03796> *****
03797>
03798> | ADD HYD (ToNorthDit) | ID: NHYD | AREA | QPEAK | TPEAK | R.V. | DWF |
03799> | (ha) | (cms) | (hrs) | (mm) | (cms) |
03800> ID1 03:300 | 10.68 | 1.626 | 1.32 | 36.86 | .000 |
03801> +ID2 05:SWMF#3 | 28.00 | 1.826 | 1.53 | 65.09 | .000 |
03802> +ID3 06:Overflow-N | .00 | .000 | .00 | .00 | .000 |
03803> |
03804> SUM 02:ToNorthDit | 38.68 | 3.129 | 1.37 | 57.30 | .000 |
03805>
03806> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03807>
03808> -----
03809> 100:0020-----
03810> *****
03811> *#
03812> *# Proposed conditions - SWMF#4
03813> *#
03814> *****
03815>
03816> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
03817> | IN>04: (204 ) |
03818> | OUT<06: (SWMF#4) |
03819> | ===== OUTFLOW STORAGE TABLE ===== |
03820> | OUTFLOW STORAGE | OUTFLOW STORAGE |
03821> | (cms) | (ha.m.) | (cms) | (ha.m.) |
03822> **** NOTE: DWF was added to inflow before routing.
03823> As a result the R.V. has changed.
03824> .000 .0000E+00 | .926 | .1837E+00 |
03825> .005 .3240E-01 | 1.692 | .2261E+00 |
03826> .008 .6740E-01 | 2.757 | .2703E+00 |
03827> .010 .1043E+00 | 3.341 | .3162E+00 |
03828> .335 .1431E+00 | 3.625 | .3398E+00 |
03829>
03830> ROUTING RESULTS | AREA | QPEAK | TPEAK | R.V. |
03831> | (ha) | (cms) | (hrs) | (mm) |
03832> INFLOW >04: (204 ) | 5.44 | 2.781 | 1.167 | 71.741 |
03833> OUTFLOW<06: (SWMF#4) | 5.44 | .964 | 1.283 | 71.725 |
03834> OVERFLOW<07: (Overflow) | .00 | .000 | .000 | .000 |
03835>
03836> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
03837> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
03838> PERCENTAGE OF TIME OVERFLOWING (%) = .00
03839>
03840> PEAK FLOW REDUCTION [Qout/Qin] (%) = 34.663
03841> TIME SHIFT OF PEAK FLOW (min)= 7.00
03842> MAXIMUM STORAGE USED (ha.m.)=.1859E+00
03843>
03844> -----
03845> 100:0021-----
03846> *****
03847> *#
03848> *# Proposed conditions - External Undeveloped Area Located West of the Site
03849> *#
03850> *****
03851>
03852> | DESIGN NASHYD | Area (ha)= 25.55 | Curve Number (CN)=82.00 |
03853> | 01:301 DT= 1.00 | Ia (mm)= 1.500 | # of Linear Res. (N)= 3.00 |
03854> | U.H. Tp(hrs)= .700 |
03855>
03856> Unit Hyd Qpeak (cms)= 1.394
03857>
03858> PEAK FLOW (cms)= 1.369 (i)
03859> TIME TO PEAK (hrs)= 2.050
03860> RUNOFF VOLUME (mm)= 35.731
03861> TOTAL RAINFALL (mm)= 67.442
03862> RUNOFF COEFFICIENT = .530
03863>
03864> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03865>
03866> -----
03867> 100:0022-----
03868> -----
03869> 100:0002-----
03870> -----
03871> 100:0002-----
03872> -----
03873> 100:0002-----
03874> -----
03875> 100:0002-----
03876> -----
03877> 100:0002-----
03878> -----
03879> 100:0002-----
03880> ** END OF RUN : 250
03881> -----
03882> *****
03883> -----
03884> -----
03885> -----
03886> -----
03887> -----
03888> -----
03889> | START | Project dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
03890> | Rainfall dir.: C:\SWMMOD-1\SWMHYMO\PROJEC-1\2ND_SU-1\
03891> | TZERO = .00 hrs on 0
03892> | METOUT= 2 (output = METRIC)
03893> | NRUN = 251
03894> | NSTORM= 1
03895> | # 1=hurhaz48.stm
03896> -----
03897> 251:0002-----
03898> *****
03899> *#
03900> *# Project Name: [Project Eagle] Project Number: [161500301]
03901> *# Date : 2024-11-21
03902> *# Modeller : [AA,MYK]
03903> *# Company : Stantec Consulting Ltd. (London)
03904> *# License # : 4730904
03905> *****
03906> *#
03907> *# This model represents the hydrologic characteristics of the Proposed
03908> *# conditions.
03909> *# Storm events modeled are:
03910> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
03911> *# 25 mm 4hr Chicago Storm (Using City of London IDF Parameters)
03912> *# Regional Storm Event: 48hr Hurricane Hazel
03913> *#
03914> *****
03915> -----
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03916> 251:0002-----
03917> -----
03918> | READ STORM | | Filename: REGIONAL STORM
03919> | Ptotal= 285.00 mm | Comments: REGIONAL STORM
03920> -----
03921> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN |
03922> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr |
03923> .25 2.000 | 12.25 2.000 | 24.25 2.000 | 36.25 2.000 |
03924> .50 2.000 | 12.50 2.000 | 24.50 2.000 | 36.50 2.000 |
03925> .75 2.000 | 12.75 2.000 | 24.75 2.000 | 36.75 2.000 |
03926> 1.00 2.000 | 13.00 2.000 | 25.00 2.000 | 37.00 2.000 |
03927> 1.25 2.000 | 13.25 2.000 | 25.25 2.000 | 37.25 2.000 |
03928> 1.50 2.000 | 13.50 2.000 | 25.50 2.000 | 37.50 2.000 |
03929> 1.75 2.000 | 13.75 2.000 | 25.75 2.000 | 37.75 2.000 |
03930> 2.00 2.000 | 14.00 2.000 | 26.00 2.000 | 38.00 2.000 |
03931> 2.25 2.000 | 14.25 2.000 | 26.25 2.000 | 38.25 2.000 |
03932> 2.50 2.000 | 14.50 2.000 | 26.50 2.000 | 38.50 2.000 |
03933> 2.75 2.000 | 14.75 2.000 | 26.75 2.000 | 38.75 2.000 |
03934> 3.00 2.000 | 15.00 2.000 | 27.00 2.000 | 39.00 2.000 |
03935> 3.25 2.000 | 15.25 2.000 | 27.25 2.000 | 39.25 2.000 |
03936> 3.50 2.000 | 15.50 2.000 | 27.50 2.000 | 39.50 2.000 |
03937> 3.75 2.000 | 15.75 2.000 | 27.75 2.000 | 39.75 2.000 |
03938> 4.00 2.000 | 16.00 2.000 | 28.00 2.000 | 40.00 2.000 |
03939> 4.25 2.000 | 16.25 2.000 | 28.25 2.000 | 40.25 2.000 |
03940> 4.50 2.000 | 16.50 2.000 | 28.50 2.000 | 40.50 2.000 |
03941> 4.75 2.000 | 16.75 2.000 | 28.75 2.000 | 40.75 2.000 |
03942> 5.00 2.000 | 17.00 2.000 | 29.00 2.000 | 41.00 2.000 |
03943> 5.25 2.000 | 17.25 2.000 | 29.25 2.000 | 41.25 2.000 |
03944> 5.50 2.000 | 17.50 2.000 | 29.50 2.000 | 41.50 2.000 |
03945> 5.75 2.000 | 17.75 2.000 | 29.75 2.000 | 41.75 2.000 |
03946> 6.00 2.000 | 18.00 2.000 | 30.00 2.000 | 42.00 2.000 |
03947> 6.25 2.000 | 18.25 2.000 | 30.25 2.000 | 42.25 2.000 |
03948> 6.50 2.000 | 18.50 2.000 | 30.50 2.000 | 42.50 2.000 |
03949> 6.75 2.000 | 18.75 2.000 | 30.75 2.000 | 42.75 2.000 |
03950> 7.00 2.000 | 19.00 2.000 | 31.00 2.000 | 43.00 2.000 |
03951> 7.25 2.000 | 19.25 2.000 | 31.25 2.000 | 43.25 2.000 |
03952> 7.50 2.000 | 19.50 2.000 | 31.50 2.000 | 43.50 2.000 |
03953> 7.75 2.000 | 19.75 2.000 | 31.75 2.000 | 43.75 2.000 |
03954> 8.00 2.000 | 20.00 2.000 | 32.00 2.000 | 44.00 2.000 |
03955> 8.25 2.000 | 20.25 2.000 | 32.25 2.000 | 44.25 2.000 |
03956> 8.50 2.000 | 20.50 2.000 | 32.50 2.000 | 44.50 2.000 |
03957> 8.75 2.000 | 20.75 2.000 | 32.75 2.000 | 44.75 2.000 |
03958> 9.00 2.000 | 21.00 2.000 | 33.00 2.000 | 45.00 2.000 |
03959> 9.25 2.000 | 21.25 2.000 | 33.25 2.000 | 45.25 2.000 |
03960> 9.50 2.000 | 21.50 2.000 | 33.50 2.000 | 45.50 2.000 |
03961> 9.75 2.000 | 21.75 2.000 | 33.75 2.000 | 45.75 2.000 |
03962> 10.00 2.000 | 22.00 2.000 | 34.00 2.000 | 46.00 2.000 |
03963> 10.25 2.000 | 22.25 2.000 | 34.25 2.000 | 46.25 2.000 |
03964> 10.50 2.000 | 22.50 2.000 | 34.50 2.000 | 46.50 2.000 |
03965> 10.75 2.000 | 22.75 2.000 | 34.75 2.000 | 46.75 2.000 |
03966> 11.00 2.000 | 23.00 2.000 | 35.00 2.000 | 47.00 2.000 |
03967> 11.25 2.000 | 23.25 2.000 | 35.25 2.000 | 47.25 2.000 |
03968> 11.50 2.000 | 23.50 2.000 | 35.50 2.000 | 47.50 2.000 |
03969> 11.75 2.000 | 23.75 2.000 | 35.75 2.000 | 47.75 2.000 |
03970> 12.00 2.000 | 24.00 2.000 | 36.00 2.000 | 48.00 2.000 |
03971> -----
03972> -----
03973> 251:0003-----
03974> *****
03975> *#
03976> *# Proposed conditions - Internal Catchments
03977> *#
03978> *****
03979>
03980> | CALIB STANDHYD | Area (ha)= 31.02
03981> | 01:201 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
03982> -----
03983>
03984> Surface Area (ha)= 30.71
03985> Dep. Storage (mm)= 2.00
03986> Average Slope (%)= 2.00
03987> Length (m)= 110.00
03988> Mannings n = .013
03989>
03990> Max.eff.Inten.(mm/hr)= 53.00
03991> over (min)= 3.00
03992> Storage Coeff. (min)= 2.83 (ii)
03993> Unit Hyd. Tpeak (min)= 3.00
03994> Unit Hyd. peak (cms)= .39
03995>
03996> PEAK FLOW (cms)= 4.52
03997> TIME TO PEAK (hrs)= 45.77
03998> RUNOFF VOLUME (mm)= 282.99
03999> TOTAL RAINFALL (mm)= 285.00
04000> RUNOFF COEFFICIENT = .99
04001>
04002> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES;
04003> CN* = 80.0 Ia = Dep. Storage (Above)
04004> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04005> THAN THE STORAGE COEFFICIENT.
04006> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04007> -----
04008> -----
04009> 251:0004-----
04010> -----
04011> | CALIB STANDHYD | Area (ha)= 12.00
04012> | 02:202 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
04013> -----
04014>
04015> Surface Area (ha)= 11.88
04016> Dep. Storage (mm)= 2.00
04017> Average Slope (%)= 2.00
04018> Length (m)= 110.00
04019> Mannings n = .013
04020>
04021> Max.eff.Inten.(mm/hr)= 53.00
04022> over (min)= 3.00
04023> Storage Coeff. (min)= 2.83 (ii)
04024> Unit Hyd. Tpeak (min)= 3.00
04025> Unit Hyd. peak (cms)= .39
04026>
04027> PEAK FLOW (cms)= 1.75
04028> TIME TO PEAK (hrs)= 45.80
04029> RUNOFF VOLUME (mm)= 282.99
04030> TOTAL RAINFALL (mm)= 285.00
04031> RUNOFF COEFFICIENT = .99
04032>
04033> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES;
04034> CN* = 80.0 Ia = Dep. Storage (Above)
04035> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04036> THAN THE STORAGE COEFFICIENT.
04037> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04038> -----
04039> -----
04040> 251:0005-----
04041> -----
04042> | CALIB STANDHYD | Area (ha)= 28.00
04043> | 03:203 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
04044> -----
04045>
04046> Surface Area (ha)= 27.72
04047> Dep. Storage (mm)= 2.00
04048> Average Slope (%)= 2.00
04049> Length (m)= 110.00
04050> Mannings n = .013
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04051>
04052> Max.eff.Inten.(mm/hr)= 53.00 50.42
04053> over (min) 2.00 10.00
04054> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
04055> Unit Hyd. Tpeak (min)= 3.00 10.00
04056> Unit Hyd. peak (cms)= .39 .12
04057>
04058> PEAK FLOW (cms)= 4.08 .04 *TOTALS*
04059> TIME TO PEAK (hrs)= 45.78 46.00 46.000 (iii)
04060> RUNOFF VOLUME (mm)= 282.98 228.21 282.452
04061> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
04062> RUNOFF COEFFICIENT = .99 .80 .991
04063>
04064> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04065> CN* = 80.0 Ia = Dep. Storage (Above)
04066> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04067> THAN THE STORAGE COEFFICIENT.
04068> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04069>
04070>
04071> 251:0006-----
04072>
04073> | CALIB STANDHYD | Area (ha)= 5.44
04074> | 04:204 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
04075>
04076> IMPERVIOUS PERVIOUS (i)
04077> Surface Area (ha)= 5.39 .05
04078> Dep. Storage (mm)= 2.00 5.00
04079> Average Slope (%)= 2.00 2.00
04080> Length (m)= 110.00 25.00
04081> Mannings n = .013 .240
04082>
04083> Max.eff.Inten.(mm/hr)= 53.00 50.42
04084> over (min) 3.00 10.00
04085> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
04086> Unit Hyd. Tpeak (min)= 3.00 10.00
04087> Unit Hyd. peak (cms)= .39 .12
04088>
04089> PEAK FLOW (cms)= .79 .01 *TOTALS*
04090> TIME TO PEAK (hrs)= 45.77 46.00 46.000 (iii)
04091> RUNOFF VOLUME (mm)= 282.98 228.22 282.453
04092> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
04093> RUNOFF COEFFICIENT = .99 .80 .991
04094>
04095> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04096> CN* = 80.0 Ia = Dep. Storage (Above)
04097> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04098> THAN THE STORAGE COEFFICIENT.
04099> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04100> ACTUAL QPEAK: PEAK( .80) + QBASE( .02) = .82 (cms)
04101>
04102>
04103> 251:0007-----
04104>
04105> | CALIB STANDHYD | Area (ha)= 1.50
04106> | 05:205 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
04107>
04108> IMPERVIOUS PERVIOUS (i)
04109> Surface Area (ha)= 1.49 .01
04110> Dep. Storage (mm)= 2.00 5.00
04111> Average Slope (%)= 2.00 2.00
04112> Length (m)= 110.00 25.00
04113> Mannings n = .013 .240
04114>
04115> Max.eff.Inten.(mm/hr)= 53.00 50.42
04116> over (min) 3.00 10.00
04117> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
04118> Unit Hyd. Tpeak (min)= 3.00 10.00
04119> Unit Hyd. peak (cms)= .39 .12
04120>
04121> PEAK FLOW (cms)= .22 .00 *TOTALS*
04122> TIME TO PEAK (hrs)= 45.73 46.00 46.000
04123> RUNOFF VOLUME (mm)= 282.99 228.24 282.451
04124> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
04125> RUNOFF COEFFICIENT = .99 .80 .991
04126>
04127> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04128> CN* = 80.0 Ia = Dep. Storage (Above)
04129> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04130> THAN THE STORAGE COEFFICIENT.
04131> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04132>
04133>
04134> 251:0008-----
04135>
04136> *#*****
04137> *# Proposed conditions - SWMF#1
04138> *#*****
04139> *#*****
04140>
04141> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
04142> | IN>01: (201 ) |
04143> | OUT<06: (SWMF#1) |
04144>
04145> OUTFLOW STORAGE | OUTFLOW STORAGE
04146> (cms) (ha.m.) | (cms) (ha.m.)
04147> .000 .0000E+00 | 1.521 .1362E+01
04148> .016 .1780E+00 | 2.289 .1802E+01
04149> .063 .3614E+00 | 2.948 .2265E+01
04150> .138 .5503E+00 | 6.164 .2514E+01
04151> .346 .7448E+00 | 11.997 .2776E+01
04152> .665 .9448E+00 | 19.770 .3044E+01
04153> 1.062 .1150E+01 | .000 .0000E+00
04154>
04155> ROUTING RESULTS AREA QPEAK TPEAK R.V.
04156> (ha) (cms) (hrs) (mm)
04157> INFLOW >01: (201 ) 31.02 4.564 46.000 282.453
04158> OUTFLOW<06: (SWMF#1) 31.02 2.934 47.033 282.439
04159> OVERFLOW<07: (Overfl) .00 .000 .000 .000
04160>
04161> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
04162> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
04163> PERCENTAGE OF TIME OVERFLOWING (%)= .00
04164>
04165> PEAK FLOW REDUCTION [Qout/Qin](%)= 64.289
04166> TIME SHIFT OF PEAK FLOW (min)= 62.00
04167> MAXIMUM STORAGE USED (ha.m.)=.2256E+01
04168>
04169>
04170> 251:0009-----
04171>
04172> *#*****
04173> *# Proposed conditions - External Undeveloped Area Located Southeast of the Sit
04174> *#*****
04175> *#*****
04176>
04177> | DESIGN NASHYD | Area (ha)= 7.80 Curve Number (CN)=86.00
04178> | 08:303 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
04179> U.H. Tp(hrs)= .190
04180>
04181> Unit Hyd Qpeak (cms)= 1.568
04182>
04183> PEAK FLOW (cms)= 1.118 (i)
04184> TIME TO PEAK (hrs)= 46.000
04185> RUNOFF VOLUME (mm)= 247.414

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04186> TOTAL RAINFALL (mm)= 285.000
04187> RUNOFF COEFFICIENT = .868
04188>
04189> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04190>
04191>
04192> 251:0010-----
04193> *#*****
04194> *#
04195> *# Proposed Conditions - Flows to Headwater Drainage Feature H1
04196> *#
04197> *#*****
04198>
04199> | ADD HYD (ToH1 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
04200> (ha) (cms) (hrs) (mm) (cms)
04201> ID1 06:SWMF#1 31.02 2.934 47.03 282.44 .000
04202> +ID2 07:Overflow-S .00 .000 .00 .00 .000
04203> +ID3 08:303 7.80 1.118 46.00 247.41 .000
04204>
04205> SUM 09:ToH1 38.82 3.815 46.07 275.40 .000
04206>
04207> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04208>
04209>
04210> 251:0011-----
04211> *#*****
04212> *#
04213> *# Proposed conditions - SWMF#2
04214> *#
04215> *#*****
04216>
04217> | ADD HYD (ToSWMF#2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
04218> (ha) (cms) (hrs) (mm) (cms)
04219> ID1 02:202 12.00 1.766 46.00 282.45 .000
04220> +ID2 05:205 1.50 .221 46.00 282.45 .000
04221>
04222> SUM 06:ToSWMF#2 13.50 1.986 46.00 282.45 .000
04223>
04224> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04225>
04226>
04227> 251:0012-----
04228>
04229> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
04230> | IN>06: (ToSWMF) |
04231> | OUT<07: (SWMF#2) |
04232>
04233> OUTFLOW STORAGE | OUTFLOW STORAGE
04234> (cms) (ha.m.) | (cms) (ha.m.)
04235> .000 .0000E+00 | 1.982 .5874E+00
04236> .013 .7660E-01 | 2.164 .6799E+00
04237> .049 .1562E+00 | 2.345 .7745E+00
04238> .106 .2382E+00 | 3.689 .8712E+00
04239> .336 .3225E+00 | 6.218 .9700E+00
04240> .727 .4087E+00 | 9.668 .1071E+01
04241> 1.333 .4970E+00 | .000 .0000E+00
04242>
04243> ROUTING RESULTS AREA QPEAK TPEAK R.V.
04244> (ha) (cms) (hrs) (mm)
04245> INFLOW >06: (ToSWMF) 13.50 1.986 46.000 282.453
04246> OUTFLOW<07: (SWMF#2) 13.50 1.841 46.033 282.444
04247> OVERFLOW<08: (Overfl) .00 .000 .000 .000
04248>
04249> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
04250> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
04251> PERCENTAGE OF TIME OVERFLOWING (%)= .00
04252>
04253> PEAK FLOW REDUCTION [Qout/Qin](%)= 92.688
04254> TIME SHIFT OF PEAK FLOW (min)= 2.00
04255> MAXIMUM STORAGE USED (ha.m.)=.5678E+00
04256>
04257>
04258> 251:0013-----
04259>
04260> | ADD HYD (FromSWMF#2) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
04261> (ha) (cms) (hrs) (mm) (cms)
04262> ID1 07:SWMF#2 13.50 1.841 46.03 282.44 .000
04263> +ID2 08:Overflow-S .00 .000 .00 .00 .000
04264>
04265> SUM 05:FromSWMF#2 13.50 1.841 46.03 282.44 .000
04266>
04267> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04268>
04269>
04270> 251:0014-----
04271>
04272> | COMPUTE DUALHYD | Average inlet capacities [CINLET] = .641 (cms)
04273> | TotalHyd 05:FromSW | Number of inlets in system [NINLET] = 1
04274> Total minor system capacity = .641 (cms)
04275> Total major system capacity [TMJSTO] = 0.(cu.m.)
04276>
04277> ID: NHYD AREA QPEAK TPEAK R.V. DWF
04278> (ha) (cms) (hrs) (mm) (cms)
04279> TOTAL HYD. 05:FromSW 13.50 1.841 46.033 282.444 .000
04280>
04281> MAJOR SYST 01:ToWell 2.56 1.200 46.033 282.444 .000
04282> MINOR SYST 02:ToHWF 10.94 .641 42.367 282.445 .000
04283>
04284> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04285>
04286>
04287> 251:0015-----
04288> *#*****
04289> *#
04290> *# Proposed conditions - External Undeveloped Area Located Southwest of the Sit
04291> *#
04292> *#*****
04293>
04294> | DESIGN NASHYD | Area (ha)= 23.13 Curve Number (CN)=83.00
04295> | 05:302 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res.(N)= 3.00
04296> U.H. Tp(hrs)= .260
04297>
04298> Unit Hyd Qpeak (cms)= 3.398
04299>
04300> PEAK FLOW (cms)= 3.240 (i)
04301> TIME TO PEAK (hrs)= 46.033
04302> RUNOFF VOLUME (mm)= 239.543
04303> TOTAL RAINFALL (mm)= 285.000
04304> RUNOFF COEFFICIENT = .841
04305>
04306> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04307>
04308>
04309> 251:0016-----
04310> *#*****
04311> *#
04312> *# Proposed Conditions - Flows to Headwater Drainage Feature H2S2
04313> *#
04314> *#*****
04315>
04316> | ADD HYD (ToH2S2 ) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
04317> (ha) (cms) (hrs) (mm) (cms)
04318> ID1 02:ToHWF 10.94 .641 42.37 282.45 .000
04319> +ID2 05:302 23.13 3.240 46.03 239.54 .000
04320>

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04321> SUM 06:ToH2S2 34.07 3.881 46.03 253.32 .000
04322>
04323> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04324>
04325> -----
04326> 251:0017-----
04327> *****
04328> *#
04329> *# Proposed conditions - SWMF#3
04330> *#
04331> *****
04332> -----
04333> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
04334> | IN>03:(203 ) |
04335> | OUT<05:(SWMF#3) |
04336> -----
04337> ***** OUTFLOW STORAGE TABLE *****
04338> OUTFLOW STORAGE | OUTFLOW STORAGE
04339> (cms) (ha.m.) | (cms) (ha.m.)
04340> .000 .0000E+00 | 1.743 .1163E+01
04341> .015 .1533E+00 | 3.190 .1341E+01
04342> .057 .3115E+00 | 4.392 .1522E+01
04343> .117 .4749E+00 | 4.909 .1706E+01
04344> .202 .6429E+00 | 8.028 .1893E+01
04345> .261 .8135E+00 | 13.536 .2082E+01
04346> .789 .9867E+00 | 20.842 .2275E+01
04347>
04348> ROUTING RESULTS AREA QPEAK TPEAK R.V.
04349> (ha) (cms) (hrs) (mm)
04350> INFLOW >03: (203 ) 28.00 4.120 46.000 282.452
04351> OUTFLOW<05: (SWMF#3) 28.00 3.833 46.033 282.439
04352> OVERFLOW<06: (Overfl) .00 .000 .000 .000
04353>
04354> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
04355> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
04356> PERCENTAGE OF TIME OVERFLOWING (%)= .00
04357>
04358> PEAK FLOW REDUCTION [Qout/Qin] (%)= 93.025
04359> TIME SHIFT OF PEAK FLOW (min)= 2.00
04360> MAXIMUM STORAGE USED (ha.m.)=.1438E+01
04361> -----
04362> 251:0018-----
04363> *****
04364> *#
04365> *# Proposed conditions - External Undeveloped Area Located Northwest of the Sit
04366> *#
04367> *****
04368> -----
04369> | DESIGN NASHYD | Area (ha)= 10.68 Curve Number (CN)=83.00
04370> | 03:300 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
04371> | U.H. Tp(hrs)= .140
04372>
04373> Unit Hyd Qpeak (cms)= 2.914
04374>
04375> PEAK FLOW (cms)= 1.516 (i)
04376> TIME TO PEAK (hrs)= 46.000
04377> RUNOFF VOLUME (mm)= 239.543
04378> TOTAL RAINFALL (mm)= 285.000
04379> RUNOFF COEFFICIENT = .840
04380>
04381> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04382>
04383> -----
04384> 251:0019-----
04385> *****
04386> *#
04387> *# Proposed Conditions - Flows to North Ditch
04388> *#
04389> *****
04390> -----
04391> | ADD HYD (ToNorthDit) | ID: NHYD AREA QPEAK TPEAK R.V. DWF
04392> |-----|-----| (ha) (cms) (hrs) (mm) (cms)
04393> ID1 03:300 10.68 1.516 46.00 239.54 .000
04394> +ID2 05:SWMF#3 28.00 3.833 46.03 282.44 .000
04395> +ID3 06:Overflow-N .00 .000 .00 .00 .000
04396> -----
04397> SUM 02:ToNorthDit 38.68 5.342 46.02 270.59 .000
04398>
04399> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04400>
04401> -----
04402> 251:0020-----
04403> *****
04404> *#
04405> *# Proposed conditions - SWMF#4
04406> *#
04407> *****
04408> -----
04409> | ROUTE RESERVOIR | Requested routing time step = 1.0 min.
04410> | IN>04:(204 ) |
04411> | OUT<06:(SWMF#4) |
04412> -----
04413> ***** OUTFLOW STORAGE TABLE *****
04414> OUTFLOW STORAGE | OUTFLOW STORAGE
04415> (cms) (ha.m.) | (cms) (ha.m.)
04416> ***** NOTE: DWF was added to inflow before routing.
04417> As a result the R.V. has changed.
04418> .000 .0000E+00 | .926 .1837E+00
04419> .005 .3240E-01 | 1.692 .2261E+00
04420> .008 .6740E-01 | 2.757 .2703E+00
04421> .010 .1043E+00 | 3.341 .3162E+00
04422> .335 .1431E+00 | 3.625 .3398E+00
04423>
04424> ROUTING RESULTS AREA QPEAK TPEAK R.V.
04425> (ha) (cms) (hrs) (mm)
04426> INFLOW >04: (204 ) 5.44 .824 46.000 360.814
04427> OUTFLOW<06: (SWMF#4) 5.44 .819 46.000 360.790
04428> OVERFLOW<07: (Overfl) .00 .000 .000 .000
04429>
04430> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
04431> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
04432> PERCENTAGE OF TIME OVERFLOWING (%)= .00
04433>
04434> PEAK FLOW REDUCTION [Qout/Qin] (%)= 99.321
04435> TIME SHIFT OF PEAK FLOW (min)= .00
04436> MAXIMUM STORAGE USED (ha.m.)=.1763E+00
04437> -----
04438> 251:0021-----
04439> *****
04440> *#
04441> *# Proposed conditions - External Undeveloped Area Located West of the Site
04442> *#
04443> *****
04444> -----
04445> | DESIGN NASHYD | Area (ha)= 25.55 Curve Number (CN)=82.00
04446> | 01:301 DT= 1.00 | Ia (mm)= 1.500 # of Linear Res. (N)= 3.00
04447> | U.H. Tp(hrs)= .700
04448>
04449> Unit Hyd Qpeak (cms)= 1.394
04450>
04451> PEAK FLOW (cms)= 2.906 (i)
04452> TIME TO PEAK (hrs)= 46.650
04453> RUNOFF VOLUME (mm)= 236.908
04454> TOTAL RAINFALL (mm)= 285.000
04455> RUNOFF COEFFICIENT = .831
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04456>
04457> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04458>
04459> -----
04460> 251:0022-----
04461> -----
04462> 251:0002-----
04463> -----
04464> 251:0002-----
04465> -----
04466> 251:0002-----
04467> -----
04468> 251:0002-----
04469> -----
04470> 251:0002-----
04471> -----
04472> 251:0002-----
04473> -----
04474> 251:0002-----
04475> FINISH
04476> -----
04477> *****
04478> WARNINGS / ERRORS / NOTES
04479> -----
04480> 001:0020 ROUTE RESERVOIR ->
04481> **** NOTE: DWF was added to inflow before routing.
04482> As a result the R.V. has changed.
04483> **** NOTE: DWF was added to inflow before routing.
04484> As a result the R.V. has changed.
04485> **** NOTE: DWF was added to inflow before routing.
04486> As a result the R.V. has changed.
04487> **** NOTE: DWF was added to inflow before routing.
04488> As a result the R.V. has changed.
04489> **** NOTE: DWF was added to inflow before routing.
04490> As a result the R.V. has changed.
04491> **** NOTE: DWF was added to inflow before routing.
04492> As a result the R.V. has changed.
04493> **** NOTE: DWF was added to inflow before routing.
04494> As a result the R.V. has changed.
04495> **** NOTE: DWF was added to inflow before routing.
04496> As a result the R.V. has changed.
04497> Simulation ended on 2024-11-22 at 13:32:43
04498> -----
04499> -----
04500>
```



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: Project Eagle, AREA 101

Engineer: Stantec

Location: Port Colbourne

Contact: Adam Kristoferson P. Eng.

OGS #: 1

Report Date: 25-Nov-24

Area 31.020 ha

Rainfall Station # 209

Weighted C 0.90

Particle Size Distribution FINE

CDS Model 5678-D

CDS Treatment Capacity 708 l/s

<u>Rainfall Intensity¹</u> <u>(mm/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate</u> <u>(l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
1.0	10.3%	19.6%	77.6	77.6	11.0	95.7	9.9
1.5	9.6%	29.2%	116.4	116.4	16.4	94.1	9.0
2.0	9.1%	38.3%	155.2	155.2	21.9	92.6	8.4
2.5	7.0%	45.3%	194.0	194.0	27.4	91.0	6.4
3.0	6.6%	51.9%	232.8	232.8	32.9	89.4	5.9
3.5	3.9%	55.8%	271.6	271.6	38.4	87.9	3.4
4.0	5.4%	61.2%	310.4	310.4	43.8	86.3	4.7
4.5	3.7%	64.9%	349.3	349.3	49.3	84.7	3.1
5.0	3.6%	68.5%	388.1	388.1	54.8	83.1	3.0
6.0	5.4%	73.9%	465.7	465.7	65.8	80.0	4.3
7.0	5.0%	78.9%	543.3	543.3	76.7	76.9	3.9
8.0	3.4%	82.4%	620.9	620.9	87.7	73.7	2.5
9.0	3.1%	85.5%	698.5	698.5	98.7	70.6	2.2
10.0	2.0%	87.4%	776.1	708.0	100.0	64.0	1.3
15.0	7.4%	94.8%	1164.2	708.0	100.0	42.7	3.2
20.0	2.3%	97.2%	1552.2	708.0	100.0	32.0	0.7
25.0	1.1%	98.2%	1940.3	708.0	100.0	25.6	0.3
30.0	0.6%	98.8%	2328.4	708.0	100.0	21.3	0.1
35.0	0.7%	99.4%	2716.4	708.0	100.0	18.3	0.1
40.0	0.3%	99.7%	3104.5	708.0	100.0	16.0	0.0
45.0	0.3%	100.0%	3492.5	708.0	100.0	14.2	0.0
50.0	0.0%	100.0%	3880.6	708.0	100.0	12.8	0.0

81.5

Removal Efficiency Adjustment² = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.5%

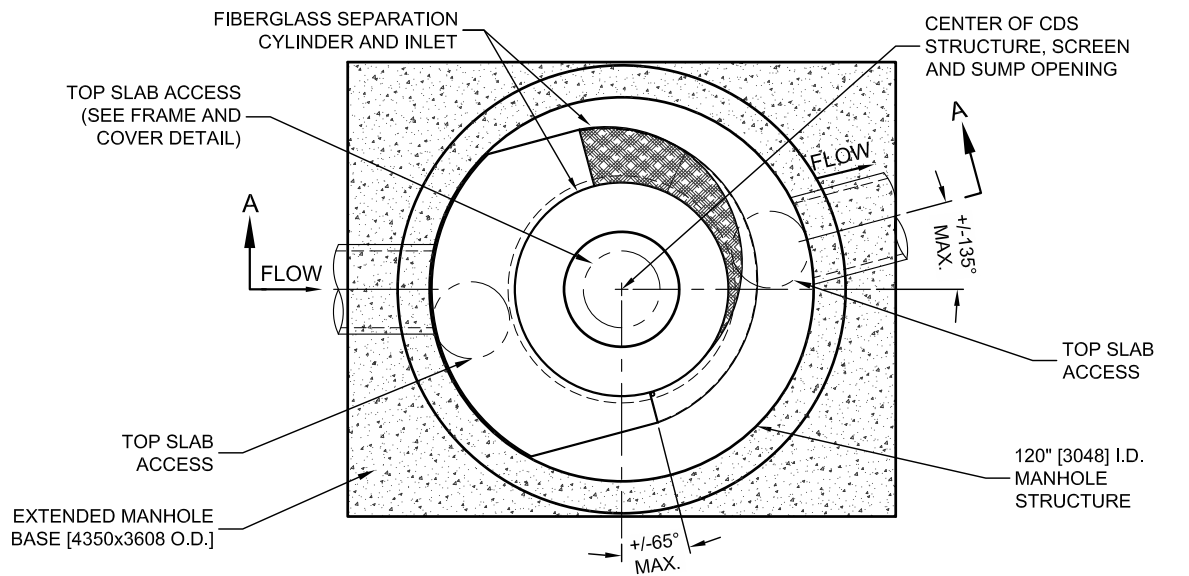
Predicted Annual Rainfall Treated = 93.4%

1 - Based on 36 years of hourly rainfall data from Canadian Station 6135638, Niagara Falls ON

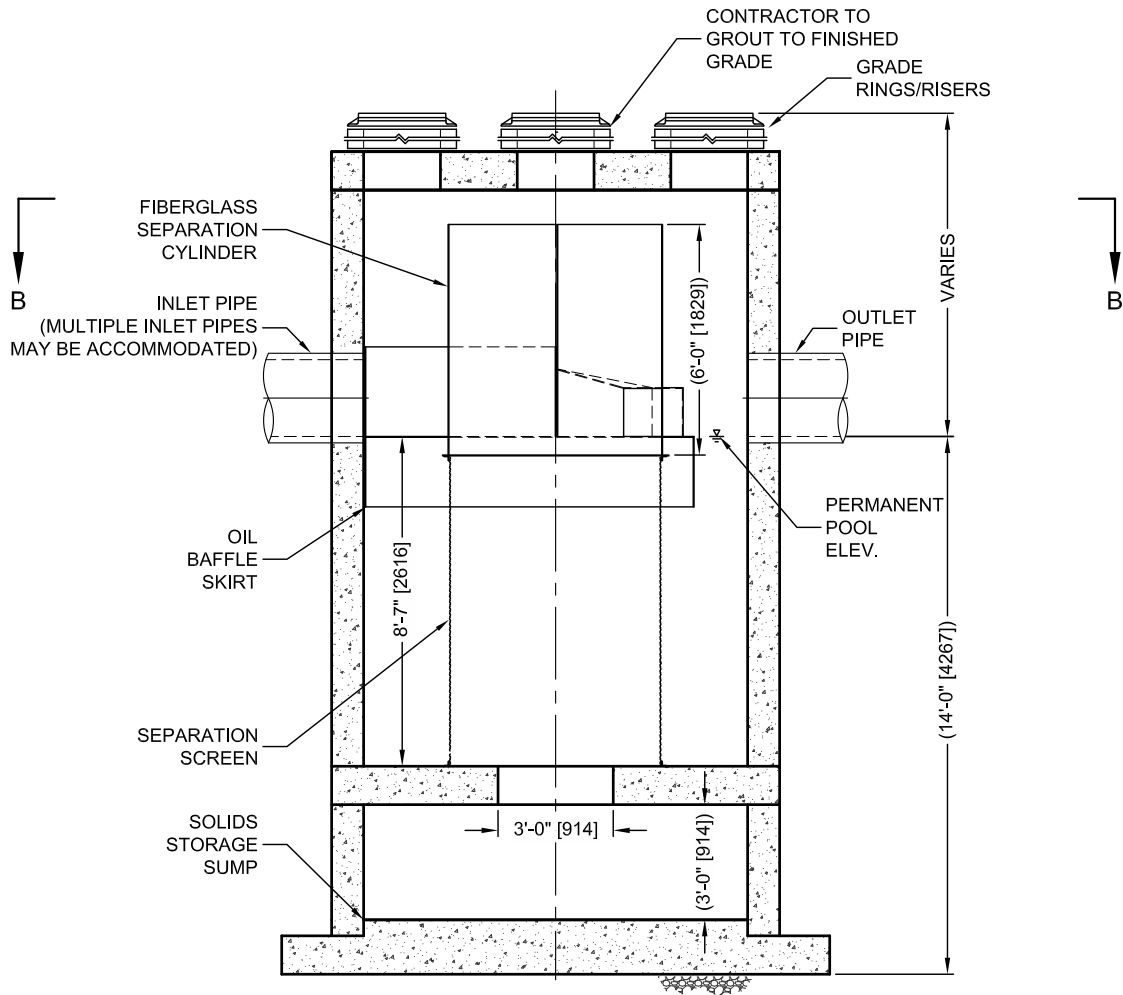
2 - CDS Efficiency based on testing conducted at the University of Central Florida

3 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

C:\USERS\HUDA.ECHELON\VIDEODOCUMENTS\START ITEMS\PMSU SAMPLE DRAWINGS\10\CDS\PMSU5678-10-C-DTL.DWG 5/30/2022 1:41 AM



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



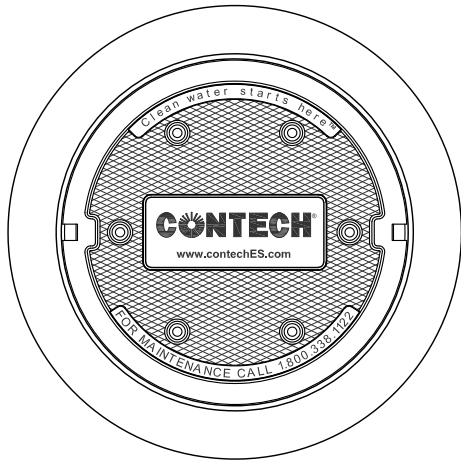
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,768,848; 6,841,722; 6,911,502; 6,981,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS PMSU5678-10-C DESIGN NOTES

THE STANDARD CDS PMSU5678-10-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

- GRATED INLET ONLY (NO INLET PIPE)
- GRATED INLET WITH INLET PIPE OR PIPES
- CURB INLET ONLY (NO INLET PIPE)
- CURB INLET WITH INLET PIPE OR PIPES
- CUSTOMIZABLE SUMP DEPTH AVAILABLE
- ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECHENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
ENGINEERED SOLUTIONS LLC

www.contechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069

800-338-1122

513-645-7000

513-645-7993 FAX

CDS PMSU5678-10-C
INLINE CDS
STANDARD DETAIL



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: Project Eagle, AREA 102

Engineer: Stantec

Location: Port Colbourne

Contact: Adam Kristoferson P. Eng.

OGS #: 1

Report Date: 25-Nov-24

Area 13.500 ha

Rainfall Station # 209

Weighted C 0.90

Particle Size Distribution FINE

CDS Model 4045 2400mm

CDS Treatment Capacity 212 l/s

<u>Rainfall Intensity¹</u> <u>(mm/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
1.0	10.3%	19.6%	33.8	33.8	15.9	94.3	9.7
1.5	9.6%	29.2%	50.7	50.7	23.9	92.0	8.8
2.0	9.1%	38.3%	67.6	67.6	31.8	89.7	8.1
2.5	7.0%	45.3%	84.4	84.4	39.8	87.5	6.2
3.0	6.6%	51.9%	101.3	101.3	47.7	85.2	5.6
3.5	3.9%	55.8%	118.2	118.2	55.7	82.9	3.2
4.0	5.4%	61.2%	135.1	135.1	63.6	80.6	4.3
4.5	3.7%	64.9%	152.0	152.0	71.6	78.3	2.9
5.0	3.6%	68.5%	168.9	168.9	79.5	76.1	2.7
6.0	5.4%	73.9%	202.7	202.7	95.4	71.5	3.9
7.0	5.0%	78.9%	236.4	212.4	100.0	63.1	3.2
8.0	3.4%	82.4%	270.2	212.4	100.0	55.2	1.9
9.0	3.1%	85.5%	304.0	212.4	100.0	49.0	1.5
10.0	2.0%	87.4%	337.8	212.4	100.0	44.1	0.9
15.0	7.4%	94.8%	506.7	212.4	100.0	29.4	2.2
20.0	2.3%	97.2%	675.5	212.4	100.0	22.1	0.5
25.0	1.1%	98.2%	844.4	212.4	100.0	17.7	0.2
30.0	0.6%	98.8%	1013.3	212.4	100.0	14.7	0.1
35.0	0.7%	99.4%	1182.2	212.4	100.0	12.6	0.1
40.0	0.3%	99.7%	1351.1	212.4	100.0	11.0	0.0
45.0	0.3%	100.0%	1520.0	212.4	100.0	9.8	0.0
50.0	0.0%	100.0%	1688.9	212.4	100.0	8.8	0.0

75.1

Removal Efficiency Adjustment² = 6.5%

Predicted Net Annual Load Removal Efficiency = 75.1%

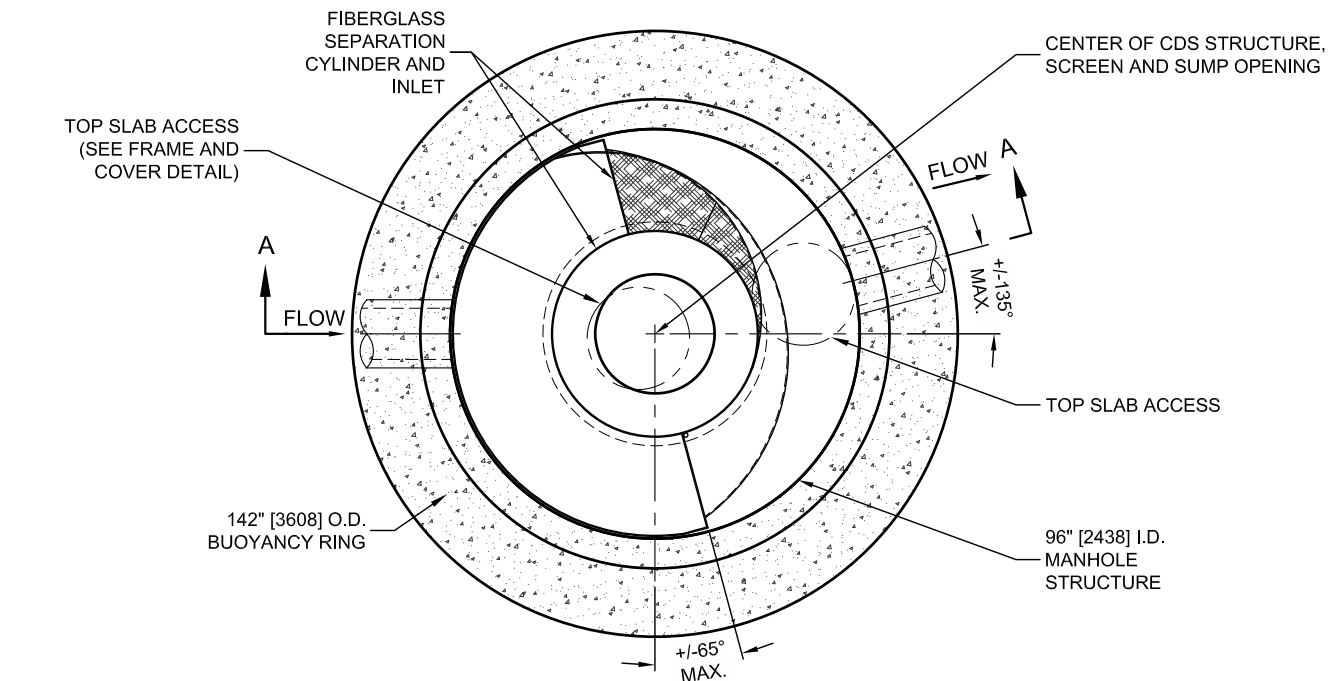
Predicted Annual Rainfall Treated = 88.7%

1 - Based on 36 years of hourly rainfall data from Canadian Station 6135638, Niagara Falls ON

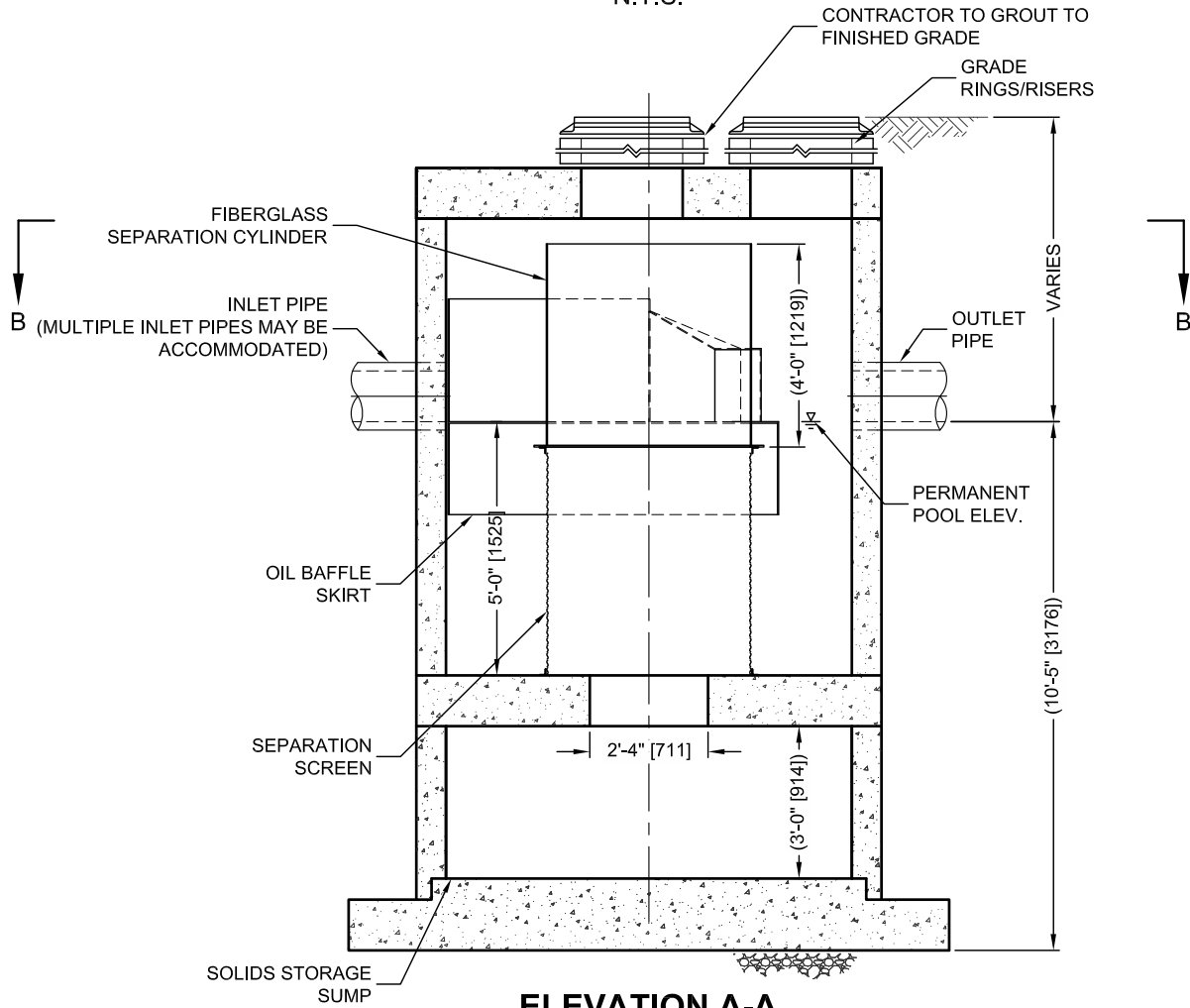
2 - CDS Efficiency based on testing conducted at the University of Central Florida

3 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

Z:\4.0 MANUFACTURERS\CONTECH PRODUCT INFO\TREATMENT\CDSDRAWINGS ECHELOMIN LINE-PDF\2022 - PMSU UPDATED CONTECH DRAWINGS - HUD\8\CD4045-8-C-DTL.DWG 6/2/2022 12:48 PM



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



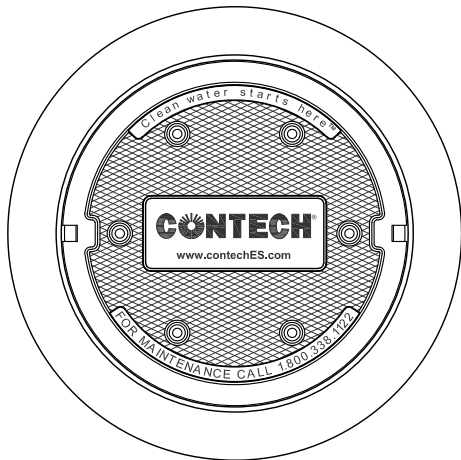
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,768,848; 6,841,722; 6,911,500; 6,981,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS PMSU4045-8-C DESIGN NOTES

THE STANDARD CDS PMSU4045-8-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

- GRATED INLET ONLY (NO INLET PIPE)
- GRATED INLET WITH INLET PIPE OR PIPES
- CURB INLET ONLY (NO INLET PIPE)
- CURB INLET WITH INLET PIPE OR PIPES
- CUSTOMIZABLE SUMP DEPTH AVAILABLE
- ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES

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- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

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CDS PMSU4045-8-C
INLINE CDS
STANDARD DETAIL



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: Project Eagle, AREA 103

Engineer: Stantec

Location: Port Colbourne

Contact: Adam Kristoferson P. Eng.

OGS #: 1

Report Date: 25-Nov-24

Area 28.000 ha

Rainfall Station # 209

Weighted C 0.90

Particle Size Distribution FINE

CDS Model 5668-D 3000mm

CDS Treatment Capacity 538 l/s

<u>Rainfall Intensity¹</u> <u>(mm/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate</u> <u>(l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
1.0	10.3%	19.6%	70.1	70.1	13.0	95.1	9.8
1.5	9.6%	29.2%	105.1	105.1	19.5	93.3	8.9
2.0	9.1%	38.3%	140.1	140.1	26.0	91.4	8.3
2.5	7.0%	45.3%	175.1	175.1	32.5	89.5	6.3
3.0	6.6%	51.9%	210.2	210.2	39.1	87.7	5.8
3.5	3.9%	55.8%	245.2	245.2	45.6	85.8	3.3
4.0	5.4%	61.2%	280.2	280.2	52.1	83.9	4.5
4.5	3.7%	64.9%	315.3	315.3	58.6	82.1	3.0
5.0	3.6%	68.5%	350.3	350.3	65.1	80.2	2.8
6.0	5.4%	73.9%	420.3	420.3	78.1	76.5	4.2
7.0	5.0%	78.9%	490.4	490.4	91.1	72.7	3.7
8.0	3.4%	82.4%	560.4	538.1	100.0	67.4	2.3
9.0	3.1%	85.5%	630.5	538.1	100.0	59.9	1.9
10.0	2.0%	87.4%	700.6	538.1	100.0	53.9	1.1
15.0	7.4%	94.8%	1050.8	538.1	100.0	35.9	2.7
20.0	2.3%	97.2%	1401.1	538.1	100.0	27.0	0.6
25.0	1.1%	98.2%	1751.4	538.1	100.0	21.6	0.2
30.0	0.6%	98.8%	2101.7	538.1	100.0	18.0	0.1
35.0	0.7%	99.4%	2452.0	538.1	100.0	15.4	0.1
40.0	0.3%	99.7%	2802.2	538.1	100.0	13.5	0.0
45.0	0.3%	100.0%	3152.5	538.1	100.0	12.0	0.0
50.0	0.0%	100.0%	3502.8	538.1	100.0	10.8	0.0

78.8

Removal Efficiency Adjustment² = 6.5%

Predicted Net Annual Load Removal Efficiency = 78.8%

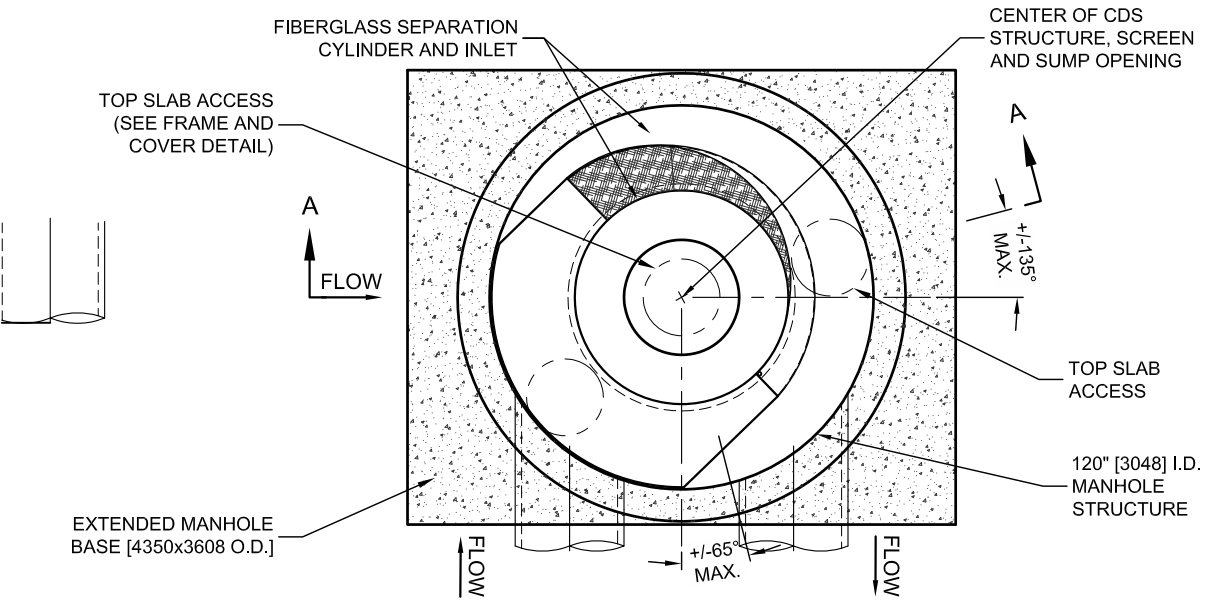
Predicted Annual Rainfall Treated = 91.5%

1 - Based on 36 years of hourly rainfall data from Canadian Station 6135638, Niagara Falls ON

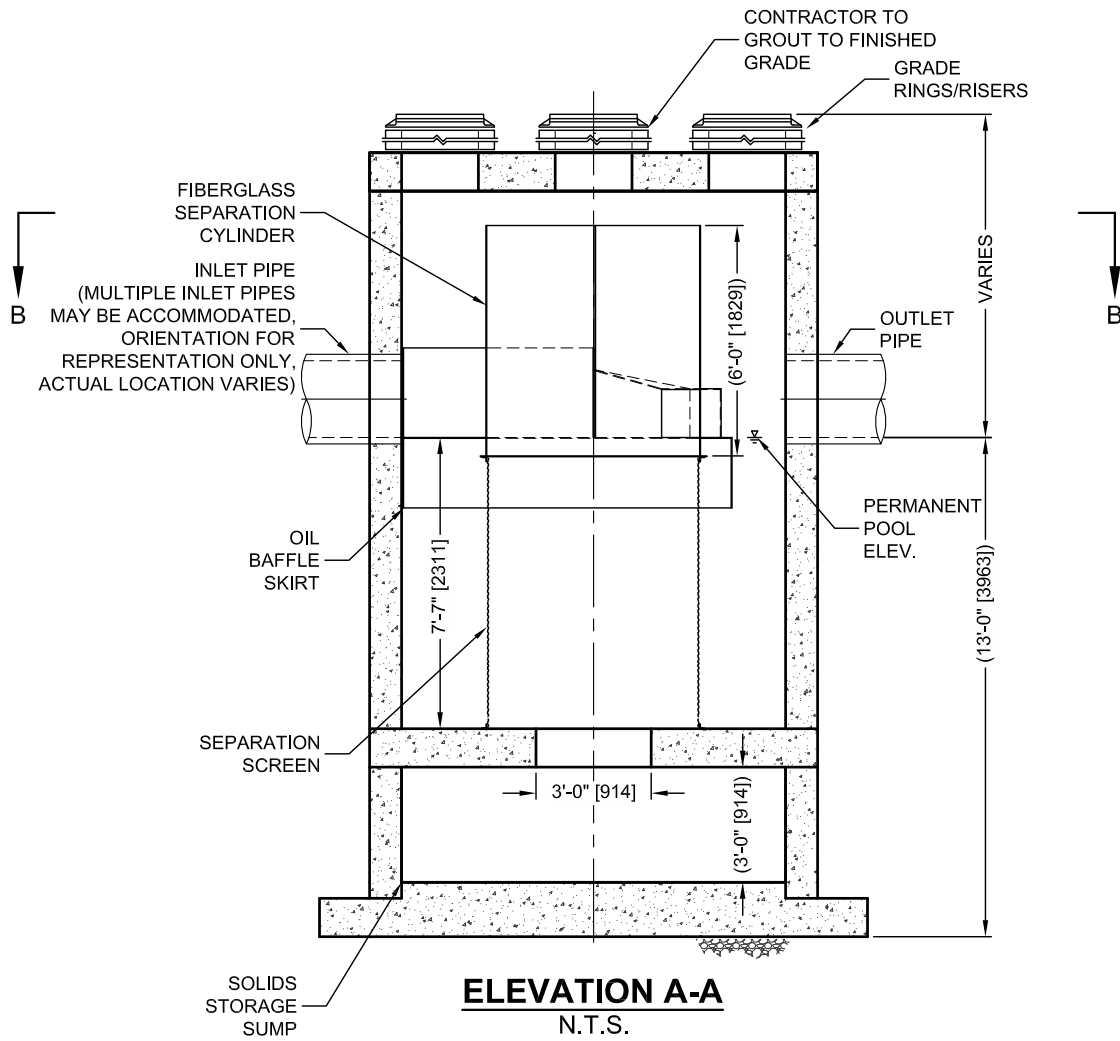
2 - CDS Efficiency based on testing conducted at the University of Central Florida

3 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

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PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



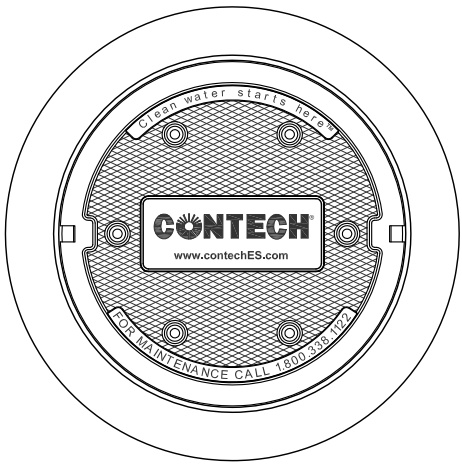
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CDS PMSU5668-10-C DESIGN NOTES

THE STANDARD CDS PMSU5668-10-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

- GRATED INLET ONLY (NO INLET PIPE)
- GRATED INLET WITH INLET PIPE OR PIPES
- CURB INLET ONLY (NO INLET PIPE)
- CURB INLET WITH INLET PIPE OR PIPES
- CUSTOMIZABLE SUMP DEPTH AVAILABLE
- ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID				
WATER QUALITY FLOW RATE (CFS OR L/s)				*
PEAK FLOW RATE (CFS OR L/s)				*
RETURN PERIOD OF PEAK FLOW (YRS)				*
SCREEN APERTURE (2400 OR 4700)				*
PIPE DATA:	I.E.	MATERIAL	DIAMETER	
INLET PIPE 1	*	*	*	
INLET PIPE 2	*	*	*	
OUTLET PIPE	*	*	*	
RIM ELEVATION				*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT	
		*	*	
NOTES/SPECIAL REQUIREMENTS:				
* PER ENGINEER OF RECORD				

GENERAL NOTES

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INSTALLATION NOTES

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- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
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CDS PMSU5668-10-C
INLINE CDS
STANDARD DETAIL



**CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION**



Project Name: Project Eagle, AREA 104

Engineer: Stantec

Location: Port Colbourne

Contact: Adam Kristoferson P. Eng.

OGS #: 1

Report Date: 3-Dec-24

Area 5.440 ha

Rainfall Station # 209

Weighted C 0.90

Particle Size Distribution FINE

CDS Model 3030

CDS Treatment Capacity 85 l/s

<u>Rainfall Intensity¹</u> <u>(mm/hr)</u>	<u>Percent Rainfall Volume¹</u>	<u>Cumulative Rainfall Volume</u>	<u>Total Flowrate (l/s)</u>	<u>Treated Flowrate (l/s)</u>	<u>Operating Rate (%)</u>	<u>Removal Efficiency (%)</u>	<u>Incremental Removal (%)</u>
1.0	10.3%	19.6%	13.6	13.6	16.0	94.3	9.7
1.5	9.6%	29.2%	20.4	20.4	24.0	92.0	8.8
2.0	9.1%	38.3%	27.2	27.2	32.0	89.7	8.1
2.5	7.0%	45.3%	34.0	34.0	40.1	87.4	6.2
3.0	6.6%	51.9%	40.8	40.8	48.1	85.1	5.6
3.5	3.9%	55.8%	47.6	47.6	56.1	82.8	3.2
4.0	5.4%	61.2%	54.4	54.4	64.1	80.5	4.3
4.5	3.7%	64.9%	61.2	61.2	72.1	78.2	2.9
5.0	3.6%	68.5%	68.1	68.1	80.1	75.9	2.7
6.0	5.4%	73.9%	81.7	81.7	96.1	71.3	3.9
7.0	5.0%	78.9%	95.3	85.0	100.0	62.6	3.2
8.0	3.4%	82.4%	108.9	85.0	100.0	54.8	1.9
9.0	3.1%	85.5%	122.5	85.0	100.0	48.7	1.5
10.0	2.0%	87.4%	136.1	85.0	100.0	43.8	0.9
15.0	7.4%	94.8%	204.2	85.0	100.0	29.2	2.2
20.0	2.3%	97.2%	272.2	85.0	100.0	21.9	0.5
25.0	1.1%	98.2%	340.3	85.0	100.0	17.5	0.2
30.0	0.6%	98.8%	408.3	85.0	100.0	14.6	0.1
35.0	0.7%	99.4%	476.4	85.0	100.0	12.5	0.1
40.0	0.3%	99.7%	544.4	85.0	100.0	11.0	0.0
45.0	0.3%	100.0%	612.5	85.0	100.0	9.7	0.0
50.0	0.0%	100.0%	680.5	85.0	100.0	8.8	0.0

74.9

Removal Efficiency Adjustment² = 6.5%

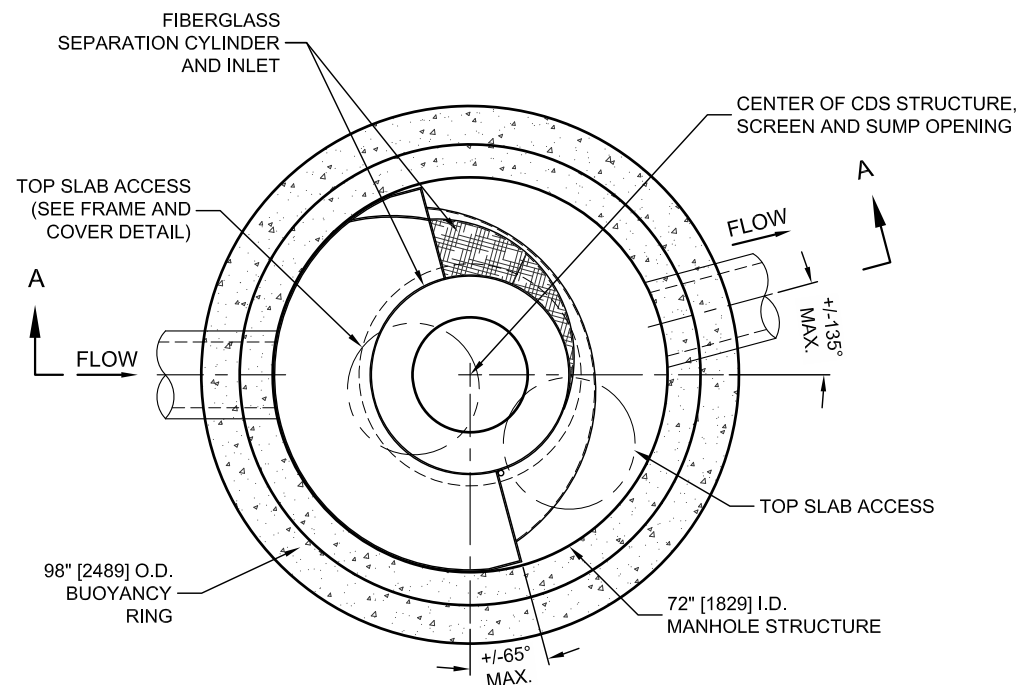
Predicted Net Annual Load Removal Efficiency = 74.9%

Predicted Annual Rainfall Treated = 88.6%

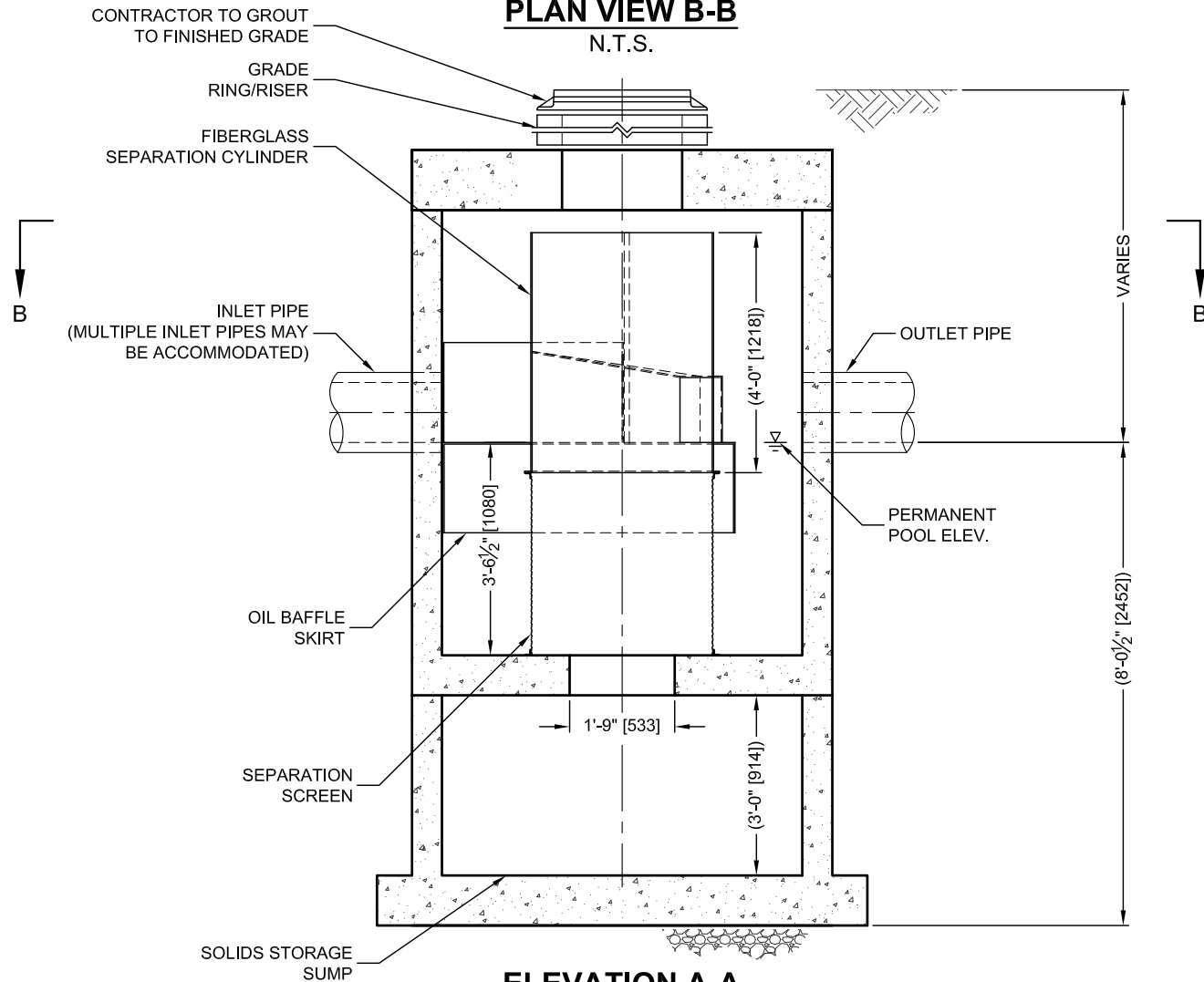
1 - Based on 36 years of hourly rainfall data from Canadian Station 6135638, Niagara Falls ON

2 - CDS Efficiency based on testing conducted at the University of Central Florida

3 - CDS design flowrate and scaling based on standard manufacturer model & product specifications



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,782. RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS PMSU3030-6-C DESIGN NOTES

THE STANDARD CDS PMSU3030-6-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION

GRATED INLET ONLY (NO INLET PIPE)

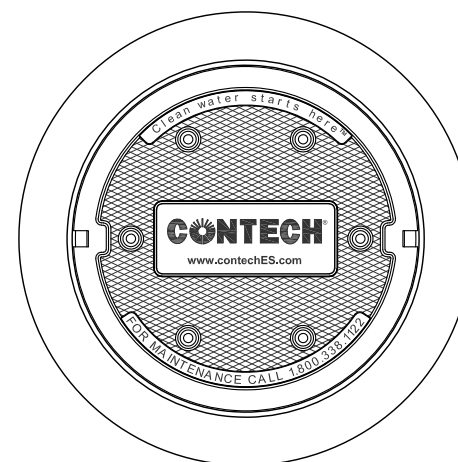
GRATED INLET WITH INLET PIPE OR PIPES

CURB INLET ONLY (NO INLET PIPE)

CURB INLET WITH INLET PIPE OR PIPES

CUSTOMIZABLE SUMP DEPTH AVAILABLE

ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID			
WATER QUALITY FLOW RATE (CFS OR L/s)			*
PEAK FLOW RATE (CFS OR L/s)			*
RETURN PERIOD OF PEAK FLOW (YRS)			*
SCREEN APERTURE (2400 OR 4700)			*
PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*
RIM ELEVATION			*
ANTI-FLOTATION BALLAST		WIDTH	HEIGHT
		*	*
NOTES/SPECIAL REQUIREMENTS:			
* PER ENGINEER OF RECORD			

GENERAL NOTES

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2. DIMENSIONS MARKED WITH () ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES

- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
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CDS PMSU3030-6-C
 INLINE CDS
 STANDARD DETAIL

161500301-Project Eagle
Sediment Forebay Cleanout Frequency - OGS Factor

Cleanout Frequency - SWMF #2

Table 5.3 MOEE SWMPP Guidelines

$$\text{cleanout} = \text{Vol}/(\text{load} * A_{\text{sew}} * \text{effic})$$

$$= \quad \quad \quad \mathbf{59.6} \quad \quad \mathbf{\text{years}}$$

Therefore,

Cleanout Frequency Satisfied

A_{sew} = Contributing Sewer Area (ha)

Imp = Percent Impervious (%)

load = Sediment Loading (m³/ha)

effic = Removal Efficiency (%) - Level 1

Targ = Cleanout Frequency Target (years)

Vol = Sediment volume (m³)

A_{sew} = 13.50

Imp = 100%

load = 1.16

effic = 0.80

Targ = 7.00

Vol = 746.29

Cleanout Frequency - SWMF #3

Table 5.3 MOEE SWMPP Guidelines

$$\text{cleanout} = \text{Vol}/(\text{load} * A_{\text{sew}} * \text{effic})$$

$$= \quad \quad \quad \mathbf{55.7} \quad \quad \mathbf{\text{years}}$$

Therefore,

Cleanout Frequency Satisfied

A_{sew} = Contributing Sewer Area (ha)

Imp = Percent Impervious (%)

load = Sediment Loading (m³/ha)

effic = Removal Efficiency (%) - Level 1

Targ = Cleanout Frequency Target (years)

Vol = Sediment volume (m³)

A_{sew} = 28.00

Imp = 100%

load = 1.16

effic = 80%

Targ = 7

Vol = 1448

Cleanout Frequency - SWMF #4

Table 5.3 MOEE SWMPP Guidelines

$$\text{cleanout} = \text{Vol}/(\text{load} * A_{\text{sew}} * \text{effic})$$

$$= \quad \quad \quad \mathbf{47.9} \quad \quad \mathbf{\text{years}}$$

Therefore,

Cleanout Frequency Satisfied

A_{sew} = Contributing Sewer Area (ha)

Imp = Percent Impervious (%)

load = Sediment Loading (m³/ha)

effic = Removal Efficiency (%) - Level 1

Targ = Cleanout Frequency Target (years)

Vol = Sediment volume (m³)

A_{sew} = 5.44

Imp = 100%

load = 1.16

effic = 0.80

Targ = 7.00

Vol = 241.66

SWMHYMO Parameters

161500301 - Project Eagle

Post-Development Conditions

Overland Flows

Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Slope (%)	Length P (m)	Length IMP (m)	R.C
Internal Catchments										
Draining to SWMF#1 - West Overland Flow Route	401	STANDHYD	14.35	80	100	100	2.00	25	110	0.90
Draining to SWMF#1 - North Overland Flow Route	402	STANDHYD	5.46	80	100	100	2.00	25	110	0.90
Draining to SWMF#2	403	STANDHYD	11.17	80	100	100	2	25	110	0.90
Draining to SWMF#3 - Wet Cell	404	STANDHYD	8.79	80	100	100	2.00	25	110	0.90
Draining to SWMF#3 - Forebay	405	STANDHYD	10.21	80	100	100	2.00	25	110	0.90

Notes:

TIMP

.....➡ Total percent impervious

XIMP

.....➡ Percent impervious directly connected

161500301 - Project Eagle

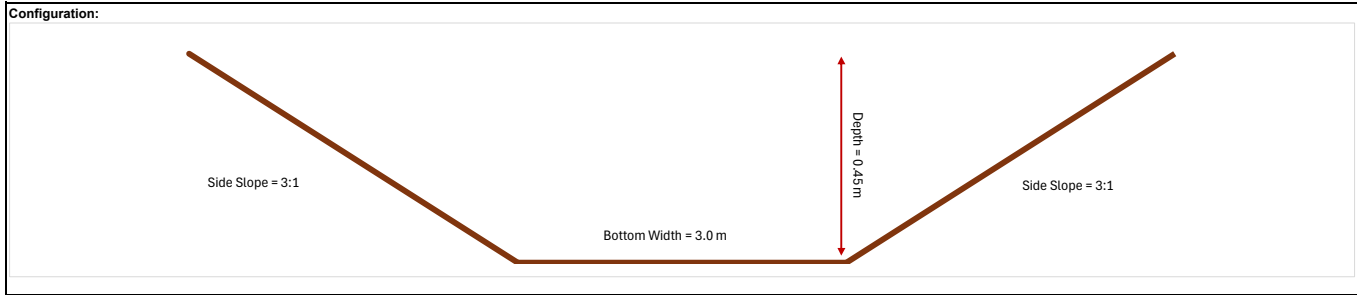
SWMF #1 - West Overland Flow Route

Input Data:		
Flow =	7.274	m ³ /s
Manning's 'n' =	0.035	
Channel Slope =	19.8%	
Side Slope =	3 m/m [3 means 3:1]	
Side Slope =	3 m/m [3 means 3:1]	
Bottom Width =	3 m	[0 = triangular, +ve = trapezoidal]

Calculated Values:		
Velocity =	5.27	m/s
Area =	1.379	m ²
Wetted Perimeter =	5.166	m
Hydraulic Radius (R) =	0.267	m

Depth Estimate:		
Estimated Flow Depth =	0.342	m
lhs-rhs =	4E-03	
Note: Calculations are correct when lhs-rhs = 0		

Proposed Depth	0.45	m
Estimated 100-year Flow Depth	0.34	m
Provided Freeboard	0.11	m



SWMF #1 - West Overland Flow Route - Rip Rap Sizing

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

Flow	7.27	m ³ /s
Cross-sectional Area	1.38	m ²
Velocity	5.27	m/s

Velocity Range	> 4.7	m/s
----------------	-------	-----

* Cable concrete is recommended

Rip Rap Size	
1000 mm Φ Rip Rap	1750 mm thick
100% smaller than 1500 mm	
At least 20% larger than 1150 mm	
At least 50% larger than 1000 mm	
At least 80% larger than 600 mm	

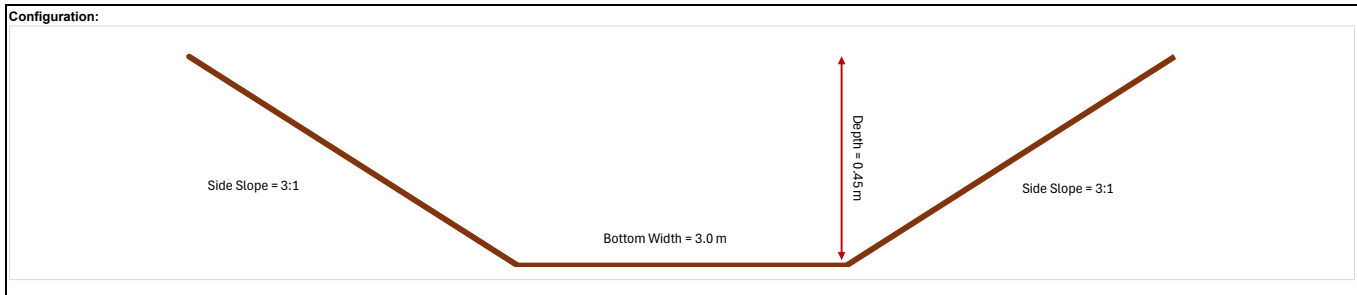
SWMF #1 - North Overland Flow Route

Input Data:		
Flow =	2.768	m ³ /s
Manning's 'n' =	0.035	
Channel Slope =	3.0%	
Side Slope =	3 m/m [3 means 3:1]	
Side Slope =	3 m/m [3 means 3:1]	
Bottom Width =	3 m	[0 = triangular, +ve = trapezoidal]

Calculated Values:		
Velocity =	2.04	m/s
Area =	1.358	m ²
Wetted Perimeter =	5.140	m
Hydraulic Radius (R) =	0.264	m

Depth Estimate:		
Estimated Flow Depth =	0.338	m
lhs-rhs =	-6E-05	
Note: Calculations are correct when lhs-rhs = 0		

Proposed Depth	0.45	m
Estimated 100-year Flow Depth	0.34	m
Provided Freeboard	0.11	m



SWMF #1 - North Overland Flow Route - Rip Rap Sizing

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

Flow	2.77	m ³ /s
Cross-sectional Area	1.36	m ²
Velocity	2.04	m/s

Velocity Range	2.0 - 2.6	m/s
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Rip Rap Size	
200 mm Φ Rip Rap	350 mm thick
100% smaller than 300 mm	
At least 20% larger than 225 mm	
At least 50% larger than 200 mm	
At least 80% larger than 120 mm	

161500301 - Project Eagle

SWMF #2 - Overland Flow Route Leading to the Wet Cell

Input Data:

Flow =	5.662 m ³ /s
Manning's 'n' =	0.035
Channel Slope =	12.5%
Side Slope =	3 m/m [3 means 3:1]
Side Slope =	3 m/m [3 means 3:1]
Bottom Width =	3 m [0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	4.16 m/s
Area=	1.360 m ²
Wetted Perimeter =	5.142 m
Hydraulic Radius (R) =	0.265 m

Depth Estimate:

Estimated Flow Depth = **0.339 m** lhs-rhs = -2E-04

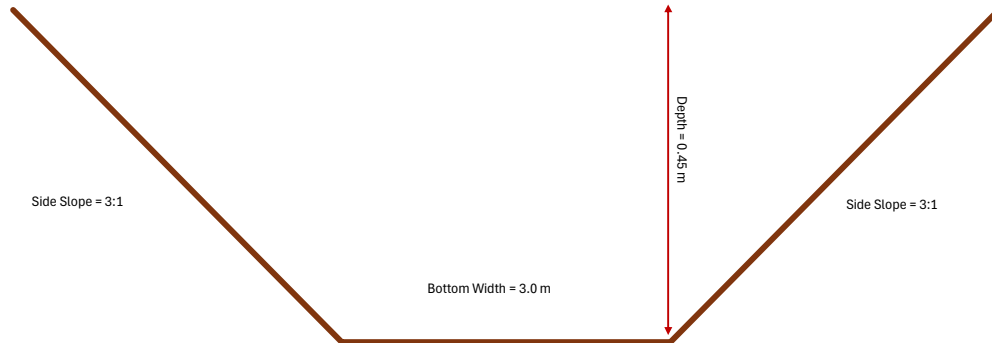
Note: Calculations are correct when lhs-rhs = 0

Proposed Depth 0.45 m

Estimated 100-year Flow Depth 0.34 m

Provided Freeboard 0.11 m

Configuration:



SWMF #2 - Overland Flow Route Leading to the Wet Cell - Rip Rap Sizing

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

Flow	5.66 m ³ /s
Cross-sectional Area	1.36 m ²
Velocity	4.16 m/s

Velocity Range 4.0-4.7 m/s

* Cable concrete is recommended

Rip Rap Size	
800 mm Φ Rip Rap 1400 mm thick	
100% smaller than 1200 mm	
At least 20% larger than 925 mm	
At least 50% larger than 800 mm	
At least 80% larger than 450 mm	

161500301 - Project Eagle

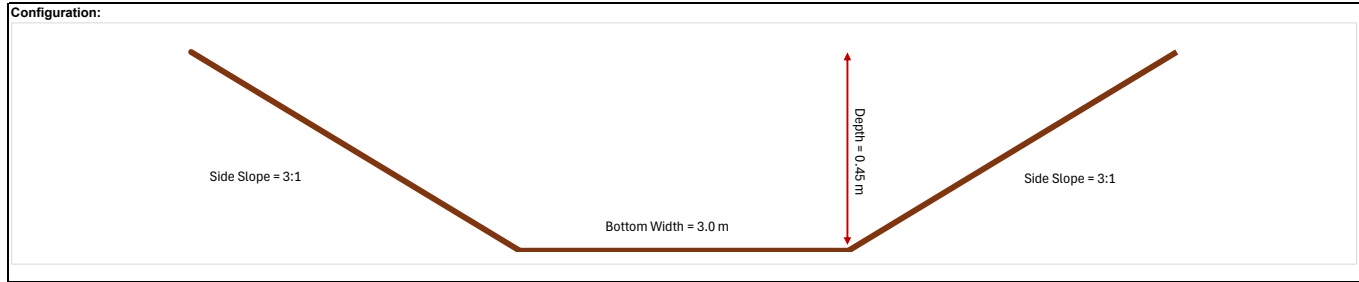
SWMF #3 - Overland Flow Route Leading to the Forebay

Input Data:	
Flow =	5.175 m ³ /s
Manning's 'n' =	0.035
Channel Slope =	12.9%
Side Slope =	3 m/m [3 means 3:1]
Side Slope =	3 m/m [3 means 3:1]
Bottom Width =	3 m [0 = triangular, +ve = trapezoidal]

Calculated Values:	
Velocity =	4.09 m/s
Area =	1.264 m ²
Wetted Perimeter =	5.020 m
Hydraulic Radius (R) =	0.252 m

Depth Estimate:	
Estimated Flow Depth =	0.319 m
lhs-rhs =	2E-05
Note: Calculations are correct when lhs-rhs = 0	

Proposed Depth	0.45 m
Estimated 100-year Flow Depth	0.32 m
Provided Freeboard	0.13 m



SWMF #3 - Overland Flow Route Leading to the Forebay - Rip Rap Sizing

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

Flow	5.18 m ³ /s
Cross-sectional Area	1.26 m ²
Velocity	4.09 m/s

Rip Rap Size	
800 mm Φ Rip Rap	1400 mm thick
100% smaller than 1200 mm	
At least 20% larger than 925 mm	
At least 50% larger than 800 mm	
At least 80% larger than 450 mm	

Velocity Range	4.0-4.7 m/s
----------------	-------------

* Cable concrete is recommended

Drainage Swale Conveying Flows from the Stockpile to SWMF #3

Input Data:	
Flow =	4.456 m ³ /s
Manning's 'n' =	0.035
Channel Slope =	5.0%
Side Slope =	3 m/m [3 means 3:1]
Side Slope =	3 m/m [3 means 3:1]
Bottom Width =	3 m [0 = triangular, +ve = trapezoidal]

Calculated Values:	
Velocity =	2.81 m/s
Area =	1.583 m ²
Wetted Perimeter =	5.415 m
Hydraulic Radius (R) =	0.292 m

Depth Estimate:	
Estimated Flow Depth =	0.382 m
lhs-rhs =	4E-06
Note: Calculations are correct when lhs-rhs = 0	

Proposed Depth	0.45 m
Estimated 100-year Flow Depth	0.38 m
Provided Freeboard	0.07 m

SWMF #3 - Overland Flow Route Leading to the Wet Cell

Rip Rap Design

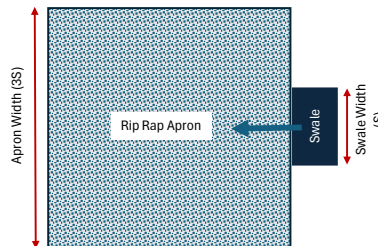
Flow	4.456 m ³ /s
Cross-sectional Area	1.583 m ²
Velocity	2.81 m/s

Velocity Range	2.6 - 3.0 m/s
----------------	---------------

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

Rip Rap Size	
300 mm Φ Rip Rap	525 mm thick
100% smaller than 500 mm	
At least 20% larger than 350 mm	
At least 50% larger than 300 mm	
At least 80% larger than 200 mm	

Rip Rap Apron	
Swale Depth	0.45 m
Top width of the Swale	5.70 m
Width of Rip Rap Apron	17.10 m



SWMHYMO Parameters

161500301 - Project Eagle

Overland Flow Route - Riprap sizing

SWMF #1 - West Overland Flow Route - Rip Rap Sizing

Velocity	5.27	m/s
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Velocity Range (m/s)	Contact manufacturer for Cable Concrete Specifications
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Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

1000 mm Φ Rip Rap 1750 mm Thick
100% smaller than 1500 mm
At least 20% larger than 1150 mm
At least 50% larger than 1000 mm
At least 80% larger than 600 mm

OPSS.PROV 1004 (not in OPSS)	R-600 or CC90 Cable Concrete
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SWMF #1 - North Overland Flow Route - Rip Rap Sizing

Velocity	2.04	m/s
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Velocity Range (m/s)	2.0-2.6
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Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

200 mm Φ Rip Rap 350 mm Thick
100% smaller than 300 mm
At least 20% larger than 225 mm
At least 50% larger than 200 mm
At least 80% larger than 120 mm

OPSS.PROV 1004	R-50
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SWMF #2 - Overland Flow Route Leading to the Wet Cell - Rip Rap Sizing

Velocity	4.16	m/s
----------	------	-----

Velocity Range (m/s)	4.0-4.7
----------------------	---------

Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

800 mm Φ Rip Rap 1400 mm Thick
100% smaller than 1200 mm
At least 20% larger than 925 mm
At least 50% larger than 800 mm
At least 80% larger than 450 mm

OPSS.PROV 1004 (not in OPSS)	R-400 or CC90 Cable Concrete
------------------------------	------------------------------

SWMF #3 - Overland Flow Route Leading to the Forebay - Rip Rap Sizing

Velocity	4.09	m/s
----------	------	-----

Velocity Range (m/s)	4.0-4.7
----------------------	---------

Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

800 mm Φ Rip Rap 1400 mm Thick
100% smaller than 1200 mm
At least 20% larger than 925 mm
At least 50% larger than 800 mm
At least 80% larger than 450 mm

OPSS.PROV 1004 (not in OPSS)	R-400 or CC90 Cable Concrete
------------------------------	------------------------------

SWMF #3 - Overland Flow Route Leading to the Wet Cell - Rip Rap

Velocity	2.81	m/s
----------	------	-----

Velocity Range (m/s)	2.6-3.0
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Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

300 mm Φ Rip Rap 525 mm Thick
100% smaller than 500 mm
At least 20% larger than 350 mm
At least 50% larger than 300 mm
At least 80% larger than 200 mm

Rip Rap Apron	
Swale Depth	0.45 m
Top width of the Swale	5.70 m
Width of Rip Rap Apron	17.10 m

OPSS.PROV 1004 (not in OPSS)	R-100
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Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle Pond 1 West OLF Inlet
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, Ontario
Address:	Hwy 40
Engineer Name:	Adam Kristoferson
Comments:	Overland Flow channel inlet to pond

Input Parameters:

Max Expected Flow:	7.300	Bed Width:	6.00
Max Expected Velocity:	5.300	Type of Flow:	Normal
Bed Slope:	0.200	Alignment:	Straight
Side Slope:	3.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
CC90 (90 LB/SF)	4.10	4.36	1.32	1.06
Design Details				
Block b: 802.6		Manning's N: 0.026		
Block bT: 701.0		Vertical Offset dz (mm): 12.70		
Block hB: 215.9		Step 6 - Net Drag & Lift		
Block Weight (N): 2933.10		Drag on Block [Bed] (N): 330.77		
Submerged Block Weight (N): 1735.60		Drag on Block [Side] (N): 277.12		
Bed Width (m): 6.00		Lift on Block [Bed] (N): 172.30		
Flow Depth: 0.201		Lift on Block [Side] (N): 152.96		
Bed Slope (Degree): 11.29		Shear Stresses		
Side Slope (Degree): 18.11		Bed, straight: 393.96		
		Side: 293.72		

Disclaimer

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THIS PROGRAM CALCULATES THE SEPARATE SAFETY FACTORS FOR FAILURE BY OVERTURNING AND SLIDING OF CONCRETE BLOCK REVETMENT SYSTEMS. THIS PROGRAM USES THE OVERTURNING EQUATION IN: "Articulating Concrete Block Revetment Design-Factor of Safety Method"--National Concrete Masonry Association TEK 11-12 and "Bridge Scour and Stream Instability Countermeasures"-- U.S. Department of Transportation, Hydraulic Engineering Circular No. 23 (HEC-23). IN ADDITION, THE PROGRAM COMPUTES THE FACTOR AGAINST FAILURE DUE TO SLIDING BASED ON THE THEORY OF DAMS IN: "Design of Small Dams", by U.S. Bureau of Reclamation" The equations in this program are calibrated using laboratory studies conducted at: University of Minnesota Colorado State University of Windsor to derive the forces and moments in the Factors of Safety. See CC-TM.

Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle Pond 2 Wet Cell OLF Inlet and Pond 3
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, Ontario
Address:	Hwy 40
Engineer Name:	Adam Kristoferson
Comments:	OLF Inlet

Input Parameters:

Max Expected Flow:	5.600	Bed Width:	6.00
Max Expected Velocity:	4.200	Type of Flow:	Normal
Bed Slope:	0.200	Alignment:	Straight
Side Slope:	3.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
CC90 (90 LB/SF)	4.62	4.89	1.44	1.12
Design Details				
Block b: 802.6		Manning's N: 0.026		
Block bT: 701.0		Vertical Offset dz (mm): 12.70		
Block hB: 215.9		Step 6 - Net Drag & Lift		
Block Weight (N): 2933.10		Drag on Block [Bed] (N): 284.14		
Submerged Block Weight (N): 1735.60		Drag on Block [Side] (N): 237.70		
Bed Width (m): 6.00		Lift on Block [Bed] (N): 146.95		
Flow Depth: 0.174		Lift on Block [Side] (N): 130.21		
Bed Slope (Degree): 11.29		Shear Stresses		
Side Slope (Degree): 18.11		Bed, straight: 341.04		
		Side: 254.27		

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SWMF#1 - Summary of Erosion Control Sizing

SWMF #1			
	Erosion Control Type	Bed Width (m)	Comment
At the inlet	CC-G2	6	Inlet pipe is 1500 mm Velocity = 2.83 m/s
Upstream of the outlet pipe	CC-G2	3	Smallest CC is expected to be sufficient
Downstream of the outlet pipe	R-200	Apron Width = 5 m Apron Length = 6 m	Outlet pipe is 1350 mm
Spillway	R-100	52 m (bed) + 20:1 sides	

SWMF #1 - Outlet to the Drain - Rip Rap Sizing

Velocity	3.99	m/s
----------	------	-----

Velocity Range (m/s)	3.5-4.0
----------------------	---------

Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

500 mm Φ Rip Rap 875 mm Thick

100% smaller than 750 mm

At least 20% larger than 575 mm

At least 50% larger than 500 mm

At least 80% larger than 300 mm

Culvert Diameter (m)	1.35
----------------------	------

RipRap Size	R-200
--------------------	-------

	Calculated	Designed
Apron Width (m)	4.05	5.00
Apron Length (m)	5.40	6.00

Culvert Calculator Report

SWMF1 - Outlet Pipe

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.60 m	Headwater Depth/Height	2.00
Computed Headwater Elev.	179.60 m	Discharge	5.5381 m³/s
Inlet Control HW Elev.	179.60 m	Tailwater Elevation	176.50 m
Outlet Control HW Elev.	179.47 m	Control Type	Inlet Control

Grades			
Upstream Invert	176.85 m	Downstream Invert	176.60 m
Length	50.90 m	Constructed Slope	0.005000 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	1.22 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	1.22 m
Velocity Downstream	3.99 m/s	Critical Slope	0.008794 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.37 m
Section Size	1350 mm	Rise	1.37 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	179.47 m	Upstream Velocity Head	0.72 m
Ke	0.50	Entrance Loss	0.36 m

Inlet Control Properties			
Inlet Control HW Elev.	179.60 m	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	1.5 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF1 Inlet to the Forebay
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	4.500	Bed Width:	6.00
Max Expected Velocity:	2.830	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
G2 (25 LB/SF)	27.80	2.71	16.58	0.57
Design Details				
Block b: 228.6		Manning's N: 0.023		
Block bT: 109.5		Vertical Offset dz (mm): 12.70		
Block hB: 79.8		Step 6 - Net Drag & Lift		
Block Weight (N): 71.20		Drag on Block [Bed] (N): 1.38		
Submerged Block Weight (N): 41.50		Drag on Block [Side] (N): 1.14		
Bed Width (m): 6.00		Lift on Block [Bed] (N): 0.66		
Flow Depth: 0.698		Lift on Block [Side] (N): 0.58		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 6.85		
		Side: 5.20		

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161500301 - Project Eagle

SWMF #1 - Spillway

Input Data:

Flow = 15.807 m³/s
Manning's 'n' = 0.035
Channel Slope = 17.6%
Side Slope = 20 m/m [3 means 3:1]
Side Slope = 20 m/m [3 means 3:1]
Bottom Width = 52 m [0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity = 2.67 m/s
Area = 5.923 m²
Wetted Perimeter = 56.378 m
Hydraulic Radius (R) = 0.105 m

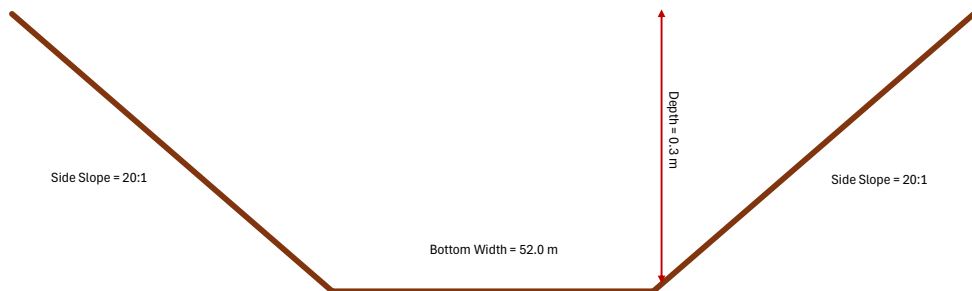
Depth Estimate:

Estimated Flow Depth = 0.109 m lhs-rhs = 4E-05

Note: Calculations are correct when lhs-rhs = 0

Proposed Depth 0.45 m
Estimated 100-year Flow Depth 0.11 m
Provided Freeboard 0.34 m

Configuration:



Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

OPSS.PROV 1004 (not in OPSS)

R-100

Velocity 2.67 m/s

Velocity Range (m/s) 2.6-3.0

300 mm Φ Rip Rap 525 mm Thick
100% smaller than 500 mm
At least 20% larger than 350 mm
At least 50% larger than 300 mm
At least 80% larger than 200 mm

Thickness		
1.5 x D50	450	mm
Or per Standard	525	mm
	525	mm

SWMF#2 - Summary of Erosion Control Sizing

SWMF #2			
	Erosion Control Type	Bed Width (m)	Comment
At the inlet	CC-G2	5	Inlet pipe is 1050 mm Velocity = 2.44 m/s
Upstream of the outlet pipe	CC-G2	3	Smallest CC is expected to be sufficient
Downstream of the outlet pipe	CC-35	Apron Width = 6 m Apron Length = 7 m	Outlet pipe is 1650 mm
Downstream of the minor outlet	R-200	Apron Width = 3 m Apron Length = 3 m	Outlet pipe is 450 mm
Bottom of forebay	CC-G2	-	Smallest CC is expected to be sufficient
At the forebay berm	R-10	-	Considering the 0.15 m/s velocity target, this size should be sufficient
Spillway	R-200	20 m (bed) + 20:1 sides	

SWMF #2 - Outlet to the Welland Canal - Rip Rap Sizing

Velocity	5.92	m/s
----------	------	-----

Velocity Range (m/s)	Contact manufacturer for Cable Concrete Specifications
----------------------	--

Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

1000 mm Φ Rip Rap 1750 mm Thick
 100% smaller than 1500 mm
 At least 20% larger than 1150 mm
 At least 50% larger than 1000 mm
 At least 80% larger than 600 mm

Culvert Diameter (m)	1.65
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Erosion Control Size	CC-35
----------------------	-------

	Calculated	Designed
Apron Width (m)	4.95	6.00
Apron Length (m)	6.60	7.00

SWMF #2 - Outlet to the Drain - Rip Rap Sizing

Velocity	3.71	m/s
----------	------	-----

Velocity Range (m/s)	3.5-4.0
----------------------	---------

Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

500 mm Φ Rip Rap 875 mm Thick
 100% smaller than 750 mm
 At least 20% larger than 575 mm
 At least 50% larger than 500 mm
 At least 80% larger than 300 mm

Culvert Diameter (m)	0.45
----------------------	------

RipRap Size	R-200
-------------	-------

	Calculated	Designed
Apron Width (m)	1.35	3.00
Apron Length (m)	1.80	3.00

Culvert Calculator Report

SWMF2 - Outlet Pipe

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	180.80 m	Headwater Depth/Height	3.34
Computed Headwater Elev.	180.80 m	Discharge	12.9328 m³/s
Inlet Control HW Elev.	180.80 m	Tailwater Elevation	173.69 m
Outlet Control HW Elev.	180.69 m	Control Type	Inlet Control

Grades			
Upstream Invert	175.20 m	Downstream Invert	175.00 m
Length	76.30 m	Constructed Slope	0.002569 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	1.62 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	1.62 m
Velocity Downstream	5.92 m/s	Critical Slope	0.016202 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.68 m
Section Size	1650 mm	Rise	1.68 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	180.69 m	Upstream Velocity Head	1.75 m
Ke	0.50	Entrance Loss	0.88 m

Inlet Control Properties			
Inlet Control HW Elev.	180.80 m	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	2.2 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report

SWMF2 - Minor 450 mm Pipe

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	180.80 m	Headwater Depth/Height	5.16
Computed Headwater Elev.	180.80 m	Discharge	0.6075 m³/s
Inlet Control HW Elev.	180.53 m	Tailwater Elevation	178.20 m
Outlet Control HW Elev.	180.80 m	Control Type	Outlet Control
Grades			
Upstream Invert	178.44 m	Downstream Invert	178.30 m
Length	24.00 m	Constructed Slope	0.006000 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.45 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.45 m
Velocity Downstream	3.71 m/s	Critical Slope	0.037677 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	0.46 m
Section Size	450 mm	Rise	0.46 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	180.80 m	Upstream Velocity Head	0.70 m
Ke	0.50	Entrance Loss	0.35 m
Inlet Control Properties			
Inlet Control HW Elev.	180.53 m	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	0.2 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF2 Inlet to the Forebay
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	2.000	Bed Width:	5.00
Max Expected Velocity:	2.440	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
G2 (25 LB/SF)	40.21	2.76	24.13	0.57
Design Details				
Block b: 228.6		Manning's N: 0.023		
Block bT: 109.5		Vertical Offset dz (mm): 12.70		
Block hB: 79.8		Step 6 - Net Drag & Lift		
Block Weight (N): 71.20		Drag on Block [Bed] (N): 0.94		
Submerged Block Weight (N): 41.50		Drag on Block [Side] (N): 0.78		
Bed Width (m): 5.00		Lift on Block [Bed] (N): 0.46		
Flow Depth: 0.479		Lift on Block [Side] (N): 0.40		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 4.70		
		Side: 3.57		

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Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF2 Outlet to Welland Canal
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	13.000	Bed Width:	6.00
Max Expected Velocity:	5.920	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
CC35 (35 LB/SF)	45.86	3.28	26.82	0.57
Design Details				
Block b: 393.7		Manning's N: 0.025		
Block bT: 292.1		Vertical Offset dz (mm): 12.70		
Block hB: 114.3		Step 6 - Net Drag & Lift		
Block Weight (N): 292.70		Drag on Block [Bed] (N): 3.24		
Submerged Block Weight (N): 159.90		Drag on Block [Side] (N): 2.78		
Bed Width (m): 6.00		Lift on Block [Bed] (N): 1.84		
Flow Depth: 1.372		Lift on Block [Side] (N): 1.68		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 13.46		
		Side: 10.23		

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161500301 - Project Eagle

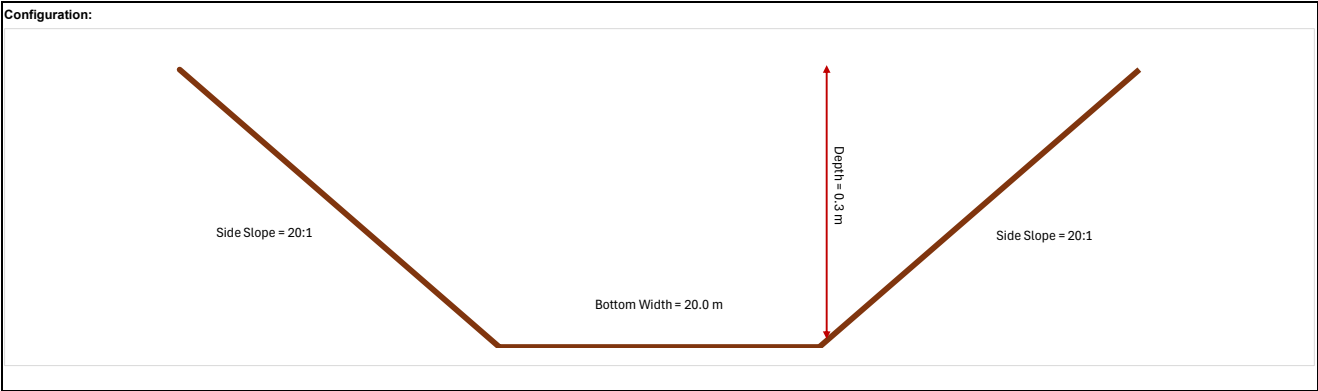
SWMF #2 - Spillway

Input Data:		
Flow =	6.868	m ³ /s
Manning's 'n' =	0.035	
Channel Slope =	58.8%	
Side Slope =	20	m/m [3 means 3:1]
Side Slope =	20	m/m [3 means 3:1]
Bottom Width =	20	m [0 = triangular, +ve = trapezoidal]

Depth Estimate:		
Estimated Flow Depth =	0.081	m
lhs-rhs =	-2E-06	
Note: Calculations are correct when lhs-rhs = 0		

Calculated Values:		
Velocity =	3.91	m/s
Area=	1.755	m ²
Wetted Perimeter =	23.251	m
Hydraulic Radius (R) =	0.075	m

Proposed Depth	0.45	m
Estimated 100-year Flow Depth	0.08	m
Provided Freeboard	0.37	m



Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

OPSS.PROV 1004 (not in OPSS)	R-200
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Velocity	3.91	m/s
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Velocity Range (m/s)	3.5-4.0
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500 mm Φ Rip Rap	875 mm Thick
100% smaller than 750 mm	
At least 20% larger than 575 mm	
At least 50% larger than 500 mm	
At least 80% larger than 300 mm	

Thickness		
1.5 x D50	750	mm
Or per Standard	875	mm
	875	mm

SWMF#3 - Summary of Erosion Control Sizing

SWMF #3			
	Erosion Control Type	Bed Width (m)	Comment
At the inlet	CC-G2	5	Inlet pipe is 1200 mm Velocity = 2.44 m/s
Upstream of the outlet pipe	CC-G2	3	Smallest CC is expected to be sufficient
Downstream of the outlet pipe	R-100	Apron Width = 6 m Apron Length = 8 m	Outlet pipe is 1800 mm
Bottom of forebay	CC-G2	-	Smallest CC is expected to be sufficient
At the forebay berm	R-10	-	Considering the 0.15 m/s velocity target, this size should be sufficient
Spillway	R-100	46.5 m (bed) + 20:1 sides	

SWMF #3 - Outlet to North Ditch - Rip Rap Sizing

Velocity	3.4	m/s
Velocity Range (m/s)	3.0-3.5	
Rip Rap Gradation		
<i>Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings</i>		
400 mm Φ Rip Rap	700 mm Thick	
100% smaller than 600 mm		
At least 20% larger than 450 mm		
At least 50% larger than 400 mm		
At least 80% larger than 250 mm		
Culvert Diameter (m)	1.8	
RipRap Size	R-100	
	Calculated	Designed
Apron Width (m)	5.40	6.00
Apron Length (m)	7.20	8.00

SWMF #3 - Outlet to the Welland Canal - Rip Rap Sizing

Velocity	3.96	m/s
Velocity Range (m/s)	3.5-4.0	
Rip Rap Gradation		
<i>Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings</i>		
500 mm Φ Rip Rap	875 mm Thick	
100% smaller than 750 mm		
At least 20% larger than 575 mm		
At least 50% larger than 500 mm		
At least 80% larger than 300 mm		
Culvert Rise (m)	1.83	Culvert Span (m) 2.13
Erosion Control Size	R-200	
	Calculated	Designed
Apron Width (m)	6.39	7.00
Apron Length (m)	7.32	8.00

Culvert Calculator Report

SWMF3 - Outlet Pipe

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	179.30 m	Headwater Depth/Height	1.10
Computed Headwater Elev.	179.30 m	Discharge	5.9566 m³/s
Inlet Control HW Elev.	179.19 m	Tailwater Elevation	177.20 m
Outlet Control HW Elev.	179.30 m	Control Type	Entrance Control
Grades			
Upstream Invert	177.29 m	Downstream Invert	177.25 m
Length	8.30 m	Constructed Slope	0.005060 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	1.16 m
Slope Type	Steep	Normal Depth	1.13 m
Flow Regime	Supercritical	Critical Depth	1.21 m
Velocity Downstream	3.40 m/s	Critical Slope	0.004107 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.83 m
Section Size	1800 mm	Rise	1.83 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	179.30 m	Upstream Velocity Head	0.53 m
Ke	0.50	Entrance Loss	0.27 m
Inlet Control Properties			
Inlet Control HW Elev.	179.19 m	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	2.6 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Culvert Calculator Report

North Ditch Culvert - Proposed 20250305

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	177.50 m	Headwater Depth/Height	0.75
Computed Headwater Elev.	176.63 m	Discharge	5.3420 m³/s
Inlet Control HW Elev.	176.61 m	Tailwater Elevation	173.69 m
Outlet Control HW Elev.	176.63 m	Control Type	Entrance Control
Grades			
Upstream Invert	175.25 m	Downstream Invert	174.73 m
Length	50.60 m	Constructed Slope	0.010277 m/m
Hydraulic Profile			
Profile	S2	Depth, Downstream	0.63 m
Slope Type	Steep	Normal Depth	0.61 m
Flow Regime	Supercritical	Critical Depth	0.86 m
Velocity Downstream	3.96 m/s	Critical Slope	0.003835 m/m
Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.13 m
Section Size	2130 x 1830 mm	Rise	1.83 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	176.63 m	Upstream Velocity Head	0.43 m
Ke	0.20	Entrance Loss	0.09 m
Inlet Control Properties			
Inlet Control HW Elev.	176.61 m	Flow Control	N/A
Inlet Type	90° headwall w 45° bevels	Area Full	3.9 m²
K	0.49500	HDS 5 Chart	10
M	0.66700	HDS 5 Scale	2
C	0.03140	Equation Form	2
Y	0.82000		

161500301 - Project Eagle

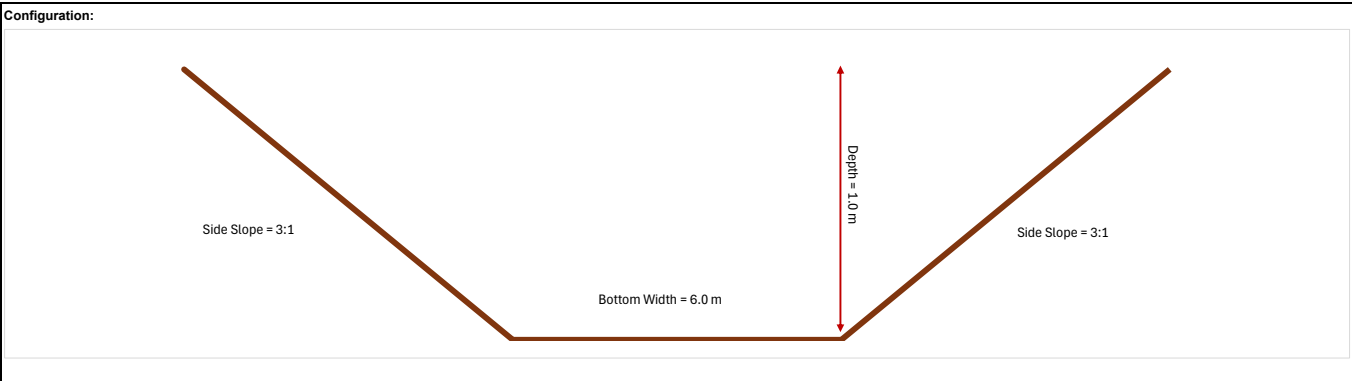
North Ditch - Upstream of the Culvert Leading to Welland Canal

Input Data:		
Flow =	5.342	m ³ /s
Manning's 'n' =	0.03	
Channel Slope =	1.5%	
Side Slope =	3 m/m [3 means 3:1]	
Side Slope =	3 m/m [3 means 3:1]	
Bottom Width =	6 m	[0 = triangular, +ve = trapezoidal]

Calculated Values:		
Velocity =	1.94	m/s
Area=	2.758	m ²
Wetted Perimeter =	8.437	m
Hydraulic Radius (R) =	0.327	m

Depth Estimate:		
Estimated Flow Depth =	0.385	m
lhs-rhs =	-7E-04	
Note: Calculations are correct when lhs-rhs = 0		

Proposed Depth	0.45	m
Estimated 100-year Flow Depth	0.39	m
Provided Freeboard	0.06	m



North Ditch - Upstream of the Culvert Leading to Welland Canal

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

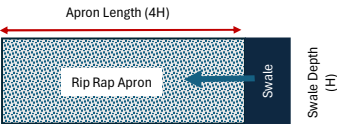
Flow	5.34	m ³ /s
Cross-sectional Area	2.76	m ²
Velocity	1.94	m/s

Velocity Range	1.0-2.0	m/s
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RipRap Size	R-20
-------------	------

Rip Rap Apron	
Swale Depth	1.0 m
Length of Rip Rap Apron	4.0 m

Rip Rap Size	
100 mm Φ Rip Rap	175 mm Thick
100% smaller than 150 mm	
At least 20% larger than 120 mm	
At least 50% larger than 100 mm	
At least 80% larger than 60 mm	



Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF3 Inlet to the Forebay
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	2.000	Bed Width:	5.00
Max Expected Velocity:	2.440	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
G2 (25 LB/SF)	40.21	2.76	24.13	0.57
Design Details				
Block b: 228.6		Manning's N: 0.023		
Block bT: 109.5		Vertical Offset dz (mm): 12.70		
Block hB: 79.8		Step 6 - Net Drag & Lift		
Block Weight (N): 71.20		Drag on Block [Bed] (N): 0.94		
Submerged Block Weight (N): 41.50		Drag on Block [Side] (N): 0.78		
Bed Width (m): 5.00		Lift on Block [Bed] (N): 0.46		
Flow Depth: 0.479		Lift on Block [Side] (N): 0.40		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 4.70		
		Side: 3.57		

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161500301 - Project Eagle

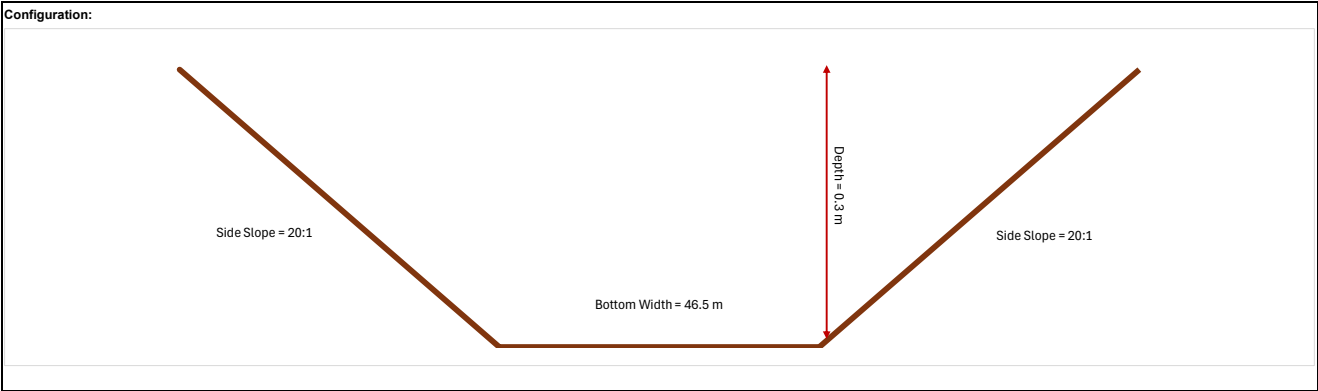
SWMF #3 - Spillway

Input Data:		
Flow =	14.271	m ³ /s
Manning's 'n' =	0.035	
Channel Slope =	26.3%	
Side Slope =	20	m/m [3 means 3:1]
Side Slope =	20	m/m [3 means 3:1]
Bottom Width =	46.5	m [0 = triangular, +ve = trapezoidal]

Calculated Values:		
Velocity =	3.02	m/s
Area=	4.722	m ²
Wetted Perimeter =	50.403	m
Hydraulic Radius (R) =	0.094	m

Depth Estimate:			
Estimated Flow Depth =	0.097	m	lhs-rhs = -8E-07
Note: Calculations are correct when lhs-rhs = 0			

Proposed Depth	0.45	m
Estimated 100-year Flow Depth	0.10	m
Provided Freeboard	0.35	m



Rip Rap Gradation

Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings

OPSS.PROV 1004 (not in OPSS)	R-100
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Velocity	3.02	m/s
----------	------	-----

Velocity Range (m/s)	3.0-3.5
----------------------	---------

400 mm Φ Rip Rap	700 mm Thick
100% smaller than 600 mm	
At least 20% larger than 450 mm	
At least 50% larger than 400 mm	
At least 80% larger than 250 mm	

Thickness		
1.5 x D50	600	mm
Or per Standard	700	mm
	700	mm

SWMF#4 - Summary of Erosion Control Sizing

SWMF #4			
	Erosion Control Type	Bed Width (m)	Comment
At the inlet	CC-G2	3	Inlet pipe is 825 mm Velocity = 1.90 m/s
Upstream of the outlet pipe	CC-G2	3	Smallest CC is expected to be sufficient
Downstream of the outlet pipe	CC-35	Apron Width = 5 m Apron Length = 5 m	Outlet pipe is 1200 mm
Bottom of forebay	CC-G2	-	Smallest CC is expected to be sufficient
At the forebay berm	CC-G2	-	Considering the 0.15 m/s velocity target, this size should be sufficient

SWMF #4 - Outlet to the Welland Canal - Rip Rap Sizing		
Velocity	6.87	m/s
Velocity Range (m/s) Contact manufacturer for Cable Concrete Specifications		
Rip Rap Gradation <i>Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings</i> 1000 mm Φ Rip Rap 1750 mm Thick 100% smaller than 1500 mm At least 20% larger than 1150 mm At least 50% larger than 1000 mm At least 80% larger than 600 mm		
Culvert Diameter (m)	1.2	
Erosion Control Size	CC-35	
	Calculated	Designed
Apron Width (m)	3.60	5.00
Apron Length (m)	4.80	5.00

Culvert Calculator Report

SWMF4 - Outlet Pipe

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	182.80 m	Headwater Depth/Height	6.50
Computed Headwater Elev.	182.80 m	Discharge	8.0102 m³/s
Inlet Control HW Elev.	181.83 m	Tailwater Elevation	173.69 m
Outlet Control HW Elev.	182.80 m	Control Type	Outlet Control

Grades			
Upstream Invert	174.87 m	Downstream Invert	174.30 m
Length	95.00 m	Constructed Slope	0.006000 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	1.21 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	1.21 m
Velocity Downstream	6.87 m/s	Critical Slope	0.035728 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.22 m
Section Size	1200 mm	Rise	1.22 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	182.80 m	Upstream Velocity Head	2.40 m
Ke	0.50	Entrance Loss	1.20 m

Inlet Control Properties			
Inlet Control HW Elev.	181.83 m	Flow Control	N/A
Inlet Type	Square edge w/headwall	Area Full	1.2 m²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF4 Inlet to the Forebay
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	0.800	Bed Width:	3.00
Max Expected Velocity:	1.900	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
G2 (25 LB/SF)	52.04	2.78	30.78	0.57
Design Details				
Block b: 228.6		Manning's N: 0.023		
Block bT: 109.5		Vertical Offset dz (mm): 12.70		
Block hB: 79.8		Step 6 - Net Drag & Lift		
Block Weight (N): 71.20		Drag on Block [Bed] (N): 0.73		
Submerged Block Weight (N): 41.50		Drag on Block [Side] (N): 0.60		
Bed Width (m): 3.00		Lift on Block [Bed] (N): 0.35		
Flow Depth: 0.375		Lift on Block [Side] (N): 0.30		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 3.68		
		Side: 2.80		

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Minimum FOS **>1.0**Optimum FOS **>1.5**

Project Name:	Project Eagle - SWMF4 Outlet to Welland Canal
Projected Start Date For Project:	2025-01-01
City & State/Province:	Port Colborne, ON
Address:	HWY 140
Engineer Name:	Adam Kristoferson
Comments:	

Input Parameters:

Max Expected Flow:	8.100	Bed Width:	5.00
Max Expected Velocity:	6.870	Type of Flow:	Bridge/Culvert
Bed Slope:	0.001	Alignment:	Straight
Side Slope:	1.000	Channel Length:	0

Product Type	Overturning Bed	Overturning Side	Sliding Bed	Sliding Side
CC35 (35 LB/SF)	54.58	3.31	31.73	0.57
Design Details				
Block b: 393.7		Manning's N: 0.025		
Block bT: 292.1		Vertical Offset dz (mm): 12.70		
Block hB: 114.3		Step 6 - Net Drag & Lift		
Block Weight (N): 292.70		Drag on Block [Bed] (N): 2.72		
Submerged Block Weight (N): 159.90		Drag on Block [Side] (N): 2.33		
Bed Width (m): 5.00		Lift on Block [Bed] (N): 1.54		
Flow Depth: 1.152		Lift on Block [Side] (N): 1.40		
Bed Slope (Degree): 0.06		Shear Stresses		
Side Slope (Degree): 44.98		Bed, straight: 11.30		
		Side: 8.59		

Disclaimer

THIS PROGRAM IS INTENDED AS A GUIDE TO THE DESIGN OF CABLE CONCRETE MATS. ALL FINAL DESIGNS SHOULD BE VERIFIED BY A LICENCED CIVIL ENGINEER.

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THIS PROGRAM CALCULATES THE SEPARATE SAFETY FACTORS FOR FAILURE BY OVERTURNING AND SLIDING OF CONCRETE BLOCK REVETMENT SYSTEMS. THIS PROGRAM USES THE OVERTURNING EQUATION IN: "Articulating Concrete Block Revetment Design-Factor of Safety Method"--National Concrete Masonry Association TEK 11-12 and "Bridge Scour and Stream Instability Countermeasures"-- U.S. Department of Transportation, Hydraulic Engineering Circular No. 23 (HEC-23). IN ADDITION, THE PROGRAM COMPUTES THE FACTOR AGAINST FAILURE DUE TO SLIDING BASED ON THE THEORY OF DAMS IN: "Design of Small Dams", by U.S. Bureau of Reclamation" The equations in this program are calibrated using laboratory studies conducted at: University of Minnesota Colorado State University of Windsor to derive the forces and moments in the Factors of Safety. See CC-TM.

```
00001> 2 Metric units
00002> #*****
00003> # Project Name: [Project Eagle] Project Number: [161500301]
00004> # Date : 2024-11-26
00005> # Modeller : [AA,MYK]
00006> # Company : Stantec Consulting Ltd. (London)
00007> # License # : 4730904
00008> #*****
00009> #*****
00010> #
00011> # This model represents the hydrologic characteristics of overland flows
00012> # under Proposed conditions.
00013> # Storm events modeled are:
00014> # 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00015> # Regional Storm Event: 48hr Hurricane Hazel
00016> #
00017> #*****
00018> #-----|
00019> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[2]
00020> #% ["002YR.HYD"] <--storm filename, one per line for NSTORM ti
00021> #%-----|
00022> READ STORM STORM_FILENAME=["STORM.001"]
00023> #%-----|
00024> #*****
00025> #
00026> # SWMF #1
00027> #
00028> #*****
00029> CALIB STANDHYD ID=[01], NHYD=["401"], DT=[1](min), AREA=[14.35](ha),
00030> XIMP=[0.99], TIMP=[0.99], DWF=[0.0](cms), LOSS=[2],
00031> SCS curve number CN=[80],
00032> Pervious surfaces: IAPER=[5](mm), SLPP=[2](%),
00033> LGP=[25](m), MNP=[0.24], SCP=[0](min),
00034> Impervious surfaces: IAIMP=[2](mm), SLPI=[2](%),
00035> LGI=[110](m), MNI=[0.013], SCI=[0](min)
00036> RAINFALL=[ , , , ](mm/hr) , END=-1
00037> #%-----|
00038> CALIB STANDHYD ID=[02], NHYD=["402"], DT=[1](min), AREA=[5.46](ha),
00039> XIMP=[0.99], TIMP=[0.99], DWF=[0.0](cms), LOSS=[2],
00040> SCS curve number CN=[80],
00041> Pervious surfaces: IAPER=[5](mm), SLPP=[2](%),
00042> LGP=[25](m), MNP=[0.24], SCP=[0](min),
00043> Impervious surfaces: IAIMP=[2](mm), SLPI=[2](%),
00044> LGI=[110](m), MNI=[0.013], SCI=[0](min)
00045> RAINFALL=[ , , , ](mm/hr) , END=-1
00046> #%-----|
00047> #
00048> #
00049> # SWMF #2
00050> #
00051> #*****
00052> CALIB STANDHYD ID=[03], NHYD=["403"], DT=[1](min), AREA=[11.17](ha),
00053> XIMP=[0.99], TIMP=[0.99], DWF=[0.0](cms), LOSS=[2],
00054> SCS curve number CN=[80],
00055> Pervious surfaces: IAPER=[5](mm), SLPP=[2](%),
00056> LGP=[25](m), MNP=[0.24], SCP=[0](min),
00057> Impervious surfaces: IAIMP=[2](mm), SLPI=[2](%),
00058> LGI=[110](m), MNI=[0.013], SCI=[0](min)
00059> RAINFALL=[ , , , ](mm/hr) , END=-1
00060> #%-----|
00061> #
00062> #
00063> # SWMF #3
00064> #
00065> #*****
00066> CALIB STANDHYD ID=[04], NHYD=["404"], DT=[1](min), AREA=[8.79](ha),
00067> XIMP=[0.99], TIMP=[0.99], DWF=[0.0](cms), LOSS=[2],
00068> SCS curve number CN=[80],
00069> Pervious surfaces: IAPER=[5](mm), SLPP=[2](%),
00070> LGP=[25](m), MNP=[0.24], SCP=[0](min),
00071> Impervious surfaces: IAIMP=[2](mm), SLPI=[2](%),
00072> LGI=[110](m), MNI=[0.013], SCI=[0](min)
00073> RAINFALL=[ , , , ](mm/hr) , END=-1
00074> #%-----|
00075> CALIB STANDHYD ID=[05], NHYD=["405"], DT=[1](min), AREA=[10.21](ha),
00076> XIMP=[0.99], TIMP=[0.99], DWF=[0.0](cms), LOSS=[2],
00077> SCS curve number CN=[80],
00078> Pervious surfaces: IAPER=[5](mm), SLPP=[2](%),
00079> LGP=[25](m), MNP=[0.24], SCP=[0](min),
00080> Impervious surfaces: IAIMP=[2](mm), SLPI=[2](%),
00081> LGI=[110](m), MNI=[0.013], SCI=[0](min)
00082> RAINFALL=[ , , , ](mm/hr) , END=-1
00083> #%-----|
00084> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[5]
00085> #% ["005YR.HYD"] <--storm filename, one per line for NSTORM ti
00086> #%-----|
00087> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[10]
00088> #% ["10YR.HYD"] <--storm filename, one per line for NSTORM tim
00089> #%-----|
00090> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[25]
00091> #% ["25YR.HYD"] <--storm filename, one per line for NSTORM tim
00092> #%-----|
00093> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[50]
00094> #% ["50YR.HYD"] <--storm filename, one per line for NSTORM tim
00095> #%-----|
00096> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[100]
00097> #% ["100YR.HYD"] <--storm filename, one per line for NSTORM ti
00098> #%-----|
00099> START TZERO=[0.0], METOUT=[2], NSTORM=[1], NRUN=[256]
00100> #% ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
00101> #%-----|
00102> FINISH
00103>
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00001> =====
00002>
00003> SSSSS W W M M H H Y Y M M O O 999 999 =====
00004> S W W W M M M H H Y Y M M M O O 9 9 9 9
00005> SSSSS W W W M M M H H H H Y Y M M M O O ## 9 9 9 9 Ver 4.05
00006> S W W M M M H H Y Y M M O O 9999 9999 Sept 2011
00007> SSSSS W W M M H H Y Y M M O O 9 9 9 9
00008> ***** # 4730904 *****
00009> StormWater Management Hydrologic Model 999 999
00010>
00011> *****
00012> ***** SWHMYMO Ver/4.05 *****
00013> ***** A single event and continuous hydrologic simulation model *****
00014> ***** based on the principles of HYMO and its successors *****
00015> ***** OTTHYMO-83 and OTTHYMO-89. *****
00016> *****
00017> ***** Distributed by: J.F. Sabourin and Associates Inc. *****
00018> ***** Ottawa, Ontario: (613) 836-3884 *****
00019> ***** Gatineau, Quebec: (819) 243-6858 *****
00020> ***** E-Mail: swmhyom@jfsa.Com *****
00021> *****
00022>
00023> *****
00024> ***** Licensed user: Stantec Consulting Ltd. (Kitchener) *****
00025> ***** Kitchener SERIAL#:4730904 *****
00026> *****
00027> *****
00028> *****
00029> ***** ***** PROGRAM ARRAY DIMENSIONS ***** *****
00030> ***** Maximum value for ID numbers : 10 *****
00031> ***** Max. number of rainfall points: 105408 *****
00032> ***** Max. number of flow points : 105408 *****
00033> *****
00034>
00035>
00036> ***** D E T A I L E D O U T P U T *****
00037> *****
00038> ***** DATE : 2024-11-26 TIME: 14:05:14 RUN COUNTER: 000139 *****
00039> *****
00040> * Input filename: C:\SWM-MO-1\SWHMYMO\PROJEC-1\olf.dat *
00041> * Output filename: C:\SWM-MO-1\SWHMYMO\PROJEC-1\olf.out *
00042> * Summary filename: C:\SWM-MO-1\SWHMYMO\PROJEC-1\olf.sum *
00043> * User comments: *
00044> * 1: *
00045> * 2: *
00046> * 3: *
00047> *****
00048>
00049>
00050> 001:0001-----
00051> *****
00052> *# Project Name: [Project Eagle] Project Number: [161500301]
00053> *# Date : 2024-11-26
00054> *# Modeller : [AA,MWK]
00055> *# Company : Stantec Consulting Ltd. (London)
00056> *# License # : 4730904
00057> *****
00058> *****
00059> *#
00060> *# This model represents the hydrologic characteristics of overland flows
00061> *# under Proposed conditions.
00062> *# Storm events modeled are:
00063> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00064> *# Regional Storm Event: 48hr Hurricane Hazel
00065> *#
00066> *****
00067> ** END OF RUN : 1
00068> *****
00069> *****
00070>
00071>
00072>
00073>
00074>
00075> -----
00076> | START | Project dir.: C:\SWM-MO-1\SWHMYMO\PROJEC-1\
00077> |-----| Rainfall dir.: C:\SWM-MO-1\SWHMYMO\PROJEC-1\
00078> | TZERO = 0 hrs on |
00079> | METOUT= 2 (output = METRIC)
00080> | NRUN = 002
00081> | NSTORM= 1
00082> | # 1=002YR.HYD
00083> -----
00084> 002:0002-----
00085> *****
00086> *# Project Name: [Project Eagle] Project Number: [161500301]
00087> *# Date : 2024-11-26
00088> *# Modeller : [AA,MWK]
00089> *# Company : Stantec Consulting Ltd. (London)
00090> *# License # : 4730904
00091> *****
00092> *****
00093> *#
00094> *# This model represents the hydrologic characteristics of overland flows
00095> *# under Proposed conditions.
00096> *# Storm events modeled are:
00097> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00098> *# Regional Storm Event: 48hr Hurricane Hazel
00099> *#
00100> *****
00101> -----
00102> 002:0002-----
00103> -----
00104> | READ STORM | Filename: CHICAGO STORM 2 Years, 3hr from Colborne
00105> | Ptotal= 36.37 mm | Comments: CHICAGO STORM 2 Years, 3hr from Colborne
00106> -----
00107> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00108> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00109> |.08 3.094 |.83 9.551 |1.58 11.939 |2.33 4.519
00110> |.17 3.326 |.92 12.836 |1.67 10.023 |2.42 4.243
00111> |.25 3.600 |1.00 19.669 |1.75 8.649 |2.50 4.002
00112> |.33 3.930 |1.08 41.191 |1.83 7.616 |2.58 3.789
00113> |.42 4.334 |1.17 99.781 |1.92 6.813 |2.67 3.599
00114> |.50 4.841 |1.25 48.700 |2.00 6.171 |2.75 3.429
00115> |.58 5.497 |1.33 28.010 |2.08 5.645 |2.83 3.276
00116> |.67 6.380 |1.42 19.395 |2.17 5.207 |2.92 3.137
00117> |.75 7.633 |1.50 14.781 |2.25 4.837 |3.00 3.010
00118> -----
00119>
00120> 002:0003-----
00121> *****
00122> *#
00123> *# SWMF #1
00124> *#
00125> *****
00126> -----
00127> | CALIB STANDHYD | Area (ha)= 14.35
00128> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00129> -----
00130> IMPERVIOUS PERVIOUS (i)
00131> Surface Area (ha)= 14.21 .14
00132> Dep. Storage (mm)= 2.00 5.00
00133> Average Slope (%)= 2.00 2.00
00134> Length (m)= 110.00 25.00
00135> Mannings n = .013 .240
```

```
00136>
00137> Max.eff.Inten.(mm/hr)= 99.78 19.28
00138> over (min)= 2.00 12.00
00139> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00140> Unit Hyd. Tpeak (min)= 2.00 12.00
00141> Unit Hyd. peak (cms)= .52 .09
00142>
00143>
00144> PEAK FLOW (cms)= 3.61 .00 *TOTALS*
00145> TIME TO PEAK (hrs)= 1.17 1.42 3.609 (iii)
00146> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00147> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00148> RUNOFF COEFFICIENT = .95 .29 .938
00149>
00150> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00151> CN* = 80.0 Ia = Dep. Storage (Above)
00152> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00153> THAN THE STORAGE COEFFICIENT.
00154> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00155>
00156> 002:0004-----
00157> -----
00158> | CALIB STANDHYD | Area (ha)= 5.46
00159> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00160> -----
00161> IMPERVIOUS PERVIOUS (i)
00162> Surface Area (ha)= 5.41 .05
00163> Dep. Storage (mm)= 2.00 5.00
00164> Average Slope (%)= 2.00 2.00
00165> Length (m)= 110.00 25.00
00166> Mannings n = .013 .240
00167>
00168>
00169> Max.eff.Inten.(mm/hr)= 99.78 19.28
00170> over (min)= 2.00 12.00
00171> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00172> Unit Hyd. Tpeak (min)= 2.00 12.00
00173> Unit Hyd. peak (cms)= .52 .09
00174>
00175> PEAK FLOW (cms)= 1.37 .00 *TOTALS*
00176> TIME TO PEAK (hrs)= 1.17 1.42 1.373 (iii)
00177> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00178> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00179> RUNOFF COEFFICIENT = .95 .29 .938
00180>
00181> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00182> CN* = 80.0 Ia = Dep. Storage (Above)
00183> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00184> THAN THE STORAGE COEFFICIENT.
00185> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00186>
00187> 002:0005-----
00188> *****
00189> *#
00190> *# SWMF #2
00191> *#
00192> *****
00193> -----
00194> | CALIB STANDHYD | Area (ha)= 11.17
00195> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00196> -----
00197> IMPERVIOUS PERVIOUS (i)
00198> Surface Area (ha)= 11.06 .11
00199> Dep. Storage (mm)= 2.00 5.00
00200> Average Slope (%)= 2.00 2.00
00201> Length (m)= 110.00 25.00
00202> Mannings n = .013 .240
00203>
00204>
00205> Max.eff.Inten.(mm/hr)= 99.78 19.28
00206> over (min)= 2.00 12.00
00207> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00208> Unit Hyd. Tpeak (min)= 2.00 12.00
00209> Unit Hyd. peak (cms)= .52 .09
00210>
00211> PEAK FLOW (cms)= 2.81 .00 *TOTALS*
00212> TIME TO PEAK (hrs)= 1.17 1.42 2.809 (iii)
00213> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00214> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00215> RUNOFF COEFFICIENT = .95 .29 .938
00216>
00217> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00218> CN* = 80.0 Ia = Dep. Storage (Above)
00219> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00220> THAN THE STORAGE COEFFICIENT.
00221> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00222>
00223> 002:0006-----
00224> *****
00225> *#
00226> *# SWMF #3
00227> *#
00228> *****
00229> -----
00230> | CALIB STANDHYD | Area (ha)= 8.79
00231> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00232> -----
00233> IMPERVIOUS PERVIOUS (i)
00234> Surface Area (ha)= 8.70 .09
00235> Dep. Storage (mm)= 2.00 5.00
00236> Average Slope (%)= 2.00 2.00
00237> Length (m)= 110.00 25.00
00238> Mannings n = .013 .240
00239>
00240>
00241> Max.eff.Inten.(mm/hr)= 99.78 19.28
00242> over (min)= 2.00 12.00
00243> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00244> Unit Hyd. Tpeak (min)= 2.00 12.00
00245> Unit Hyd. peak (cms)= .52 .09
00246>
00247> PEAK FLOW (cms)= 2.21 .00 *TOTALS*
00248> TIME TO PEAK (hrs)= 1.17 1.42 2.211 (iii)
00249> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00250> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00251> RUNOFF COEFFICIENT = .95 .29 .938
00252>
00253> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00254> CN* = 80.0 Ia = Dep. Storage (Above)
00255> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00256> THAN THE STORAGE COEFFICIENT.
00257> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00258>
00259> 002:0007-----
00260> -----
00261> | CALIB STANDHYD | Area (ha)= 10.21
00262> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00263> -----
00264> IMPERVIOUS PERVIOUS (i)
00265> Surface Area (ha)= 10.11 .10
00266> Dep. Storage (mm)= 2.00 5.00
00267> Average Slope (%)= 2.00 2.00
00268> Length (m)= 110.00 25.00
00269> Mannings n = .013 .240
00270>
```

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00271> Max.eff.Inten.(mm/hr)= 99.78 19.28
00272> over (min) 2.00 12.00
00273> Storage Coeff. (min)= 2.20 (ii) 12.23 (ii)
00274> Unit Hyd. Tpeak (min)= 2.00 12.00
00275> Unit Hyd. peak (cms)= .52 .09
00276>
00277> PEAK FLOW (cms)= 2.57 .00 2.568 (iii)
00278> TIME TO PEAK (hrs)= 1.17 1.42 1.167
00279> RUNOFF VOLUME (mm)= 34.37 10.37 34.131
00280> TOTAL RAINFALL (mm)= 36.37 36.37 36.371
00281> RUNOFF COEFFICIENT = .95 .29 .938
00282>
00283> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00284> CN* = 80.0 Ia = Dep. Storage (Above)
00285> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00286> THAN THE STORAGE COEFFICIENT.
00287> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00288>
00289> -----
00290> 002:0008-----
00291> ** END OF RUN : 4
00292>
00293> -----
00294>
00295>
00296>
00297>
00298>
00299> -----
00300> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00301> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00302> | TZERO = .00 hrs on 0
00303> | METOUT= 2 (output = METRIC)
00304> | NRUN = 005
00305> | NSTORM= 1
00306> | # 1=005YR.HYD
00307> -----
00308> 005:0002-----
00309> *****
00310> *# Project Name: [Project Eagle] Project Number: [161500301]
00311> *# Date : 2024-11-26
00312> *# Modeller : [AA,MVK]
00313> *# Company : Stantec Consulting Ltd. (London)
00314> *# License # : 4730904
00315> *****
00316> *****
00317> *#
00318> *# This model represents the hydrologic characteristics of overland flows
00319> *# under Proposed conditions.
00320> *# Storm events modeled are:
00321> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00322> *# Regional Storm Event: 48hr Hurricane Hazel
00323> *#
00324> *****
00325> -----
00326> 005:0002-----
00327>
00328> | READ STORM | Filename: CHICAGO STORM 5 Years, 3hr from Colborne
00329> | Ptotal= 42.70 mm | Comments: CHICAGO STORM 5 Years, 3hr from Colborne
00330> -----
00331>
00332> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00333> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00334> .08 3.757 | .83 11.211 | 1.58 13.931 | 2.33 5.426
00335> .17 4.031 | .92 14.951 | 1.67 11.750 | 2.42 5.105
00336> .25 4.353 | 1.00 22.713 | 1.75 10.182 | 2.50 4.823
00337> .33 4.739 | 1.08 47.493 | 1.83 9.000 | 2.58 4.573
00338> .42 5.210 | 1.17 118.092 | 1.92 8.078 | 2.67 4.351
00339> .50 5.800 | 1.25 56.211 | 2.00 7.339 | 2.75 4.153
00340> .58 6.560 | 1.33 32.225 | 2.08 6.732 | 2.83 3.971
00341> .67 7.579 | 1.42 22.401 | 2.17 6.225 | 2.92 3.808
00342> .75 9.019 | 1.50 17.161 | 2.25 5.795 | 3.00 3.658
00343> -----
00344> 005:0003-----
00345> *****
00346> *#
00347> *# SWMF #1
00348> *#
00349> *****
00350> -----
00351> | CALIB STANDHYD | Area (ha)= 14.35
00352> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00353> -----
00354>
00355> IMPERVIOUS Pervious (i)
00356> Surface Area (ha)= 14.21 .14
00357> Dep. Storage (mm)= 2.00 5.00
00358> Average Slope (%)= 2.00 2.00
00359> Length (m)= 110.00 25.00
00360> Mannings n = .013 .240
00361> Max.eff.Inten.(mm/hr)= 118.09 27.64
00362> over (min) 2.00 11.00
00363> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
00364> Unit Hyd. Tpeak (min)= 2.00 11.00
00365> Unit Hyd. peak (cms)= .55 .10
00366>
00367> *TOTALS*
00368> PEAK FLOW (cms)= 4.32 .01 4.318 (iii)
00369> TIME TO PEAK (hrs)= 1.17 1.37 1.167
00370> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
00371> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
00372> RUNOFF COEFFICIENT = .95 .33 .947
00373>
00374> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00375> CN* = 80.0 Ia = Dep. Storage (Above)
00376> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00377> THAN THE STORAGE COEFFICIENT.
00378> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00379>
00380> -----
00381> 005:0004-----
00382>
00383> | CALIB STANDHYD | Area (ha)= 5.46
00384> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00385> -----
00386>
00387> IMPERVIOUS Pervious (i)
00388> Surface Area (ha)= 5.41 .05
00389> Dep. Storage (mm)= 2.00 5.00
00390> Average Slope (%)= 2.00 2.00
00391> Length (m)= 110.00 25.00
00392> Mannings n = .013 .240
00393> Max.eff.Inten.(mm/hr)= 118.09 27.64
00394> over (min) 2.00 11.00
00395> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
00396> Unit Hyd. Tpeak (min)= 2.00 11.00
00397> Unit Hyd. peak (cms)= .55 .10
00398>
00399> *TOTALS*
00400> PEAK FLOW (cms)= 1.64 .00 1.643 (iii)
00401> TIME TO PEAK (hrs)= 1.17 1.37 1.167
00402> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
00403> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
00404> RUNOFF COEFFICIENT = .95 .33 .947
00405>
00406> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00407> CN* = 80.0 Ia = Dep. Storage (Above)
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00408> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00409> THAN THE STORAGE COEFFICIENT.
00410> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00411> -----
00412> 005:0005-----
00413> *****
00414> *# SWMF #2
00415> *#
00416> *****
00417> -----
00418> | CALIB STANDHYD | Area (ha)= 11.17
00419> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00420> -----
00421>
00422> IMPERVIOUS Pervious (i)
00423> Surface Area (ha)= 11.06 .11
00424> Dep. Storage (mm)= 2.00 5.00
00425> Average Slope (%)= 2.00 2.00
00426> Length (m)= 110.00 25.00
00427> Mannings n = .013 .240
00428> Max.eff.Inten.(mm/hr)= 118.09 27.64
00429> over (min) 2.00 11.00
00430> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
00431> Unit Hyd. Tpeak (min)= 2.00 11.00
00432> Unit Hyd. peak (cms)= .55 .10
00433>
00434> *TOTALS*
00435> PEAK FLOW (cms)= 3.36 .01 3.361 (iii)
00436> TIME TO PEAK (hrs)= 1.17 1.37 1.167
00437> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
00438> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
00439> RUNOFF COEFFICIENT = .95 .33 .947
00440>
00441> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00442> CN* = 80.0 Ia = Dep. Storage (Above)
00443> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00444> THAN THE STORAGE COEFFICIENT.
00445> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00446> -----
00447> 005:0006-----
00448> *****
00449> *# SWMF #3
00450> *#
00451> *****
00452> *****
00453> -----
00454> | CALIB STANDHYD | Area (ha)= 8.79
00455> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00456> -----
00457>
00458> IMPERVIOUS Pervious (i)
00459> Surface Area (ha)= 8.70 .09
00460> Dep. Storage (mm)= 2.00 5.00
00461> Average Slope (%)= 2.00 2.00
00462> Length (m)= 110.00 25.00
00463> Mannings n = .013 .240
00464> Max.eff.Inten.(mm/hr)= 118.09 27.64
00465> over (min) 2.00 11.00
00466> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
00467> Unit Hyd. Tpeak (min)= 2.00 11.00
00468> Unit Hyd. peak (cms)= .55 .10
00469>
00470> *TOTALS*
00471> PEAK FLOW (cms)= 2.64 .00 2.645 (iii)
00472> TIME TO PEAK (hrs)= 1.17 1.37 1.167
00473> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
00474> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
00475> RUNOFF COEFFICIENT = .95 .33 .947
00476>
00477> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00478> CN* = 80.0 Ia = Dep. Storage (Above)
00479> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00480> THAN THE STORAGE COEFFICIENT.
00481> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00482> -----
00483> 005:0007-----
00484> -----
00485> | CALIB STANDHYD | Area (ha)= 10.21
00486> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00487> -----
00488>
00489> IMPERVIOUS Pervious (i)
00490> Surface Area (ha)= 10.11 .10
00491> Dep. Storage (mm)= 2.00 5.00
00492> Average Slope (%)= 2.00 2.00
00493> Length (m)= 110.00 25.00
00494> Mannings n = .013 .240
00495> Max.eff.Inten.(mm/hr)= 118.09 27.64
00496> over (min) 2.00 11.00
00497> Storage Coeff. (min)= 2.06 (ii) 10.74 (ii)
00498> Unit Hyd. Tpeak (min)= 2.00 11.00
00499> Unit Hyd. peak (cms)= .55 .10
00500>
00501> *TOTALS*
00502> PEAK FLOW (cms)= 3.07 .00 3.072 (iii)
00503> TIME TO PEAK (hrs)= 1.17 1.37 1.167
00504> RUNOFF VOLUME (mm)= 40.70 14.04 40.434
00505> TOTAL RAINFALL (mm)= 42.70 42.70 42.701
00506> RUNOFF COEFFICIENT = .95 .33 .947
00507>
00508> (i) CN PROCEDURE SELECTED FOR Pervious Losses:
00509> CN* = 80.0 Ia = Dep. Storage (Above)
00510> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00511> THAN THE STORAGE COEFFICIENT.
00512> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00513> -----
00514> 005:0008-----
00515> -----
00516> 005:0002-----
00517> ** END OF RUN : 9
00518> *****
00519> *****
00520> -----
00521>
00522>
00523>
00524>
00525> -----
00526> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00527> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00528> | TZERO = .00 hrs on 0
00529> | METOUT= 2 (output = METRIC)
00530> | NRUN = 010
00531> | NSTORM= 1
00532> | # 1=10YR.HYD
00533> -----
00534> 010:0002-----
00535> *****
00536> *# Project Name: [Project Eagle] Project Number: [161500301]
00537> *# Date : 2024-11-26
00538> *# Modeller : [AA,MVK]
00539> *# Company : Stantec Consulting Ltd. (London)
00540> *# License # : 4730904
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00541> *#*****
00542> *#*****
00543> *#*****
00544> *# This model represents the hydrologic characteristics of overland flows
00545> *# under Proposed conditions.
00546> *# Storm events modeled are:
00547> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00548> *# Regional Storm Event: 48hr Hurricane Hazel
00549> *#*****
00550> *#*****
00551> *#*****
00552> 010:0002-----
00553> *#*****
00554> | READ STORM | Filename: CHICAGO STORM 10 Years, 3hr from Colborn
00555> | Ptotal= 47.76 mm | Comments: CHICAGO STORM 10 Years, 3hr from Colborn
00556> *#*****
00557> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00558> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00559> |.08 4.368 |.83 12.544 |1.58 15.478 |2.33 6.229
00560> |.17 4.675 |.92 16.574 |1.67 13.127 |2.42 5.873
00561> |.25 5.035 |1.00 24.913 |1.75 11.431 |2.50 5.560
00562> |.33 5.466 |1.08 51.922 |1.83 10.148 |2.58 5.282
00563> |.42 5.990 |1.17 133.409 |1.92 9.144 |2.67 5.034
00564> |.50 6.643 |1.25 61.515 |2.00 8.335 |2.75 4.810
00565> |.58 7.481 |1.33 35.164 |2.08 7.670 |2.83 4.608
00566> |.67 8.598 |1.42 24.576 |2.17 7.113 |2.92 4.424
00567> |.75 10.168 |1.50 18.949 |2.25 6.638 |3.00 4.256
00568> *#*****
00569> *#*****
00570> 010:0003-----
00571> *#*****
00572> *#
00573> *# SWMF #1
00574> *#
00575> *#*****
00576> *#*****
00577> | CALIB STANDHYD | Area (ha)= 14.35
00578> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00579> *#*****
00580> IMPERVIOUS PERVIOUS (i)
00581> Surface Area (ha)= 14.21 .14
00582> Dep. Storage (mm)= 2.00 5.00
00583> Average Slope (%)= 2.00 2.00
00584> Length (m)= 110.00 25.00
00585> Mannings n = .013 .240
00586> *#*****
00587> Max.eff.Inten.(mm/hr)= 133.41 35.92
00588> over (min)= 2.00 10.00
00589> Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
00590> Unit Hyd. Tpeak (min)= 2.00 10.00
00591> Unit Hyd. peak (cms)= .57 .11
00592> *#*****
00593> PEAK FLOW (cms)= 4.91 .01 4.911 (iii)
00594> TIME TO PEAK (hrs)= 1.17 1.35 1.167
00595> RUNOFF VOLUME (mm)= 45.76 17.21 45.477
00596> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
00597> RUNOFF COEFFICIENT = .96 .36 .952
00598> *#*****
00599> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00600> CN* = 80.0 Ia = Dep. Storage (Above)
00601> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00602> THAN THE STORAGE COEFFICIENT.
00603> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00604> *#*****
00605> *#*****
00606> 010:0004-----
00607> *#*****
00608> | CALIB STANDHYD | Area (ha)= 5.46
00609> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00610> *#*****
00611> IMPERVIOUS PERVIOUS (i)
00612> Surface Area (ha)= 5.41 .05
00613> Dep. Storage (mm)= 2.00 5.00
00614> Average Slope (%)= 2.00 2.00
00615> Length (m)= 110.00 25.00
00616> Mannings n = .013 .240
00617> *#*****
00618> Max.eff.Inten.(mm/hr)= 133.41 35.92
00619> over (min)= 2.00 10.00
00620> Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
00621> Unit Hyd. Tpeak (min)= 2.00 10.00
00622> Unit Hyd. peak (cms)= .57 .11
00623> *#*****
00624> PEAK FLOW (cms)= 1.87 .00 1.869 (iii)
00625> TIME TO PEAK (hrs)= 1.17 1.35 1.167
00626> RUNOFF VOLUME (mm)= 45.76 17.21 45.477
00627> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
00628> RUNOFF COEFFICIENT = .96 .36 .952
00629> *#*****
00630> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00631> CN* = 80.0 Ia = Dep. Storage (Above)
00632> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00633> THAN THE STORAGE COEFFICIENT.
00634> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00635> *#*****
00636> *#*****
00637> 010:0005-----
00638> *#*****
00639> *#
00640> *# SWMF #2
00641> *#
00642> *#*****
00643> *#*****
00644> | CALIB STANDHYD | Area (ha)= 11.17
00645> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00646> *#*****
00647> IMPERVIOUS PERVIOUS (i)
00648> Surface Area (ha)= 11.06 .11
00649> Dep. Storage (mm)= 2.00 5.00
00650> Average Slope (%)= 2.00 2.00
00651> Length (m)= 110.00 25.00
00652> Mannings n = .013 .240
00653> *#*****
00654> Max.eff.Inten.(mm/hr)= 133.41 35.92
00655> over (min)= 2.00 10.00
00656> Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
00657> Unit Hyd. Tpeak (min)= 2.00 10.00
00658> Unit Hyd. peak (cms)= .57 .11
00659> *#*****
00660> PEAK FLOW (cms)= 3.82 .01 3.823 (iii)
00661> TIME TO PEAK (hrs)= 1.17 1.35 1.167
00662> RUNOFF VOLUME (mm)= 45.76 17.21 45.477
00663> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
00664> RUNOFF COEFFICIENT = .96 .36 .952
00665> *#*****
00666> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00667> CN* = 80.0 Ia = Dep. Storage (Above)
00668> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00669> THAN THE STORAGE COEFFICIENT.
00670> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00671> *#*****
00672> *#*****
00673> 010:0006-----
00674> *#*****
00675> *#
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00676> *# SWMF #3
00677> *#
00678> *#*****
00679> *#*****
00680> | CALIB STANDHYD | Area (ha)= 8.79
00681> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00682> *#*****
00683> IMPERVIOUS PERVIOUS (i)
00684> Surface Area (ha)= 8.70 .09
00685> Dep. Storage (mm)= 2.00 5.00
00686> Average Slope (%)= 2.00 2.00
00687> Length (m)= 110.00 25.00
00688> Mannings n = .013 .240
00689> *#*****
00690> Max.eff.Inten.(mm/hr)= 133.41 35.92
00691> over (min)= 2.00 10.00
00692> Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
00693> Unit Hyd. Tpeak (min)= 2.00 10.00
00694> Unit Hyd. peak (cms)= .57 .11
00695> *#*****
00696> PEAK FLOW (cms)= 3.01 .01 3.008 (iii)
00697> TIME TO PEAK (hrs)= 1.17 1.35 1.167
00698> RUNOFF VOLUME (mm)= 45.76 17.21 45.477
00699> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
00700> RUNOFF COEFFICIENT = .96 .36 .952
00701> *#*****
00702> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00703> CN* = 80.0 Ia = Dep. Storage (Above)
00704> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00705> THAN THE STORAGE COEFFICIENT.
00706> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00707> *#*****
00708> *#*****
00709> 010:0007-----
00710> *#*****
00711> | CALIB STANDHYD | Area (ha)= 10.21
00712> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00713> *#*****
00714> IMPERVIOUS PERVIOUS (i)
00715> Surface Area (ha)= 10.11 .10
00716> Dep. Storage (mm)= 2.00 5.00
00717> Average Slope (%)= 2.00 2.00
00718> Length (m)= 110.00 25.00
00719> Mannings n = .013 .240
00720> *#*****
00721> Max.eff.Inten.(mm/hr)= 133.41 35.92
00722> over (min)= 2.00 10.00
00723> Storage Coeff. (min)= 1.96 (ii) 9.78 (ii)
00724> Unit Hyd. Tpeak (min)= 2.00 10.00
00725> Unit Hyd. peak (cms)= .57 .11
00726> *#*****
00727> PEAK FLOW (cms)= 3.49 .01 3.494 (iii)
00728> TIME TO PEAK (hrs)= 1.17 1.35 1.167
00729> RUNOFF VOLUME (mm)= 45.76 17.21 45.477
00730> TOTAL RAINFALL (mm)= 47.76 47.76 47.763
00731> RUNOFF COEFFICIENT = .96 .36 .952
00732> *#*****
00733> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00734> CN* = 80.0 Ia = Dep. Storage (Above)
00735> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00736> THAN THE STORAGE COEFFICIENT.
00737> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00738> *#*****
00739> *#*****
00740> 010:0008-----
00741> *#*****
00742> 010:0002-----
00743> *#*****
00744> 010:0002-----
00745> ** END OF RUN : 24
00746> *#*****
00747> *#*****
00748> *#*****
00749> *#*****
00750> *#*****
00751> *#*****
00752> *#*****
00753> *#*****
00754> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00755> | TZERO = .00 hrs on 0 Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00756> | METOUT= 2 (output = METRIC)
00757> | NRUR = 025
00758> | NSTORM= 1
00759> | # 1=25YR.HYD
00760> *#*****
00761> *#*****
00762> 025:0002-----
00763> *#*****
00764> *# Project Name: [Project Eagle] Project Number: [161500301]
00765> *# Date : 2024-11-26
00766> *# Modeller : [AA,MYK]
00767> *# Company : Stantec Consulting Ltd. (London)
00768> *# License # : 4730904
00769> *#*****
00770> *#*****
00771> *#
00772> *# This model represents the hydrologic characteristics of overland flows
00773> *# under Proposed conditions.
00774> *# Storm events modeled are:
00775> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
00776> *# Regional Storm Event: 48hr Hurricane Hazel
00777> *#*****
00778> *#*****
00779> *#*****
00780> 025:0002-----
00781> *#*****
00782> | READ STORM | Filename: CHICAGO STORM 25 Years, 3hr from Colborn
00783> | Ptotal= 55.20 mm | Comments: CHICAGO STORM 25 Years, 3hr from Colborn
00784> *#*****
00785> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
00786> | hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
00787> |.08 5.275 |.83 14.397 |1.58 17.590 |2.33 7.402
00788> |.17 5.629 |.92 18.778 |1.67 15.034 |2.42 6.998
00789> |.25 6.043 |1.00 27.803 |1.75 13.180 |2.50 6.642
00790> |.33 6.535 |1.08 57.841 |1.83 11.770 |2.58 6.325
00791> |.42 7.131 |1.17 159.527 |1.92 10.661 |2.67 6.041
00792> |.50 7.869 |1.25 68.696 |2.00 9.764 |2.75 5.785
00793> |.58 8.810 |1.33 38.966 |2.08 9.022 |2.83 5.552
00794> |.67 10.056 |1.42 27.436 |2.17 8.397 |2.92 5.340
00795> |.75 11.792 |1.50 21.350 |2.25 7.863 |3.00 5.146
00796> *#*****
00797> *#*****
00798> *#*****
00799> *#*****
00800> *#
00801> *# SWMF #1
00802> *#
00803> *#*****
00804> *#*****
00805> | CALIB STANDHYD | Area (ha)= 14.35
00806> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00807> *#*****
00808> IMPERVIOUS PERVIOUS (i)
00809> Surface Area (ha)= 14.21 .14
00810> Dep. Storage (mm)= 2.00 5.00
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00811> Average Slope (%) = 2.00 2.00
00812> Length (m) = 110.00 25.00
00813> Mannings n = .013 .240
00814>
00815> Max.eff.Inten.(mm/hr)= 159.53 48.77
00816> over (min) 2.00 9.00
00817> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
00818> Unit Hyd. Tpeak (min)= 2.00 9.00
00819> Unit Hyd. peak (cms)= .59 .13
00820>
00821> PEAK FLOW (cms)= 5.92 .01 *TOTALS*
00822> TIME TO PEAK (hrs)= 1.17 1.30 5.924 (iii)
00823> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
00824> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
00825> RUNOFF COEFFICIENT (mm)= .96 .40 .958
00826>
00827> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
00828> CN* = 80.0 Ia = Dep. Storage (Above)
00829> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00830> THAN THE STORAGE COEFFICIENT.
00831> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00832>
00833> -----
00834> 025:0004-----
00835> -----
00836> | CALIB STANDHYD | Area (ha)= 5.46
00837> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00838> -----
00839> IMPERVIOUS PVIOUS (i)
00840> Surface Area (ha)= 5.41 .05
00841> Dep. Storage (mm)= 2.00 5.00
00842> Average Slope (%) = 2.00 2.00
00843> Length (m) = 110.00 25.00
00844> Mannings n = .013 .240
00845>
00846> Max.eff.Inten.(mm/hr)= 159.53 48.77
00847> over (min) 2.00 9.00
00848> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
00849> Unit Hyd. Tpeak (min)= 2.00 9.00
00850> Unit Hyd. peak (cms)= .59 .13
00851>
00852> PEAK FLOW (cms)= 2.25 .00 *TOTALS*
00853> TIME TO PEAK (hrs)= 1.17 1.30 2.254 (iii)
00854> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
00855> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
00856> RUNOFF COEFFICIENT = .96 .40 .958
00857>
00858> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
00859> CN* = 80.0 Ia = Dep. Storage (Above)
00860> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00861> THAN THE STORAGE COEFFICIENT.
00862> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00863>
00864> -----
00865> 025:0005-----
00866> *-----
00867> *#
00868> *# SWMF #2
00869> *#
00870> *-----
00871> -----
00872> | CALIB STANDHYD | Area (ha)= 11.17
00873> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00874> -----
00875> IMPERVIOUS PVIOUS (i)
00876> Surface Area (ha)= 11.06 .11
00877> Dep. Storage (mm)= 2.00 5.00
00878> Average Slope (%) = 2.00 2.00
00879> Length (m) = 110.00 25.00
00880> Mannings n = .013 .240
00881>
00882> Max.eff.Inten.(mm/hr)= 159.53 48.77
00883> over (min) 2.00 9.00
00884> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
00885> Unit Hyd. Tpeak (min)= 2.00 9.00
00886> Unit Hyd. peak (cms)= .59 .13
00887>
00888> PEAK FLOW (cms)= 4.61 .01 *TOTALS*
00889> TIME TO PEAK (hrs)= 1.17 1.30 4.611 (iii)
00890> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
00891> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
00892> RUNOFF COEFFICIENT = .96 .40 .958
00893>
00894> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
00895> CN* = 80.0 Ia = Dep. Storage (Above)
00896> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00897> THAN THE STORAGE COEFFICIENT.
00898> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00899>
00900> -----
00901> 025:0006-----
00902> *-----
00903> *#
00904> *# SWMF #3
00905> *#
00906> *-----
00907> -----
00908> | CALIB STANDHYD | Area (ha)= 8.79
00909> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00910> -----
00911> IMPERVIOUS PVIOUS (i)
00912> Surface Area (ha)= 8.70 .09
00913> Dep. Storage (mm)= 2.00 5.00
00914> Average Slope (%) = 2.00 2.00
00915> Length (m) = 110.00 25.00
00916> Mannings n = .013 .240
00917>
00918> Max.eff.Inten.(mm/hr)= 159.53 48.77
00919> over (min) 2.00 9.00
00920> Storage Coeff. (min)= 1.82 (ii) 8.75 (ii)
00921> Unit Hyd. Tpeak (min)= 2.00 9.00
00922> Unit Hyd. peak (cms)= .59 .13
00923>
00924> PEAK FLOW (cms)= 3.63 .01 *TOTALS*
00925> TIME TO PEAK (hrs)= 1.17 1.30 3.629 (iii)
00926> RUNOFF VOLUME (mm)= 53.20 22.17 52.893
00927> TOTAL RAINFALL (mm)= 55.20 55.20 55.204
00928> RUNOFF COEFFICIENT = .96 .40 .958
00929>
00930> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
00931> CN* = 80.0 Ia = Dep. Storage (Above)
00932> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00933> THAN THE STORAGE COEFFICIENT.
00934> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00935>
00936> -----
00937> 025:0007-----
00938> -----
00939> | CALIB STANDHYD | Area (ha)= 10.21
00940> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
00941> -----
00942> IMPERVIOUS PVIOUS (i)
00943> Surface Area (ha)= 10.11 .10
00944> Dep. Storage (mm)= 2.00 5.00
00945> Average Slope (%) = 2.00 2.00
00946>
00947> Length (m) = 110.00 25.00
00948> Mannings n = .013 .240
00949>
00950> Max.eff.Inten.(mm/hr)= 175.02 60.55
00951> over (min) 2.00 8.00
00952> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
00953> Unit Hyd. Tpeak (min)= 2.00 8.00
00954> Unit Hyd. peak (cms)= .61 .14
00955>
00956> PEAK FLOW (cms)= 6.53 .02 *TOTALS*
00957> TIME TO PEAK (hrs)= 1.17 1.28 6.538 (iii)
00958> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
00959> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
00960> RUNOFF COEFFICIENT = .97 .43 .962
00961>
00962> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
00963> CN* = 80.0 Ia = Dep. Storage (Above)
00964> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00965> THAN THE STORAGE COEFFICIENT.
00966> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00967>
00968> -----
00969> 025:0008-----
00970> 025:0002-----
00971> -----
00972> 025:0002-----
00973> -----
00974> 025:0002-----
00975> ** END OF RUN : 49
00976>
00977> -----
00978> *****
00979>
00980>
00981>
00982>
00983>
00984> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00985> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
00986> TZERO = .00 hrs on 0
00987> METOUT= 2 (output = METRIC)
00988> NRUN = 057
00989> NSTORM= 1
00990> # 1=50YR.HYD
00991>
00992> 050:0002-----
00993> *-----
00994> *# Project Name: [Project Eagle] Project Number: [161500301]
00995> *# Date : 2024-11-26
00996> *# Modeller : [AA,MYK]
00997> *# Company : Stantec Consulting Ltd. (London)
00998> *# License # : 4730904
00999> *-----
01000> *#
01001> *#
01002> *# This model represents the hydrologic characteristics of overland flows
01003> *# under Proposed conditions.
01004> *# Storm events modeled are:
01005> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01006> *# Regional Storm Event: 48hr Hurricane Hazel
01007> *#
01008> *#
01009> -----
01010> 050:0002-----
01011> -----
01012> | READ STORM | Filename: CHICAGO STORM 50 Years, 3hr from Colborn
01013> | Ptotal= 61.74 mm | Comments: CHICAGO STORM 50 Years, 3hr from Colborn
01014>
01015> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01016> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01017> .08 6.075 | .83 16.290 | 1.58 19.828 | 2.33 8.476
01018> .17 6.475 | .92 21.140 | 1.67 16.997 | 2.42 8.022
01019> .25 6.944 | 1.00 31.074 | 1.75 14.937 | 2.50 7.620
01020> .33 7.499 | 1.08 63.899 | 1.83 13.368 | 2.58 7.262
01021> .42 8.171 | 1.17 175.021 | 1.92 12.130 | 2.67 6.941
01022> .50 9.001 | 1.25 75.740 | 2.00 11.127 | 2.75 6.652
01023> .58 10.058 | 1.33 43.302 | 2.08 10.296 | 2.83 6.389
01024> .67 11.453 | 1.42 30.673 | 2.17 9.595 | 2.92 6.149
01025> .75 13.392 | 1.50 23.979 | 2.25 8.996 | 3.00 5.929
01026>
01027> -----
01028> 050:0003-----
01029> *-----
01030> *#
01031> *# SWMF #1
01032> *#
01033> *-----
01034> -----
01035> | CALIB STANDHYD | Area (ha)= 14.35
01036> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01037> -----
01038> IMPERVIOUS PVIOUS (i)
01039> Surface Area (ha)= 14.21 .14
01040> Dep. Storage (mm)= 2.00 5.00
01041> Average Slope (%) = 2.00 2.00
01042> Length (m) = 110.00 25.00
01043> Mannings n = .013 .240
01044>
01045> Max.eff.Inten.(mm/hr)= 175.02 60.55
01046> over (min) 2.00 8.00
01047> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
01048> Unit Hyd. Tpeak (min)= 2.00 8.00
01049> Unit Hyd. peak (cms)= .61 .14
01050>
01051> PEAK FLOW (cms)= 6.53 .02 *TOTALS*
01052> TIME TO PEAK (hrs)= 1.17 1.28 6.538 (iii)
01053> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
01054> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
01055> RUNOFF COEFFICIENT = .97 .43 .962
01056>
01057> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01058> CN* = 80.0 Ia = Dep. Storage (Above)
01059> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01060> THAN THE STORAGE COEFFICIENT.
01061> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01062>
01063> -----
01064> 050:0004-----
01065> -----
01066> | CALIB STANDHYD | Area (ha)= 5.46
01067> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01068> -----
01069> IMPERVIOUS PVIOUS (i)
01070> Surface Area (ha)= 5.41 .05
01071> Dep. Storage (mm)= 2.00 5.00
01072> Average Slope (%) = 2.00 2.00
01073> Length (m) = 110.00 25.00
01074> Mannings n = .013 .240
01075>
01076> Max.eff.Inten.(mm/hr)= 175.02 60.55
01077> over (min) 2.00 8.00
01078> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
01079> Unit Hyd. Tpeak (min)= 2.00 8.00
01080> Unit Hyd. peak (cms)= .61 .14

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```
01081> *TOTALS*
01082> PEAK FLOW (cms)= 2.48 .01 2.488 (iii)
01083> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01084> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
01085> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
01086> RUNOFF COEFFICIENT = .97 .43 .962
01087>
01088> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01089> CN* = 80.0 Ia = Dep. Storage (Above)
01090> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01091> THAN THE STORAGE COEFFICIENT.
01092> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01093>
01094> -----
01095> 050:0005-----
01096> *#-----
01097> *#
01098> *# SWMF #2
01099> *#
01100> *#-----
01101> -----
01102> | CALIB STANDHYD | Area (ha)= 11.17
01103> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01104> -----
01105> IMPERVIOUS PERVIOUS (i)
01106> Surface Area (ha)= 11.06 .11
01107> Dep. Storage (mm)= 2.00 5.00
01108> Average Slope (%)= 2.00 2.00
01109> Length (m)= 110.00 25.00
01110> Mannings n = .013 .240
01111>
01112> Max.eff.Inten.(mm/hr)= 175.02 60.55
01113> over (min)= 2.00 8.00
01114> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
01115> Unit Hyd. Tpeak (min)= 2.00 8.00
01116> Unit Hyd. peak (cms)= .61 .14
01117>
01118> PEAK FLOW (cms)= 5.08 .01 *TOTALS*
01119> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01120> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
01121> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
01122> RUNOFF COEFFICIENT = .97 .43 .962
01123>
01124> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01125> CN* = 80.0 Ia = Dep. Storage (Above)
01126> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01127> THAN THE STORAGE COEFFICIENT.
01128> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01129>
01130> -----
01131> 050:0006-----
01132> *#-----
01133> *#
01134> *# SWMF #3
01135> *#
01136> *#-----
01137> -----
01138> | CALIB STANDHYD | Area (ha)= 8.79
01139> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01140> -----
01141> IMPERVIOUS PERVIOUS (i)
01142> Surface Area (ha)= 8.70 .09
01143> Dep. Storage (mm)= 2.00 5.00
01144> Average Slope (%)= 2.00 2.00
01145> Length (m)= 110.00 25.00
01146> Mannings n = .013 .240
01147>
01148> Max.eff.Inten.(mm/hr)= 175.02 60.55
01149> over (min)= 2.00 8.00
01150> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
01151> Unit Hyd. Tpeak (min)= 2.00 8.00
01152> Unit Hyd. peak (cms)= .61 .14
01153>
01154> PEAK FLOW (cms)= 4.00 .01 *TOTALS*
01155> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01156> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
01157> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
01158> RUNOFF COEFFICIENT = .97 .43 .962
01159>
01160> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01161> CN* = 80.0 Ia = Dep. Storage (Above)
01162> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01163> THAN THE STORAGE COEFFICIENT.
01164> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01165>
01166> -----
01167> 050:0007-----
01168> -----
01169> | CALIB STANDHYD | Area (ha)= 10.21
01170> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01171> -----
01172> IMPERVIOUS PERVIOUS (i)
01173> Surface Area (ha)= 10.11 .10
01174> Dep. Storage (mm)= 2.00 5.00
01175> Average Slope (%)= 2.00 2.00
01176> Length (m)= 110.00 25.00
01177> Mannings n = .013 .240
01178>
01179> Max.eff.Inten.(mm/hr)= 175.02 60.55
01180> over (min)= 2.00 8.00
01181> Storage Coeff. (min)= 1.76 (ii) 8.11 (ii)
01182> Unit Hyd. Tpeak (min)= 2.00 8.00
01183> Unit Hyd. peak (cms)= .61 .14
01184>
01185> PEAK FLOW (cms)= 4.65 .01 *TOTALS*
01186> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01187> RUNOFF VOLUME (mm)= 59.74 26.78 59.412
01188> TOTAL RAINFALL (mm)= 61.74 61.74 61.742
01189> RUNOFF COEFFICIENT = .97 .43 .962
01190>
01191> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01192> CN* = 80.0 Ia = Dep. Storage (Above)
01193> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01194> THAN THE STORAGE COEFFICIENT.
01195> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01196>
01197> -----
01198> 050:0008-----
01199> -----
01200> 050:0002-----
01201> -----
01202> 050:0002-----
01203> -----
01204> 050:0002-----
01205> -----
01206> 050:0002-----
01207> ** END OF RUN : 99
01208> -----
01209> -----
01210> -----
01211> -----
01212> -----
01213> -----
01214> -----
01215> -----
```

```
01216> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01217> |----- Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01218> | TZERO = .00 hrs on
01219> | METOUT= 2 (output= METRIC)
01220> | NRUN = 100
01221> | NSTORM= 1
01222> | # I=100YR.HYD
01223> |-----
01224> 100:0002-----
01225> *#-----
01226> *# Project Name: [Project Eagle] Project Number: [161500301]
01227> *# Date : 2024-11-26
01228> *# Modeller : [AK,MVR]
01229> *# Company : Stantec Consulting Ltd. (London)
01230> *# License # : 4730904
01231> *#-----
01232> *#-----
01233> *#
01234> *# This model represents the hydrologic characteristics of overland flows
01235> *# under Proposed conditions.
01236> *# Storm events modeled are:
01237> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01238> *# Regional Storm Event: 48hr Hurricane Hazel
01239> *#
01240> *#-----
01241> -----
01242> 100:0002-----
01243> -----
01244> | READ STORM | Filename: CHICAGO STORM 100 Years, 3hr from Colbor
01245> | Ptotal= 67.44 mm | Comments: CHICAGO STORM 100 Years, 3hr from Colbor
01246> -----
01247> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01248> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01249> .08 6.710 | .83 17.742 | 1.58 21.533 | 2.33 9.322
01250> .17 7.147 | .92 22.937 | 1.67 18.501 | 2.42 8.828
01251> .25 7.657 | 1.00 33.556 | 1.75 16.290 | 2.50 8.392
01252> .33 8.261 | 1.08 68.925 | 1.83 14.603 | 2.58 8.003
01253> .42 8.990 | 1.17 19.763 | 1.92 13.270 | 2.67 7.654
01254> .50 9.891 | 1.25 81.753 | 2.00 12.188 | 2.75 7.339
01255> .58 11.034 | 1.33 46.644 | 2.08 11.291 | 2.83 7.052
01256> .67 12.541 | 1.42 33.126 | 2.17 10.533 | 2.92 6.791
01257> .75 14.629 | 1.50 25.972 | 2.25 9.884 | 3.00 6.551
01258> -----
01259> -----
01260> 100:0003-----
01261> *#-----
01262> *#
01263> *# SWMF #1
01264> *#
01265> *#-----
01266> -----
01267> | CALIB STANDHYD | Area (ha)= 14.35
01268> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01269> -----
01270> IMPERVIOUS PERVIOUS (i)
01271> Surface Area (ha)= 14.21 .14
01272> Dep. Storage (mm)= 2.00 5.00
01273> Average Slope (%)= 2.00 2.00
01274> Length (m)= 110.00 25.00
01275> Mannings n = .013 .240
01276>
01277> Max.eff.Inten.(mm/hr)= 193.76 71.28
01278> over (min)= 2.00 8.00
01279> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
01280> Unit Hyd. Tpeak (min)= 2.00 8.00
01281> Unit Hyd. peak (cms)= .62 .15
01282>
01283> PEAK FLOW (cms)= 7.27 .02 *TOTALS*
01284> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01285> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
01286> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
01287> RUNOFF COEFFICIENT = .97 .46 .965
01288>
01289> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01290> CN* = 80.0 Ia = Dep. Storage (Above)
01291> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01292> THAN THE STORAGE COEFFICIENT.
01293> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01294>
01295> -----
01296> 100:0004-----
01297> -----
01298> | CALIB STANDHYD | Area (ha)= 5.46
01299> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01300> -----
01301> IMPERVIOUS PERVIOUS (i)
01302> Surface Area (ha)= 5.41 .05
01303> Dep. Storage (mm)= 2.00 5.00
01304> Average Slope (%)= 2.00 2.00
01305> Length (m)= 110.00 25.00
01306> Mannings n = .013 .240
01307>
01308> Max.eff.Inten.(mm/hr)= 193.76 71.28
01309> over (min)= 2.00 8.00
01310> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
01311> Unit Hyd. Tpeak (min)= 2.00 8.00
01312> Unit Hyd. peak (cms)= .62 .15
01313>
01314> PEAK FLOW (cms)= 2.76 .01 *TOTALS*
01315> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01316> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
01317> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
01318> RUNOFF COEFFICIENT = .97 .46 .965
01319>
01320> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01321> CN* = 80.0 Ia = Dep. Storage (Above)
01322> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01323> THAN THE STORAGE COEFFICIENT.
01324> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01325>
01326> -----
01327> 100:0005-----
01328> *#-----
01329> *#
01330> *# SWMF #2
01331> *#
01332> *#-----
01333> *#-----
01334> | CALIB STANDHYD | Area (ha)= 11.17
01335> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01336> -----
01337> IMPERVIOUS PERVIOUS (i)
01338> Surface Area (ha)= 11.06 .11
01339> Dep. Storage (mm)= 2.00 5.00
01340> Average Slope (%)= 2.00 2.00
01341> Length (m)= 110.00 25.00
01342> Mannings n = .013 .240
01343>
01344> Max.eff.Inten.(mm/hr)= 193.76 71.28
01345> over (min)= 2.00 8.00
01346> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
01347> Unit Hyd. Tpeak (min)= 2.00 8.00
01348> Unit Hyd. peak (cms)= .62 .15
01349>
01350> PEAK FLOW (cms)= 5.66 .01 *TOTALS*
01351> 5.662 (iii)
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01351> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01352> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
01353> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
01354> RUNOFF COEFFICIENT = .97 .46 .965
01355>
01356> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01357> CN* = 80.0 Ia = Dep. Storage (Above)
01358> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01359> THAN THE STORAGE COEFFICIENT.
01360> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01361>
01362> -----
01363> 100:0006-----
01364> *****
01365> *#
01366> *# SWMF #3
01367> *#
01368> *****
01369>
01370> | CALIB STANDHYD | Area (ha)= 8.79
01371> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01372> -----
01373> IMPERVIOUS PVIOUS (i)
01374> Surface Area (ha)= 8.70 .09
01375> Dep. Storage (mm)= 2.00 5.00
01376> Average Slope (%)= 2.00 2.00
01377> Length (m)= 110.00 25.00
01378> Mannings n = .013 .240
01379>
01380> Max.eff.Inten.(mm/hr)= 193.76 71.28
01381> over (min) 2.00 8.00
01382> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
01383> Unit Hyd. Tpeak (min)= 2.00 8.00
01384> Unit Hyd. peak (cms)= .62 .15
01385>
01386> PEAK FLOW (cms)= 4.45 .01 *TOTALS*
01387> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01388> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
01389> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
01390> RUNOFF COEFFICIENT = .97 .46 .965
01391>
01392> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01393> CN* = 80.0 Ia = Dep. Storage (Above)
01394> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01395> THAN THE STORAGE COEFFICIENT.
01396> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01397>
01398> -----
01399> 100:0007-----
01400> *****
01401> | CALIB STANDHYD | Area (ha)= 10.21
01402> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01403> -----
01404> IMPERVIOUS PVIOUS (i)
01405> Surface Area (ha)= 10.11 .10
01406> Dep. Storage (mm)= 2.00 5.00
01407> Average Slope (%)= 2.00 2.00
01408> Length (m)= 110.00 25.00
01409> Mannings n = .013 .240
01410>
01411> Max.eff.Inten.(mm/hr)= 193.76 71.28
01412> over (min) 2.00 8.00
01413> Storage Coeff. (min)= 1.69 (ii) 7.63 (ii)
01414> Unit Hyd. Tpeak (min)= 2.00 8.00
01415> Unit Hyd. peak (cms)= .62 .15
01416>
01417> PEAK FLOW (cms)= 5.17 .01 *TOTALS*
01418> TIME TO PEAK (hrs)= 1.17 1.28 1.167
01419> RUNOFF VOLUME (mm)= 65.44 30.96 65.097
01420> TOTAL RAINFALL (mm)= 67.44 67.44 67.442
01421> RUNOFF COEFFICIENT = .97 .46 .965
01422>
01423> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01424> CN* = 80.0 Ia = Dep. Storage (Above)
01425> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01426> THAN THE STORAGE COEFFICIENT.
01427> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01428>
01429> -----
01430> 100:0008-----
01431> *****
01432> 100:0002-----
01433> *****
01434> 100:0002-----
01435> *****
01436> 100:0002-----
01437> *****
01438> 100:0002-----
01439> *****
01440> 100:0002-----
01441> ** END OF RUN : 255
01442>
01443> *****
01444>
01445>
01446>
01447>
01448>
01449>
01450> | START | Project dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01451> | Rainfall dir.: C:\SWM-MO-1\SWMHYMO\PROJEC-1\
01452> TZERO = .00 hrs on 0
01453> METOUT= 2 (output = METRIC)
01454> NRUN = 256
01455> NSTORM= 1
01456> # 1=hurhaz48.stm
01457> -----
01458> 256:0002-----
01459> *****
01460> *# Project Name: [Project Eagle] Project Number: [161500301]
01461> *# Date : 2024-11-26
01462> *# Modeller : [AA,MYK]
01463> *# Company : Stantec Consulting Ltd. (London)
01464> *# License # : 4730904
01465> *****
01466> *****
01467> *#
01468> *# This model represents the hydrologic characteristics of overland flows
01469> *# under Proposed conditions.
01470> *# Storm events modeled are:
01471> *# 2YR, 5YR, 10YR, 25YR, 50YR, and 100YR 3hr Chicago Storm
01472> *# Regional Storm Event: 48hr Hurricane Hazel
01473> *#
01474> *****
01475> -----
01476> 256:0002-----
01477> -----
01478> | READ STORM | Filename: REGIONAL STORM
01479> | Ptotal= 285.00 mm | Comments: REGIONAL STORM
01480> -----
01481> TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
01482> hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
01483> .25 2.000 12.25 2.000 12.25 2.000 12.25 2.000
01484> .50 2.000 12.50 2.000 12.50 2.000 12.50 2.000
01485> .75 2.000 12.75 2.000 12.75 2.000 12.75 2.000

```

```

01486> 1.00 2.000 13.00 2.000 25.00 2.000 37.00 6.000
01487> 1.25 2.000 13.25 2.000 25.25 2.000 37.25 4.000
01488> 1.50 2.000 13.50 2.000 25.50 2.000 37.50 4.000
01489> 1.75 2.000 13.75 2.000 25.75 2.000 37.75 4.000
01490> 2.00 2.000 14.00 2.000 26.00 2.000 38.00 4.000
01491> 2.25 2.000 14.25 2.000 26.25 2.000 38.25 6.000
01492> 2.50 2.000 14.50 2.000 26.50 2.000 38.50 6.000
01493> 2.75 2.000 14.75 2.000 26.75 2.000 38.75 6.000
01494> 3.00 2.000 15.00 2.000 27.00 2.000 39.00 6.000
01495> 3.25 2.000 15.25 2.000 27.25 2.000 39.25 13.000
01496> 3.50 2.000 15.50 2.000 27.50 2.000 39.50 13.000
01497> 3.75 2.000 15.75 2.000 27.75 2.000 39.75 13.000
01498> 4.00 2.000 16.00 2.000 28.00 2.000 40.00 13.000
01499> 4.25 2.000 16.25 2.000 28.25 2.000 40.25 17.000
01500> 4.50 2.000 16.50 2.000 28.50 2.000 40.50 17.000
01501> 4.75 2.000 16.75 2.000 28.75 2.000 40.75 17.000
01502> 5.00 2.000 17.00 2.000 29.00 2.000 41.00 17.000
01503> 5.25 2.000 17.25 2.000 29.25 2.000 41.25 13.000
01504> 5.50 2.000 17.50 2.000 29.50 2.000 41.50 13.000
01505> 5.75 2.000 17.75 2.000 29.75 2.000 41.75 13.000
01506> 6.00 2.000 18.00 2.000 30.00 2.000 42.00 13.000
01507> 6.25 2.000 18.25 2.000 30.25 2.000 42.25 23.000
01508> 6.50 2.000 18.50 2.000 30.50 2.000 42.50 23.000
01509> 6.75 2.000 18.75 2.000 30.75 2.000 42.75 23.000
01510> 7.00 2.000 19.00 2.000 31.00 2.000 43.00 23.000
01511> 7.25 2.000 19.25 2.000 31.25 2.000 43.25 13.000
01512> 7.50 2.000 19.50 2.000 31.50 2.000 43.50 13.000
01513> 7.75 2.000 19.75 2.000 31.75 2.000 43.75 13.000
01514> 8.00 2.000 20.00 2.000 32.00 2.000 44.00 13.000
01515> 8.25 2.000 20.25 2.000 32.25 2.000 44.25 13.000
01516> 8.50 2.000 20.50 2.000 32.50 2.000 44.50 13.000
01517> 8.75 2.000 20.75 2.000 32.75 2.000 44.75 13.000
01518> 9.00 2.000 21.00 2.000 33.00 2.000 45.00 13.000
01519> 9.25 2.000 21.25 2.000 33.25 2.000 45.25 53.000
01520> 9.50 2.000 21.50 2.000 33.50 2.000 45.50 53.000
01521> 9.75 2.000 21.75 2.000 33.75 2.000 45.75 53.000
01522> 10.00 2.000 22.00 2.000 34.00 2.000 46.00 53.000
01523> 10.25 2.000 22.25 2.000 34.25 2.000 46.25 38.000
01524> 10.50 2.000 22.50 2.000 34.50 2.000 46.50 38.000
01525> 10.75 2.000 22.75 2.000 34.75 2.000 46.75 38.000
01526> 11.00 2.000 23.00 2.000 35.00 2.000 47.00 38.000
01527> 11.25 2.000 23.25 2.000 35.25 3.000 47.25 13.000
01528> 11.50 2.000 23.50 2.000 35.50 3.000 47.50 13.000
01529> 11.75 2.000 23.75 2.000 35.75 3.000 47.75 13.000
01530> 12.00 2.000 24.00 2.000 36.00 3.000 48.00 13.000
01531>
01532> -----
01533> 256:0003-----
01534> *****
01535> *#
01536> *# SWMF #1
01537> *#
01538> *****
01539>
01540> | CALIB STANDHYD | Area (ha)= 14.35
01541> | 01:401 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01542> -----
01543> IMPERVIOUS PVIOUS (i)
01544> Surface Area (ha)= 14.21 .14
01545> Dep. Storage (mm)= 2.00 5.00
01546> Average Slope (%)= 2.00 2.00
01547> Length (m)= 110.00 25.00
01548> Mannings n = .013 .240
01549>
01550> Max.eff.Inten.(mm/hr)= 53.00 50.42
01551> over (min) 3.00 10.00
01552> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
01553> Unit Hyd. Tpeak (min)= 3.00 10.00
01554> Unit Hyd. peak (cms)= .39 .12
01555>
01556> PEAK FLOW (cms)= 2.09 .02 *TOTALS*
01557> TIME TO PEAK (hrs)= 45.80 46.00 46.000
01558> RUNOFF VOLUME (mm)= 282.99 282.21 282.453
01559> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
01560> RUNOFF COEFFICIENT = .99 .80 .991
01561>
01562> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01563> CN* = 80.0 Ia = Dep. Storage (Above)
01564> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01565> THAN THE STORAGE COEFFICIENT.
01566> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01567>
01568> -----
01569> 256:0004-----
01570> *****
01571> | CALIB STANDHYD | Area (ha)= 5.46
01572> | 02:402 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01573> -----
01574> IMPERVIOUS PVIOUS (i)
01575> Surface Area (ha)= 5.41 .05
01576> Dep. Storage (mm)= 2.00 5.00
01577> Average Slope (%)= 2.00 2.00
01578> Length (m)= 110.00 25.00
01579> Mannings n = .013 .240
01580>
01581> Max.eff.Inten.(mm/hr)= 53.00 50.42
01582> over (min) 3.00 10.00
01583> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
01584> Unit Hyd. Tpeak (min)= 3.00 10.00
01585> Unit Hyd. peak (cms)= .39 .12
01586>
01587> PEAK FLOW (cms)= .80 .01 *TOTALS*
01588> TIME TO PEAK (hrs)= 45.77 46.00 46.000
01589> RUNOFF VOLUME (mm)= 282.98 282.22 282.453
01590> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
01591> RUNOFF COEFFICIENT = .99 .80 .991
01592>
01593> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
01594> CN* = 80.0 Ia = Dep. Storage (Above)
01595> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01596> THAN THE STORAGE COEFFICIENT.
01597> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01598>
01599> -----
01600> 256:0005-----
01601> *****
01602> *#
01603> *# SWMF #2
01604> *#
01605> *****
01606>
01607> | CALIB STANDHYD | Area (ha)= 11.17
01608> | 03:403 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01609> -----
01610> IMPERVIOUS PVIOUS (i)
01611> Surface Area (ha)= 11.06 .11
01612> Dep. Storage (mm)= 2.00 5.00
01613> Average Slope (%)= 2.00 2.00
01614> Length (m)= 110.00 25.00
01615> Mannings n = .013 .240
01616>
01617> Max.eff.Inten.(mm/hr)= 53.00 50.42
01618> over (min) 3.00 10.00
01619> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
01620> Unit Hyd. Tpeak (min)= 3.00 10.00

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```
01621> Unit Hyd. peak (cms)= .39 .12
01622>
01623> PEAK FLOW (cms)= 1.63 .02 *TOTALS*
01624> TIME TO PEAK (hrs)= 45.80 46.00 1.644 (iii)
01625> RUNOFF VOLUME (mm)= 282.98 228.21 282.453
01626> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
01627> RUNOFF COEFFICIENT = .99 .80 .991
01628>
01629> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01630> CN* = 80.0 Ia = Dep. Storage (Above)
01631> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01632> THAN THE STORAGE COEFFICIENT.
01633> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01634>
01635> -----
01636> 256:0006-----
01637> *#*****
01638> *#
01639> *# SWMF #3
01640> *#
01641> *#*****
01642> -----
01643> | CALIB STANDHYD | Area (ha)= 8.79
01644> | 04:404 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01645> -----
01646> IMPERVIOUS PERVIOUS (i)
01647> Surface Area (ha)= 8.70 .09
01648> Dep. Storage (mm)= 2.00 5.00
01649> Average Slope (%)= 2.00 2.00
01650> Length (m)= 110.00 25.00
01651> Mannings n = .013 .240
01652>
01653> Max.eff.Inten.(mm/hr)= 53.00 50.42
01654> over (min) 3.00 10.00
01655> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
01656> Unit Hyd. Tpeak (min)= 3.00 10.00
01657> Unit Hyd. peak (cms)= .39 .12
01658>
01659> PEAK FLOW (cms)= 1.28 .01 *TOTALS*
01660> TIME TO PEAK (hrs)= 45.77 46.00 1.293 (iii)
01661> RUNOFF VOLUME (mm)= 282.98 228.22 282.452
01662> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
01663> RUNOFF COEFFICIENT = .99 .80 .991
01664>
01665> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01666> CN* = 80.0 Ia = Dep. Storage (Above)
01667> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01668> THAN THE STORAGE COEFFICIENT.
01669> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01670>
01671> -----
01672> 256:0007-----
01673> -----
01674> | CALIB STANDHYD | Area (ha)= 10.21
01675> | 05:405 DT= 1.00 | Total Imp(%)= 99.00 Dir. Conn.(%)= 99.00
01676> -----
01677> IMPERVIOUS PERVIOUS (i)
01678> Surface Area (ha)= 10.11 .10
01679> Dep. Storage (mm)= 2.00 5.00
01680> Average Slope (%)= 2.00 2.00
01681> Length (m)= 110.00 25.00
01682> Mannings n = .013 .240
01683>
01684> Max.eff.Inten.(mm/hr)= 53.00 50.42
01685> over (min) 3.00 10.00
01686> Storage Coeff. (min)= 2.83 (ii) 9.66 (ii)
01687> Unit Hyd. Tpeak (min)= 3.00 10.00
01688> Unit Hyd. peak (cms)= .39 .12
01689>
01690> PEAK FLOW (cms)= 1.49 .01 *TOTALS*
01691> TIME TO PEAK (hrs)= 45.77 46.00 1.502 (iii)
01692> RUNOFF VOLUME (mm)= 282.99 228.21 282.452
01693> TOTAL RAINFALL (mm)= 285.00 285.00 285.000
01694> RUNOFF COEFFICIENT = .99 .80 .991
01695>
01696> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01697> CN* = 80.0 Ia = Dep. Storage (Above)
01698> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01699> THAN THE STORAGE COEFFICIENT.
01700> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01701>
01702> -----
01703> 256:0008-----
01704> -----
01705> 256:0002-----
01706> -----
01707> 256:0002-----
01708> -----
01709> 256:0002-----
01710> -----
01711> 256:0002-----
01712> -----
01713> 256:0002-----
01714> -----
01715> 256:0002-----
01716> FINISH
01717> -----
01718> *****
01719> WARNINGS / ERRORS / NOTES
01720> -----
01721> Simulation ended on 2024-11-26 at 14:05:16
01722> =====
01723>
01724>
```

Erosion Control Sizing at the Proposed Culverts Along Welland Canal Roadside Ditch and the Culvert Proposed to Convey the Rerouted Drain

Culvert	Drainage Area	Total Area (ha)	Total Drainage Flow (max of 100-year and Hazel) (m3/s)	Contributing Area to the Culvert	Prorated Flow (m3/s)	Velocity (m/s)
Culvert 1 - Conveying Rerouted Drain at the SWMF#2 Outlet	302	23.13	3.240	3.4974	0.490	2.090
Culvert 2 - At Welland Canal Road Ditch Under the Access Road to SWMF#4 Outlet to Canal	301	25.55	2.906	4.6234	0.526	2.500
Culvert 3 - At Welland Canal Road Ditch Under the Access Road to SWMF#2 Outlet to Canal	301	25.55	2.906	11.8577	1.349	2.760

Culvert 1 - Rip Rap Sizing			
Velocity	2.090	m/s	
Velocity Range (m/s)	2.0-2.6		
Rip Rap Gradation			
<i>Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings</i>			
200 mm Φ Rip Rap	350 mm Thick		
100% smaller than 300 mm			
At least 20% larger than 225 mm			
At least 50% larger than 200 mm			
At least 80% larger than 120 mm			
Culvert Size (m)	0.60		
RipRap Size	R-50		
	Calculated	Designed	
Apron Length (m)	2.40		3.00
Apron Width (m)	1.80		3.00

Culvert 3 - Rip Rap Sizing			
Velocity	2.760	m/s	
Velocity Range (m/s)	2.6-3.0		
Rip Rap Gradation			
Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings			
300 mm Φ Rip Rap	525 mm Thick		
100% smaller than 500 mm			
At least 20% larger than 350 mm			
At least 50% larger than 300 mm			
At least 80% larger than 200 mm			
Culvert Size (m)	0.825		
RipRap Size	R-100		
	Calculated	Designed	
Apron Length (m)	3.30		4.00
Apron Width (m)	2.48		3.00

Culvert 2 - Rip Rap Sizing			
Velocity	2.500	m/s	
Velocity Range (m/s)	2.0-2.6		
Rip Rap Gradation			
Rip Rap Size per the Ministry of Transportation (MTO) Drainage Design Standards for Water Crossings			
200 mm Φ Rip Rap	350 mm Thick		
100% smaller than 300 mm			
At least 20% larger than 225 mm			
At least 50% larger than 200 mm			
At least 80% larger than 120 mm			
Culvert Size (m)	0.525		
RipRap Size	R-50		
	Calculated	Designed	
Apron Length (m)	2.10	3.00	
Apron Width (m)	1.58	2.00	

Culvert	Description	Comment	Assumed Culvert Size	Required Headwater	Berm Elevation	Velocity (m/s)	Rip Rap Size	Apron Length (m)
Culvert 1	Culvert 1 - Conveying Rerouted Drain at the SWMF#2 Outlet	A berm will be proposed to prevent water from spilling into SWMF #2	600 mm CSP	182.45	182.50	2.09	R-50	3.00

Culvert	Description	Assumed Max Headwater Elevation	Culvert Size	Velocity (m/s)	Rip Rap Size	Apron Length (m)
Culvert 2	Culvert 2 - At Welland Canal Road Ditch Under the Access Road to SWMF#4 Outlet to Canal	177.9 - Welland Canal Road Elevation at Spill Point	525 mm CSP	2.500	R-50	3.00

Culvert	Description	Assumed Max Headwater Elevation	Culvert Size	Velocity (m/s)	Rip Rap Size	Apron Length (m)
Culvert 3	Culvert 3 - At Welland Canal Road Ditch Under the Access Road to SWMF#2 Outlet to Canal	177.9 - Welland Canal Road Elevation at Spill Point	825 mm CSP	2.760	R-100	4.00

Culvert Calculator Report

Culvert 1 - Draining Rerouted Drain DS of SWMF#2

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	181.80 m	Headwater Depth/Height	1.55
Computed Headwater Elev.	182.45 m	Discharge	0.4900 m³/s
Inlet Control HW Elev.	182.34 m	Tailwater Elevation	181.36 m
Outlet Control HW Elev.	182.45 m	Control Type	Outlet Control
Grades			
Upstream Invert	181.50 m	Downstream Invert	181.36 m
Length	14.50 m	Constructed Slope	0.009655 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.46 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.46 m
Velocity Downstream	2.09 m/s	Critical Slope	0.024000 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.61 m
Section Size	600 mm	Rise	0.61 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	182.45 m	Upstream Velocity Head	0.14 m
Ke	0.90	Entrance Loss	0.13 m
Inlet Control Properties			
Inlet Control HW Elev.	182.34 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.3 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Culvert Calculator Report

Culvert 2 - At Welland Canal Road Ditch Downstream of SWMF#4

Solve For: Section Size

Culvert Summary			
Allowable HW Elevation	177.90 m	Headwater Depth/Height	3.09
Computed Headwater Elev.	177.86 m	Discharge	0.5260 m³/s
Inlet Control HW Elev.	177.50 m	Tailwater Elevation	176.11 m
Outlet Control HW Elev.	177.86 m	Control Type	Outlet Control

Grades			
Upstream Invert	176.21 m	Downstream Invert	176.11 m
Length	15.00 m	Constructed Slope	0.006667 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.48 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.48 m
Velocity Downstream	2.50 m/s	Critical Slope	0.041552 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.53 m
Section Size	525 mm	Rise	0.53 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	177.86 m	Upstream Velocity Head	0.28 m
Ke	0.90	Entrance Loss	0.25 m

Inlet Control Properties			
Inlet Control HW Elev.	177.50 m	Flow Control	Submerged
Inlet Type	Projecting	Area Full	0.2 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Culvert Calculator Report

Culvert 3 - At Welland Canal Road Ditch Downstream of SWMF#2

Solve For: Section Size

Culvert Summary			
Allowable HW Elevation	177.90 m	Headwater Depth/Height	2.18
Computed Headwater Elev.	177.79 m	Discharge	1.3490 m³/s
Inlet Control HW Elev.	177.50 m	Tailwater Elevation	175.94 m
Outlet Control HW Elev.	177.79 m	Control Type	Outlet Control
Grades			
Upstream Invert	175.96 m	Downstream Invert	175.94 m
Length	18.00 m	Constructed Slope	0.001111 m/m
Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.70 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.70 m
Velocity Downstream	2.76 m/s	Critical Slope	0.027100 m/m
Section			
Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.84 m
Section Size	825 mm	Rise	0.84 m
Number Sections	1		
Outlet Control Properties			
Outlet Control HW Elev.	177.79 m	Upstream Velocity Head	0.30 m
Ke	0.90	Entrance Loss	0.27 m
Inlet Control Properties			
Inlet Control HW Elev.	177.50 m	Flow Control	Submerged
Inlet Type	Projecting	Area Full	0.6 m²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		

Welland Canal Road Ditch - Existing

Project Description	
Friction Method	Manning Formula
Solve For	Discharge
Input Data	
Channel Slope	0.0001 m/m
Normal Depth	393.0 mm

Section Definitions

Station (m)	Elevation (m)
-0+06.542	176.3400
-0+06.372	176.3310
-0+01.617	176.1450
-0+00.462	176.1090
-0+00.145	176.0030
-0+00.087	176.0020
0+00.100	175.9470
0+00.224	176.0510
0+00.247	176.0560
0+01.026	176.1270
0+04.003	176.2180
0+07.213	176.3550

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+06.542, 176.3400)	(0+07.213, 176.3550)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	160.44 L/s
Roughness Coefficient	0.030
Elevation Range	175.947 to 176.355 m
Flow Area	1.8 m ²
Wetted Perimeter	13.479 m
Hydraulic Radius	135.4 mm
Top Width	13.404 m
Normal Depth	393.0 mm
Critical Depth	216.0 mm

Welland Canal Road Ditch - Existing

Results

Critical Slope	0.0241 m/m
Velocity	0.09 m/s
Velocity Head	0.0004 m
Specific Energy	0.393 m
Froude Number	0.076
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 mm
Length	0.000 m
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.000 m
Downstream Velocity	0.00 m/s
Upstream Velocity	0.00 m/s
Normal Depth	393.0 mm
Critical Depth	216.0 mm
Channel Slope	0.0001 m/m
Critical Slope	0.0241 m/m

SWMF1 Southeast Ditch - Existing

Project Description	
Friction Method	Manning Formula
Solve For	Discharge
Input Data	
Channel Slope	0.0010 m/m
Normal Depth	946.0 mm

Section Definitions

Station (m)	Elevation (m)
-0+07.002	177.4260
-0+06.248	177.2580
-0+06.217	177.2550
-0+06.190	177.2560
-0+02.270	176.9010
-0+02.012	176.8930
-0+01.057	176.4310
-0+00.521	176.3690
0+00.368	176.3660
0+00.601	176.3720
0+01.810	176.5530
0+01.999	176.5530
0+04.621	177.2520
0+07.162	177.3120

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+07.002, 177.4260)	(0+07.162, 177.3120)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	3,146.67 L/s
Roughness Coefficient	0.030
Elevation Range	176.366 to 177.426 m
Flow Area	5.5 m ²
Wetted Perimeter	13.890 m
Hydraulic Radius	397.5 mm
Top Width	13.652 m

SWMF1 Southeast Ditch - Existing

Results

Normal Depth	946.0 mm
Critical Depth	498.9 mm
Critical Slope	0.0132 m/m
Velocity	0.57 m/s
Velocity Head	0.0166 m
Specific Energy	0.963 m
Froude Number	0.286
Flow Type	Subcritical

GVF Input Data

Downstream Depth	0.0 mm
Length	0.000 m
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.000 m
Downstream Velocity	0.00 m/s
Upstream Velocity	0.00 m/s
Normal Depth	946.0 mm
Critical Depth	498.9 mm
Channel Slope	0.0010 m/m
Critical Slope	0.0132 m/m

SWMF2 Southwest Ditch - Existing

Project Description	
Friction Method	Manning Formula
Solve For	Discharge
Input Data	
Channel Slope	0.0001 m/m
Normal Depth	106.0 mm

Section Definitions

Station (m)	Elevation (m)
-0+07.444	177.1400
-0+03.709	177.0990
-0+00.715	176.9230
0+00.007	176.7530
0+01.615	176.8670
0+05.948	176.7970

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+07.444, 177.1400)	(0+05.948, 176.7970)	0.030

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Discharge	8.35 L/s
Roughness Coefficient	0.030
Elevation Range	176.753 to 177.140 m
Flow Area	0.2 m ²
Wetted Perimeter	5.862 m
Hydraulic Radius	37.9 mm
Top Width	5.783 m
Normal Depth	106.0 mm
Critical Depth	44.6 mm
Critical Slope	0.0322 m/m
Velocity	0.04 m/s
Velocity Head	0.0001 m
Specific Energy	0.106 m
Froude Number	0.061
Flow Type	Subcritical

SWMF2 Southwest Ditch - Existing

GVF Input Data

Downstream Depth	0.0 mm
Length	0.000 m
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.000 m
Downstream Velocity	0.00 m/s
Upstream Velocity	0.00 m/s
Normal Depth	106.0 mm
Critical Depth	44.6 mm
Channel Slope	0.0001 m/m
Critical Slope	0.0322 m/m

SWMF2 Southwest Ditch - Existing

Messages:

Water Surface Elevation exceeds lowest end station by 0.203412073490085ft. Flow is divided.

SWMF3 North Ditch - Existing

Project Description	
Friction Method	Manning Formula
Solve For	Discharge
Input Data	
Channel Slope	0.0001 m/m
Normal Depth	950.0 mm

Section Definitions

Station (m)	Elevation (m)
-0+10.000	178.2900
-0+06.000	178.2300
-0+05.000	178.0800
0+00.000	177.0500
0+02.000	177.2300
0+06.000	178.0300
0+09.000	178.1300

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-0+10.000, 178.2900)	(0+09.000, 178.1300)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	1,142.52 L/s
Roughness Coefficient	0.030
Elevation Range	177.050 to 178.290 m
Flow Area	5.4 m ²
Wetted Perimeter	10.643 m
Hydraulic Radius	506.7 mm
Top Width	10.462 m
Normal Depth	950.0 mm
Critical Depth	338.8 mm
Critical Slope	0.0156 m/m
Velocity	0.21 m/s
Velocity Head	0.0023 m
Specific Energy	0.952 m
Froude Number	0.094

SWMF3 North Ditch - Existing

Results	
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 mm
Length	0.000 m
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.000 m
Downstream Velocity	0.00 m/s
Upstream Velocity	0.00 m/s
Normal Depth	950.0 mm
Critical Depth	338.8 mm
Channel Slope	0.0001 m/m
Critical Slope	0.0156 m/m

SWMF3 North Ditch - Proposed

Project Description	
Friction Method	Manning
	Formula
Solve For	Discharge
Input Data	
Roughness Coefficient	0.030
Channel Slope	0.0005 m/m
Normal Depth	1,000.0 mm
Left Side Slope	3.000 H:V
Right Side Slope	3.000 H:V
Bottom Width	6.000 m
Results	
Discharge	5,439.85 L/s
Flow Area	9.0 m ²
Wetted Perimeter	12.325 m
Hydraulic Radius	730.2 mm
Top Width	12.000 m
Critical Depth	407.4 mm
Critical Slope	0.0128 m/m
Velocity	0.60 m/s
Velocity Head	0.0186 m
Specific Energy	1.019 m
Froude Number	0.223
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 mm
Length	0.000 m
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.000 m
Downstream Velocity	(N/A) m/s
Upstream Velocity	(N/A) m/s
Normal Depth	1,000.0 mm
Critical Depth	407.4 mm
Channel Slope	0.0005 m/m
Critical Slope	0.0128 m/m