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December 21, 2021 Project Number: 959(03)

David Schaeffer Engineering Ltd
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Ottawa, Ontario
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Attention: **Laura Maxwell, B.Sc., M.Pl.**

Subject: **Cardinal Creek Village South –
Preliminary Stormwater Management Plan and Stormwater Management Facility Design**

Introduction

As requested by your office, J.F Sabourin and Associates (JFSA) has evaluated, based on the provided information as described below; (i) the adequacy of the proposed minor system with respect to hydraulic gradeline (HGL) analysis; and (ii) the storage required in the SWM facilities to meet quality and quantity control requirements for the proposed development at Cardinal Creek Village South.

The proposed Cardinal Creek Village South site has a development area of approximately 46.30 ha. 6.29 ha of the proposed development is tributary to Pond 1 and the stormwater management system for Cardinal Creek Phase 4. 38.08 ha of the site will discharge to Pond 2 which will provide quality control, erosion control and quantity control up to the 100-year level, before discharging to the south tributary of Cardinal Creek. 1.93 ha consisting primarily of rear yards will drain uncontrolled to the south tributary of Cardinal Creek. Refer to Figure 12 for the proposed drainage areas for the subject site.

Stormwater Management Facility (Pond 2)

As noted above, SWM facility 2 will provide quality control for 38.08 ha of the site. Pond 2 also requires erosion control, provided based on the detention of the 25 mm storm runoff for a drawdown time of approximately 96 hours. The effectiveness of this erosion control was confirmed by a continuous erosion analysis, as documented in the June 2013 Cardinal Creek Village / Continuous Erosion Analysis memo.

Pond 2, discharging to the south tributary of Cardinal Creek, also requires 2- to 100-year post-to pre-development quantity control. Target release rates for Pond 2 were calculated based on existing flows simulated with AECOM's 2013 Cardinal Creek XPSWMM model for the 24-hour SCS Type II design storms, pro-rated by existing drainage area from the subject site to the south tributary. This source is appropriate as it supersedes the AECOM August 2009 “Greater Cardinal Creek Subwatershed Study - Existing Conditions” study.

The proposed drainage area to Pond 2 was simulated using SWMHYMO modelling software to assess its performance and ensure the design requirements were met. The SWMHYMO model and associated files are included in Attachment A.

A summary of the proposed SWM facility operating conditions are presented in Tables A-1 to A-5 of Attachment A, including a comparison of the existing and proposed conditions flows from the subject site to Cardinal Creek. All quantity control requirements were met by the proposed outlet controls, while still providing a 0.3 m freeboard between the maximum water level in the pond and the top of bank elevation, and a maximum 100-year active storage depth of 2.0 m.

Pond 2 is equipped with one sediment forebay connected to the main cell of the pond by a standard forebay berm. Refer to Attachment B for preliminary calculations for the required sediment forebay dimensions for this SWM facility. Pond 2 will also be equipped with a bottom-draw outlet pipe to reduce the temperatures of the outflow to Cardinal Creek.

HGL Analysis

Preliminary hydraulic grade line calculations for the proposed Cardinal Creek development were completed using PCSWMM modelling software. Pipe data, storm sewer layout and Rational Method flows in the storm sewer are as provided by DSEL. The Rational Method flows were calculated based on the 2-, 5- or 10-year level of service requirements, and the 100-year flows in the hydraulic grade line calculations were estimated as 14% greater than the Rational Method flows, to account for the additional flows captured by catchbasin grates, lead pipes and/or inlet control devices under the higher surface water depths of the 100-year storm. The proposed storm sewer infrastructure data was extracted from DSEL's detailed drawings and incorporated into a PCSWMM model, and flows derived by DSEL's rational method calculations were then applied to each Maintenance Hole (MH) in the model as steady flows (using the baseflow option). Exit losses were applied to all storm sewer pipes in the system based on the angle of the downstream connection.

The maximum HGL obtained at each MH has been extracted and provided in Table C1 in Attachment C. In absence of USF elevations for the site, the maximum HGL was compared to elevations 1.90 m below the road elevation as an assumed USF elevation. This will be updated once the USF elevations are obtained at detailed design.

An average freeboard of 2.64 m from the top of MH was observed throughout the proposed development for the 100-year return period. With a minimum freeboard of 2.1m at MH_63. As such it can be concluded that the proposed storm sewer infrastructure is sufficiently sized, to safely convey minor system flows from the development under various extreme conditions.
The PCSWMM model and associated modelling files are included in Attachment C.

Drainage Area to Cardinal Creek Village Phase 4

As noted above, a 6.29 ha area from the southern portion of Cardinal Creek Village is tributary to the north and is to be captured by the Phase 4 storm sewer and network and eventually drains to Pond 1. This area has an imperviousness of 75% according to Figure 12. As per the JFSA January 2020 SWM report for these lands, it was previously assumed that 11.84 ha at 33% imperviousness would drain to this location. While the previously assumed imperviousness is lower than the proposed imperviousness, the drainage area is substantially reduced and as such the previously assumed Area x Runoff Coefficient value (5.07) is higher than the proposed Area x Runoff Coefficient value (4.72), thus the receiving storm sewer and Pond 1 are adequately sized to handle the drainage from the area in question and no additional controls are required for these lands.

Uncontrolled Drainage Area to Cardinal Creek South Tributary

As noted above, a 1.93 ha area of rear yards from Cardinal Creek Village South will drain uncontrolled to the southern tributary of Cardinal Creek. This area is to provide the southern tributary with clean runoff to mimic pre-development conditions. A full analysis of the peak flows to the tributary will be assessed at detailed design.

Cox County Road Culvert

A 74.30 ha area has been identified as the drainage area to a 900 m concrete culvert underneath Cox Country Rd. A SWMHYMO model of the drainage area was built to simulate peak flows at the culvert in question to assess if the existing culvert's size is sufficient. A peak flow of 1.324 cms was established by the model for the 25-year design event; the required level of service for this road.

An HY-8 model was assembled to assess the conditions under the design event. Based on existing conditions, the 25-year water level was established as 88.46 m, which provides 0.81 m of freeboard for this event. The based on this analysis this crossing has sufficient capacity to convey 2.28 m³/s before overtopping, the 100 Year flow for this location is 1.904 m³/s, as such this culvert has greater than a 100-year level of service. See attachment D for the full analysis of this crossing

Conclusion

The memorandum confirms the following design conditions:

- Pond 2 is sufficiently sized to meet the existing release rates and erosion control requirements.
- The preliminary HGL analysis confirms the proposed storm sewer network is sufficiently sized.
- The 6.29 ha drainage area to the north will be treated by Pond 1.
- The 1.93 ha uncontrolled rear yard area will discharge directly to the southern tributary of Cardinal Creek.
- The existing culvert at Cox County Rd is sufficiently sized.
- Pond 2's bottom-draw outlet pipe will reduce outflow temperatures to Cardinal Creek.

Yours truly,
J.F Sabourin and Associates Inc.

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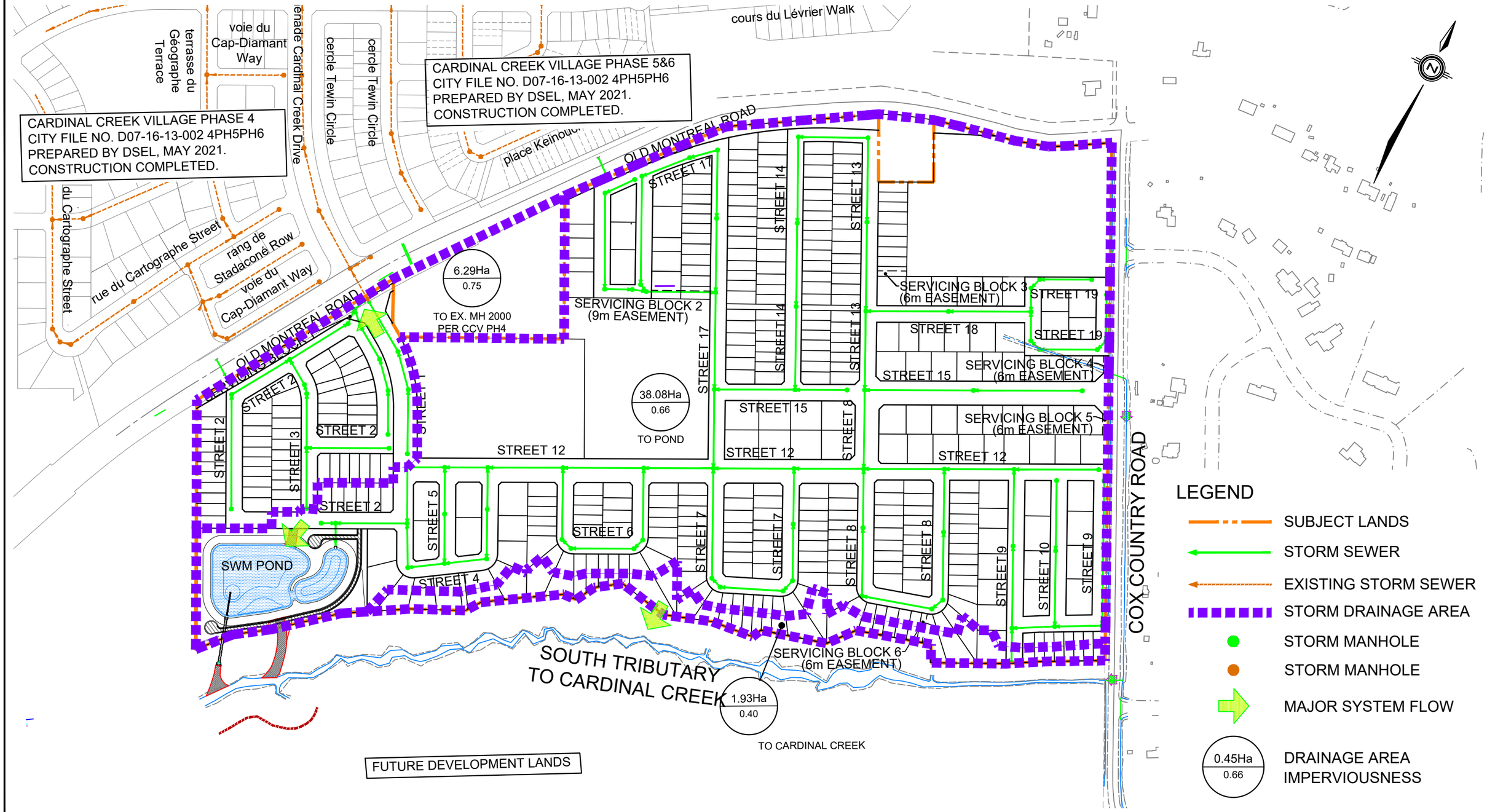
Figures

Attachments



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POND DRAINAGE PLAN
CARDINAL CREEK VILLAGE SOUTH

PROJECT No.:	19-1153
SCALE:	1:4000
DATE:	DECEMBER 2021
FIGURE:	12

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Attachment A

Pond 2 Summary Tables and Modelling Files

Table A-1: Summary of Total Proposed Drainage Area

To SWM Facility	Area (ha)	Imperv. (%)	Area x Imp.	Required Storage [1] (m^3)		
				Perm. Pool	Qual. Control	Eros. Control
Pond 2	38.08	66	2513.3	6689	1523	5495

[1] Quality control and permanent pool requirements based on MOE guidelines for enhanced quality control for wet ponds. Erosion control based on 25 mm storm runoff volume for Pond 2, confirmed by 2013 continuous erosion analysis.

Table A-2: Simulated Release Rates and Volumes for Proposed SWM Facility 2 to South Tributary of Cardinal Creek [1]

Pond Component	Existing Outflow (m^3/s)	SWM Facility 2 (38.08 ha)		
		Pond Outflow (m^3/s)	Pond Level (m)	Pond Storage (m^3)
Permanent Pool [2]	N/A	N/A	82.50	12419
Extended Detention [2]	N/A	0.044	83.40	8282
2yr/24hr SCS	0.253	0.091	83.48	9132
5yr/24hr SCS	0.432	0.241	83.75	12010
10yr/24hr SCS	0.565	0.340	83.93	14030
25yr/24hr SCS	0.741	0.442	84.15	16620
50yr/24hr SCS	0.883	0.503	84.31	18620
100yr/24hr SCS	1.043	0.559	84.48	20780
July 1st, 1979	N/A	0.801	84.66	23060
August 4th, 1988	N/A	0.544	84.44	20150
August 8, 1996	N/A	0.511	84.34	18910

[1] Existing conditions flows as generated on subcatchments to south tributary as per Greater Cardinal Creek Subwatershed Study Existing Conditions XPSWMM hydrology model provided by AECOM on December 21, 2012, and pro-rated by drainage area (228.87 ha total, 31.20 ha through subject site). Post- to pre-development quantity control required for the 2- to 100-year design storms.

[2] Extended detention based on 25 mm storm runoff volume with a drawdown time of 96 hours. Volumes are active storage only for all components except the permanent pool.

Table A-3: Extended Detention Parameters for SWM Facility 2

Permanent Pool Parameters			Quality Orifice Parameters		
Area (C3)	8150.05	m^2	Diameter	0.150	m
Volume	12418.64	m^3			
PP Elev	82.500	m	Area	0.018	m^2
QC Elev	82.700	m	Invert	82.500	m
h (m)	0.200	m	C_o	0.62	

Notes:
- C3 is the intercept from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- h is the maximum water elevation above the orifice (m).

Table A-4: Extended Detention Drawdown Time for SWM Facility 2

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
82.50	**0.00**	**8150.05**	**0.00**				**0.000**	**PP Elev**
82.60	826.69	8383.80	0.10	2337	29.74	1.24	0.009	
82.70	**1676.76**	**8617.55**	**0.20**	**2337**	**42.46**	**1.77**	**0.017**	**QC Elev**
82.80	2550.20	8851.29	0.30	2337	52.48	2.19	0.023	
82.90	3447.02	9085.04	0.40	2337	61.16	2.55	0.028	
83.00	4367.21	9318.79	0.50	2337	69.00	2.87	0.032	
83.10	5310.78	9552.53	0.60	2337	76.27	3.18	0.035	
83.20	6277.72	9786.28	0.70	2337	83.12	3.46	0.038	
83.30	7268.03	10020.03	0.80	2337	89.64	3.74	0.041	
83.40	**8281.72**	**10253.78**	**0.90**	**2337**	**95.92**	**4.00**	**0.044**	**Ext. Det.**
83.50	9318.79	10487.53	1.00	2337	101.99	4.25	0.047	

Notes:
- C2 is the slope coefficient from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm for a 96 hour drawdown time.

Table A-5: Stage-Storage-Outflow Curve for SWM Facility 2

			Quality Control 1		Quantity Control 1		Emergency Spillway			
			Vertical Orifice		Vertical Orifice		Broad Crested Weir			
			Dia (m)	0.150	Dia (m)	0.500	L (m)	6.000		
			Area (m^2)	0.018	Area (m^2)	0.196				
			Invert (m)	82.50	Invert (m)	83.40	C_w	1.580		
			C_o	0.62	C_o	0.62	Invert (m)	84.60		
			Q @ D	0.013	Q @ D	0.270	n contr.	0		
Elevation	Active Sto.	Demarkation	Head	Outflow	Head	Outflow	Head	Outflow	Outflow	Storage
(m)	(m^3)	Points	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)	(ha·m)
82.50	**0**	**PP Elev**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
82.60	827		0.100	0.009	0.000	0.000	0.000	0.000	0.009	0.083
82.70	**1677**	**QC Elev**	**0.200**	**0.017**	**0.000**	**0.000**	**0.000**	**0.000**	**0.017**	**0.168**
82.80	2550		0.300	0.023	0.000	0.000	0.000	0.000	0.023	0.255
82.90	3447		**0.400**	**0.028**	**0.000**	**0.000**	**0.000**	**0.000**	**0.028**	**0.345**
83.00	4367		0.500	0.032	0.000	0.000	0.000	0.000	0.032	0.437
83.10	5311		0.600	0.035	0.000	0.000	0.000	0.000	0.035	0.531
83.20	6278		0.700	0.038	0.000	0.000	0.000	0.000	0.038	0.628
83.30	7268		0.800	0.041	0.000	0.000	0.000	0.000	0.041	0.727
83.40	**8282**	**Ext. Det.**	**0.900**	**0.044**	**0.000**	**0.000**	**0.000**	**0.000**	**0.044**	**0.828**
83.50	9319		1.000	0.047	0.100	0.054	0.000	0.000	0.101	0.932
83.60	10379		1.100	0.049	0.200	0.108	0.000	0.000	0.157	1.038
83.70	11463		1.200	0.051	0.300	0.162	0.000	0.000	0.213	1.146
83.80	12570		1.300	0.054	0.400	0.216	0.000	0.000	0.269	1.257
83.90	13701		1.400	0.056	0.500	0.270	0.000	0.000	0.325	1.370
84.00	14855		1.500	0.058	0.600	0.319	0.000	0.000	0.377	1.485
84.10	16032		1.600	0.060	0.700	0.362	0.000	0.000	0.422	1.603
84.20	17233		1.700	0.062	0.800	0.400	0.000	0.000	0.462	1.723
84.30	18457		1.800	0.064	0.900	0.435	0.000	0.000	0.498	1.846
84.40	19704		1.900	0.066	1.000	0.467	0.000	0.000	0.533	1.970
84.50	20975		2.000	0.067	1.100	0.497	0.000	0.000	0.564	2.098
84.60	**22258**	**Ovf Elev**	**2.100**	**0.069**	**1.200**	**0.526**	**0.000**	**0.000**	**0.595**	**2.226**
84.70	23540		2.200	0.071	1.300	0.553	0.100	0.300	0.923	2.354
84.80	24823		2.300	0.072	1.400	0.578	0.200	0.848	1.499	2.482

Notes :
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm.
- Ovf Elev indicates the elevation of the emergency overflow provided above the 100-year water level.

```
00001> 20     Metric units / ID Numbers OFF
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00006> *#  Project Number: [959(03)]
00007> *#  Date          : [2021/12/10]
00008> *#  Modeller      : [BL]
00009> *#  Company       : J.F. Sabourin and Associates
00010> *#  License #     : 2549237
00011> *#*************************************************************************************
00012> *%  25 mm Storm based on 2-Year, 3-Hour Chicago Storm
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00022> *# PROPOSED CONDITIONS
00023> *##############################################################################
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00028>                      Impervious areas: IAimp=[1.57](mm), SLPI=[0.9](%), LGI=[504](m), MNI=[0.013], SCI=[0](min),
00029>                      RAINFALL=[ ,  ,  -1](mm/hr)
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00031> *%-----------------|-------------------------------------------------------------|
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00034>                      RDT=[1](min),
00035>                           TABLE of ( OUTFLOW-STORAGE ) values
00036>                                     (cms) - (ha-m)
00037>                                   [ 0 , 0 ]
00038>                                   [ 0.009 , 0.083 ]
00039>                                   [ 0.017 , 0.168 ]
00040>                                   [ 0.023 , 0.255 ]
00041>                                   [ 0.028 , 0.345 ]
00042>                                   [ 0.032 , 0.437 ]
00043>                                   [ 0.035 , 0.531 ]
00044>                                   [ 0.038 , 0.628 ]
00045>                                   [ 0.041 , 0.727 ]
00046>                                   [ 0.044 , 0.828 ]
00047>                                   [ 0.101 , 0.932 ]
00048>                                   [ 0.157 , 1.038 ]
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00051>                                   [ 0.325 , 1.37 ]
00052>                                   [ 0.377 , 1.485 ]
00053>                                   [ 0.422 , 1.603 ]
00054>                                   [ 0.462 , 1.723 ]
00055>                                   [ 0.498 , 1.846 ]
00056>                                   [ 0.533 , 1.97 ]
00057>                                   [ 0.564 , 2.098 ]
00058>                                   [ 0.595 , 2.226 ]
00059>                                   [ 0.923 , 2.354 ]
00060>                                   [ 1.499 , 2.482 ]
00061>                                   [  -1   ,  -1   ]  (max twenty pts)
00062>                           NHYDovf=["Povf"] ,
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00064> *##############################################################################
00065> *# STORMS
00066> *##############################################################################
00067> *%  25 mm Storm based on 2-Year, 3-Hour Chicago Storm
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00004>  S       W W W   MM MM   H   H    Y Y    MM MM   O   O        2   2  0   0  11   5
00005>  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O            2  0   0  11   5       Ver 5.500
00006>      S    W W    M   M   H   H     Y     M   M   O   O       222   0   0  11   555     FEB  2015
00007>  SSSSS    W W    M   M   H   H     Y     M   M    OOO        2     0   0  11     5     =========
00008>                                                              2     0   0  11     5   # 2549237
00009>         StormWater Management HYdrologic Model                222    000   11   555   =========
00010>
00011>  ************************************************************************************
00012>  ****************************************  SWMHYMO Ver 5.500  ***********************
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: swmhymo@jfsa.Com               ***********************
00021>  ************************************************************************************
00022>
00023>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024>  ++++++++++++++++++ Licensed user: JFSAinc.                          ++++++++++++++++++
00025>  ++++++++++++++++++                 Ottawa                 SERIAL#:2549237          ++++++++++++++++++
00026>  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028>  ************************************************************************************
00029>  *****************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++                 *****************
00030>  *****************           Maximum value for ID numbers  :      11                *****************
00031>  *****************           Max. number of rainfall points: 105408                 *****************
00032>  *****************           Max. number of flow points    : 105408                 *****************
00033>  ************************************************************************************
00034>
00035>
00036>  ********************************  S U M M A R Y   O U T P U T  ************************************
00037>  ************************************************************************************
00038>  *                        RUN DATE: 2021-12-16     TIME: 12:08:17     RUN COUNTER: 001514                *
00039>  ************************************************************************************
00040>  * Input   file: C:\Users\blidbetter\Desktop\SWMHYMO\SWM\CCVS_v01.dat                 *
00041>  * Output  file: C:\Users\blidbetter\Desktop\SWMHYMO\SWM\CCVS_v01.out                 *
00042>  * Summary file: C:\Users\blidbetter\Desktop\SWMHYMO\SWM\CCVS_v01.sum                 *
00043>  * User comments:                                                                    *
00044>  * 1:_____________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________*
00047>  ************************************************************************************
00048>
00049>
00050> #*************************************************************************
00051> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00052> #*************************************************************************
00053> #  Project Name  : [Cardinal Creek Village South]
00054> #  Project Number: [959(03)]
00055> #  Date          : [2021/12/10]
00056> #  Modeller      : [BL]
00057> #  Company       : J.F. Sabourin and Associates
00058> #  License #     : 2549237
00059> #*************************************************************************
00060>  RUN#:COMMAND#
00061> R0001:C00001-----------------------------------------------------------------------
00062>      START
00063>       [TZERO =    .00 hrs on        0]
00064>       [METOUT=   2   (1=imperial, 2=metric output)]
00065>       [NSTORM=   1 ]
00066>       [NRUN  = 0001 ]
00067> R0001:C00002-----------------------------------------------------------------------
00068>      READ STORM
00069>       Filename = storm.001
00070>       Comment  = 25 MM BASED ON CHICAGO STORM 2 Year, 3 Hours
00071>       [SDT=10.00:SDUR=   3.00:PTOT=  25.00]
00072> R0001:C00003-----------------------------------------------------------------------
00073>      DEFAULT VALUES
00074>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00075>       ICASEdv  = 1 (read and print data)
00076>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00077>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00078>       Horton's infiltration equation parameters:
00079>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00080>       Parameters for PERVIOUS surfaces in STANDHYD:
00081>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00082>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00083>       [IAimp=   1.57 mm] [CLI= 1.50]  [MNI= .013]
00084>       Parameters used in NASHYD:
00085>       [Ia=   4.67 mm] [N= 3.00]
00086>       Average monthly Pan Evaporation data in    (mm)
00087>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00088>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00089>       Average monthly Potential Evapotranspiration in    (mm)
00090>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00091>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00092> ##########################################################################
00093> # PROPOSED CONDITIONS
00094> ##########################################################################
00095> # Lumped drainage to Cardinal Creek Village South Pond 2
00096> R0001:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00097>    CALIB STANDHYD          1.0 01:CCVS          38.08    2.435 No_date    1:05   14.43 .577     .000
00098>       [XIMP=.56:TIMP=.66]
00099>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00100>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00101>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00102> # Estimated Pond Volumes for SWM Facility
00103> R0001:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00104>    ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    2.435 No_date    1:05   14.43  n/a     .000
00105>                  out <=    1.0 01:Pout          38.08     .035 No_date   3:16   14.43  n/a     .000
00106>            overflow <=    1.0 03:Povf             .00     .000 No_date   0:00    .00  n/a     .000
00107>       {MxStoUsed=.5219E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00108> ##########################################################################
00109> # STORMS
00110> ##########################################################################
00111>   ** END OF RUN :   1
00112>
00113>  ************************************************************************************
00114>
00115>
00116>
00117>
00118>
00119>  RUN#:COMMAND#
00120> R0002:C00001-----------------------------------------------------------------------
00121>      START
00122>       [TZERO =    .00 hrs on        0]
00123>       [METOUT=   2   (1=imperial, 2=metric output)]
00124>       [NSTORM=   1 ]
00125>       [NRUN  = 0002 ]
00126> #*************************************************************************
00127> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00128> #*************************************************************************
00129> #  Project Name  : [Cardinal Creek Village South]
00130> #  Project Number: [959(03)]
00131> #  Date          : [2021/12/10]
00132> #  Modeller      : [BL]
00133> #  Company       : J.F. Sabourin and Associates
00134> #  License #     : 2549237
00135> #*************************************************************************
00136> R0002:C00002-----------------------------------------------------------------------
00137>      READ STORM
00138>       Filename = storm.001
00139>       Comment  = CHICAGO STORM 2 Year, 3 Hours
00140>       [SDT=10.00:SDUR=   3.00:PTOT=  31.86]
00141> R0002:C00003-----------------------------------------------------------------------
00142>      DEFAULT VALUES
00143>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00144>       ICASEdv  = 1 (read and print data)
00145>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00146>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00147>       Horton's infiltration equation parameters:
00148>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00149>       Parameters for PERVIOUS surfaces in STANDHYD:
00150>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00151>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00152>       [IAimp=   1.57 mm] [CLI= 1.50]  [MNI= .013]
00153>       Parameters used in NASHYD:
00154>       [Ia=   4.67 mm] [N= 3.00]
00155>       Average monthly Pan Evaporation data in    (mm)
00156>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00157>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00158>       Average monthly Potential Evapotranspiration in    (mm)
00159>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00160>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00161> ##########################################################################
00162> # PROPOSED CONDITIONS
00163> ##########################################################################
00164> # Lumped drainage to Cardinal Creek Village South Pond 2
00165> R0002:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00166>    CALIB STANDHYD          1.0 01:CCVS          38.08    3.438 No_date    1:04   19.77 .620     .000
00167>       [XIMP=.56:TIMP=.66]
00168>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00169>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00170>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00171> # Estimated Pond Volumes for SWM Facility
00172> R0002:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00173>    ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    3.438 No_date    1:04   19.77  n/a     .000
00174>                  out <=    1.0 01:Pout          38.08     .041 No_date   3:14   19.77  n/a     .000
00175>            overflow <=    1.0 03:Povf             .00     .000 No_date   0:00    .00  n/a     .000
00176>       {MxStoUsed=.7205E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00177> ##########################################################################
00178> # STORMS
00179> ##########################################################################
00180>   ** END OF RUN :   4
00181>
00182>  ************************************************************************************
00183>
00184>
00185>
00186>
00187>
00188>  RUN#:COMMAND#
00189> R0005:C00001-----------------------------------------------------------------------
00190>      START
00191>       [TZERO =    .00 hrs on        0]
00192>       [METOUT=   2   (1=imperial, 2=metric output)]
00193>       [NSTORM=   1 ]
00194>       [NRUN  = 0005 ]
00195> #*************************************************************************
00196> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00197> #*************************************************************************
00198> #  Project Name  : [Cardinal Creek Village South]
00199> #  Project Number: [959(03)]
00200> #  Date          : [2021/12/10]
00201> #  Modeller      : [BL]
00202> #  Company       : J.F. Sabourin and Associates
00203> #  License #     : 2549237
00204> #*************************************************************************
00205> R0005:C00002-----------------------------------------------------------------------
00206>      READ STORM
00207>       Filename = storm.001
00208>       Comment  = CHICAGO STORM  5 Year, 3 Hours
00209>       [SDT=10.00:SDUR=   3.00:PTOT=  42.51]
00210> R0005:C00003-----------------------------------------------------------------------
00211>      DEFAULT VALUES
00212>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00213>       ICASEdv  = 1 (read and print data)
00214>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00215>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00216>       Horton's infiltration equation parameters:
00217>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00218>       Parameters for PERVIOUS surfaces in STANDHYD:
00219>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00220>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00221>       [IAimp=   1.57 mm] [CLI= 1.50]  [MNI= .013]
00222>       Parameters used in NASHYD:
00223>       [Ia=   4.67 mm] [N= 3.00]
00224>       Average monthly Pan Evaporation data in    (mm)
00225>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00226>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00227>       Average monthly Potential Evapotranspiration in    (mm)
00228>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00229>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00230> ##########################################################################
00231> # PROPOSED CONDITIONS
00232> ##########################################################################
00233> # Lumped drainage to Cardinal Creek Village South Pond 2
00234> R0005:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00235>    CALIB STANDHYD          1.0 01:CCVS          38.08    5.373 No_date    1:04   28.74 .676     .000
00236>       [XIMP=.56:TIMP=.66]
00237>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00238>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00239>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00240> # Estimated Pond Volumes for SWM Facility
00241> R0005:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00242>    ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    5.373 No_date    1:04   28.74  n/a     .000
00243>                  out <=    1.0 01:Pout          38.08     .143 No_date   3:05   28.74  n/a     .000
00244>            overflow <=    1.0 03:Povf             .00     .000 No_date   0:00    .00  n/a     .000
00245>       {MxStoUsed=.1012E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00246> ##########################################################################
00247> # STORMS
00248> ##########################################################################
00249>   ** END OF RUN :   9
00250>
00251>  ************************************************************************************
00252>
00253>
00254>
00255>
00256>
00257>  RUN#:COMMAND#
00258> R0010:C00001-----------------------------------------------------------------------
00259>      START
00260>       [TZERO =    .00 hrs on        0]
00261>       [METOUT=   2   (1=imperial, 2=metric output)]
00262>       [NSTORM=   1 ]
00263>       [NRUN  = 0010 ]
00264> #*************************************************************************
00265> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00266> #*************************************************************************
00267> #  Project Name  : [Cardinal Creek Village South]
00268> #  Project Number: [959(03)]
00269> #  Date          : [2021/12/10]
00270> #  Modeller      : [BL]
00271> #  Company       : J.F. Sabourin and Associates
00272> #  License #     : 2549237
00273> #*************************************************************************
00274> R0010:C00002-----------------------------------------------------------------------
00275>      READ STORM
00276>       Filename = storm.001
00277>       Comment  = CHICAGO STORM 10 Year, 3 Hours
00278>       [SDT=10.00:SDUR=   3.00:PTOT=  49.50]
00279> R0010:C00003-----------------------------------------------------------------------
00280>      DEFAULT VALUES
00281>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00282>       ICASEdv  = 1 (read and print data)
00283>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00284>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00285>       Horton's infiltration equation parameters:
00286>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00287>       Parameters for PERVIOUS surfaces in STANDHYD:
00288>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00289>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00290>       [IAimp=   1.57 mm] [CLI= 1.50]  [MNI= .013]
00291>       Parameters used in NASHYD:
00292>       [Ia=   4.67 mm] [N= 3.00]
00293>       Average monthly Pan Evaporation data in    (mm)
00294>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00295>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00296>       Average monthly Potential Evapotranspiration in    (mm)
00297>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00298>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00299> ##########################################################################
00300> # PROPOSED CONDITIONS
00301> ##########################################################################
00302> # Lumped drainage to Cardinal Creek Village South Pond 2
00303> R0010:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00304>    CALIB STANDHYD          1.0 01:CCVS          38.08    6.698 No_date    1:03   34.94 .706     .000
00305>       [XIMP=.56:TIMP=.66]
00306>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00307>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00308>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00309> # Estimated Pond Volumes for SWM Facility
00310> R0010:C00005-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00311>    ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    6.698 No_date    1:03   34.94  n/a     .000
00312>                  out <=    1.0 01:Pout          38.08     .234 No_date   2:48   34.93  n/a     .000
00313>            overflow <=    1.0 03:Povf             .00     .000 No_date   0:00    .00  n/a     .000
00314>       {MxStoUsed=.1188E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00315> ##########################################################################
00316> # STORMS
00317> ##########################################################################
00318>   ** END OF RUN :   24
00319>
00320>  ************************************************************************************
00321>
00322>
00323>
00324>
00325>
00326>  RUN#:COMMAND#
00327> R0025:C00001-----------------------------------------------------------------------
00328>      START
00329>       [TZERO =    .00 hrs on        0]
00330>       [METOUT=   2   (1=imperial, 2=metric output)]
00331>       [NSTORM=   1 ]
00332>       [NRUN  = 0025 ]
00333> #*************************************************************************
00334> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00335> #*************************************************************************
00336> #  Project Name  : [Cardinal Creek Village South]
00337> #  Project Number: [959(03)]
00338> #  Date          : [2021/12/10]
00339> #  Modeller      : [BL]
00340> #  Company       : J.F. Sabourin and Associates
00341> #  License #     : 2549237
00342> #*************************************************************************
00343> R0025:C00002-----------------------------------------------------------------------
00344>      READ STORM
00345>       Filename = storm.001
00346>       Comment  = CHICAGO STORM   25 Year, 3 Hours
00347>       [SDT=10.00:SDUR=   3.00:PTOT=  58.23]
00348> R0025:C00003-----------------------------------------------------------------------
00349>      DEFAULT VALUES
00350>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00351>       ICASEdv  = 1 (read and print data)
00352>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00353>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00354>       Horton's infiltration equation parameters:
00355>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00356>       Parameters for PERVIOUS surfaces in STANDHYD:
00357>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00358>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00359>       [IAimp=   1.57 mm] [CLI= 1.50]  [MNI= .013]
00360>       Parameters used in NASHYD:
00361>       [Ia=   4.67 mm] [N= 3.00]
00362>       Average monthly Pan Evaporation data in    (mm)
00363>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00364>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00365>       Average monthly Potential Evapotranspiration in    (mm)
00366>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00367>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00368> ##########################################################################
00369> # PROPOSED CONDITIONS
00370> ##########################################################################
00371> # Lumped drainage to Cardinal Creek Village South Pond 2
00372> R0025:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00373>    CALIB STANDHYD          1.0 01:CCVS          38.08    8.647 No_date    1:03   42.74 .734     .000
00374>       [XIMP=.56:TIMP=.66]
00375>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00376>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00377>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00378> # Estimated Pond Volumes for SWM Facility
```

```
00379> R0025:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00380>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    8.647 No_date    1:03   42.74  n/a     .000
00381>               out <=    1.0 01:Pout          38.08     .347 No_date    2:26   42.74  n/a     .000
00382>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00383>     {MxStoUsed=.1418E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00384> ###############################################################################
00385> # STORMS
00386> ###############################################################################
00387>  ** END OF RUN :   49
00388>
00389> *******************************************************************************************************
00390>
00391>
00392>
00393>
00394>
00395>  RUN#:COMMAND#
00396> R0050:C00001------------------------------------------------------------------------------------------
00397>       START
00398>       [TZERO =    .00 hrs on        0]
00399>       [METOUT=   2   (1=imperial, 2=metric output)]
00400>       [NSTORM=   1 ]
00401>       [NRUN  = 0050 ]
00402> #*****************************************************************************
00403> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00404> #*****************************************************************************
00405> #  Project Name  : [Cardinal Creek Village South]
00406> #  Project Number: [959(03)]
00407> #  Date          : [2021/12/10]
00408> #  Modeller      : [BL]
00409> #  Company       : J.F. Sabourin and Associates
00410> #  License #     : 2549237
00411> #*****************************************************************************
00412> R0050:C00002------------------------------------------------------------------------------------------
00413>       READ STORM
00414>       Filename = storm.001
00415>       Comment  = CHICAGO STORM  50 Year, 3 Hours
00416>       [SDT=10.00:SDUR=   3.00:PTOT=  64.81]
00417> R0050:C00003------------------------------------------------------------------------------------------
00418>       DEFAULT VALUES
00419>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00420>       ICASEdv  = 1 (read and print data)
00421>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00422>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00423>       Horton's infiltration equation parameters:
00424>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00425>       Parameters for PERVIOUS surfaces in STANDHYD:
00426>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=.250]
00427>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00428>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI=.013]
00429>       Parameters used in NASHYD:
00430>       [Ia=   4.67 mm] [N= 3.00]
00431>       Average monthly Pan Evaporation data in    (mm)
00432>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00433>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00434>       Average monthly Potential Evapotranspiration in    (mm)
00435>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00436>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00437> ###############################################################################
00438> # PROPOSED CONDITIONS
00439> ###############################################################################
00440> # Lumped drainage to Cardinal Creek Village South Pond 2
00441> R0050:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00442>     CALIB STANDHYD        1.0 01:CCVS          38.08    9.948 No_date    1:03   48.84 .754     .000
00443>       [XIMP=.56:TIMP=.66]
00444>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00445>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00446>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00447> # Estimated Pond Volumes for SWM Facility
00448> R0050:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00449>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    9.948 No_date    1:03   48.84  n/a     .000
00450>               out <=    1.0 01:Pout          38.08     .423 No_date    2:19   48.84  n/a     .000
00451>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00452>     {MxStoUsed=.1607E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00453> ###############################################################################
00454> # STORMS
00455> ###############################################################################
00456>  ** END OF RUN :   98
00457>
00458> *******************************************************************************************************
00459>
00460>
00461>
00462>
00463>
00464>  RUN#:COMMAND#
00465> R0099:C00001------------------------------------------------------------------------------------------
00466>       START
00467>       [TZERO =    .00 hrs on        0]
00468>       [METOUT=   2   (1=imperial, 2=metric output)]
00469>       [NSTORM=   1 ]
00470>       [NRUN  = 0099 ]
00471> #*****************************************************************************
00472> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00473> #*****************************************************************************
00474> #  Project Name  : [Cardinal Creek Village South]
00475> #  Project Number: [959(03)]
00476> #  Date          : [2021/12/10]
00477> #  Modeller      : [BL]
00478> #  Company       : J.F. Sabourin and Associates
00479> #  License #     : 2549237
00480> #*****************************************************************************
00481> R0099:C00002------------------------------------------------------------------------------------------
00482>       READ STORM
00483>       Filename = storm.001
00484>       Comment  = CHICAGO STORM   100 Year, 3 Hours
00485>       [SDT=10.00:SDUR=   3.00:PTOT=  71.66]
00486> R0099:C00003------------------------------------------------------------------------------------------
00487>       DEFAULT VALUES
00488>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00489>       ICASEdv  = 1 (read and print data)
00490>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00491>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00492>       Horton's infiltration equation parameters:
00493>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00494>       Parameters for PERVIOUS surfaces in STANDHYD:
00495>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=.250]
00496>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00497>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI=.013]
00498>       Parameters used in NASHYD:
00499>       [Ia=   4.67 mm] [N= 3.00]
00500>       Average monthly Pan Evaporation data in    (mm)
00501>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00502>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00503>       Average monthly Potential Evapotranspiration in    (mm)
00504>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00505>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00506> ###############################################################################
00507> # PROPOSED CONDITIONS
00508> ###############################################################################
00509> # Lumped drainage to Cardinal Creek Village South Pond 2
00510> R0099:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00511>     CALIB STANDHYD        1.0 01:CCVS          38.08   11.538 No_date    1:03   55.14 .769     .000
00512>       [XIMP=.56:TIMP=.66]
00513>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00514>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00515>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00516> # Estimated Pond Volumes for SWM Facility
00517> R0099:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00518>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08   11.538 No_date    1:03   55.14  n/a     .000
00519>               out <=    1.0 01:Pout          38.08     .486 No_date    2:16   55.14  n/a     .000
00520>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00521>     {MxStoUsed=.1807E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00522> ###############################################################################
00523> # STORMS
00524> ###############################################################################
00525>  ** END OF RUN :  101
00526>
00527> *******************************************************************************************************
00528>
00529>
00530>
00531>
00532>
00533>  RUN#:COMMAND#
00534> R0102:C00001------------------------------------------------------------------------------------------
00535>       START
00536>       [TZERO =    .00 hrs on        0]
00537>       [METOUT=   2   (1=imperial, 2=metric output)]
00538>       [NSTORM=   1 ]
00539>       [NRUN  = 0102 ]
00540> #*****************************************************************************
00541> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00542> #*****************************************************************************
00543> #  Project Name  : [Cardinal Creek Village South]
00544> #  Project Number: [959(03)]
00545> #  Date          : [2021/12/10]
00546> #  Modeller      : [BL]
00547> #  Company       : J.F. Sabourin and Associates
00548> #  License #     : 2549237
00549> #*****************************************************************************
00550> R0102:C00002------------------------------------------------------------------------------------------
00551>       READ STORM
00552>       Filename = storm.001
00553>       Comment  = 2 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00554>       [SDT=10.00:SDUR=  24.00:PTOT=  48.46]
00555> R0102:C00003------------------------------------------------------------------------------------------
00556>       DEFAULT VALUES
00557>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00558>       ICASEdv  = 1 (read and print data)
00559>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00560>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00561>       Horton's infiltration equation parameters:
00562>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00563>       Parameters for PERVIOUS surfaces in STANDHYD:
00564>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=.250]
00565>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00566>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI=.013]
00567>       Parameters used in NASHYD:
00568>       [Ia=   4.67 mm] [N= 3.00]
00569>       Average monthly Pan Evaporation data in    (mm)
00570>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00571>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00572>       Average monthly Potential Evapotranspiration in    (mm)
00573>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00574>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00575> ###############################################################################
00576> # PROPOSED CONDITIONS
00577> ###############################################################################
00578> # Lumped drainage to Cardinal Creek Village South Pond 2
00579> R0102:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00580>     CALIB STANDHYD        1.0 01:CCVS          38.08    3.323 No_date   12:04   31.02 .640     .000
00581>       [XIMP=.56:TIMP=.66]
00582>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00583>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00584>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00585> # Estimated Pond Volumes for SWM Facility
00586> R0102:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00587>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    3.323 No_date   12:04   31.01  n/a     .000
00588>               out <=    1.0 01:Pout          38.08     .091 No_date   14:24   31.01  n/a     .000
00589>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00590>     {MxStoUsed=.9132E+00  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00591> ###############################################################################
00592> # STORMS
00593> ###############################################################################
00594>  ** END OF RUN :  104
00595>
00596> *******************************************************************************************************
00597>
00598>
00599>
00600>
00601>
00602>  RUN#:COMMAND#
00603> R0105:C00001------------------------------------------------------------------------------------------
00604>       START
00605>       [TZERO =    .00 hrs on        0]
00606>       [METOUT=   2   (1=imperial, 2=metric output)]
00607>       [NSTORM=   1 ]
00608>       [NRUN  = 0105 ]
00609> #*****************************************************************************
00610> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00611> #*****************************************************************************
00612> #  Project Name  : [Cardinal Creek Village South]
00613> #  Project Number: [959(03)]
00614> #  Date          : [2021/12/10]
00615> #  Modeller      : [BL]
00616> #  Company       : J.F. Sabourin and Associates
00617> #  License #     : 2549237
00618> #*****************************************************************************
00619> R0105:C00002------------------------------------------------------------------------------------------
00620>       READ STORM
00621>       Filename = storm.001
00622>       Comment  = 5 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00623>       [SDT=10.00:SDUR=  24.00:PTOT=  64.11]
00624> R0105:C00003------------------------------------------------------------------------------------------
00625>       DEFAULT VALUES
00626>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00627>       ICASEdv  = 1 (read and print data)
00628>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00629>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00630>       Horton's infiltration equation parameters:
00631>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00632>       Parameters for PERVIOUS surfaces in STANDHYD:
00633>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=.250]
00634>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00635>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI=.013]
00636>       Parameters used in NASHYD:
00637>       [Ia=   4.67 mm] [N= 3.00]
00638>       Average monthly Pan Evaporation data in    (mm)
00639>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00640>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00641>       Average monthly Potential Evapotranspiration in    (mm)
00642>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00643>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00644> ###############################################################################
00645> # PROPOSED CONDITIONS
00646> ###############################################################################
00647> # Lumped drainage to Cardinal Creek Village South Pond 2
00648> R0105:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00649>     CALIB STANDHYD        1.0 01:CCVS          38.08    4.976 No_date   12:03   42.89 .669     .000
00650>       [XIMP=.56:TIMP=.66]
00651>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00652>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00653>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00654> # Estimated Pond Volumes for SWM Facility
00655> R0105:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00656>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    4.976 No_date   12:03   42.89  n/a     .000
00657>               out <=    1.0 01:Pout          38.08     .241 No_date   13:19   42.89  n/a     .000
00658>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00659>     {MxStoUsed=.1201E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00660> ###############################################################################
00661> # STORMS
00662> ###############################################################################
00663>  ** END OF RUN :  109
00664>
00665> *******************************************************************************************************
00666>
00667>
00668>
00669>
00670>
00671>  RUN#:COMMAND#
00672> R0110:C00001------------------------------------------------------------------------------------------
00673>       START
00674>       [TZERO =    .00 hrs on        0]
00675>       [METOUT=   2   (1=imperial, 2=metric output)]
00676>       [NSTORM=   1 ]
00677>       [NRUN  = 0110 ]
00678> #*****************************************************************************
00679> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00680> #*****************************************************************************
00681> #  Project Name  : [Cardinal Creek Village South]
00682> #  Project Number: [959(03)]
00683> #  Date          : [2021/12/10]
00684> #  Modeller      : [BL]
00685> #  Company       : J.F. Sabourin and Associates
00686> #  License #     : 2549237
00687> #*****************************************************************************
00688> R0110:C00002------------------------------------------------------------------------------------------
00689>       READ STORM
00690>       Filename = storm.001
00691>       Comment  = 10 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00692>       [SDT=10.00:SDUR=  24.00:PTOT=  74.35]
00693> R0110:C00003------------------------------------------------------------------------------------------
00694>       DEFAULT VALUES
00695>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00696>       ICASEdv  = 1 (read and print data)
00697>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00698>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00699>       Horton's infiltration equation parameters:
00700>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00701>       Parameters for PERVIOUS surfaces in STANDHYD:
00702>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=.250]
00703>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00704>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI=.013]
00705>       Parameters used in NASHYD:
00706>       [Ia=   4.67 mm] [N= 3.00]
00707>       Average monthly Pan Evaporation data in    (mm)
00708>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00709>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00710>       Average monthly Potential Evapotranspiration in    (mm)
00711>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00712>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00713> ###############################################################################
00714> # PROPOSED CONDITIONS
00715> ###############################################################################
00716> # Lumped drainage to Cardinal Creek Village South Pond 2
00717> R0110:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00718>     CALIB STANDHYD        1.0 01:CCVS          38.08    6.089 No_date   12:02   50.74 .682     .000
00719>       [XIMP=.56:TIMP=.66]
00720>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00721>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00722>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00723> # Estimated Pond Volumes for SWM Facility
00724> R0110:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00725>     ROUTE RESERVOIR ->    1.0 02:CCVS          38.08    6.089 No_date   12:02   50.74  n/a     .000
00726>               out <=    1.0 01:Pout          38.08     .340 No_date   13:07   50.74  n/a     .000
00727>          overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
00728>     {MxStoUsed=.1403E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00729> ###############################################################################
00730> # STORMS
00731> ###############################################################################
00732>  ** END OF RUN :  124
00733>
00734> *******************************************************************************************************
00735>
00736>
00737>
00738>
00739>
00740>  RUN#:COMMAND#
00741> R0125:C00001------------------------------------------------------------------------------------------
00742>       START
00743>       [TZERO =    .00 hrs on        0]
00744>       [METOUT=   2   (1=imperial, 2=metric output)]
00745>       [NSTORM=   1 ]
00746>       [NRUN  = 0125 ]
00747> #*****************************************************************************
00748> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00749> #*****************************************************************************
00750> #  Project Name  : [Cardinal Creek Village South]
00751> #  Project Number: [959(03)]
00752> #  Date          : [2021/12/10]
00753> #  Modeller      : [BL]
00754> #  Company       : J.F. Sabourin and Associates
00755> #  License #     : 2549237
00756> #*****************************************************************************
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00757> R0125:C00002------------------------------------------------------------------------------
00758>       READ STORM
00759>        Filename = storm.001
00760>        Comment  = 25 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00761>        [SDT=10.00:SDUR=  24.00:PTOT=  86.89]
00762> R0125:C00003------------------------------------------------------------------------------
00763>       DEFAULT VALUES
00764>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00765>        ICASEdv  = 1 (read and print data)
00766>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
00767>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00768>        Horton's infiltration equation parameters:
00769>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00770>        Parameters for PERVIOUS surfaces in STANDHYD:
00771>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00772>        Parameters for IMPERVIOUS surfaces in STANDHYD:
00773>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00774>        Parameters used in NASHYD:
00775>        [Ia=   4.67 mm] [N= 3.00]
00776>        Average monthly Pan Evaporation data in    (mm)
00777>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00778>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00779>        Average monthly Potential Evapotranspiration in    (mm)
00780>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00781>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00782> ##############################################################################
00783> # PROPOSED CONDITIONS
00784> ##############################################################################
00785> # Lumped drainage to Cardinal Creek Village South Pond 2
00786> R0125:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00787>      CALIB STANDHYD          1.0 01:CCVS          38.08    7.455 No_date   12:02   60.46 .696     .000
00788>        [XIMP=.56:TIMP=.66]
00789>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00790>        [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00791>        [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00792> # Estimated Pond Volumes for SWM Facility
00793> R0125:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00794>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    7.455 No_date   12:02   60.46  n/a     .000
00795>                 out <=     1.0 01:Pout          38.08     .442 No_date   13:03   60.46  n/a     .000
00796>            overflow <=     1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00797>     {MxStoUsed=.1662E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00798> ##############################################################################
00799> # STORMS
00800> ##############################################################################
00801>   ** END OF RUN :  149
00802>
00803> ********************************************************************************
00804>
00805>
00806>
00807>
00808>
00809>  RUN#:COMMAND#
00810> R0150:C00001------------------------------------------------------------------------------
00811>       START
00812>        [TZERO =    .00 hrs on        0]
00813>        [METOUT=   2   (1=imperial, 2=metric output)]
00814>        [NSTORM=   1 ]
00815>        [NRUN  = 0150 ]
00816> ********************************************************************************
00817> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00818> #********************************************************************************
00819> #  Project Name  : [Cardinal Creek Village South]
00820> #  Project Number: [959(03)]
00821> #  Date          : [2021/12/10]
00822> #  Modeller      : [BL]
00823> #  Company       : J.F. Sabourin and Associates
00824> #  License #     : 2549237
00825> #********************************************************************************
00826> R0150:C00002------------------------------------------------------------------------------
00827>       READ STORM
00828>        Filename = storm.001
00829>        Comment  = 50 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00830>        [SDT=10.00:SDUR=  24.00:PTOT=  96.53]
00831> R0150:C00003------------------------------------------------------------------------------
00832>       DEFAULT VALUES
00833>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00834>        ICASEdv  = 1 (read and print data)
00835>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
00836>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00837>        Horton's infiltration equation parameters:
00838>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00839>        Parameters for PERVIOUS surfaces in STANDHYD:
00840>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00841>        Parameters for IMPERVIOUS surfaces in STANDHYD:
00842>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00843>        Parameters used in NASHYD:
00844>        [Ia=   4.67 mm] [N= 3.00]
00845>        Average monthly Pan Evaporation data in    (mm)
00846>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00847>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00848>        Average monthly Potential Evapotranspiration in    (mm)
00849>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00850>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00851> ##############################################################################
00852> # PROPOSED CONDITIONS
00853> ##############################################################################
00854> # Lumped drainage to Cardinal Creek Village South Pond 2
00855> R0150:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00856>      CALIB STANDHYD          1.0 01:CCVS          38.08    8.547 No_date   12:02   67.83 .703     .000
00857>        [XIMP=.56:TIMP=.66]
00858>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00859>        [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00860>        [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00861> # Estimated Pond Volumes for SWM Facility
00862> R0150:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00863>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    8.547 No_date   12:02   67.83  n/a     .000
00864>                 out <=     1.0 01:Pout          38.08     .503 No_date   13:02   67.83  n/a     .000
00865>            overflow <=     1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00866>     {MxStoUsed=.1862E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00867> ##############################################################################
00868> # STORMS
00869> ##############################################################################
00870>   ** END OF RUN :  198
00871>
00872> ********************************************************************************
00873>
00874>
00875>
00876>
00877>
00878>  RUN#:COMMAND#
00879> R0199:C00001------------------------------------------------------------------------------
00880>       START
00881>        [TZERO =    .00 hrs on        0]
00882>        [METOUT=   2   (1=imperial, 2=metric output)]
00883>        [NSTORM=   1 ]
00884>        [NRUN  = 0199 ]
00885> ********************************************************************************
00886> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00887> #********************************************************************************
00888> #  Project Name  : [Cardinal Creek Village South]
00889> #  Project Number: [959(03)]
00890> #  Date          : [2021/12/10]
00891> #  Modeller      : [BL]
00892> #  Company       : J.F. Sabourin and Associates
00893> #  License #     : 2549237
00894> #********************************************************************************
00895> R0199:C00002------------------------------------------------------------------------------
00896>       READ STORM
00897>        Filename = storm.001
00898>        Comment  = 100 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00899>        [SDT=10.00:SDUR=  24.00:PTOT= 106.73]
00900> R0199:C00003------------------------------------------------------------------------------
00901>       DEFAULT VALUES
00902>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00903>        ICASEdv  = 1 (read and print data)
00904>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
00905>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00906>        Horton's infiltration equation parameters:
00907>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00908>        Parameters for PERVIOUS surfaces in STANDHYD:
00909>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00910>        Parameters for IMPERVIOUS surfaces in STANDHYD:
00911>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00912>        Parameters used in NASHYD:
00913>        [Ia=   4.67 mm] [N= 3.00]
00914>        Average monthly Pan Evaporation data in    (mm)
00915>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00916>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00917>        Average monthly Potential Evapotranspiration in    (mm)
00918>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00919>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00920> ##############################################################################
00921> # PROPOSED CONDITIONS
00922> ##############################################################################
00923> # Lumped drainage to Cardinal Creek Village South Pond 2
00924> R0199:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00925>      CALIB STANDHYD          1.0 01:CCVS          38.08    9.772 No_date   12:02   75.61 .708     .000
00926>        [XIMP=.56:TIMP=.66]
00927>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00928>        [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00929>        [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00930> # Estimated Pond Volumes for SWM Facility
00931> R0199:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00932>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    9.772 No_date   12:02   75.62  n/a     .000
00933>                 out <=     1.0 01:Pout          38.08     .559 No_date   13:00   75.61  n/a     .000
00934>            overflow <=     1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
00935>     {MxStoUsed=.2078E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
00936> ##############################################################################
00937> # STORMS
00938> ##############################################################################
00939>   ** END OF RUN :  978
00940>
00941> ********************************************************************************
00942>
00943>
00944>
00945>
00946>
00947>  RUN#:COMMAND#
00948> R0979:C00001------------------------------------------------------------------------------
00949>       START
00950>        [TZERO =    .00 hrs on        0]
00951>        [METOUT=   2   (1=imperial, 2=metric output)]
00952>        [NSTORM=   1 ]
00953>        [NRUN  = 0979 ]
00954> ********************************************************************************
00955> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00956> #********************************************************************************
00957> #  Project Name  : [Cardinal Creek Village South]
00958> #  Project Number: [959(03)]
00959> #  Date          : [2021/12/10]
00960> #  Modeller      : [BL]
00961> #  Company       : J.F. Sabourin and Associates
00962> #  License #     : 2549237
00963> #********************************************************************************
00964> R0979:C00002------------------------------------------------------------------------------
00965>       READ STORM
00966>        Filename = storm.001
00967>        Comment  = July 1st, 1979 Storm (3H) - Ottawa International Airport step 5 min
00968>        [SDT= 5.00:SDUR=   3.00:PTOT=  83.99]
00969> R0979:C00003------------------------------------------------------------------------------
00970>       DEFAULT VALUES
00971>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
00972>        ICASEdv  = 1 (read and print data)
00973>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
00974>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00975>        Horton's infiltration equation parameters:
00976>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00977>        Parameters for PERVIOUS surfaces in STANDHYD:
00978>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00979>        Parameters for IMPERVIOUS surfaces in STANDHYD:
00980>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00981>        Parameters used in NASHYD:
00982>        [Ia=   4.67 mm] [N= 3.00]
00983>        Average monthly Pan Evaporation data in    (mm)
00984>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00985>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00986>        Average monthly Potential Evapotranspiration in    (mm)
00987>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00988>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00989> ##############################################################################
00990> # PROPOSED CONDITIONS
00991> ##############################################################################
00992> # Lumped drainage to Cardinal Creek Village South Pond 2
00993> R0979:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00994>      CALIB STANDHYD          1.0 01:CCVS          38.08    8.163 No_date    1:35   68.14 .811     .000
00995>        [XIMP=.56:TIMP=.66]
00996>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
00997>        [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
00998>        [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
00999> # Estimated Pond Volumes for SWM Facility
01000> R0979:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01001>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    8.163 No_date    1:35   68.14  n/a     .000
01002>                 out <=     1.0 01:Pout          38.08     .801 No_date    2:23   68.14  n/a     .000
01003>            overflow <=     1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
01004>     {MxStoUsed=.2306E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
01005> ##############################################################################
01006> # STORMS
01007> ##############################################################################
01008>   ** END OF RUN :  987
01009>
01010> ********************************************************************************
01011>
01012>
01013>
01014>
01015>
01016>  RUN#:COMMAND#
01017> R0988:C00001------------------------------------------------------------------------------
01018>       START
01019>        [TZERO =    .00 hrs on        0]
01020>        [METOUT=   2   (1=imperial, 2=metric output)]
01021>        [NSTORM=   1 ]
01022>        [NRUN  = 0988 ]
01023> ********************************************************************************
01024> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01025> #********************************************************************************
01026> #  Project Name  : [Cardinal Creek Village South]
01027> #  Project Number: [959(03)]
01028> #  Date          : [2021/12/10]
01029> #  Modeller      : [BL]
01030> #  Company       : J.F. Sabourin and Associates
01031> #  License #     : 2549237
01032> #********************************************************************************
01033> R0988:C00002------------------------------------------------------------------------------
01034>       READ STORM
01035>        Filename = storm.001
01036>        Comment  = August 4th, 1988 Storm (5H+) - Ottawa International Airport step 5
01037>        [SDT= 5.00:SDUR=   5.58:PTOT=  80.59]
01038> R0988:C00003------------------------------------------------------------------------------
01039>       DEFAULT VALUES
01040>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
01041>        ICASEdv  = 1 (read and print data)
01042>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
01043>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
01044>        Horton's infiltration equation parameters:
01045>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
01046>        Parameters for PERVIOUS surfaces in STANDHYD:
01047>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
01048>        Parameters for IMPERVIOUS surfaces in STANDHYD:
01049>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01050>        Parameters used in NASHYD:
01051>        [Ia=   4.67 mm] [N= 3.00]
01052>        Average monthly Pan Evaporation data in    (mm)
01053>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01054>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01055>        Average monthly Potential Evapotranspiration in    (mm)
01056>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01057>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01058> ##############################################################################
01059> # PROPOSED CONDITIONS
01060> ##############################################################################
01061> # Lumped drainage to Cardinal Creek Village South Pond 2
01062> R0988:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01063>      CALIB STANDHYD          1.0 01:CCVS          38.08    8.568 No_date    2:03   63.99 .794     .000
01064>        [XIMP=.56:TIMP=.66]
01065>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
01066>        [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
01067>        [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
01068> # Estimated Pond Volumes for SWM Facility
01069> R0988:C00005------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01070>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    8.568 No_date    2:03   63.99  n/a     .000
01071>                 out <=     1.0 01:Pout          38.08     .544 No_date    3:27   63.98  n/a     .000
01072>            overflow <=     1.0 03:Povf           .00     .000 No_date    0:00     .00  n/a     .000
01073>     {MxStoUsed=.2015E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
01074> ##############################################################################
01075> # STORMS
01076> ##############################################################################
01077>   ** END OF RUN :  995
01078>
01079> ********************************************************************************
01080>
01081>
01082>
01083>
01084>
01085>  RUN#:COMMAND#
01086> R0996:C00001------------------------------------------------------------------------------
01087>       START
01088>        [TZERO =    .00 hrs on        0]
01089>        [METOUT=   2   (1=imperial, 2=metric output)]
01090>        [NSTORM=   1 ]
01091>        [NRUN  = 0996 ]
01092> ********************************************************************************
01093> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01094> #********************************************************************************
01095> #  Project Name  : [Cardinal Creek Village South]
01096> #  Project Number: [959(03)]
01097> #  Date          : [2021/12/10]
01098> #  Modeller      : [BL]
01099> #  Company       : J.F. Sabourin and Associates
01100> #  License #     : 2549237
01101> #********************************************************************************
01102> R0996:C00002------------------------------------------------------------------------------
01103>       READ STORM
01104>        Filename = storm.001
01105>        Comment  = August 8th, 1996 Storm (5H+) - Ottawa International Airport step 5
01106>        [SDT= 5.00:SDUR=   5.75:PTOT=  73.90]
01107> R0996:C00003------------------------------------------------------------------------------
01108>       DEFAULT VALUES
01109>        Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
01110>        ICASEdv  = 1 (read and print data)
01111>        FileTitle= File comment: [Parameters for City of Ottawa Projects]
01112>                   THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
01113>        Horton's infiltration equation parameters:
01114>        [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
01115>        Parameters for PERVIOUS surfaces in STANDHYD:
01116>        [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
01117>        Parameters for IMPERVIOUS surfaces in STANDHYD:
01118>        [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01119>        Parameters used in NASHYD:
01120>        [Ia=   4.67 mm] [N= 3.00]
01121>        Average monthly Pan Evaporation data in    (mm)
01122>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01123>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01124>        Average monthly Potential Evapotranspiration in    (mm)
01125>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01126>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01127> ##############################################################################
01128> # PROPOSED CONDITIONS
01129> ##############################################################################
01130> # Lumped drainage to Cardinal Creek Village South Pond 2
01131> R0996:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01132>      CALIB STANDHYD          1.0 01:CCVS          38.08    6.695 No_date    1:31   58.25 .788     .000
01133>        [XIMP=.56:TIMP=.66]
01134>        [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
```

```
01135>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
01136>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
01137> # Estimated Pond Volumes for SWM Facility
01138> R0998:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01139>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08    6.695 No_date    1:31   58.25  n/a     .000
01140>                out <=     1.0 01:Pout          38.08     .511 No_date    3:52   58.25  n/a     .000
01141>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
01142>      {MxStoUsed=.1891E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
01143> ###############################################################################
01144> # STORMS
01145> ###############################################################################
01146>   ** END OF RUN :  998
01147>
01148> ***************************************************************************************************
01149>
01150>
01151>
01152>
01153>
01154>  RUN#:COMMAND#
01155> R0999:C00001-------------------------------------------------------------------------------------------
01156>       START
01157>       [TZERO =    .00 hrs on        0]
01158>       [METOUT=   2     (1=imperial, 2=metric output)]
01159>       [NSTORM=   1 ]
01160>       [NRUN  = 0999 ]
01161> #*******************************************************************************
01162> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
01163> #*******************************************************************************
01164> #  Project Name  : [Cardinal Creek Village South]
01165> #  Project Number: [959(03)]
01166> #  Date          : [2021/12/10]
01167> #  Modeller      : [BL]
01168> #  Company       : J.F. Sabourin and Associates
01169> #  License #     : 2549237
01170> #*******************************************************************************
01171> R0999:C00002-------------------------------------------------------------------------------------------
01172>       READ STORM
01173>       Filename = storm.001
01174>       Comment  = CHICAGO STORM   100 Year, 3 Hours
01175>       [SDT=10.00:SDUR=   3.00:PTOT=  86.00]
01176> R0999:C00003-------------------------------------------------------------------------------------------
01177>       DEFAULT VALUES
01178>       Filename = C:\Users\blidbetter\Desktop\SWMHYMO\SWM\Ottawa.val
01179>       ICASEdv  = 1 (read and print data)
01180>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
01181>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
01182>       Horton's infiltration equation parameters:
01183>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
01184>       Parameters for PERVIOUS surfaces in STANDHYD:
01185>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
01186>       Parameters for IMPERVIOUS surfaces in STANDHYD:
01187>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
01188>       Parameters used in NASHYD:
01189>       [Ia=   4.67 mm] [N= 3.00]
01190>       Average monthly Pan Evaporation data in    (mm)
01191>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01192>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01193>       Average monthly Potential Evapotranspiration in    (mm)
01194>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
01195>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
01196> ###############################################################################
01197> # PROPOSED CONDITIONS
01198> ###############################################################################
01199> # Lumped drainage to Cardinal Creek Village South Pond 2
01200> R0999:C00004-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01201>      CALIB STANDHYD       1.0 01:CCVS          38.08   14.800 No_date    1:02   68.72 .799     .000
01202>       [XIMP=.56:TIMP=.66]
01203>       [Horton parameters: Fo= 76.20:Fc= 13.20:DCAY=4.14:  F= .00]
01204>       [Pervious     area: IAper= 4.67:SLPP=2.00:LGP=  40.:MNP=.250:SCP=   .0]
01205>       [Impervious   area: IAimp= 1.57:SLPI= .90:LGI= 504.:MNI=.013:SCI=   .0]
01206> # Estimated Pond Volumes for SWM Facility
01207> R0999:C00005-------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
01208>      ROUTE RESERVOIR ->     1.0 02:CCVS          38.08   14.800 No_date    1:02   68.72  n/a     .000
01209>                out <=     1.0 01:Pout          38.08     .644 No_date    2:12   68.71  n/a     .000
01210>            overflow <=    1.0 03:Povf            .00     .000 No_date    0:00     .00  n/a     .000
01211>      {MxStoUsed=.2245E+01  m3, TotOvfVol=.0000E+00  m3, N-Ovf=    0, TotDurOvf=    0.hrs}
01212> ###############################################################################
01213> # STORMS
01214> ###############################################################################
01215> R0999:C00002-------------------------------------------------------------------------------------------
01216>       FINISH
01217> -------------------------------------------------------------------------------------------------------
01218> ***************************************************************************************************
01219>       WARNINGS / ERRORS / NOTES
01220>       -------------------------
01221>    Simulation ended on 2021-12-16     at 12:08:18
01222> =======================================================================================================
01223>
```

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Attachment B

Pond 2 Forebay Calculations

CALCULATION SHEET B-1: FOREBAY SIZING FOR SWM FACILITY 2

Cardinal Creek Village South
SWM Facility 2
City of Ottawa
Calculation of Forebay Size

Settling Criteria

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

$$L_{min} = \left(\frac{r\,Q_p}{V_s}\right)^{0.5}$$

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

Input:

r =	0.33		(assumed)
Q_p =	0.044	m^3/s	(at elevation 82.7 m)
V_s =	0.0003	m/s	

L_{min} = 6.99 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (refer to Attachment C)

Dispersion Criteria

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

$$L_{min} = \frac{8\,Q}{d\,V_f}$$

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II S
- d = depth of permanent pool (forebay)
- V_f = desired final velocity

Input:

Q =	6.089	m^3/s
d =	2.5	m
Vf =	0.5	m/s

L_{min} = 38.97 m

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

Minimum Length of Forebay Required **38.97 m** (at elevation 82.5 m)

Average Forebay Velocity

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

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

where:
- Q = Inlet flowrate (10-Year, 24-Hour SCS Type II Storm)
- d = depth of pond during peak 10-year inflow (12h:00min)
- W_{avg} = average width of forebay

Input:

Q =	6.089	m^3/s	
d =	3.93	m	
W_{avg} =	14	m	(minimum required)

V = 0.11 m/s

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Attachment C

HGL Analysis Results and Modelling Files

Table C1: Cardinal Creek Village South - Preliminary HGL Analysis
100-Year Development Flows

MH-ID	Invert Elevation	Top of MH (m)	Max HGL (m)	Freeboard (m)
1	87.36	90.16	87.77	2.39
2	86.96	90.05	87.67	2.38
3	86.73	89.93	87.60	2.33
5	87.14	90.09	87.72	2.37
6	86.97	89.98	87.69	2.29
7	86.55	89.86	87.55	2.31
8	87.00	89.80	87.41	2.39
9	86.26	89.80	87.41	2.39
10	86.10	89.67	87.32	2.35
11	87.30	90.17	87.50	2.67
13	85.86	89.54	87.15	2.39
14	86.67	89.62	87.26	2.36
15	86.45	89.52	87.18	2.34
16	85.56	89.43	87.05	2.38
17	88.40	91.20	88.60	2.60
18	88.20	91.16	88.42	2.74
19	88.00	91.15	88.36	2.79
20	87.84	91.06	88.31	2.75
21	87.79	91.04	88.28	2.76
22	87.87	91.19	88.57	2.62
23	87.70	91.08	88.45	2.63
24	87.63	91.06	88.40	2.66
25	87.20	90.99	88.22	2.77
26	87.00	90.76	88.11	2.65
27	93.09	95.96	93.29	2.67
28	89.24	92.84	89.55	3.29
29	86.71	90.59	87.90	2.69
30	87.86	90.96	88.25	2.71
31	87.36	90.57	88.11	2.46
32	86.44	90.02	87.68	2.34
33	86.62	89.60	87.24	2.36
34	86.39	89.50	87.18	2.32
36	86.16	89.39	87.08	2.31
37	85.13	89.30	86.96	2.34
38	87.05	90.00	87.32	2.68
39	86.89	89.91	87.10	2.81
40	84.67	89.18	86.68	2.50
41	87.27	90.07	87.66	2.41
43	86.93	90.02	87.65	2.37
45	86.66	89.86	87.54	2.32
46	86.57	89.80	87.51	2.29
47	88.61	91.56	88.82	2.74
48	87.75	90.79	88.25	2.54
49	87.00	90.09	87.83	2.26
50	86.74	89.80	87.54	2.26
52	86.38	89.78	87.50	2.28
53	88.41	91.45	88.60	2.85
54	86.05	89.72	87.32	2.40
55	92.86	95.72	93.06	2.66
57	89.15	92.43	89.42	3.01
58	86.94	90.51	87.64	2.87
59	87.10	89.98	87.50	2.48
60	86.63	89.89	87.43	2.46
61	85.76	89.51	87.12	2.39
62	86.23	89.92	86.99	2.93
63	85.81	88.80	86.70	2.10
64	85.55	88.78	86.67	2.11
65	84.30	88.60	86.49	2.11
66	85.69	88.64	86.33	2.31
67	83.92	88.49	86.25	2.24
68	85.72	88.63	86.32	2.31
69	85.49	88.52	86.19	2.33
70	85.22	88.50	86.14	2.36
71	83.68	88.36	86.06	2.30
72	85.67	88.55	85.91	2.64
73	83.46	88.23	85.86	2.37
74	85.68	88.49	85.83	2.66
75	83.32	88.16	85.74	2.42
76	83.16	88.12	85.33	2.79
77	85.44	88.47	85.74	2.73
79	85.27	88.40	85.69	2.71
81	85.13	88.34	85.61	2.73
82	82.94	88.26	84.88	3.38
83	84.20	87.00	84.39	2.61
84	82.69	87.03	84.35	2.68
86	81.61	85.91	81.82	4.09
87	76.57	80.28	77.60	2.68
89	81.44	84.32	81.67	2.65
90	84.05	86.85	84.16	2.69
91	80.53	84.28	80.73	3.55
92	78.24	81.31	78.46	2.85
93	77.50	80.76	77.89	2.87
94	76.27	80.37	77.44	2.93
95	76.02	81.13	77.27	3.86
96	81.57	84.37	81.67	2.70
97	79.99	83.08	80.13	2.95
98	79.26	82.10	79.45	2.65
99	78.43	81.16	78.73	2.43
101	75.94	80.94	77.22	3.72
102	85.07	88.06	85.18	2.88
103	81.89	85.07	82.02	3.05
104	78.02	82.97	78.55	4.42
105	75.89	80.68	77.05	3.63
			Min	2.10
			Max	4.42
			Average	2.64

Model Name: CCVS_v01.inp

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 0
Number of subcatchments ... 0
Number of nodes 95
Number of links 100
Number of pollutants 0
Number of land uses 0

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
MH-1	JUNCTION	87.36	2.80	0.0	Yes
MH-10	JUNCTION	86.10	3.57	0.0	Yes
MH-101	JUNCTION	75.94	5.00	0.0	
MH-102	JUNCTION	85.07	2.99	0.0	Yes
MH-103	JUNCTION	81.89	3.18	0.0	Yes
MH-104	JUNCTION	78.02	4.95	0.0	Yes
MH-105	JUNCTION	75.89	4.79	0.0	
MH-11	JUNCTION	87.29	2.88	0.0	Yes
MH-13	JUNCTION	85.86	3.68	0.0	Yes
MH-14	JUNCTION	86.67	2.95	0.0	Yes
MH-15	JUNCTION	86.45	3.07	0.0	Yes
MH-16	JUNCTION	85.56	3.87	0.0	
MH-17	JUNCTION	88.40	2.80	0.0	Yes
MH-18	JUNCTION	88.19	2.96	0.0	Yes
MH-19	JUNCTION	88.00	3.15	0.0	Yes
MH-2	JUNCTION	86.95	3.10	0.0	Yes
MH-20	JUNCTION	87.84	3.22	0.0	Yes
MH-21	JUNCTION	87.79	3.25	0.0	
MH-22	JUNCTION	87.87	3.32	0.0	Yes
MH-23	JUNCTION	87.69	3.38	0.0	Yes
MH-24	JUNCTION	87.63	3.43	0.0	
MH-25	JUNCTION	87.20	3.79	0.0	Yes
MH-26	JUNCTION	87.00	3.76	0.0	Yes
MH-27	JUNCTION	93.09	2.87	0.0	Yes
MH-28	JUNCTION	89.24	3.60	0.0	Yes
MH-29	JUNCTION	86.71	3.88	0.0	
MH-3	JUNCTION	86.73	3.21	0.0	Yes
MH-30	JUNCTION	87.86	3.10	0.0	Yes
MH-31	JUNCTION	87.36	3.21	0.0	Yes
MH-32	JUNCTION	86.44	3.58	0.0	
MH-33	JUNCTION	86.62	2.98	0.0	Yes
MH-34	JUNCTION	86.39	3.11	0.0	Yes
MH-36	JUNCTION	86.16	3.23	0.0	Yes
MH-37	JUNCTION	85.13	4.17	0.0	
MH-38	JUNCTION	87.05	2.95	0.0	Yes
MH-39	JUNCTION	86.89	3.02	0.0	Yes
MH-40	JUNCTION	84.67	4.51	0.0	
MH-41	JUNCTION	87.27	2.80	0.0	Yes
MH-43	JUNCTION	86.92	3.10	0.0	Yes
MH-45	JUNCTION	86.66	3.21	0.0	
MH-46	JUNCTION	86.56	3.23	0.0	
MH-47	JUNCTION	88.61	2.95	0.0	Yes
MH-48	JUNCTION	87.75	3.04	0.0	Yes
MH-49	JUNCTION	87.00	3.09	0.0	Yes
MH-5	JUNCTION	87.14	2.95	0.0	Yes
MH-50	JUNCTION	86.74	3.06	0.0	
MH-52	JUNCTION	86.38	3.40	0.0	
MH-53	JUNCTION	88.41	3.04	0.0	Yes
MH-54	JUNCTION	86.05	3.67	0.0	Yes
MH-55	JUNCTION	92.86	2.86	0.0	Yes
MH-57	JUNCTION	89.15	3.28	0.0	Yes
MH-58	JUNCTION	86.94	3.57	0.0	Yes
MH-59	JUNCTION	87.10	2.88	0.0	Yes
MH-6	JUNCTION	86.97	3.01	0.0	Yes
MH-60	JUNCTION	86.63	3.26	0.0	Yes
MH-61	JUNCTION	85.75	3.75	0.0	
MH-62	JUNCTION	86.23	3.69	0.0	Yes
MH-63	JUNCTION	85.81	2.99	0.0	Yes
MH-64	JUNCTION	85.55	3.23	0.0	Yes
MH-65	JUNCTION	84.30	4.30	0.0	
MH-66	JUNCTION	85.69	2.96	0.0	Yes
MH-67	JUNCTION	83.92	4.57	0.0	Yes
MH-68	JUNCTION	85.72	2.91	0.0	Yes
MH-69	JUNCTION	85.49	3.04	0.0	Yes
MH-7	JUNCTION	86.55	3.31	0.0	Yes
MH-70	JUNCTION	85.22	3.28	0.0	Yes
MH-71	JUNCTION	83.68	4.68	0.0	
MH-72	JUNCTION	85.67	2.88	0.0	Yes
MH-73	JUNCTION	83.46	4.77	0.0	
MH-74	JUNCTION	85.68	2.81	0.0	Yes
MH-75	JUNCTION	83.32	4.84	0.0	
MH-76	JUNCTION	83.16	4.96	0.0	
MH-77	JUNCTION	85.44	3.04	0.0	Yes
MH-79	JUNCTION	85.27	3.13	0.0	Yes
MH-8	JUNCTION	87.00	2.80	0.0	Yes
MH-81	JUNCTION	85.13	3.21	0.0	Yes
MH-82	JUNCTION	82.94	5.32	0.0	
MH-83	JUNCTION	84.20	2.80	0.0	Yes
MH-84	JUNCTION	82.69	4.34	0.0	
MH-86	JUNCTION	81.61	4.30	0.0	Yes
MH-87	JUNCTION	76.57	3.71	1.0	Yes
MH-89	JUNCTION	81.44	2.88	0.0	Yes
MH-9	JUNCTION	86.26	3.54	0.0	Yes
MH-90	JUNCTION	84.05	2.80	0.0	Yes
MH-91	JUNCTION	80.53	3.75	0.0	Yes
MH-92	JUNCTION	78.24	3.07	0.0	Yes
MH-93	JUNCTION	77.50	3.26	0.0	Yes
MH-94	JUNCTION	76.27	4.10	1.0	
MH-95	JUNCTION	76.02	5.11	0.0	
MH-96	JUNCTION	81.57	2.80	0.0	Yes
MH-97	JUNCTION	79.99	3.09	0.0	Yes
MH-98	JUNCTION	79.26	2.84	0.0	Yes

MH-99	JUNCTION	78.43	2.73	0.0
MH-HW1	OUTFALL	82.62	1.65	0.0
OF1	OUTFALL	75.83	1.05	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	% Slope	Roughness
STM-101-105	MH-101	MH-105	CONDUIT	17.5	0.3029	0.0130
STM-10-13	MH-10	MH-13	CONDUIT	83.5	0.2000	0.0130
STM-102-103	MH-102	MH-103	CONDUIT	70.0	4.0032	0.0130
STM-103-104	MH-103	MH-104	CONDUIT	43.0	4.0032	0.0130
STM-104-105	MH-104	MH-105	CONDUIT	66.5	1.2001	0.0130
STM-105-OF1	MH-105	OF1	CONDUIT	20.0	0.3000	0.0130
STM-11-13	MH-11	MH-13	CONDUIT	92.5	0.7006	0.0130
STM-1-2	MH-1	MH-2	CONDUIT	73.0	0.3507	0.0130
STM-13-16	MH-13	MH-16	CONDUIT	76.0	0.2000	0.0130
STM-14-15	MH-14	MH-15	CONDUIT	74.0	0.2000	0.0130
STM-14-33	MH-14	MH-33	CONDUIT	15.5	0.3484	0.0130
STM-15-16	MH-15	MH-16	CONDUIT	68.5	0.2496	0.0130
STM-16-37	MH-16	MH-37	CONDUIT	88.0	0.1500	0.0130
STM-17-18	MH-17	MH-18	CONDUIT	50.5	0.3505	0.0130
STM-18-19	MH-18	MH-19	CONDUIT	13.5	0.3482	0.0130
STM-19-20	MH-19	MH-20	CONDUIT	63.0	0.2000	0.0130
STM-20-21	MH-20	MH-21	CONDUIT	13.5	0.2000	0.0130
STM-21-25	MH-21	MH-25	CONDUIT	31.5	0.2000	0.0130
STM-22-23	MH-22	MH-23	CONDUIT	56.5	0.2496	0.0130
STM-2-3	MH-2	MH-3	CONDUIT	85.0	0.2000	0.0130
STM-23-24	MH-23	MH-24	CONDUIT	13.5	0.2519	0.0130
STM-24-25	MH-24	MH-25	CONDUIT	25.5	0.2510	0.0130
STM-25-26	MH-25	MH-26	CONDUIT	90.0	0.2000	0.0130
STM-26-29	MH-26	MH-29	CONDUIT	90.0	0.2000	0.0130
STM-27-28	MH-27	MH-28	CONDUIT	92.0	3.4020	0.0130
STM-27-55	MH-27	MH-55	CONDUIT	76.0	0.3500	0.0130
STM-28-29	MH-28	MH-29	CONDUIT	97.0	1.6507	0.0130
STM-29-32	MH-29	MH-32	CONDUIT	86.0	0.3000	0.0130
STM-30-31	MH-30	MH-31	CONDUIT	118.5	0.3502	0.0130
STM-31-32	MH-31	MH-32	CONDUIT	118.5	0.4498	0.0130
STM-32-37	MH-32	MH-37	CONDUIT	86.0	0.7000	0.0130
STM-33-34	MH-33	MH-34	CONDUIT	77.5	0.2000	0.0130
STM-34-36	MH-34	MH-36	CONDUIT	74.5	0.2000	0.0130
STM-36-37	MH-36	MH-37	CONDUIT	64.5	0.1504	0.0130
STM-3-7	MH-3	MH-7	CONDUIT	52.0	0.2000	0.0130
STM-37-40	MH-37	MH-40	CONDUIT	76.0	0.4000	0.0130
STM-38-39	MH-38	MH-39	CONDUIT	61.5	0.2000	0.0130
STM-38-62	MH-38	MH-62	CONDUIT	15.0	0.5000	0.0130
STM-39-40	MH-39	MH-40	CONDUIT	60.5	1.1505	0.0130
STM-40-65	MH-40	MH-65	CONDUIT	88.0	0.2500	0.0130
STM-41-43	MH-41	MH-43	CONDUIT	35.5	0.3493	0.0130
STM-43-45	MH-43	MH-45	CONDUIT	105.0	0.2000	0.0130
STM-45-46	MH-45	MH-46	CONDUIT	30.0	0.2000	0.0130
STM-46-52	MH-46	MH-52	CONDUIT	15.5	0.2000	0.0130
STM-47-48	MH-47	MH-48	CONDUIT	31.5	2.8520	0.0130
STM-47-53	MH-47	MH-53	CONDUIT	74.5	0.2497	0.0130
STM-48-49	MH-48	MH-49	CONDUIT	55.5	0.9009	0.0130
STM-49-50	MH-49	MH-50	CONDUIT	118.5	0.2000	0.0130
STM-50-52	MH-50	MH-52	CONDUIT	10.0	0.2000	0.0130
STM-52-54	MH-52	MH-54	CONDUIT	75.5	0.1497	0.0130
STM-53-54	MH-53	MH-54	CONDUIT	81.0	2.0510	0.0130
STM-54-61	MH-54	MH-61	CONDUIT	105.5	0.2502	0.0130
STM-55-57	MH-55	MH-57	CONDUIT	94.0	3.4521	0.0130
STM-5-6	MH-5	MH-6	CONDUIT	76.5	0.2000	0.0130

STM-57-58	MH-57	MH-58	CONDUIT	91.0	
1.7508	0.0130				
STM-58-60	MH-58	MH-60	CONDUIT	91.0	
0.2506	0.0130				
STM-59-60	MH-59	MH-60	CONDUIT	57.0	
0.3000	0.0130				
STM-60-61	MH-60	MH-61	CONDUIT	88.0	
0.4000	0.0130				
STM-61-65	MH-61	MH-65	CONDUIT	86.0	
0.6000	0.0130				
STM-62-63	MH-62	MH-63	CONDUIT	69.0	
0.5000	0.0130				
STM-63-64	MH-63	MH-64	CONDUIT	13.0	
0.3000	0.0130				
STM-64-65	MH-64	MH-65	CONDUIT	120.0	
0.2000	0.0130				
STM-65-67	MH-65	MH-67	CONDUIT	76.0	
0.3000	0.0130				
STM-66-67	MH-66	MH-67	CONDUIT	78.5	
0.2000	0.0130				
STM-66-68	MH-66	MH-68	CONDUIT	13.5	
0.3482	0.0130				
STM-6-7	MH-6	MH-7	CONDUIT	82.5	
0.2000	0.0130				
STM-67-71	MH-67	MH-71	CONDUIT	88.0	
0.2500	0.0130				
STM-68-69	MH-68	MH-69	CONDUIT	69.0	
0.3000	0.0130				
STM-69-70	MH-69	MH-70	CONDUIT	14.0	
0.3000	0.0130				
STM-70-71	MH-70	MH-71	CONDUIT	78.0	
0.1500	0.0130				
STM-71-73	MH-71	MH-73	CONDUIT	82.0	
0.2500	0.0130				
STM-72-73	MH-72	MH-73	CONDUIT	45.5	
0.7011	0.0130				
STM-72-77	MH-72	MH-77	CONDUIT	54.0	
0.3000	0.0130				
STM-73-75	MH-73	MH-75	CONDUIT	47.0	
0.2511	0.0130				
STM-74-75	MH-74	MH-75	CONDUIT	51.0	
0.6510	0.0130				
STM-74-79	MH-74	MH-79	CONDUIT	54.0	
0.3500	0.0130				
STM-75-76	MH-75	MH-76	CONDUIT	41.0	
0.2512	0.0130				
STM-76-82	MH-76	MH-82	CONDUIT	61.5	
0.2504	0.0130				
STM-77-79	MH-77	MH-79	CONDUIT	46.5	
0.2000	0.0130				
STM-7-9	MH-7	MH-9	CONDUIT	46.5	
0.3011	0.0130				
STM-79-81	MH-79	MH-81	CONDUIT	40.0	
0.2000	0.0130				
STM-81-82	MH-81	MH-82	CONDUIT	48.0	
0.1813	0.0130				
STM-82-84	MH-82	MH-84	CONDUIT	78.0	
0.2500	0.0130				
STM-83-84	MH-83	MH-84	CONDUIT	16.0	
0.3500	0.0130				
STM-84-HW1	MH-84	MH-HW1	CONDUIT	29.0	
0.2517	0.0130				
STM-86-87	MH-86	MH-87	CONDUIT	125.0	
3.5526	0.0130				
STM-87-94	MH-87	MH-94	CONDUIT	74.0	
0.3000	0.0130				
STM-8-9	MH-8	MH-9	CONDUIT	37.5	
0.3493	0.0130				
STM-89-91	MH-89	MH-91	CONDUIT	90.0	
0.4500	0.0130				
STM-90-91	MH-90	MH-91	CONDUIT	66.0	
3.9030	0.0130				
STM-9-10	MH-9	MH-10	CONDUIT	89.5	
0.1497	0.0130				
STM-91-92	MH-91	MH-92	CONDUIT	59.0	
3.5531	0.0130				
STM-92-93	MH-92	MH-93	CONDUIT	10.0	
3.5522	0.0130				
STM-93-94	MH-93	MH-94	CONDUIT	31.5	
1.0001	0.0130				
STM-94-95	MH-94	MH-95	CONDUIT	75.0	
0.3000	0.0130				
STM-95-101	MH-95	MH-101	CONDUIT	17.0	
0.2529	0.0130				
STM-96-97	MH-96	MH-97	CONDUIT	48.0	
2.7010	0.0130				
STM-97-98	MH-97	MH-98	CONDUIT	35.5	
1.9497	0.0130				
STM-98-99	MH-98	MH-99	CONDUIT	42.0	
1.8003	0.0130				
STM-99-101	MH-99	MH-101	CONDUIT	19.5	
0.4000	0.0130				

****
Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
STM-101-105	CIRCULAR	1.05	0.87	0.26	1.05	1	1502.88
STM-10-13	CIRCULAR	0.68	0.36	0.17	0.68	1	375.95
STM-102-103	CIRCULAR	0.30	0.07	0.07	0.30	1	193.49
STM-103-104	CIRCULAR	0.30	0.07	0.07	0.30	1	193.49
STM-104-105	CIRCULAR	0.82	0.53	0.21	0.82	1	1572.59
STM-105-OF1	CIRCULAR	1.05	0.87	0.26	1.05	1	1495.77
STM-11-13	CIRCULAR	0.38	0.11	0.09	0.38	1	146.76
STM-1-2	CIRCULAR	0.30	0.07	0.07	0.30	1	57.27
STM-13-16	CIRCULAR	0.75	0.44	0.19	0.75	1	

STM-14-15	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-14-33	CIRCULAR	0.30	0.07	0.07	0.30	1
57.08						
STM-15-16	CIRCULAR	0.53	0.22	0.13	0.53	1
214.89						
STM-16-37	CIRCULAR	0.90	0.64	0.23	0.90	1
701.17						
STM-17-18	CIRCULAR	0.30	0.07	0.07	0.30	1
57.25						
STM-18-19	CIRCULAR	0.30	0.07	0.07	0.30	1
57.06						
STM-19-20	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-20-21	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-21-25	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-22-23	CIRCULAR	0.82	0.53	0.21	0.82	1
717.13						
STM-2-3	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-23-24	CIRCULAR	0.82	0.53	0.21	0.82	1
720.42						
STM-24-25	CIRCULAR	0.82	0.53	0.21	0.82	1
719.17						
STM-25-26	CIRCULAR	0.97	0.75	0.24	0.97	1
1002.29						
STM-26-29	CIRCULAR	0.97	0.75	0.24	0.97	1
1002.29						
STM-27-28	CIRCULAR	0.38	0.11	0.09	0.38	1
323.41						
STM-27-55	CIRCULAR	0.30	0.07	0.07	0.30	1
57.21						
STM-28-29	CIRCULAR	0.45	0.16	0.11	0.45	1
366.33						
STM-29-32	CIRCULAR	0.97	0.75	0.24	0.97	1
1227.55						
STM-30-31	CIRCULAR	0.60	0.28	0.15	0.60	1
363.39						
STM-31-32	CIRCULAR	0.68	0.36	0.17	0.68	1
563.79						
STM-32-37	CIRCULAR	0.97	0.75	0.24	0.97	1
1875.14						
STM-33-34	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-34-36	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-36-37	CIRCULAR	0.60	0.28	0.15	0.60	1
238.13						
STM-3-7	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-37-40	CIRCULAR	1.20	1.13	0.30	1.20	1
2465.93						
STM-38-39	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-38-62	CIRCULAR	0.30	0.07	0.07	0.30	1
68.38						
STM-39-40	CIRCULAR	0.45	0.16	0.11	0.45	1
305.83						
STM-40-65	CIRCULAR	1.35	1.43	0.34	1.35	1
2668.87						
STM-41-43	CIRCULAR	0.30	0.07	0.07	0.30	1
57.15						
STM-43-45	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-45-46	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-46-52	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-47-48	CIRCULAR	0.30	0.07	0.07	0.30	1
163.32						
STM-47-53	CIRCULAR	0.45	0.16	0.11	0.45	1
142.47						
STM-48-49	CIRCULAR	0.30	0.07	0.07	0.30	1
91.79						
STM-49-50	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-50-52	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-52-54	CIRCULAR	0.68	0.36	0.17	0.68	1
325.22						
STM-53-54	CIRCULAR	0.45	0.16	0.11	0.45	1
408.34						
STM-54-61	CIRCULAR	0.90	0.64	0.23	0.90	1
905.64						
STM-55-57	CIRCULAR	0.30	0.07	0.07	0.30	1
179.68						
STM-5-6	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-57-58	CIRCULAR	0.45	0.16	0.11	0.45	1
377.27						
STM-58-60	CIRCULAR	0.68	0.36	0.17	0.68	1
420.78						
STM-59-60	CIRCULAR	0.38	0.11	0.09	0.38	1
96.04						
STM-60-61	CIRCULAR	0.68	0.36	0.17	0.68	1
531.67						
STM-61-65	CIRCULAR	0.90	0.64	0.23	0.90	1
1402.36						
STM-62-63	CIRCULAR	0.30	0.07	0.07	0.30	1
68.38						
STM-63-64	CIRCULAR	0.38	0.11	0.09	0.38	1
96.04						
STM-64-65	CIRCULAR	0.60	0.28	0.15	0.60	1
274.61						
STM-65-67	CIRCULAR	1.50	1.77	0.38	1.50	1
3872.02						
STM-66-67	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-66-68	CIRCULAR	0.30	0.07	0.07	0.30	1
57.06						
STM-6-7	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-67-71	CIRCULAR	1.65	2.14	0.41	1.65	1
4557.51						
STM-68-69	CIRCULAR	0.38	0.11	0.09	0.38	1
96.04						
STM-69-70	CIRCULAR	0.38	0.11	0.09	0.38	1
96.04						

STM-70-71	CIRCULAR	0.60	0.28	0.15	0.60	1
237.82						
STM-71-73	CIRCULAR	1.65	2.14	0.41	1.65	1
4557.51						
STM-72-73	CIRCULAR	0.30	0.07	0.07	0.30	1
80.98						
STM-72-77	CIRCULAR	0.38	0.11	0.09	0.38	1
96.04						
STM-73-75	CIRCULAR	1.65	2.14	0.41	1.65	1
4567.19						
STM-74-75	CIRCULAR	0.30	0.07	0.07	0.30	1
78.03						
STM-74-79	CIRCULAR	0.30	0.07	0.07	0.30	1
57.21						
STM-75-76	CIRCULAR	1.65	2.14	0.41	1.65	1
4568.61						
STM-76-82	CIRCULAR	1.65	2.14	0.41	1.65	1
4561.21						
STM-77-79	CIRCULAR	0.45	0.16	0.11	0.45	1
127.51						
STM-7-9	CIRCULAR	0.53	0.22	0.13	0.53	1
235.99						
STM-79-81	CIRCULAR	0.53	0.22	0.13	0.53	1
192.34						
STM-81-82	CIRCULAR	0.53	0.22	0.13	0.53	1
183.10						
STM-82-84	CIRCULAR	1.65	2.14	0.41	1.65	1
4557.51						
STM-83-84	CIRCULAR	0.30	0.07	0.07	0.30	1
57.21						
STM-84-HW1	CIRCULAR	1.65	2.14	0.41	1.65	1
4573.19						
STM-86-87	CIRCULAR	0.38	0.11	0.09	0.38	1
330.49						
STM-87-94	CIRCULAR	0.97	0.75	0.24	0.97	1
1227.55						
STM-8-9	CIRCULAR	0.30	0.07	0.07	0.30	1
57.16						
STM-89-91	CIRCULAR	0.38	0.11	0.09	0.38	1
117.62						
STM-90-91	CIRCULAR	0.30	0.07	0.07	0.30	1
191.05						
STM-9-10	CIRCULAR	0.68	0.36	0.17	0.68	1
325.27						
STM-91-92	CIRCULAR	0.38	0.11	0.09	0.38	1
330.51						
STM-92-93	CIRCULAR	0.38	0.11	0.09	0.38	1
330.47						
STM-93-94	CIRCULAR	0.45	0.16	0.11	0.45	1
285.13						
STM-94-95	CIRCULAR	1.05	0.87	0.26	1.05	1
1495.77						
STM-95-101	CIRCULAR	1.05	0.87	0.26	1.05	1
1373.46						
STM-96-97	CIRCULAR	0.30	0.07	0.07	0.30	1
158.93						
STM-97-98	CIRCULAR	0.30	0.07	0.07	0.30	1
135.03						
STM-98-99	CIRCULAR	0.30	0.07	0.07	0.30	1
129.76						
STM-99-101	CIRCULAR	0.38	0.11	0.09	0.38	1
110.90						

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

****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 12/14/2021 00:00:00
Ending Date 12/15/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Routing Time Step ..... 1.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 6
Head Tolerance ..... 0.000100 m

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	62.205	622.053
External Outflow	62.205	622.053
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.265	2.653
Final Stored Volume	0.265	2.648
Continuity Error (%)	0.001	

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

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*******************************
Highest Flow Instability Indexes
*******************************
Link STM-73-75 (41)
Link STM-95-101 (30)
Link STM-75-76 (30)
Link STM-50-52 (17)
Link STM-65-67 (10)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.75 sec
Average Time Step           :     1.00 sec
Maximum Time Step           :     1.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     6.76
Percent Not Converging      :    24.86
Time Step Frequencies       :
    1.000 -  0.758 sec      :   100.00 %
    0.758 -  0.574 sec      :     0.00 %
    0.574 -  0.435 sec      :     0.00 %
    0.435 -  0.330 sec      :     0.00 %
    0.330 -  0.250 sec      :     0.00 %


******************
Node Depth Summary
******************

-------------------------------------------------------------------------------
                            Average  Maximum  Maximum  Time of Max    Reported
                              Depth    Depth      HGL   Occurrence  Max Depth
Node                Type      Meters   Meters   Meters  days hr:min      Meters
-------------------------------------------------------------------------------
MH-1                JUNCTION    0.41     0.41    87.77     0  17:16        0.41
MH-10               JUNCTION    1.22     1.22    87.32     0  09:45        1.22
MH-101              JUNCTION    1.27     1.27    77.22     0  16:42        1.27
MH-102              JUNCTION    0.10     0.10    85.18     0  00:15        0.10
MH-103              JUNCTION    0.13     0.13    82.02     0  00:00        0.13
MH-104              JUNCTION    0.53     0.53    78.55     0  00:00        0.53
MH-105              JUNCTION    1.16     1.16    77.05     0  23:46        1.16
MH-11               JUNCTION    0.21     0.21    87.50     0  02:26        0.21
MH-13               JUNCTION    1.29     1.29    87.15     0  19:41        1.29
MH-14               JUNCTION    0.59     0.59    87.26     0  01:51        0.59
MH-15               JUNCTION    0.73     0.73    87.18     0  00:45        0.73
MH-16               JUNCTION    1.49     1.49    87.05     0  23:23        1.49
MH-17               JUNCTION    0.19     0.19    88.60     0  04:24        0.19
MH-18               JUNCTION    0.23     0.23    88.42     0  08:47        0.23
MH-19               JUNCTION    0.36     0.36    88.36     0  08:46        0.36
MH-2                JUNCTION    0.71     0.71    87.67     0  12:50        0.71
MH-20               JUNCTION    0.47     0.47    88.31     0  08:46        0.47
MH-21               JUNCTION    0.50     0.50    88.28     0  08:45        0.50
MH-22               JUNCTION    0.71     0.71    88.57     0  08:46        0.71
MH-23               JUNCTION    0.76     0.76    88.45     0  08:46        0.76
MH-24               JUNCTION    0.77     0.77    88.40     0  08:46        0.77
MH-25               JUNCTION    1.02     1.02    88.22     0  08:45        1.02
MH-26               JUNCTION    1.11     1.11    88.11     0  22:43        1.11
MH-27               JUNCTION    0.20     0.20    93.29     0  00:00        0.20
MH-28               JUNCTION    0.30     0.30    89.55     0  00:00        0.30
MH-29               JUNCTION    1.18     1.18    87.90     0  19:38        1.18
MH-3                JUNCTION    0.88     0.88    87.60     0  01:49        0.88
MH-30               JUNCTION    0.40     0.40    88.25     0  08:47        0.40
MH-31               JUNCTION    0.75     0.75    88.11     0  23:23        0.75
MH-32               JUNCTION    1.24     1.24    87.68     0  19:14        1.24
MH-33               JUNCTION    0.63     0.63    87.24     0  20:08        0.63
MH-34               JUNCTION    0.80     0.80    87.18     0  17:12        0.80
MH-36               JUNCTION    0.92     0.92    87.08     0  06:59        0.92
MH-37               JUNCTION    1.84     1.84    86.96     0  20:26        1.84
MH-38               JUNCTION    0.27     0.27    87.32     0  00:02        0.27
MH-39               JUNCTION    0.21     0.21    87.10     0  00:00        0.21
MH-40               JUNCTION    2.01     2.01    86.68     0  11:03        2.01
MH-41               JUNCTION    0.39     0.39    87.66     0  23:26        0.39
MH-43               JUNCTION    0.73     0.73    87.65     0  15:23        0.73
MH-45               JUNCTION    0.88     0.88    87.54     0  23:13        0.88
MH-46               JUNCTION    0.94     0.95    87.51     0  11:08        0.95
MH-47               JUNCTION    0.21     0.21    88.82     0  00:01        0.21
MH-48               JUNCTION    0.50     0.50    88.25     0  11:37        0.50
MH-49               JUNCTION    0.83     0.83    87.83     0  15:28        0.83
MH-5                JUNCTION    0.58     0.58    87.72     0  17:54        0.58
MH-50               JUNCTION    0.81     0.81    87.54     0  22:04        0.81
MH-52               JUNCTION    1.11     1.11    87.50     0  02:29        1.11
MH-53               JUNCTION    0.19     0.19    88.60     0  00:00        0.19
MH-54               JUNCTION    1.27     1.27    87.32     0  23:53        1.27
MH-55               JUNCTION    0.20     0.20    93.06     0  00:23        0.20
MH-57               JUNCTION    0.26     0.26    89.42     0  00:00        0.26
MH-58               JUNCTION    0.70     0.70    87.64     0  13:22        0.70
MH-59               JUNCTION    0.39     0.39    87.50     0  05:56        0.39
MH-6                JUNCTION    0.72     0.72    87.69     0  07:43        0.72
MH-60               JUNCTION    0.80     0.80    87.43     0  07:22        0.80
MH-61               JUNCTION    1.36     1.36    87.12     0  23:51        1.36
MH-62               JUNCTION    0.76     0.76    86.99     0  20:31        0.76
MH-63               JUNCTION    0.88     0.89    86.70     0  06:31        0.88
MH-64               JUNCTION    1.12     1.12    86.67     0  06:06        1.12
MH-65               JUNCTION    2.19     2.19    86.49     0  09:09        2.19
MH-66               JUNCTION    0.65     0.65    86.33     0  20:14        0.65
MH-67               JUNCTION    2.33     2.33    86.25     0  12:33        2.33
MH-68               JUNCTION    0.60     0.60    86.32     0  19:19        0.60
MH-69               JUNCTION    0.70     0.70    86.19     0  18:22        0.70
MH-7                JUNCTION    1.01     1.01    87.55     0  00:06        1.01
MH-70               JUNCTION    0.92     0.92    86.14     0  08:44        0.92
MH-71               JUNCTION    2.37     2.37    86.06     0  14:36        2.37
MH-72               JUNCTION    0.24     0.24    85.91     0  14:58        0.24
MH-73               JUNCTION    2.40     2.40    85.86     0  17:21        2.40
MH-74               JUNCTION    0.15     0.15    85.83     0  10:26        0.15
MH-75               JUNCTION    2.42     2.42    85.74     0  20:53        2.42
MH-76               JUNCTION    2.18     2.18    85.33     0  08:23        2.18
MH-77               JUNCTION    0.31     0.31    85.74     0  11:39        0.31
MH-79               JUNCTION    0.42     0.42    85.69     0  11:35        0.42
MH-8                JUNCTION    0.41     0.41    87.41     0  10:46        0.41
MH-81               JUNCTION    0.48     0.48    85.61     0  11:35        0.48
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MH-82	JUNCTION	1.93	1.93	84.88	0	11:19	1.93
MH-83	JUNCTION	0.20	0.20	84.39	0	09:39	0.20
MH-84	JUNCTION	1.66	1.66	84.35	0	17:32	1.66
MH-86	JUNCTION	0.21	0.21	81.82	0	00:17	0.21
MH-87	JUNCTION	1.03	1.03	77.60	0	01:13	1.03
MH-89	JUNCTION	0.23	0.23	81.67	0	00:00	0.23
MH-9	JUNCTION	1.15	1.15	87.41	0	05:06	1.15
MH-90	JUNCTION	0.11	0.11	84.16	0	00:03	0.11
MH-91	JUNCTION	0.20	0.20	80.73	0	00:00	0.20
MH-92	JUNCTION	0.22	0.22	78.46	0	00:00	0.22
MH-93	JUNCTION	0.39	0.39	77.89	0	00:01	0.39
MH-94	JUNCTION	1.17	1.17	77.44	0	11:11	1.17
MH-95	JUNCTION	1.25	1.25	77.27	0	15:36	1.25
MH-96	JUNCTION	0.10	0.10	81.67	0	00:00	0.10
MH-97	JUNCTION	0.14	0.14	80.13	0	00:00	0.14
MH-98	JUNCTION	0.19	0.19	79.45	0	00:00	0.19
MH-99	JUNCTION	0.30	0.30	78.73	0	00:00	0.30
MH-HW1	OUTFALL	1.65	1.65	84.27	0	00:00	1.65
OF1	OUTFALL	1.05	1.05	76.88	0	00:00	1.05

Node Inflow Summary

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
MH-1	JUNCTION	36.41	36.41	0	00:00	3.15	3.15	0.000
MH-10	JUNCTION	48.34	312.62	0	20:12	4.18	27	0.000
MH-101	JUNCTION	0.00	1308.90	0	04:15	0	113	-0.000
MH-102	JUNCTION	49.40	49.40	0	00:00	4.27	4.27	0.000
MH-103	JUNCTION	23.14	72.53	0	00:15	2	6.27	-0.000
MH-104	JUNCTION	1077.01	1149.54	0	00:00	93.1	99.3	-0.000
MH-105	JUNCTION	0.00	2458.41	0	04:39	0	212	0.000
MH-11	JUNCTION	87.73	87.73	0	00:00	7.58	7.58	0.000
MH-13	JUNCTION	5.88	406.22	0	13:25	0.508	35.1	0.000
MH-14	JUNCTION	119.17	119.17	0	00:00	10.3	10.3	-0.000
MH-15	JUNCTION	67.97	160.14	0	12:30	5.87	13.8	-0.000
MH-16	JUNCTION	0.00	566.34	0	17:50	0	48.9	-0.000
MH-17	JUNCTION	41.38	41.38	0	00:00	3.58	3.58	-0.000
MH-18	JUNCTION	7.41	48.79	0	07:39	0.64	4.22	0.000
MH-19	JUNCTION	33.55	82.34	0	18:42	2.9	7.11	0.000
MH-2	JUNCTION	32.90	69.32	0	01:41	2.84	5.99	-0.000
MH-20	JUNCTION	18.78	101.12	0	18:42	1.62	8.74	0.000
MH-21	JUNCTION	0.00	101.12	0	18:42	0	8.74	0.000
MH-22	JUNCTION	612.05	612.05	0	00:00	52.9	52.9	0.000
MH-23	JUNCTION	2.04	614.09	0	09:40	0.177	53.1	0.000
MH-24	JUNCTION	0.00	614.09	0	18:41	0	53.1	0.000
MH-25	JUNCTION	66.24	781.45	0	18:41	5.72	67.5	-0.000
MH-26	JUNCTION	51.75	833.22	0	11:14	4.47	72	0.000
MH-27	JUNCTION	201.93	201.93	0	00:00	17.4	17.4	-0.000
MH-28	JUNCTION	105.35	292.05	0	00:00	9.1	25.2	0.000
MH-29	JUNCTION	0.00	1125.26	0	09:40	0	97.2	0.000
MH-3	JUNCTION	17.68	87.00	0	03:47	1.53	7.52	-0.000
MH-30	JUNCTION	240.26	240.26	0	00:00	20.8	20.8	0.000
MH-31	JUNCTION	199.54	439.81	0	04:03	17.2	38	0.000
MH-32	JUNCTION	0.00	1565.07	0	16:38	0	135	-0.000
MH-33	JUNCTION	43.76	70.80	0	03:34	3.78	6.11	0.000
MH-34	JUNCTION	89.42	160.21	0	14:09	7.73	13.8	-0.000
MH-36	JUNCTION	53.96	214.16	0	21:31	4.66	18.5	-0.000
MH-37	JUNCTION	0.00	2345.55	0	22:49	0	203	-0.000
MH-38	JUNCTION	107.59	107.59	0	00:00	9.3	9.3	0.000
MH-39	JUNCTION	50.60	137.44	0	00:00	4.37	11.9	-0.000
MH-40	JUNCTION	0.00	2482.99	0	16:05	0	215	0.000
MH-41	JUNCTION	11.59	11.59	0	00:00	1	1	-0.000
MH-43	JUNCTION	116.18	127.77	0	23:13	10	11	0.000
MH-45	JUNCTION	0.00	127.77	0	08:27	0	11	-0.000
MH-46	JUNCTION	0.00	127.78	0	21:51	0	11	0.000

MH-47		JUNCTION	122.48	122.48	0	00:00	10.6	
10.6	0.000							
MH-48		JUNCTION	16.24	78.41	0	00:01	1.4	
6.77	0.000							
MH-49		JUNCTION	128.72	207.13	0	02:31	11.1	
17.9	-0.000							
MH-5		JUNCTION	56.28	56.28	0	00:00	4.86	
4.86	0.000							
MH-50		JUNCTION	0.00	207.14	0	14:11	0	
17.9	0.000							
MH-52		JUNCTION	0.00	334.93	0	21:52	0	
28.9	-0.000							
MH-53		JUNCTION	95.09	155.40	0	00:00	8.22	
13.4	-0.000							
MH-54		JUNCTION	295.62	785.94	0	19:57	25.5	
67.9	0.000							
MH-55		JUNCTION	120.62	135.86	0	00:00	10.4	
11.7	0.000							
MH-57		JUNCTION	109.41	245.27	0	00:23	9.45	
21.2	-0.000							
MH-58		JUNCTION	96.04	341.31	0	00:00	8.3	
29.5	-0.000							
MH-59		JUNCTION	57.93	57.93	0	00:00	5.01	
5.01	0.000							
MH-6		JUNCTION	48.05	104.34	0	08:29	4.15	
9.01	-0.000							
MH-60		JUNCTION	22.76	422.03	0	13:58	1.97	
36.5	-0.000							
MH-61		JUNCTION	0.00	1207.95	0	22:43	0	
104	-0.000							
MH-62		JUNCTION	40.64	61.39	0	00:02	3.51	
5.3	0.000							
MH-63		JUNCTION	9.21	70.62	0	04:28	0.796	
6.1	0.000							
MH-64		JUNCTION	138.20	208.82	0	07:09	11.9	
18	-0.000							
MH-65		JUNCTION	0.00	3899.71	0	01:46	0	
337	-0.000							
MH-66		JUNCTION	107.59	107.59	0	00:00	9.3	
9.3	-0.000							
MH-67		JUNCTION	296.71	4277.33	0	22:38	25.6	
370	-0.000							
MH-68		JUNCTION	47.03	73.74	0	16:58	4.06	
6.37	0.000							
MH-69		JUNCTION	11.08	84.81	0	16:58	0.957	
7.33	0.000							
MH-7		JUNCTION	1.15	192.49	0	07:09	0.0992	
16.6	0.000							
MH-70		JUNCTION	86.90	171.73	0	20:53	7.51	
14.8	-0.000							
MH-71		JUNCTION	0.00	4449.03	0	12:19	0	
384	0.000							
MH-72		JUNCTION	94.35	94.35	0	00:00	8.15	
8.15	-0.000							
MH-73		JUNCTION	0.00	4481.83	0	00:08	0	
387	-0.000							
MH-74		JUNCTION	66.21	66.21	0	00:00	5.72	
5.72	-0.000							
MH-75		JUNCTION	0.00	4520.72	0	08:19	0	
391	0.000							
MH-76		JUNCTION	0.00	4520.65	0	14:30	0	
391	-0.000							
MH-77		JUNCTION	27.32	88.88	0	14:58	2.36	
7.68	-0.000							
MH-79		JUNCTION	23.67	139.95	0	13:03	2.05	
12.1	-0.000							
MH-8		JUNCTION	8.28	8.28	0	00:00	0.715	
0.715	0.000							
MH-81		JUNCTION	50.98	190.93	0	11:35	4.4	
16.5	-0.000							
MH-82		JUNCTION	0.00	4711.55	0	07:17	0	
407	0.000							
MH-83		JUNCTION	29.79	29.79	0	00:00	2.57	
2.57	0.000							
MH-84		JUNCTION	0.00	4741.30	0	11:19	0	
410	-0.000							
MH-86		JUNCTION	201.93	201.93	0	00:00	17.4	
17.4	0.000							
MH-87		JUNCTION	796.60	998.53	0	00:03	68.8	
86.3	0.000							
MH-89		JUNCTION	71.17	71.17	0	00:00	6.15	
6.15	-0.000							
MH-9		JUNCTION	63.50	264.29	0	18:28	5.49	
22.8	-0.000							
MH-90		JUNCTION	54.62	54.62	0	00:00	4.72	
4.72	0.000							
MH-91		JUNCTION	55.22	181.01	0	00:00	4.77	
15.6	-0.000							
MH-92		JUNCTION	14.07	195.08	0	00:00	1.22	
16.9	0.000							
MH-93		JUNCTION	22.31	217.40	0	00:00	1.93	
18.8	0.000							
MH-94		JUNCTION	0.00	1215.95	0	00:49	0	
105	-0.000							
MH-95		JUNCTION	0.00	1215.96	0	04:51	0	
105	-0.000							
MH-96		JUNCTION	39.72	39.72	0	00:00	3.43	
3.43	-0.000							
MH-97		JUNCTION	22.08	61.80	0	00:00	1.91	
5.34	-0.000							
MH-98		JUNCTION	31.12	92.92	0	00:00	2.69	
8.03	0.000							
MH-99		JUNCTION	0.00	92.92	0	00:00	0	
8.03	0.000							
MH-HW1		OUTFALL	0.00	4741.30	0	11:19	0	
410	0.000							
OF1		OUTFALL	0.00	2458.41	0	16:42	0	
212	0.000							

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Node Surcharge Summary
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Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters

MH-1	JUNCTION	24.00	0.109	2.390
MH-10	JUNCTION	24.00	0.522	2.351
MH-13	JUNCTION	24.00	0.130	2.388
MH-14	JUNCTION	24.00	0.138	2.361
MH-15	JUNCTION	24.00	0.209	2.338
MH-16	JUNCTION	24.00	0.248	2.380
MH-2	JUNCTION	24.00	0.262	2.383
MH-21	JUNCTION	24.00	0.019	2.756
MH-26	JUNCTION	24.00	0.115	2.653
MH-3	JUNCTION	24.00	0.369	2.326
MH-31	JUNCTION	24.00	0.067	2.463
MH-32	JUNCTION	24.00	0.181	2.341
MH-33	JUNCTION	24.00	0.177	2.356
MH-34	JUNCTION	24.00	0.272	2.316
MH-36	JUNCTION	24.00	0.317	2.310
MH-37	JUNCTION	24.00	0.153	2.338
MH-40	JUNCTION	24.00	0.039	2.497
MH-41	JUNCTION	24.00	0.087	2.409
MH-43	JUNCTION	24.00	0.205	2.365
MH-45	JUNCTION	24.00	0.299	2.321
MH-46	JUNCTION	24.00	0.391	2.289
MH-48	JUNCTION	24.00	0.156	2.538
MH-49	JUNCTION	24.00	0.281	2.255
MH-5	JUNCTION	24.00	0.131	2.366
MH-50	JUNCTION	24.00	0.254	2.255
MH-52	JUNCTION	24.00	0.255	2.284
MH-54	JUNCTION	24.00	0.120	2.403
MH-59	JUNCTION	24.00	0.018	2.484
MH-6	JUNCTION	24.00	0.254	2.286
MH-60	JUNCTION	24.00	0.046	2.457
MH-61	JUNCTION	24.00	0.162	2.393
MH-63	JUNCTION	24.00	0.510	2.105
MH-64	JUNCTION	24.00	0.520	2.114
MH-65	JUNCTION	24.00	0.350	2.111
MH-66	JUNCTION	24.00	0.190	2.306
MH-67	JUNCTION	24.00	0.276	2.236
MH-68	JUNCTION	24.00	0.224	2.309
MH-69	JUNCTION	24.00	0.299	2.331
MH-7	JUNCTION	24.00	0.300	2.305
MH-70	JUNCTION	24.00	0.324	2.358
MH-71	JUNCTION	24.00	0.354	2.305
MH-73	JUNCTION	24.00	0.138	2.374
MH-75	JUNCTION	24.00	0.089	2.423
MH-76	JUNCTION	24.00	0.466	2.786
MH-8	JUNCTION	24.00	0.112	2.390
MH-87	JUNCTION	24.00	0.048	2.684
MH-9	JUNCTION	24.00	0.241	2.392
MH-95	JUNCTION	24.00	0.175	3.859

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Node Flooding Summary
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No nodes were flooded.

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
MH-HW1	100.00	4741.27	4741.30	409.646
OF1	100.00	2458.39	2458.41	212.405
System	100.00	7199.67	7199.70	622.051

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
STM-101-105	CONDUIT	1308.87	0 04:39	1.51	0.87	1.00
STM-10-13	CONDUIT	312.62	0 13:25	0.87	0.83	1.00
STM-102-103	CONDUIT	49.40	0 00:15	2.28	0.26	0.35
STM-103-104	CONDUIT	72.53	0 00:00	2.53	0.37	0.43
STM-104-105	CONDUIT	1149.54	0 00:00	3.20	0.73	0.64
STM-105-OF1	CONDUIT	2458.41	0 16:42	2.84	1.64	1.00
STM-11-13	CONDUIT	87.73	0 00:18	0.95	0.60	0.78
STM-1-2	CONDUIT	36.42	0 01:41	0.52	0.64	1.00
STM-13-16	CONDUIT	406.21	0 17:54	0.92	0.82	1.00
STM-14-15	CONDUIT	92.17	0 12:30	0.58	0.72	1.00
STM-14-33	CONDUIT	27.04	0 03:34	0.38	0.47	1.00
STM-15-16	CONDUIT	160.14	0 20:22	0.74	0.75	1.00
STM-16-37	CONDUIT	566.34	0 14:35	0.89	0.81	1.00
STM-17-18	CONDUIT	41.38	0 07:39	0.84	0.72	0.65
STM-18-19	CONDUIT	48.79	0 18:42	0.88	0.86	0.73
STM-19-20	CONDUIT	82.34	0 18:42	0.55	0.65	0.89
STM-20-21	CONDUIT	101.12	0 18:42	0.64	0.79	1.00
STM-21-25	CONDUIT	101.12	0 04:23	0.64	0.79	1.00
STM-22-23	CONDUIT	612.05	0 09:40	1.24	0.85	0.87
STM-2-3	CONDUIT	69.33	0 03:47	0.44	0.54	1.00
STM-23-24	CONDUIT	614.09	0 18:41	1.21	0.85	0.91
STM-24-25	CONDUIT	614.09	0 18:41	1.26	0.85	0.86
STM-25-26	CONDUIT	781.47	0 11:14	1.05	0.78	1.00
STM-26-29	CONDUIT	833.21	0 09:40	1.12	0.83	1.00
STM-27-28	CONDUIT	186.70	0 00:00	3.03	0.58	0.55
STM-27-55	CONDUIT	15.24	0 00:00	0.57	0.27	0.40
STM-28-29	CONDUIT	292.05	0 00:00	2.55	0.80	0.68
STM-29-32	CONDUIT	1125.27	0 21:41	1.51	0.92	1.00
STM-30-31	CONDUIT	240.27	0 04:03	0.96	0.66	0.83
STM-31-32	CONDUIT	439.81	0 17:50	1.23	0.78	1.00
STM-32-37	CONDUIT	1565.07	0 05:21	2.10	0.83	1.00
STM-33-34	CONDUIT	70.79	0 14:09	0.45	0.56	1.00

STM-34-36	CONDUIT	160.21	0	21:31	0.74	0.83	1.00
STM-36-37	CONDUIT	214.16	0	06:21	0.76	0.90	1.00
STM-3-7	CONDUIT	87.01	0	20:32	0.55	0.68	1.00
STM-37-40	CONDUIT	2345.56	0	16:05	2.07	0.95	1.00
STM-38-39	CONDUIT	86.84	0	00:00	1.03	0.68	0.52
STM-38-62	CONDUIT	20.75	0	00:02	0.83	0.30	0.38
STM-39-40	CONDUIT	137.44	0	00:00	1.10	0.45	0.74
STM-40-65	CONDUIT	2482.98	0	04:20	1.73	0.93	1.00
STM-41-43	CONDUIT	11.59	0	23:13	0.16	0.20	1.00
STM-43-45	CONDUIT	127.77	0	08:27	0.59	0.66	1.00
STM-45-46	CONDUIT	127.78	0	21:51	0.59	0.66	1.00
STM-46-52	CONDUIT	127.80	0	21:51	0.59	0.66	1.00
STM-47-48	CONDUIT	62.17	0	00:01	1.15	0.38	0.71
STM-47-53	CONDUIT	60.31	0	00:00	0.94	0.42	0.42
STM-48-49	CONDUIT	78.41	0	02:31	1.11	0.85	1.00
STM-49-50	CONDUIT	207.14	0	14:11	0.96	1.08	1.00
STM-50-52	CONDUIT	207.16	0	04:41	0.96	1.08	1.00
STM-52-54	CONDUIT	334.92	0	19:57	0.94	1.03	1.00
STM-53-54	CONDUIT	155.40	0	00:00	1.28	0.38	0.71
STM-54-61	CONDUIT	785.95	0	22:43	1.24	0.87	1.00
STM-55-57	CONDUIT	135.86	0	00:23	2.79	0.76	0.65
STM-5-6	CONDUIT	56.28	0	08:29	0.35	0.44	1.00
STM-57-58	CONDUIT	245.27	0	00:00	2.52	0.65	0.59
STM-58-60	CONDUIT	341.33	0	13:58	0.95	0.81	1.00
STM-59-60	CONDUIT	57.94	0	01:53	0.52	0.60	1.00
STM-60-61	CONDUIT	422.03	0	02:22	1.18	0.79	1.00
STM-61-65	CONDUIT	1207.95	0	16:41	1.90	0.86	1.00
STM-62-63	CONDUIT	61.40	0	04:28	0.87	0.90	1.00
STM-63-64	CONDUIT	70.62	0	07:09	0.64	0.74	1.00
STM-64-65	CONDUIT	208.82	0	18:15	0.74	0.76	1.00
STM-65-67	CONDUIT	3899.72	0	22:38	2.21	1.01	1.00
STM-66-67	CONDUIT	80.91	0	19:09	0.51	0.63	1.00
STM-66-68	CONDUIT	26.71	0	16:58	0.38	0.47	1.00
STM-6-7	CONDUIT	104.34	0	08:01	0.66	0.82	1.00
STM-67-71	CONDUIT	4277.34	0	12:19	2.00	0.94	1.00
STM-68-69	CONDUIT	73.73	0	16:58	0.67	0.77	1.00
STM-69-70	CONDUIT	84.83	0	20:53	0.77	0.88	1.00
STM-70-71	CONDUIT	171.71	0	13:28	0.61	0.72	1.00
STM-71-73	CONDUIT	4449.04	0	00:08	2.08	0.98	1.00
STM-72-73	CONDUIT	32.79	0	17:29	0.54	0.40	0.79
STM-72-77	CONDUIT	61.56	0	14:58	0.84	0.64	0.63
STM-73-75	CONDUIT	4481.92	0	08:19	2.10	0.98	1.00
STM-74-75	CONDUIT	38.81	0	05:20	0.68	0.50	0.75
STM-74-79	CONDUIT	27.40	0	10:26	0.66	0.48	0.57
STM-75-76	CONDUIT	4520.65	0	14:30	2.11	0.99	1.00
STM-76-82	CONDUIT	4520.63	0	07:17	2.11	0.99	1.00
STM-77-79	CONDUIT	88.88	0	14:59	0.71	0.70	0.73
STM-7-9	CONDUIT	192.51	0	18:28	0.89	0.82	1.00
STM-79-81	CONDUIT	139.95	0	11:35	0.75	0.73	0.81
STM-81-82	CONDUIT	190.93	0	11:35	1.11	1.04	0.74
STM-82-84	CONDUIT	4711.51	0	11:19	2.21	1.03	0.98
STM-83-84	CONDUIT	29.79	0	10:26	0.59	0.52	0.68
STM-84-HW1	CONDUIT	4741.30	0	11:19	2.22	1.04	1.00
STM-86-87	CONDUIT	201.93	0	00:03	2.18	0.61	0.78
STM-87-94	CONDUIT	998.55	0	00:49	1.34	0.81	1.00
STM-8-9	CONDUIT	8.29	0	18:35	0.12	0.14	1.00
STM-89-91	CONDUIT	71.17	0	00:00	1.10	0.61	0.57
STM-90-91	CONDUIT	54.62	0	00:03	2.33	0.29	0.37
STM-9-10	CONDUIT	264.28	0	20:12	0.74	0.81	1.00
STM-91-92	CONDUIT	181.01	0	00:00	3.04	0.55	0.53
STM-92-93	CONDUIT	195.08	0	00:00	3.02	0.59	0.57
STM-93-94	CONDUIT	217.40	0	00:01	1.68	0.76	0.76
STM-94-95	CONDUIT	1215.96	0	04:51	1.40	0.81	1.00
STM-95-101	CONDUIT	1215.98	0	04:15	1.40	0.89	1.00
STM-96-97	CONDUIT	39.72	0	00:00	1.86	0.25	0.34
STM-97-98	CONDUIT	61.80	0	00:00	1.79	0.46	0.49
STM-98-99	CONDUIT	92.92	0	00:00	1.80	0.72	0.69
STM-99-101	CONDUIT	92.92	0	00:01	1.13	0.84	0.70

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Flow Classification Summary
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Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
STM-101-105	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-10-13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-102-103	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-103-104	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-104-105	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-105-OF1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-11-13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
STM-1-2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-13-16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-14-15	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-14-33	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-15-16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-16-37	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-17-18	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-18-19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-19-20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

STM-20-21	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-21-25	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-22-23	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-2-3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-23-24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-24-25	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-25-26	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-26-29	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-27-28	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-27-55	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
STM-28-29	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-29-32	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-30-31	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-31-32	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-32-37	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-33-34	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-34-36	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-36-37	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-3-7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-37-40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-38-39	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-38-62	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-39-40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
STM-40-65	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-41-43	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-43-45	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-45-46	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-46-52	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-47-48	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
STM-47-53	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-48-49	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-49-50	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-50-52	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-52-54	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-53-54	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
STM-54-61	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-55-57	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-5-6	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-57-58	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-58-60	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-59-60	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-60-61	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-61-65	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-62-63	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-63-64	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-64-65	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-65-67	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-66-67	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-66-68	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-6-7	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-67-71	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-68-69	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-69-70	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-70-71	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-71-73	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-72-73	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-72-77	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-73-75	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-74-75	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-74-79	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00

STM-75-76	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-76-82	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-77-79	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-7-9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-79-81	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-81-82	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-82-84	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-83-84	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-84-HW1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-86-87	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
0.00									
STM-87-94	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-8-9	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-89-91	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-90-91	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-9-10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-91-92	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-92-93	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-93-94	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-94-95	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-95-101	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
0.00									
STM-96-97	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									
STM-97-98	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
0.00									
STM-98-99	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
0.00									
STM-99-101	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
0.00									

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
STM-101-105	24.00	24.00	24.00	0.01	24.00
STM-10-13	24.00	24.00	24.00	0.01	14.93
STM-105-OF1	24.00	24.00	24.00	24.00	24.00
STM-11-13	0.01	0.01	24.00	0.01	0.01
STM-1-2	24.00	24.00	24.00	0.01	0.01
STM-13-16	24.00	24.00	24.00	0.01	0.01
STM-14-15	24.00	24.00	24.00	0.01	0.01
STM-14-33	24.00	24.00	24.00	0.01	0.01
STM-15-16	24.00	24.00	24.00	0.01	0.01
STM-16-37	24.00	24.00	24.00	0.01	0.01
STM-20-21	24.00	24.00	24.00	0.01	0.01
STM-21-25	24.00	24.00	24.00	0.01	24.00
STM-2-3	24.00	24.00	24.00	0.01	0.01
STM-25-26	24.00	24.00	24.00	0.01	0.01
STM-26-29	24.00	24.00	24.00	0.01	24.00
STM-29-32	24.00	24.00	24.00	0.01	0.01
STM-30-31	0.01	0.01	24.00	0.01	0.01
STM-31-32	24.00	24.00	24.00	0.01	0.01
STM-32-37	24.00	24.00	24.00	0.01	24.00
STM-33-34	24.00	24.00	24.00	0.01	0.01
STM-34-36	24.00	24.00	24.00	0.01	0.01
STM-36-37	24.00	24.00	24.00	0.01	24.00
STM-3-7	24.00	24.00	24.00	0.01	0.01
STM-37-40	24.00	24.00	24.00	0.01	0.01
STM-39-40	0.01	0.01	24.00	0.01	0.01
STM-40-65	24.00	24.00	24.00	0.01	0.01
STM-41-43	24.00	24.00	24.00	0.01	0.01
STM-43-45	24.00	24.00	24.00	0.01	0.01
STM-45-46	24.00	24.00	24.00	0.01	0.01
STM-46-52	24.00	24.00	24.00	0.01	0.01
STM-47-48	0.01	0.01	24.00	0.01	0.01
STM-48-49	24.00	24.00	24.00	0.01	0.01
STM-49-50	24.00	24.00	24.00	24.00	24.00
STM-50-52	24.00	24.00	24.00	24.00	24.00
STM-52-54	24.00	24.00	24.00	24.00	24.00
STM-53-54	0.01	0.01	24.00	0.01	0.01
STM-54-61	24.00	24.00	24.00	0.01	0.01
STM-5-6	24.00	24.00	24.00	0.01	0.01
STM-58-60	24.00	24.00	24.00	0.01	0.01
STM-59-60	24.00	24.00	24.00	0.01	0.01
STM-60-61	24.00	24.00	24.00	0.01	0.01
STM-61-65	24.00	24.00	24.00	0.01	24.00
STM-62-63	24.00	24.00	24.00	0.01	0.01
STM-63-64	24.00	24.00	24.00	0.01	0.01
STM-64-65	24.00	24.00	24.00	0.01	0.01
STM-65-67	24.00	24.00	24.00	24.00	24.00
STM-66-67	24.00	24.00	24.00	0.01	0.01
STM-66-68	24.00	24.00	24.00	0.01	0.01
STM-6-7	24.00	24.00	24.00	0.01	0.01
STM-67-71	24.00	24.00	24.00	0.01	0.01
STM-68-69	24.00	24.00	24.00	0.01	0.01
STM-69-70	24.00	24.00	24.00	0.01	24.00
STM-70-71	24.00	24.00	24.00	0.01	0.01
STM-71-73	24.00	24.00	24.00	0.01	0.01
STM-72-73	0.01	0.01	24.00	0.01	0.01
STM-73-75	24.00	24.00	24.00	0.01	13.07
STM-74-75	0.01	0.01	24.00	0.01	0.01

STM-75-76	24.00	24.00	24.00	0.01	24.00
STM-76-82	24.00	24.00	24.00	0.01	24.00
STM-7-9	24.00	24.00	24.00	0.01	24.00
STM-81-82	0.01	0.01	0.01	24.00	0.01
STM-82-84	0.01	24.00	0.01	24.00	0.01
STM-84-HW1	24.00	24.00	24.00	24.00	24.00
STM-86-87	0.01	0.01	24.00	0.01	0.01
STM-87-94	24.00	24.00	24.00	0.01	0.01
STM-8-9	24.00	24.00	24.00	0.01	0.01
STM-9-10	24.00	24.00	24.00	0.01	0.01
STM-94-95	24.00	24.00	24.00	0.01	0.01
STM-95-101	24.00	24.00	24.00	0.01	24.00

Analysis begun on: Tue Dec 14 16:02:14 2021
Analysis ended on: Tue Dec 14 16:02:24 2021
Total elapsed time: 00:00:10

JFSA
WATER RESOURCES AND
ENVIRONMENTAL CONSULTANTS

Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment D

Cox Country Road Culvert Analysis

Area ID	Area (ha)	Soil Description	Soil Group	Land Use Description	CN	CN*	Tp (h)
eCCR	74.3	F1, G4, R3	B / BC / D	50% B = 70% Woods, 30% Farm; 40% BC = 15% Imp, 25% Woods, 60% Urban Lawn; 10% D = 15% Imp, 15% Woods, 70% Urban Lawn	71.525	61	1.29

As per Ontario Soil Map 58 and the MTO Manual:

Short ID	Soil Description	Soil Group
F1	Farmington, fine sandy loam or sandy loam or loam, good drainage	B
G4	Grenville, sandy loam or loam or silt loam, mix of good and imperfect	BC
R1	Rideau, silty clay or clay, imperfect drainage	D
R3	Rideau, silty clay or clay, poor drainage	D
X1	Escarpment, marine clay or heavy clay	D
X3	Escarpment, limestone or dolomite or sandstone scarps	D

Calculation of Time to Peak (Tp)

	EXISTING CONDITIONS	
	UNITS	eCCR
	Metric	metric
Area	(ha)	74.3
Hydrologic Soil Group[1]		B / BC / D
CN[2]		72
C (as per Rational Method)[3]		0.25
Length of Channel[4]	(m)	1997
Elevation of Channel Outlet	(m)	87.31
Elevation of Channel Headwater	(m)	111.5
Average Slope of Channel	(m/m)	0.0121
Time to Peak (=2/3 Tc)		
Kirpich	(min)	25
FAA	(min)	77
SCS	(min)	111
Brainby Williams	(min)	48
		1.29

NOTES:
1- As per Ontario Soil Map
2- See CN C spreadsheet for detail
3- See CN C spreadsheet for detail
4- As measured on topographic map provided by DSEL

Tc Equations applicability

Kirpich	Best for rural watersheds with slopes ranging from 3% to10%
FAA	Best for flat drainage areas (was developped for air field drainage) but used frequently for urban watersheds
SCS	Best for Agricultural SW in general and urban SW < 2000 acres
BW	One of the best method for predicting Tc. Especially for good for small culvert design

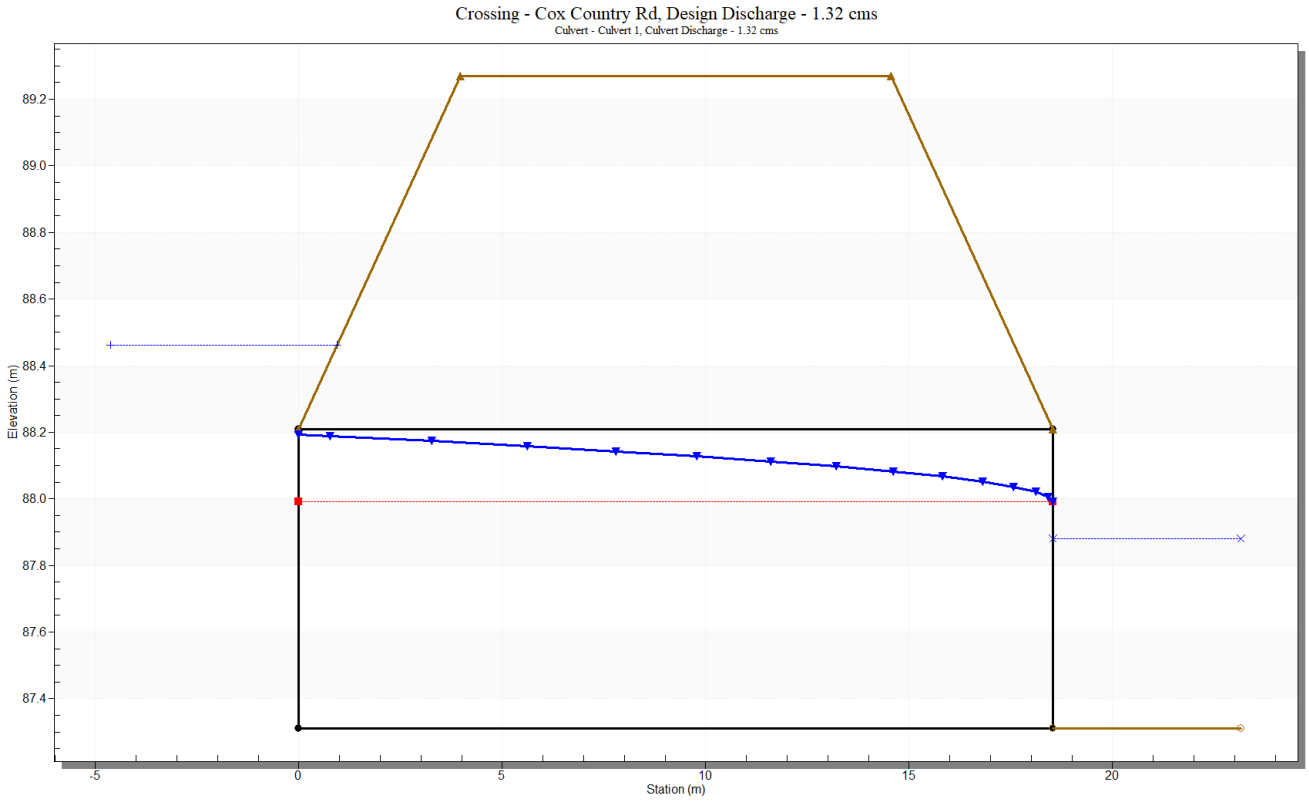
	Tc Equations and inputs (imperial unless otherwise noted)	Result in	input L as
Kirpich	$Tc = 0.0078\ L^{0.77}\ S^{-0.385}$	(min)	(ft)
FAA	$Tc = (1.8(1.1-C)L^{0.50}) / (S^{0.333})$	(min)	(ft)
SCS Lag	$Tc = (100L^{0.8}((1000/CN)-9)^{0.7} / (1900\ S^{0.5})$	(min)	(ft)
BW (metr	$Tc = (0.605L) / (S^{0.2}\ A^{0.1})$	(hrs)	(km)

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: Cox Country Rd

Headwater Elevation (m)	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
87.31	0.00	0.00	0.00	1
87.63	0.13	0.13	0.00	1
87.76	0.26	0.26	0.00	1
87.87	0.40	0.40	0.00	1
87.96	0.53	0.53	0.00	1
88.05	0.66	0.66	0.00	1
88.13	0.79	0.79	0.00	1
88.21	0.93	0.93	0.00	1
88.29	1.06	1.06	0.00	1
88.37	1.19	1.19	0.00	1
88.46	1.32	1.32	0.00	1
89.27	2.28	2.28	0.00	Overtopping



```
20     Metric units / ID Numbers OFF
*#*****************************************************************************
*#  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
*#*****************************************************************************
*#  Project Name  : [Cardinal Creek Village]
*#  Project Number: [959-11]
*#  Date          : 2021/07/07
*#  Modeller      : Laura Pipkins, P.Eng.
*#  Company       : J.F. Sabourin and Associates
*#  License #     : 2582634
*#*****************************************************************************
*%  25-Year, 3-Hour Chicago Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
*%                   ["025YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
READ STORM          STORM_FILENAME=["storm.001"]
*%-----------------|-----------------------------------------------------------|
DEFAULT VALUES      ICASEdef=[1],  read and print values
                    DEFVAL_FILENAME=["Ottawa.val"]
*%-----------------|-----------------------------------------------------------|
*# CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
*# Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
*#
*# Time to Peak = 2/3 of FAA Tc
*##############################################################################
*# EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
*##############################################################################
*# Existing Drainage from Subject Site to Ottawa River
DESIGN NASHYD       NHYD=["eCCR"], DT=[1]min, AREA=[74.3](ha),
                    DWF=[0](cms), CN/C=[61], TP=[1.29]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr), END=-1
*%-----------------|-----------------------------------------------------------|
*%-----------------|-----------------------------------------------------------|
*##############################################################################
*# STORMS
*##############################################################################
*%  25 mm Storm based on 2-Year, 3-Hour Chicago Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[001]
*%                   ["25MMC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  2-Year, 3-Hour Chicago Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[002]
*%                   ["002YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  5-Year, 3-Hour Chicago Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
*%                   ["005YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  10-Year, 3-Hour Chicago Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
*%                   ["010YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  25-Year, 3-Hour Chicago Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
*%                   ["025YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  50-Year, 3-Hour Chicago Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
*%                   ["050YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  100-Year, 3-Hour Chicago Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[099]
*%                   ["100YC3H.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  2-Year, 24-Hour SCS Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[102]
*%                   ["SC24002x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  5-Year, 24-Hour SCS Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[105]
*%                   ["SC24005x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  10-Year, 24-Hour SCS Storm
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[110]
*%                   ["SC24010x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  25-Year, 24-Hour SCS Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[125]
*%                   ["SC24025x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  50-Year, 24-Hour SCS Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[150]
*%                   ["SC24050x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  100-Year, 24-Hour SCS Storm
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[199]
*%                   ["SC24100x.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  July 1st, 1979 Storm - Ottawa International Airport
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[979]
*%                   ["19790701.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  August 4th, 1988 Storm - Ottawa International Airport
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[988]
*%                   ["19880804.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  August 8th, 1996 Storm - Ottawa International Airport
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[996]
*%                   ["19960808.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%  100-Year, 3-Hour Chicago Storm + 20%
*%START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[999]
*%                   ["100YC3H+.stm"] <--storm filename, one per line for NSTORM time
*%-----------------|-----------------------------------------------------------|
*%-----------------|-----------------------------------------------------------|
FINISH
```

```
00001>  ================================================================================================
00002>
00003>  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222    000   11   5555   =========
00004>  S       W W W   MM MM   H   H    Y Y    MM MM   O   O        2   2  0   0  11   5       =========
00005>  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O       2   2   0   0  11   5         Ver 5.500
00006>      S    W W    M   M   H   H     Y     M   M   O   O     222     0   0  11   555     FEB  2015
00007>  SSSSS    W W    M   M   H   H     Y     M   M    OOO      2       0   0  11      5    =========
00008>                                                           2       0   0  11      5   # 2549237
00009>         StormWater Management HYdrologic Model             222     000   11   555    =========
00010>
00011>  ***************************************************************************************************
00012>  ***************************************  SWMHYMO Ver 5.500  ***************************************
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: swmhymo@jfsa.Com                   ***********************
00021>  ***************************************************************************************************
00022>
00023>  ***************************************************************************************************
00024>  ****************** Licensed user: JFSAinc.                                  ***********************
00025>  ******************               Ottawa                    SERIAL#:2549237  ***********************
00026>  ***************************************************************************************************
00027>
00028>  ***************************************************************************************************
00029>  *****************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++          ***********************
00030>  *****************           Maximum value for ID numbers :     11          ***********************
00031>  *****************           Max. number of rainfall points: 105408         ***********************
00032>  *****************           Max. number of flow points   : 105408         ***********************
00033>  ***************************************************************************************************
00034>
00035>
00036>  ********************************   S U M M A R Y   O U T P U T   ********************************
00037>  ***************************************************************************************************
00038>  *                    RUN DATE: 2021-07-19     TIME: 10:39:02     RUN COUNTER: 004037              *
00039>  ***************************************************************************************************
00040>  * Input  file: T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\CCV_v1.dat          *
00041>  * Output file: T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\CCV_v1.out          *
00042>  * Summary file: T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\CCV_v1.sum         *
00043>  * User comments:                                                                                 *
00044>  * 1:_____________________________________________________________________________________________*
00045>  * 2:_____________________________________________________________________________________________*
00046>  * 3:_____________________________________________________________________________________________*
00047>  ***************************************************************************************************
00048>
00049>
00050> #*************************************************************************
00051> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00052> #*************************************************************************
00053> #  Project Name  : [Cardinal Creek Village]
00054> #  Project Number: [959-11]
00055> #  Date          : 2021/07/07
00056> #  Modeller      : Laura Pipkins, P.Eng.
00057> #  Company       : J.F. Sabourin and Associates
00058> #  License #     : 2582634
00059> #*************************************************************************
00060>   ** END OF RUN :   24
00061>
00062>  ***************************************************************************************************
00063>
00064>
00065>
00066>
00067>
00068>  RUN#:COMMAND#
00069> R0025:C00001------------------------------------------------------------------------------
00070>       START
00071>       [TZERO =    .00 hrs on       0]
00072>       [METOUT=   2    (1=imperial, 2=metric output)]
00073>       [NSTORM=   1 ]
00074>       [NRUN  = 0025 ]
00075> #*************************************************************************
00076> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00077> #*************************************************************************
00078> #  Project Name  : [Cardinal Creek Village]
00079> #  Project Number: [959-11]
00080> #  Date          : 2021/07/07
00081> #  Modeller      : Laura Pipkins, P.Eng.
00082> #  Company       : J.F. Sabourin and Associates
00083> #  License #     : 2582634
00084> #*************************************************************************
00085> R0025:C00002------------------------------------------------------------------------------
00086>      READ STORM
00087>       Filename = storm.001
00088>       Comment  = CHICAGO STORM   25 Year, 3 Hours
00089>       [SDT=10.00:SDUR=   3.00:PTOT=  58.23]
00090> R0025:C00003------------------------------------------------------------------------------
00091>       DEFAULT VALUES
00092>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00093>       ICASEdv  = 1 (read and print data)
00094>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00095>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00096>       Horton's infiltration equation parameters:
00097>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00098>       Parameters for PERVIOUS surfaces in STANDHYD:
00099>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00100>      Parameters for IMPERVIOUS surfaces in STANDHYD:
00101>      [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00102>      Parameters used in NASHYD:
00103>      [Ia=    4.67 mm] [N= 3.00]
00104>      Average monthly Pan Evaporation data in    (mm)
00105>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00106>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00107>      Average monthly Potential Evapotranspiration in    (mm)
00108>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00109>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00110> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00111> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00112> #
00113> # Time to Peak = 2/3 of FAA Tc
00114> ###########################################################################
00115> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00116> ###########################################################################
00117> # Existing Drainage from Subject Site to Ottawa River
00118> R0025:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00119>      DESIGN NASHYD         1.0 01:eCCR          74.30     .947 No_date    2:41   13.28 .228     .000
00120>       [CN= 61.0: N= 3.00: Tp= 1.29]
00121> ###########################################################################
00122> # STORMS
00123> ###########################################################################
00124>   ** END OF RUN :   49
00125>
00126>  ***************************************************************************************************
00127>
00128>
00129>
00130>
00131>
00132>  RUN#:COMMAND#
00133> R0050:C00001------------------------------------------------------------------------------
00134>       START
00135>       [TZERO =    .00 hrs on       0]
00136>       [METOUT=   2    (1=imperial, 2=metric output)]
00137>       [NSTORM=   1 ]
00138>       [NRUN  = 0050 ]
00139> #*************************************************************************
00140> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00141> #*************************************************************************
00142> #  Project Name  : [Cardinal Creek Village]
00143> #  Project Number: [959-11]
00144> #  Date          : 2021/07/07
00145> #  Modeller      : Laura Pipkins, P.Eng.
00146> #  Company       : J.F. Sabourin and Associates
00147> #  License #     : 2582634
00148> #*************************************************************************
00149> R0050:C00002------------------------------------------------------------------------------
00150>      READ STORM
00151>       Filename = storm.001
00152>       Comment  = CHICAGO STORM  50 Year, 3 Hours
00153>       [SDT=10.00:SDUR=   3.00:PTOT=  64.81]
00154> R0050:C00003------------------------------------------------------------------------------
00155>       DEFAULT VALUES
00156>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00157>       ICASEdv  = 1 (read and print data)
00158>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00159>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00160>       Horton's infiltration equation parameters:
00161>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00162>       Parameters for PERVIOUS surfaces in STANDHYD:
00163>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00164>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00165>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00166>       Parameters used in NASHYD:
00167>       [Ia=    4.67 mm] [N= 3.00]
00168>       Average monthly Pan Evaporation data in    (mm)
00169>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00170>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00171>      Average monthly Potential Evapotranspiration in    (mm)
00172>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00173>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00174> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00175> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00176> #
00177> # Time to Peak = 2/3 of FAA Tc
00178> ###########################################################################
00179> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00180> ###########################################################################
00181> # Existing Drainage from Subject Site to Ottawa River
00182> R0050:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00183>      DESIGN NASHYD         1.0 01:eCCR          74.30    1.162 No_date    2:40   16.25 .251     .000
00184>       [CN= 61.0: N= 3.00: Tp= 1.29]
00185> ###########################################################################
00186> # STORMS
00187> ###########################################################################
00188>   ** END OF RUN :   98
00189>

00190>  ***************************************************************************************************
00191>
00192>
00193>
00194>
00195>
00196>  RUN#:COMMAND#
00197> R0099:C00001------------------------------------------------------------------------------
00198>       START
00199>       [TZERO =    .00 hrs on       0]
00200>       [METOUT=   2    (1=imperial, 2=metric output)]
00201>       [NSTORM=   1 ]
00202>       [NRUN  = 0099 ]
00203> #*************************************************************************
00204> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00205> #*************************************************************************
00206> #  Project Name  : [Cardinal Creek Village]
00207> #  Project Number: [959-11]
00208> #  Date          : 2021/07/07
00209> #  Modeller      : Laura Pipkins, P.Eng.
00210> #  Company       : J.F. Sabourin and Associates
00211> #  License #     : 2582634
00212> #*************************************************************************
00213> R0099:C00002------------------------------------------------------------------------------
00214>       READ STORM
00215>       Filename = storm.001
00216>       Comment  = CHICAGO STORM  100 Year, 3 Hours
00217>       [SDT=10.00:SDUR=   3.00:PTOT=  71.66]
00218> R0099:C00003------------------------------------------------------------------------------
00219>       DEFAULT VALUES
00220>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00221>       ICASEdv  = 1 (read and print data)
00222>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00223>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00224>       Horton's infiltration equation parameters:
00225>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00226>       Parameters for PERVIOUS surfaces in STANDHYD:
00227>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00228>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00229>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00230>       Parameters used in NASHYD:
00231>       [Ia=    4.67 mm] [N= 3.00]
00232>       Average monthly Pan Evaporation data in    (mm)
00233>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00234>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00235>      Average monthly Potential Evapotranspiration in    (mm)
00236>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00237>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00238> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00239> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00240> #
00241> # Time to Peak = 2/3 of FAA Tc
00242> ###########################################################################
00243> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00244> ###########################################################################
00245> # Existing Drainage from Subject Site to Ottawa River
00246> R0099:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00247>      DESIGN NASHYD         1.0 01:eCCR          74.30    1.402 No_date    2:39   19.57 .273     .000
00248>       [CN= 61.0: N= 3.00: Tp= 1.29]
00249> ###########################################################################
00250> # STORMS
00251> ###########################################################################
00252>   ** END OF RUN :  124
00253>
00254>  ***************************************************************************************************
00255>
00256>
00257>
00258>
00259>
00260>  RUN#:COMMAND#
00261> R0125:C00001------------------------------------------------------------------------------
00262>       START
00263>       [TZERO =    .00 hrs on       0]
00264>       [METOUT=   2    (1=imperial, 2=metric output)]
00265>       [NSTORM=   1 ]
00266>       [NRUN  = 0125 ]
00267> #*************************************************************************
00268> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00269> #*************************************************************************
00270> #  Project Name  : [Cardinal Creek Village]
00271> #  Project Number: [959-11]
00272> #  Date          : 2021/07/07
00273> #  Modeller      : Laura Pipkins, P.Eng.
00274> #  Company       : J.F. Sabourin and Associates
00275> #  License #     : 2582634
00276> #*************************************************************************
00277> R0125:C00002------------------------------------------------------------------------------
00278>      READ STORM
00279>       Filename = storm.001
00280>       Comment  = 25 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00281>       [SDT=10.00:SDUR=  24.00:PTOT=  86.89]
00282> R0125:C00003------------------------------------------------------------------------------
00283>       DEFAULT VALUES
00284>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00285>       ICASEdv  = 1 (read and print data)
00286>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00287>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00288>       Horton's infiltration equation parameters:
00289>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00290>       Parameters for PERVIOUS surfaces in STANDHYD:
00291>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00292>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00293>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00294>       Parameters used in NASHYD:
00295>       [Ia=    4.67 mm] [N= 3.00]
00296>       Average monthly Pan Evaporation data in    (mm)
00297>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00298>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00299>      Average monthly Potential Evapotranspiration in    (mm)
00300>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00301>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00302> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00303> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00304> #
00305> # Time to Peak = 2/3 of FAA Tc
00306> ###########################################################################
00307> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00308> ###########################################################################
00309> # Existing Drainage from Subject Site to Ottawa River
00310> R0125:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00311>      DESIGN NASHYD         1.0 01:eCCR          74.30    1.324 No_date   13:22   27.63 .318     .000
00312>       [CN= 61.0: N= 3.00: Tp= 1.29]
00313> ###########################################################################
00314> # STORMS
00315> ###########################################################################
00316>   ** END OF RUN :  149
00317>
00318>  ***************************************************************************************************
00319>
00320>
00321>
00322>
00323>
00324>  RUN#:COMMAND#
00325> R0150:C00001------------------------------------------------------------------------------
00326>       START
00327>       [TZERO =    .00 hrs on       0]
00328>       [METOUT=   2    (1=imperial, 2=metric output)]
00329>       [NSTORM=   1 ]
00330>       [NRUN  = 0150 ]
00331> #*************************************************************************
00332> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00333> #*************************************************************************
00334> #  Project Name  : [Cardinal Creek Village]
00335> #  Project Number: [959-11]
00336> #  Date          : 2021/07/07
00337> #  Modeller      : Laura Pipkins, P.Eng.
00338> #  Company       : J.F. Sabourin and Associates
00339> #  License #     : 2582634
00340> #*************************************************************************
00341> R0150:C00002------------------------------------------------------------------------------
00342>       READ STORM
00343>       Filename = storm.001
00344>       Comment  = 50 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00345>       [SDT=10.00:SDUR=  24.00:PTOT=  96.53]
00346> R0150:C00003------------------------------------------------------------------------------
00347>       DEFAULT VALUES
00348>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00349>       ICASEdv  = 1 (read and print data)
00350>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00351>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00352>       Horton's infiltration equation parameters:
00353>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00354>       Parameters for PERVIOUS surfaces in STANDHYD:
00355>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP=  .250]
00356>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00357>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00358>       Parameters used in NASHYD:
00359>       [Ia=    4.67 mm] [N= 3.00]
00360>       Average monthly Pan Evaporation data in    (mm)
00361>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00362>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00363>      Average monthly Potential Evapotranspiration in    (mm)
00364>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00365>   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00366> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00367> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00368> #
00369> # Time to Peak = 2/3 of FAA Tc
00370> ###########################################################################
00371> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00372> ###########################################################################
00373> # Existing Drainage from Subject Site to Ottawa River
00374> R0150:C00004------------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00375>      DESIGN NASHYD         1.0 01:eCCR          74.30    1.596 No_date   13:21   33.19 .344     .000
00376>       [CN= 61.0: N= 3.00: Tp= 1.29]
00377> ###########################################################################
00378> # STORMS
```

```
00379> ##############################################################################
00380>   ** END OF RUN :  198
00381>
00382> ********************************************************************************************************
00383>
00384>
00385>
00386>
00387>
00388>  RUN#:COMMAND#
00389> R0199:C00001-----------------------------------------------------------------------------------------------
00390>      START
00391>       [TZERO =    .00 hrs on        0]
00392>       [METOUT=   2    (1=imperial, 2=metric output)]
00393>       [NSTORM=   1 ]
00394>       [NRUN  = 8199 ]
00395> #*******************************************************************************
00396> #  SWMHYMO Ver:5.02/Jan 2001 <BETA> / INPUT DATA FILE
00397> #*******************************************************************************
00398> #  Project Name  : [Cardinal Creek Village]
00399> #  Project Number: [959-11]
00400> #  Date          : 2021/07/07
00401> #  Modeller      : Laura Pipkins, P.Eng.
00402> #  Company       : J.F. Sabourin and Associates
00403> #  License #     : 2582634
00404> #*******************************************************************************
00405> R0199:C00002-----------------------------------------------------------------------------------------------
00406>       READ STORM
00407>       Filename = storm.001
00408>       Comment  = 100 years SCS Type 2 Storm 24 Hours step 10 min, City of Ottawa
00409>       [SDT=10.00:SDUR=  24.00:PTOT= 106.73]
00410> R0199:C00003-----------------------------------------------------------------------------------------------
00411>      DEFAULT VALUES
00412>       Filename = T:\PROJ\959(02)-11\202001 Subm13\Design\SWMHYMO\202107 Pre-Dev\Ottawa.val
00413>       ICASEdv  = 1 (read and print data)
00414>       FileTitle= File comment: [Parameters for City of Ottawa Projects]
00415>                  THE FOLLOWING PARAMETERS ARE USED IN THE DESIGN STANDHYD COM
00416>       Horton's infiltration equation parameters:
00417>       [Fo= 76.20 mm/hr] [Fc=13.20 mm/hr] [DCAY= 4.14 /hr] [F=  .00 mm]
00418>       Parameters for PERVIOUS surfaces in STANDHYD:
00419>       [IAper=   4.67 mm] [LGP=40.00 m] [MNP= .250]
00420>       Parameters for IMPERVIOUS surfaces in STANDHYD:
00421>       [IAimp=   1.57 mm] [CLI= 1.50]   [MNI= .013]
00422>       Parameters used in NASHYD:
00423>       [Ia=      4.67 mm] [N= 3.00]
00424>       Average monthly Pan Evaporation data in    (mm)
00425>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00426>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00427>       Average monthly Potential Evapotranspiration in    (mm)
00428>    JAN   FEB   MAR   APR   MAY   JUN   JUL   AUG   SEP   OCT   NOV   DEC
00429>    .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00   .00
00430> # CN -> CN* based on Ontario Soil Map 58, Nov 1985 MTO Manual Chart H2-6A,
00431> # Lidar data, May 2000 SWMHYMO USER's Manual, air photos, assume good condition
00432> #
00433> # Time to Peak = 2/3 of FAA Tc
00434> ##############################################################################
00435> # EXISTING CONDITIONS - Drainage to South Tributary East of Cox County Road
00436> ##############################################################################
00437> # Existing Drainage from Subject Site to Ottawa River
00438> R0199:C00004-----------DTmin-ID:NHYD---------AREAha-QPEAKcms-TpeakDate_hh:mm----RVmm-R.C.---DWFcms
00439>      DESIGN NASHYD         1.0 01:eCCR          74.30    1.904 No_date   13:21   39.39 .369     .000
00440>       [CN= 61.0: N= 3.00: Tp= 1.29]
00441> ##############################################################################
00442> # STORMS
00443> ##############################################################################
00444> R0199:C00002-----------------------------------------------------------------------------------------------
00445>      FINISH
00446> -----------------------------------------------------------------------------------------------------------
00447> ********************************************************************************************************
00448>       WARNINGS / ERRORS / NOTES
00449>       -------------------------
00450>    Simulation ended on 2021-07-19     at 10:39:03
00451> ===========================================================================================================
00452>
```