



TRI-M HOLDINGS CORP.

440 Texas Road

Stormwater Management Report

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1.0

Introduction

Dillon Consulting Limited (Dillon) was retained by Tri-M Holdings Corp. to prepare a stormwater management strategy in support of Detailed Design for the proposed development at 440 Texas Road in the town of Amherstburg, Ontario. As shown on Figure 1, the proposed development land is located on the north side of the Texas Road; west of Concession Road 2 N in the town of Amherstburg.

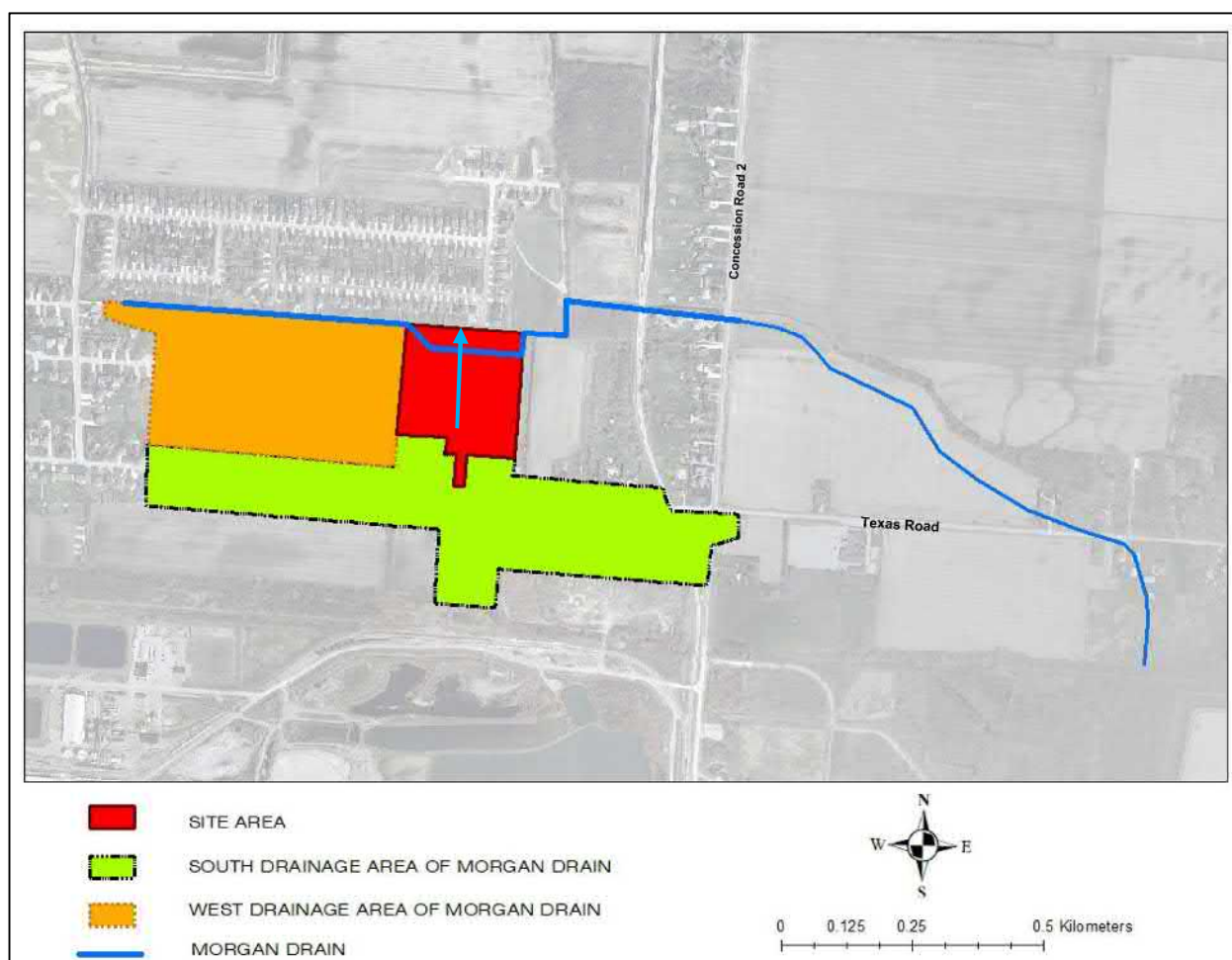


Figure 1: Project Site Location

The existing site is approximately 5.3 ha (13.1 ac) in size, and consists primarily of undeveloped land. Under the proposed development conditions, the site will consist of 48 proposed single residential lots, one stormwater management (SWM) pond, proposed right of way (ROW), and a 0.07 ha area dedicated as future development which will likely be developed into a park.

It should be noted that a branch of the Morgan Drain runs through this site area. Under the proposed conditions, the west and south branches of the Morgan Drain will tie into the site storm sewers, which will outlet to the proposed stormwater management pond. A portion of the site storm sewers will

legally be part of the Morgan Drain, as well as the stormwater management pond. The west and south drain branches have external contributing areas of 13.22 ha and 12.20 ha respectively, for a total of 25.42 ha (62.81 ac). The layout of the Morgan drain and north-west and south drainage areas are shown in Figure 1 and the 440 Texas Road site plan is shown in Appendix A.

1.1 Background Information

The following items were reviewed and inform the currently analysis:

- Stormwater Management Planning and Design Manual (Ministry of the Environment (MOE, 2003);
- Highway Drainage Design Standards (Ontario Ministry of Transportation, January, 2008) (HDDS, MTO, 2008);
- Hydraulic Design of Energy Dissipators and Culverts for Channels, Hydraulic Engineering Circular No. 14, Third Edition (U.S. Department of Transportation, July 2006) (HEC 14, 2006);
- Material Specification for Aggregates (Ontario Provincial Standard Specification, November, 2013) (OPSS, MUNI, 2013);
- 440 Texas Road Site Plan (Provided in Appendix A);
- Windsor/Essex Region Stormwater Management Standards Manual (ERCA SWM Standards, 2018); and
- Morgan Drain Plan, Town of Amherstburg, R Dobbin Engineering Inc.

1.2 Stormwater Management Design Criteria

The stormwater management (SWM) design criteria were developed based on the guidance presented in the ERCA SWM Standards, 2018 and Stormwater Management Planning and Design Manual (Ministry of the Environment (MOE, 2003).

1.2.1 Minor System Conveyance

Proposed site storm sewers are required to convey the 1:5 year design storm event and maintain a hydraulic grade line (HGL) at least 300 mm below ground surface.

1.2.2 Major System Conveyance

For return period storm events in excess of the 1:5 year, up to and including the 1:100 year event, the maximum allowable surface ponding depth is 300 mm.

1.2.3 Quality Control

Runoff produced by the site is required to be treated to a “Normal” protection level, which is defined by the removal of 70% of total suspended solids (TSS) on an average annual basis.

1.2.4 Quantity Control

The allowable release rate from this development will be the existing conditions 1:2 year peak runoff rate. All storms up to and including the 1:100 year event will be required to be controlled to this allowable rate.

1.2.5 Climate Change Resiliency Assessment

The Urban Stress Test (UST) design storm event, as identified within the Windsor/Essex Region Stormwater Management Standards Manual (December, 2018), will be used to evaluate the resiliency to the potential impacts of climate change of the proposed development. For events up to and including the Urban Stress Test (UST) event, runoff is not to spill overland off the site.

1.2.6 Design Storms

The following design storm events were used for the analysis:

- 1:100 year, 4 hour design storm using Chicago distribution with 15 minute time interval with a total rainfall depth of 81.6 mm.
- 1:100 year, 24 hour design storm using SCS Type-II distribution with a 2 hour time interval and a total rainfall depth of 108 mm.
- Urban Stress Test (UST) Storm - 1:100 year, 24 hour design storm using Chicago distribution with 15 minute time interval and an additional 42 mm uniformly distributed, with a total rainfall depth of 150 mm.
- Water Quality Storm - 1:2 year, 4 hour design storm using Chicago distribution with a 15 minute time interval and a total rainfall depth of 32 mm.

1.3 Modelling Approach

Assessment of hydrologic and hydraulic conditions for both existing and proposed scenarios was undertaken using the PCSWMM 2021 software distributed by CHI. PCSWMM is a modelling software for stormwater, wastewater, and watershed systems which provides a graphic user interface (GUI) for the United States Environment Protection Agency's Stormwater Management Model (EPA SWMM).

The stormwater assessment for this development was completed using the Green-Ampt infiltration method for the hydrologic calculations and the dynamic wave routing method for the hydraulic calculations.

Development of the existing and proposed conditions models are summarized in subsequent sections.

2.0

Existing Conditions

Under existing conditions, the 5.3 ha site consists of undeveloped agricultural land. The site is generally flat with a gentle slope towards the existing Morgan Drain.

2.1

Site Soil

Based on the ERCA soil mapping data, the soil characteristics for the 440 Texas Road site area is composed of Brookston Clay which has a hydrologic soil group (HSG) D classification (Table A-3.7.7, ERCA SWM Manual, 2008). The infiltration parameters for the existing condition model has been selected based on this soil type.

2.2

Existing Conditions Hydrologic Assessment

The existing conditions sub-catchment parameters used in the PCSWMM model are provided below in Table 1. Infiltration parameters were selected using the ERCA SWM Manual (Table - 3.7.7.3, ERCA SWM Manual, 2008) based on the hydrologic soil group classification. As the existing area is primarily undeveloped - with the exception of an existing residential property - the percent imperviousness has been selected as 5%. The typical Manning's roughness coefficients are selected from the ERCA SWM Manual (Table – 3.7.4.1, ERCA SWM Manual, 2008). Full details of all the input parameters provided in the existing conditions PCSWMM model are provided in the model output found in Appendix B.

Table 1: Existing Condition Sub-Catchment Parameters

Attribute	Development
Land Use	Agricultural
Area (ha)	5.3
Flow Length* (m)	380
Imperviousness (%)	5
Slope (%)	0.5
Manning's n Impervious	0.013
Manning's n Pervious	0.15
Depression Storage Impervious (mm)	2.5
Depression Storage Pervious (mm)	7.5
Infiltration: Suction Head (mm)	180
Infiltration: Conductivity (mm/hr)	0.5
Infiltration: Initial Deficit (fraction)	0.1

*Maximum flow path to outlet

2.2.1 Morgan Drain Sub-Catchment Areas

Subcatchment attributes for the Morgan Drain drainage areas were provided by the Drainage Engineer as a drainage report is under production concurrently. Composite runoff coefficients were provided as part of the subcatchment properties, which were converted to per cent imperviousness to use in PCSWMM. These subcatchment parameters are summarized in Table 2 below.

Table 2: Post Development Sub-Catchment Parameters for the Morgan Drain Drainage Areas

Attribute	Development	
	West Drainage Area	South Drainage Area
Land Use	Agricultural	Agricultural/Residential
Area (ha)	13.22	12.20
Flow Length* (m)	236	650
Imperviousness (%)	3	33
Slope (%)	0.1	0.1
Manning's n Impervious	0.013	0.013
Manning's n Pervious	0.15	0.15
Depression Storage Impervious (mm)	2.5	2.5
Depression Storage Pervious (mm)	7.5	7.5
Infiltration: Suction Head (mm)	180	180
Infiltration: Conductivity (mm/hr)	0.5	0.5
Infiltration: Initial Deficit (fraction)	0.1	0.1

*Maximum flow path to outlet

The north-west and south subcatchments of the Morgan Drain were connected through a dummy subcatchment in the PCSWMM model to provide a total peak flow rate from external areas while accounting for peak timing.

2.3 Allowable Release Rate

As discussed in Section 1.2.4, the allowable release rate has been selected as the existing conditions 1:2 year storm event for the 5.3 ha of site area. The peak runoff rate during the 1:2 year Chicago 4 hour storm event was estimated using the PCSWMM model as 0.102 m³/s. Modelling results are included in Appendix B.

3.0

Proposed Conditions

3.1

Proposed Conditions Hydrologic Analysis

Under proposed conditions, the 5.3 ha site area consists of 48 proposed single family residential lots, road ROW, a SWM pond, and a future development area. As the level of imperviousness is proposed to be higher compared to existing conditions, a stormwater management pond will be required to achieve the target release rate noted in Section 2.3. The external contributing areas of the Morgan Drain tie into the storm system at the north-west corner of the site, and south boundary as shown in Appendix A. These subcatchments are included in the PCSWMM model, and flow is conveyed into the proposed SWM pond. Twin bypass pipes are proposed to allow external flows to outlet the proposed wet pond with a maximum outflow rate of the external area inflow. These bypass pipes will be set with an invert (181.70 m) above the normal water level (181.2 m) in order to drain the external flows via gravity to the Morgan Drain north of the site. Once water levels in the pond drain below the bypass pipe inverts, a pump is proposed to lower the remaining volume to the normal water level of the permanent pool. The pump outlet rate will be proportional to the total developed area of the Morgan Drain catchment to this point, and is established in Section 3.2.3 of this report.

Sub catchment attributes for the proposed development were selected based on the ERCA SWM standard and are summarized in Table 3 below. Note that a portion of the site includes a 0.07 ha “future development” area which is anticipated to consist largely of green space, and has been assumed as 20% impervious for this analysis. Additional details of the modelling parameters and other model details for proposed conditions are provided in Appendix C.

Table 3: Post Development Sub-Catchment Parameters for the Site

Attribute	Development
Land Use	Residential
Area (ha)	5.3
Flow Length* (m)	345
Imperviousness (%)	62
Slope (%)	1
Manning's n Impervious	0.013
Manning's n Pervious	0.15
Depression Storage Impervious (mm)	2.5
Depression Storage Pervious (mm)	7.5
Infiltration: Suction Head (mm)	180

Attribute	Development
Infiltration: Conductivity (mm/hr)	0.5
Infiltration: Initial Deficit (fraction)	0.1

*Maximum flow path to outlet

The stormwater management (SWM) facility will be located near the east area of the subdivision development. The facility will occupy approximately 0.55 ha of the development site. The proposed SWM facility has been sized with 3:1 side slopes in the active storage area and 5:1 side slopes in the permanent pool. The proposed pond has a total depth of 3.0 m with 2.0 m of active storage and 1.0 m of permanent pool depth.

The proposed wet pond will include twin bypass pipes for larger storm events to allow the external Morgan Drain flows to be conveyed unimpeded by the pond outlet structure. The bypass pipes are proposed as 1.092 m by 1.727 m horizontal elliptical pipes. The bypass has been sized such that the outflow is equal to or less than the peak inflow from the external subcatchments under the 1:5 year, 1:100 year, and UST events.

3.1.1

Tailwater Conditions

To account for tailwater conditions in the Morgan Drain downstream of the site, flows from the North Branch have been included in the model. The sub-catchment parameters considered for the North Branch contributing area are provided in Table 4 below.

Table 4: Sub-Catchment Parameters for the Morgan Drain North Branch Drainage Area

Attribute	Development
Land Use	Residential/Undeveloped
Area (ha)	53
Flow Length (m)	1450
Imperviousness (%)	40
Slope (%)	0.1
Manning's n Impervious	0.013
Manning's n Pervious	0.15
Depression Storage Impervious (mm)	2.5
Depression Storage Pervious (mm)	7.5
Infiltration: Suction Head (mm)	180
Infiltration: Conductivity (mm/hr)	0.5
Infiltration: Initial Deficit (fraction)	0.1

Additional details of the modelling parameters and the sub-catchment layout are provided in Appendix C.

3.2 Stormwater Management Measures

The proposed stormwater management strategy consists of a wet pond to provide quality and quantity control. The outlet of the proposed pond will consist of two elements – a low flow pump and a high flow bypass system. As a portion of the active storage within the pond is at a lower elevation than the receiving system, the pump will be active while water levels in the pond are between the permanent pool elevation and the bypass system invert elevation. The pump will not be active while levels in the pond are above the bypass invert.

3.2.1 Minor and Major System Conveyance

The design of the site storm sewer system, as well as major system grading has been provided in the FSR prepared by Dillon Consulting Limited on April 2022. For the purpose of the stormwater management pond design, major and minor system runoff from contributing areas are assumed to be conveyed unimpeded to this facility.

3.2.2 Stormwater Quantity Control

The proposed SWM infrastructure is sized to control post-development flows to the allowable release rate for all events up to and including the 1:100 year design storm events. From Section 2.3, the allowable release rate is estimated as 0.102 m³/s. A pump with the required capacity to control the site flow lower than the allowable release rate is proposed from the pond to the outfall.

To assess the resiliency of the proposed SWM facility, an additional modelling scenario was performed using the Urban Stress Test (UST) design storm event provided in the Windsor/Essex Region Stormwater Management Standards Manual (December, 2018).

A minimum 0.3 m freeboard is required above the 1:100 year storm event (Section 3.3.2.3, ERCA SWM Standards, 2018). From the modelling analysis, a freeboard of 0.36 m is estimated for the 1:100 year 4 hour event, 0.62 m in the 1:100 year 24 hour event, and 0.16 m in the UST event. Based on the proposed conditions modelling analysis for the required design storm events, the proposed pond will store the volumes shown in Table 5 in order to meet the required release rates.

Table 5: Required Storage Volume and Pond Free-board in Different Storm Events

Storm Event	Required Pond Storage (m ³)	Available Pond Freeboard (m)
1:100 Year, 4 hour	6,585	0.36
1:100 Year, 24 hour	5,335	0.62
UST	7,620	0.16

To accommodate the UST event, the total volume below the top of bank will need to store 7,620 m³ as a minimum. As mentioned in Section 3.0, the proposed stormwater management pond will consist of 3:1 side slopes in the active storage area, and allow for 2.0 m of active storage depth. The total active pond volume available is 8,542 m³, which is adequate to store all storm up to and including the UST event.

Table 6 below shows the comparison of inflow from the Morgan Drain sub-catchment and outflow from the bypass pipes. Twin 1.092m by 1.727m horizontal elliptical pipes have been proposed as the bypass system.

Table 6: Comparison of Morgan Drain Sub-catchment and Conduit Flow

Storm Event	Bypass Pipes Outflow (m ³ /s)	Morgan Drain Subcatchment External Inflow (m ³ /s)
1:5 Year, 4 hour	0.62	1.00
1:100 Year, 4 hour	1.56	2.12
UST	2.16	2.37
Water Quality Storm	0.22	0.50

Note that while the pond outlet flow rate does not exceed the inflow rate from the Morgan Drain external areas, it is implicit that the site allowable release rate is met.

3.2.3 Water Quality Control

The proposed SWM facility services a catchment area of approximately 5.3 ha and the external drainage area for the Morgan Drain of 25.42 ha. As discussed in Section 1.2.3, the facility will be designed to provide a Normal Protection Level water quality treatment (70% TSS removal) for the 5.3 ha development only. Due to the pond orientation, the required length of the forebay, as governed by settling distance, is not achievable when the pumped outflow is set to the allowable release rate. In order to lower the required settling length to an achievable distance, the pump outflow rate is proposed to be 0.30 m³/s.

Based on the 2003 MOE guidelines, the following parameters must be met to achieve the water quality control requirements:

- Minimum permanent pool volume of 420 m³; and
- Minimum forebay length of 22 m (governed by settling distance).

The total permanent pool provided in the proposed pond is approximately 680 m³, and the approximate length available for the forebay is 22 m. A riprap apron is also proposed for energy dissipation at the pond inlet to reduce the velocity of incoming flows. A rip rap apron has been sized following the specifications of HEC 14, 2006 and HDDS, MTO, 2008 standards. For a 1:5 year event flow rate of 1.68 m³/s, and an inlet of 1.2 m in diameter, the nominal stone size has been estimated as 100 mm with an the apron length of 4.8 m. Although the estimated stone size required is relatively small, a rip rap

distribution of R-50 has been specified as per OPSS 1004. The details of the water quality calculations are provided in Appendix D.

Note that the permanent pool volume has been specified to treat runoff from the proposed site only, and not the external Morgan Drain contributing areas.

4.0

Conclusions

The stormwater management design for the proposed development meets the established SWM criteria for the overall site, and negative impacts due to the site development are not anticipated for the receiving system.

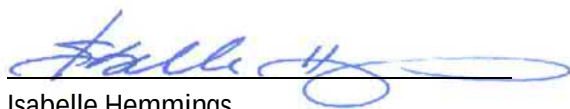
The conclusions are based on the results of the stormwater management analysis as follows:

- The proposed development will have a maximum allowable release rate of $0.102 \text{ m}^3/\text{s}$ into Morgan Drain. This allowable release rate will be controlled using a pump, and by providing an active storage volume of $8,542 \text{ m}^3$.
- The proposed pond provides a minimum 0.3 m freeboard for the 1:100 year event.
- The proposed development will capture the UST event without spilling overland from the site.
- Water quality control of the SWM pond for 70% TSS removal will be achieved by providing a permanent pool volume of 680 m^3 . The pond provides a 22 m long forebay, as required.
- To obtain the required forebay length, the pump flow rate is proposed to be lower than the allowable release rate for the site. The proposed pump has maximum outflow rate of $0.03 \text{ m}^3/\text{s}$ which aligns with both the water quantity and water quality requirements.
- An 4.8 m long energy dissipation apron has also been recommended at the pond inlet using rip rap sized to meet R-50 gradation as described in OPSS 1004.

This report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

Yours truly,

DILLON CONSULTING LIMITED



Isabelle Hemmings
for James Michener, P.Eng.
Project Engineer, Water Resources

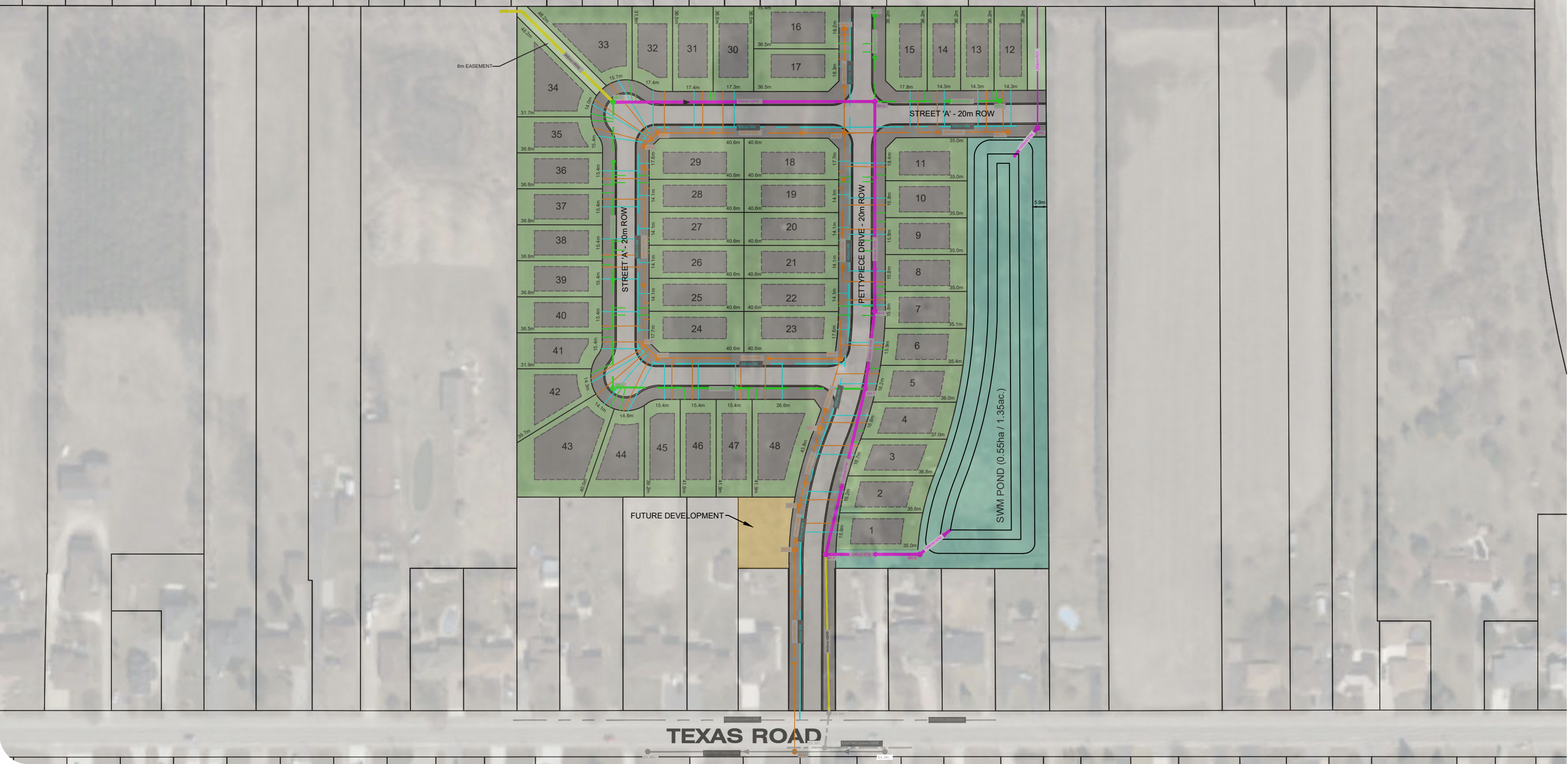


Monika Saha, EIT
Designer, Water Resources

Appendix A

440 Texas Road Site Plan

440 Texas Road Site Plan



20-3950 ONTARIO LTD.
440 TEXAS ROAD

SITE SERVICING PLAN

 **SUBJECT SITE**
± 5.3 ha (± 13.1 ac)

 **PROPOSED SWM POND**

 **PROPOSED LOTS**
(48 LOTS)

 **FUTURE DEVELOPMENT**

 **PROPOSED ROW**

 **PROPOSED DRAIN EASEMENT**

 **SANITARY SEWER**
 **STORM SEWER**
 **MUNICIPAL DRAIN**
 **COMBINED MUN. DRAIN AND STORM SEWER**
 **WATERMAIN**

PROPOSED MINIMUM SETBACKS
FRONT YARD DEPTH - 6.0m
BACK YARD DEPTH - 7.5m
SIDE YARD DEPTH
INTERIOR - 2.5m
EXTERIOR - 6.0m

File Location:
c:\pw working directory\projects 2020\331kp\dms70690\20-3950 texas road concept
plan - current.dwg
January, 06, 2022 8:10 AM

SOURCE: COUNTY OF ESSEX AERIAL (2019)

MAP/DRAWING INFORMATION
THIS DRAWING IS FOR INFORMATION PURPOSES ONLY. ALL
DIMENSIONS AND BOUNDARY INFORMATION SHOULD BE
VERIFIED BY AN O.L.S PRIOR TO CONSTRUCTION.
CREATED BY: ESB
CHECKED BY: MAM
DESIGNED BY: ESB

SCALE: 1:2000



PROJECT: 20-3950
STATUS: DRAFT
DATE: 10/27/2021

Appendix B

Existing Conditions PCSWMM Model Details

Existing Condition Model



Existing Condition Model: PCSWMM Input Details

[TITLE]

;;Project Title/Notes

[OPTIONS]

;;Option	Value
FLOW_UNITS	CMS
INFILTRATION	GREEN_AMPT
FLOW_ROUTING	DYNWAVE
LINK_OFFSETS	DEPTH
MIN_SLOPE	0
ALLOW_PONDING	NO
SKIP_STEADY_STATE	NO

START_DATE	11/15/2021
START_TIME	00:00:00
REPORT_START_DATE	11/15/2021
REPORT_START_TIME	00:00:00
END_DATE	11/16/2021
END_TIME	12:00:00
SWEEP_START	01/01
SWEEP_END	12/31
DRY_DAYS	0
REPORT_STEP	00:01:00
WET_STEP	00:05:00
DRY_STEP	00:05:00
ROUTING_STEP	5
RULE_STEP	00:00:00

INERTIAL_DAMPING	PARTIAL
NORMAL_FLOW_LIMITED	BOTH
FORCE_MAIN_EQUATION	H-W
VARIABLE_STEP	0.75
LENGTHENING_STEP	0
MIN_SURFAREA	0
MAX_TRIALS	8
HEAD_TOLERANCE	0.0015
SYS_FLOW_TOL	5
LAT_FLOW_TOL	5
MINIMUM_STEP	0.5
THREADS	6

[EVAPORATION]

;;Data Source	Parameters
;;-----	-----
CONSTANT	0.0
DRY_ONLY	NO

[RAINGAGES]

;;Name	Format	Interval	SCF	Source
;;-----	-----	-----	-----	-----
Raingage1	INTENSITY	0:15	1.0	TIMESERIES 2y_4h

[SUBCATCHMENTS]

;;Name	Rain Gage	Outlet	Area	%Imperv	Width	%Slope	CurbLen	SnowPack
;;-----	-----	-----	-----	-----	-----	-----	-----	-----
S1	Raingage1	OF1	5.3	5	139.474	0.5	0	

[SUBAREAS]

;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
;;-----	-----	-----	-----	-----	-----	-----	-----
S1	0.013	0.15	2.5	7.5	0	OUTLET	

[INFILTRATION]

;;Subcatchment	Param1	Param2	Param3	Param4	Param5
;;-----	-----	-----	-----	-----	-----
S1	180	0.5	0.1	0	0

[OUTFALLS]

;;Name	Elevation	Type	Stage Data	Gated	Route To
;;-----	-----	-----	-----	-----	-----
OF1	181.5	FREE		NO	

[TIMESERIES]

;;Name	Date	Time	Value
;;-----	-----	-----	-----
100y_24h		0:00	0
100y_24h		2:00	1.08
100y_24h		4:00	1.62
100y_24h		6:00	1.62
100y_24h		8:00	2.16
100y_24h		10:00	3.24
100y_24h		12:00	25.92
100y_24h		14:00	8.64

100y_24h	16:00	3.24
100y_24h	18:00	2.16
100y_24h	20:00	1.62
100y_24h	22:00	1.62
100y_24h	24:00:00	1.08
100y_4h	0:00	3.95
100y_4h	0:15	4.87
100y_4h	0:30	6.36
100y_4h	0:45	9.19
100y_4h	1:00	16.45
100y_4h	1:15	46.45
100y_4h	1:30	143.67
100y_4h	1:45	32.45
100y_4h	2:00	17.25
100y_4h	2:15	11.53
100y_4h	2:30	8.62
100y_4h	2:45	6.87
100y_4h	3:00	5.71
100y_4h	3:15	4.89
100y_4h	3:30	4.28
100y_4h	3:45	3.81
100y_4h	4:00	0
2y_4h	0:00	2.1
2y_4h	0:15	2.52
2y_4h	0:30	3.18
2y_4h	0:45	4.38
2y_4h	1:00	7.31
2y_4h	1:15	19.33
2y_4h	1:30	68.13
2y_4h	1:45	13.64
2y_4h	2:00	7.63
2y_4h	2:15	5.34
2y_4h	2:30	4.14
2y_4h	2:45	3.4
2y_4h	3:00	2.89
2y_4h	3:15	2.53
2y_4h	3:30	2.25
2y_4h	3:45	2.03
2y_4h	4:00	0

5y_4h	0:00	2.58
5y_4h	0:15	3.13
5y_4h	0:30	4.02
5y_4h	0:45	5.66
5y_4h	1:00	9.76
5y_4h	1:15	26.72
5y_4h	1:30	88.4
5y_4h	1:45	18.73
5y_4h	2:00	10.21
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UST	0:15	2.43
UST	0:30	2.45
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UST	1:15	2.51
UST	1:30	2.53
UST	1:45	2.55
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UST	2:45	2.67
UST	3:00	2.71
UST	3:15	2.74
UST	3:30	2.79
UST	3:45	2.83
UST	4:00	2.88
UST	4:15	2.94
UST	4:30	3
UST	4:45	3.07
UST	5:00	3.15
UST	5:15	3.23

UST	5:30	3.33
UST	5:45	3.45
UST	6:00	3.59
UST	6:15	3.75
UST	6:30	3.94
UST	6:45	4.18
UST	7:00	4.49
UST	7:15	4.89
UST	7:30	5.43
UST	7:45	6.2
UST	8:00	7.41
UST	8:15	9.56
UST	8:30	14.29
UST	8:45	32.01
UST	9:00	145.13
UST	9:15	48.51
UST	9:30	23.13
UST	9:45	15.08
UST	10:00	11.35
UST	10:15	9.23
UST	10:30	7.88
UST	10:45	6.94
UST	11:00	6.25
UST	11:15	5.73
UST	11:30	5.32
UST	11:45	4.99
UST	12:00	4.72
UST	12:15	4.49
UST	12:30	4.29
UST	12:45	4.12
UST	13:00	3.98
UST	13:15	3.85
UST	13:30	3.74
UST	13:45	3.63
UST	14:00	3.54
UST	14:15	3.46
UST	14:30	3.39
UST	14:45	3.32
UST	15:00	3.26
UST	15:15	3.2
UST	15:30	3.15

UST	15:45	3.1
UST	16:00	3.05
UST	16:15	3.01
UST	16:30	2.97
UST	16:45	2.93
UST	17:00	2.9
UST	17:15	2.87
UST	17:30	2.84
UST	17:45	2.81
UST	18:00	2.78
UST	18:15	2.76
UST	18:30	2.73
UST	18:45	2.71
UST	19:00	2.69
UST	19:15	2.67
UST	19:30	2.65
UST	19:45	2.63
UST	20:00	2.61
UST	20:15	2.59
UST	20:30	2.57
UST	20:45	2.56
UST	21:00	2.54
UST	21:15	2.53
UST	21:30	2.51
UST	21:45	2.5
UST	22:00	2.49
UST	22:15	2.47
UST	22:30	2.46
UST	22:45	2.45
UST	23:00	2.44
UST	23:15	2.43
UST	23:30	2.42
UST	23:45	2.41
UST	24:00:00	0

[REPORT]

;;Reporting Options

INPUT YES

CONTROLS NO

SUBCATCHMENTS ALL

NODES ALL

LINKS ALL

[TAGS]

[MAP]

DIMENSIONS	326851.2976	4665982.7891	327141.8164	4666326.5149
UNITS	Meters			

[COORDINATES]

;;Node	X-Coord	Y-Coord
;;-----	-----	-----
OF1	327118.611	4666222.196

[VERTICES]

;;Link	X-Coord	Y-Coord
;;-----	-----	-----

[POLYGONS]

;;Subcatchment	X-Coord	Y-Coord
;;-----	-----	-----
S1	326973.637	4665999.691
S1	326979.646	4666061.479
S1	326956.46	4666062.794
S1	326959.455	4666093.315
S1	326864.503	4666100.121
S1	326880.909	4666310.891
S1	327105.914	4666293.435
S1	327090.299	4666053.543
S1	326998.359	4666061.02
S1	326995.326	4665998.413
S1	326973.637	4665999.691

[SYMBOLS]

;;Gage	X-Coord	Y-Coord
;;-----	-----	-----

Existing Condition Model: PCSWMM Output Details

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

Element Count

Number of rain gages 1
Number of subcatchments ... 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
-----	-----	-----	-----
Raingage1	2y_4h	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
-----	-----	-----	-----	-----	-----	-----
S1	5.30	139.47	5.00	0.5000	Raingage1	OF1

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
-----	-----	-----	-----	-----	-----
OF1	OUTFALL	181.50	0.00	0.0	

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

Analysis Options

Flow Units CMS

Process Models:

Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO
 Flow Routing NO
 Water Quality NO
 Infiltration Method GREEN_AMPT
 Surcharge Method EXTRAN
 Starting Date 11/15/2021 00:00:00
 Ending Date 11/16/2021 12:00:00
 Antecedent Dry Days 0.0
 Report Time Step 00:01:00
 Wet Time Step 00:05:00
 Dry Time Step 00:05:00

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	0.200	37.700
Evaporation Loss	0.000	0.000
Infiltration Loss	0.122	23.059
Surface Runoff	0.077	14.546
Final Storage	0.001	0.125
Continuity Error (%)	-0.079	

*****	Volume	Volume
-------	--------	--------

Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.077	0.771
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.077	0.771
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

Subcatchment Runoff Summary

		Total	Total	Total	Total	Imperv	Perv	Total	Total
Peak	Runoff	Precip	Runon	Evap	Infil	Runoff	Runoff	Runoff	Runoff
Runoff	Coeff	mm	mm	mm	mm	mm	mm	mm	10^6 ltr
Subcatchment									
CMS									
S1		37.70	0.00	0.00	23.06	1.77	12.77	14.55	0.77
0.10	0.386								

Analysis begun on: Wed Nov 24 11:00:18 2021
Analysis ended on: Wed Nov 24 11:00:18 2021
Total elapsed time: < 1 sec

Appendix C

Proposed Conditions PCSWMM Model Details

Proposed Conditions Model: PCSWMM Input Details

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option      Value
FLOW_UNITS    CMS
INFILTRATION  GREEN_AMPT
FLOW_ROUTING  DYNWAVE
LINK_OFFSETS  ELEVATION
MIN_SLOPE     0
ALLOW_PONDING YES
SKIP_STEADY_STATE NO

START_DATE    11/15/2021
START_TIME    00:00:00
REPORT_START_DATE 11/15/2021
REPORT_START_TIME 00:00:00
END_DATE      11/17/2021
END_TIME      00:00:00
SWEEP_START   01/01
SWEEP_END     12/31
DRY_DAYS      0
REPORT_STEP   00:05:00
WET_STEP      00:05:00
DRY_STEP      00:05:00
ROUTING_STEP  5
RULE_STEP     00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP    0.75
LENGTHENING_STEP 0
MIN_SURFAREA     0
MAX_TRIALS       8
HEAD_TOLERANCE   0.0015
SYS_FLOW_TOL     5
LAT_FLOW_TOL     5
MINIMUM_STEP     0.5
THREADS          6

[EVAPORATION]
;;Data Source  Parameters
;;-----
CONSTANT       0.0
DRY_ONLY       NO

[RAINGAGES]
;;Name      Format   Interval SCF      Source
;;-----
Raingage1    INTENSITY 0:15    1.0    TIMESERIES 5y_4h

[SUBCATCHMENTS]
;;Name      Rain Gage      Outlet      Area      %Imperv Width  %Slope  CurbLen  SnowPack
;;-----
Dummy_Subcatchment Raingage1    SU1         0.0001    100      0.01    0.1     0
S1           Raingage1    SU1         5.3       62       153.623 1       0
```


S2	Raingage1	J1	53	40	365.517	0.1	0
South_Drain	Raingage1	Dummy_Subcatchment	12.2	32.86	187.692	0.1	0
West_Drain	Raingage1	Dummy_Subcatchment	13.22	2.86	560.169	0.1	0

[SUBAREAS]							
;;Subcatchment	N-Imperv	N-Perv	S-Imperv	S-Perv	PctZero	RouteTo	PctRouted
;;-----							
Dummy_Subcatchment	0.013	0.15	2.5	7.5	0	OUTLET	
S1	0.013	0.15	2.5	7.5	0	OUTLET	
S2	0.013	0.15	2.5	7.5	0	IMPERVIOUS	70
South_Drain	0.013	0.15	2.5	7.5	0	IMPERVIOUS	90
West_Drain	0.013	0.15	2.5	7.5	0	OUTLET	

[INFILTRATION]					
;;Subcatchment	Param1	Param2	Param3	Param4	Param5
;;-----					
Dummy_Subcatchment	180	0.5	0.1	0	0
S1	180	0.5	0.1	0	0
S2	180	0.5	0.1	0	0
South_Drain	180	0.5	0.1	0	0
West_Drain	180	0.5	0.1	0	0

[JUNCTIONS]					
;;Name	Elevation	MaxDepth	InitDepth	SurDepth	Aponded
;;-----					
External_area_outlet	181.28	2.22	0	0	0
J1	181.45	2.55	0	0.3	100
J2_site_outfall	181.68	1.82	0	0.1	0
Pond_outlet	181.51	1.99	0	0	0

[OUTFALLS]					
;;Name	Elevation	Type	Stage Data	Gated	Route To
;;-----					
Outfall_culvert	181.15	NORMAL		NO	

[STORAGE]										
;;Name	Elev.	MaxDepth	InitDepth	Shape	Curve Name/Params	N/A	Fevap	Psi	Ksat	IMD
;;-----										
SU1	181.2	2	0	TABULAR	Pond_updated_detailed_newslope		0 0			

[CONDUITS]								
;;Name	From Node	To Node	Length	Roughness	InOffset	OutOffset	InitFlow	MaxFlow
;;-----								
C1	J2_site_outfall	Pond_outlet	50	0.013	181.65	181.51	0	0
C2	Pond_outlet	External_area_outlet	150	0.035	181.44	181.28	0	0
C3	External_area_outlet	Outfall_culvert	120	0.035	181.28	181.15	0	0
C4	J1	External_area_outlet	220	0.01	181.45	181.28	0	0
W1	SU1	J2_site_outfall	20	0.013	181.7	181.65	0	0

[PUMPS]						
;;Name	From Node	To Node	Pump Curve	Status	Startup	Shutoff
;;-----						
P1	SU1	J2_site_outfall	Pump_curve_detailed	ON	0.01	0

[XSECTIONS]							
;;Link	Shape	Geom1	Geom2	Geom3	Geom4	Barrels	Culvert
;;-----							
C1	HORIZ_ELLIPSE	10	0	0	0	2	

C2	IRREGULAR	Morgan_drain	0	0	0	1
C3	IRREGULAR	Morgan_drain	0	0	0	1
C4	IRREGULAR	NorthBranch	0	0	0	1
W1	HORIZ_ELLIPSE 10		0	0	0	2

[TRANSECTS]									
;;Transect Data in HEC-2 format									
;									
NC 0.05	0.05	0.035							
X1 Morgan_drain	6	5	10.2	0.0	0.0	0.0	0.0	0.0	0.0
GR 183.5	0	183	5	181.6	7.1	181.6	8.1	183	10.2
GR 183.5	15.2								
;									
NC 0.05	0.05	0.035							
X1 NorthBranch	6	5	9.7	0.0	0.0	0.0	0.0	0.0	0.0
GR 183.2	0	183	5	182	7.1	182	7.6	183	9.7
GR 183.2	14.7								

[LOSSES]					
;;Link	Kentry	Kexit	Kavg	Flap Gate	Seepage
;;-----					
C1	0.5	0.5	0	NO	0
W1	0.5	0.5	0	NO	0

[CURVES]			
;;Name	Type	X-Value	Y-Value
;;-----			
Pump_curve	Pump2	0	0
Pump_curve		0.1	0.001
Pump_curve		1	0.102
Pump_curve_detailed	Pump2	0	0
Pump_curve_detailed		0.01	0.005
Pump_curve_detailed		0.2	0.03
Pump_curve_detailed		0.55	0.03
Pump_curve_detailed		0.56	0
Pump_curve_detailed2	Pump2	0	0
Pump_curve_detailed2		0.01	0.005
Pump_curve_detailed2		0.2	0.102
Pump_curve_detailed2		1.09	0.102
Pump_curve_detailed2		1.1	0
1.1_grate	Rating	0	0
1.1_grate		0.26	1
1.1_grate		0.7	3
1.1_grate		1.24	4
1.1_grate		1.57	4.5
1.15_grate	Rating	0	0
1.15_grate		0.26	1
1.15_grate		0.59	3
1.15_grate		1.2	4
1.15_grate		1.5	4.8
1.2_grate	Rating	0	0
1.2_grate		0.25	1
1.2_grate		0.52	3

1.2_grate		1.5	5.2
1.25_grate	Rating	0	0
1.25_grate		0.24	1
1.25_grate		0.51	3
1.25_grate		1.2	5
1.25_grate		1.52	5.7
1.25_grate		1.68	6
1.3_grate	Rating	0	0
1.3_grate		0.24	1
1.3_grate		0.5	3
1.3_grate		1.53	6.2
1_grate	Rating	0	0
1_grate		0.28	1
1_grate		0.45	2
1_grate		0.71	2.5
1_grate		1.02	3
1_grate		1.55	3.7
600_grate	Rating	0	0
600_grate		0.88	1
600_grate		1.26	1.2
600_grate		1.5	1.3
650_grate	Rating	0	0
650_grate		0.64	1
650_grate		1.26	1.4
650_grate		2.58	2
700_grate	Rating	0	0
700_grate		0.47	1
700_grate		1.2	1.6
700_grate		1.8	2
750_grate	Rating	0	0
750_grate		0.36	1
750_grate		1.2	1.8
750_grate		1.45	2
750_grate		1.8	2.2
750_grate		3.3	3
850_grate	Rating	0	0
850_grate		0.32	1
850_grate		0.88	2
850_grate		1.26	2.4
850_grate		1.59	2.7
950_grate	Rating	0	0
950_grate		0.29	1
950_grate		0.56	2
950_grate		1.25	3
950_grate		1.61	3.4
Curve_eq_768_no_clog	Rating	0.1	0.05
Curve_eq_768_no_clog		0.2	0.15
Curve_eq_768_no_clog		0.3	0.31

Curve_eq_768_no_clog	0.5	0.84
Curve_eq_768_no_clog	0.8	2.37
Curve_eq_768_no_clog	1	3.99
Curve_eq_768_no_clog	1.2	6.2
Curve_eq_768_no_clog	1.4	9.09
Curve_eq_768_no_clog	1.5	10.82
Curve_from_equation_500 Rating	0.1	0.02
Curve_from_equation_500	0.2	0.05
Curve_from_equation_500	0.3	0.1
Curve_from_equation_500	0.5	0.27
Curve_from_equation_500	0.8	0.76
Curve_from_equation_500	1	1.27
Curve_from_equation_500	1.2	1.98
Curve_from_equation_500	1.4	2.89
Curve_from_equation_500	1.5	3.44
Curve_from_equation_600 Rating	0.1	0.02
Curve_from_equation_600	0.2	0.06
Curve_from_equation_600	0.3	0.12
Curve_from_equation_600	0.5	0.33
Curve_from_equation_600	0.8	0.92
Curve_from_equation_600	1	1.56
Curve_from_equation_600	1.2	2.42
Curve_from_equation_600	1.4	3.55
Curve_from_equation_600	1.5	4.23
Curve_from_Equation_700 Rating	0.1	0.02
Curve_from_Equation_700	0.2	0.05
Curve_from_Equation_700	0.3	0.1
Curve_from_Equation_700	0.5	0.28
Curve_from_Equation_700	0.8	0.77
Curve_from_Equation_700	1	1.3
Curve_from_Equation_700	1.2	2.02
Curve_from_Equation_700	1.4	2.96
Curve_from_Equation_700	1.5	3.52
Curve_from_Equation_768 Rating	0	0
Curve_from_Equation_768	0.1	0.03
Curve_from_Equation_768	0.2	0.08
Curve_from_Equation_768	0.3	0.15
Curve_from_Equation_768	0.5	0.42
Curve_from_Equation_768	0.8	1.18
Curve_from_Equation_768	1	1.99
Curve_from_Equation_768	1.2	3.1
Curve_from_Equation_768	1.4	4.55
Curve_from_Equation_768	1.5	5.41
Pond_Storage_4:1 Storage	0	1085
Pond_Storage_4:1	0.5	1772
Pond_Storage_4:1	1.5	3223
Pond_Storage_5:1 Storage	0	1456
Pond_Storage_5:1	1	3223
Pond_Trial Storage	0	1300
Pond_Trial	1	2000
Pond_Trial	2.5	3500

Pond_updated_detailed Storage	0	1600
Pond_updated_detailed	1	3442
Pond_updated_detailed	2	5487
Pond_updated_detailed_newslope Storage	0	3055
Pond_updated_detailed_newslope	1	4235
Pond_updated_detailed_newslope	2	5487
Pond_withdrain Storage	0	1599.05
Pond_withdrain	1	3057.13
Pond_withdrain	2.5	5451.87

[TIMESERIES]			
;;Name	Date	Time	Value
;;-----	-----	-----	-----
100y_24h		0:00	0
100y_24h		2:00	1.08
100y_24h		4:00	1.62
100y_24h		6:00	1.62
100y_24h		8:00	2.16
100y_24h		10:00	3.24
100y_24h		12:00	25.92
100y_24h		14:00	8.64
100y_24h		16:00	3.24
100y_24h		18:00	2.16
100y_24h		20:00	1.62
100y_24h		22:00	1.62
100y_24h		24:00:00	1.08
100y_4h		0:00	3.95
100y_4h		0:15	4.87
100y_4h		0:30	6.36
100y_4h		0:45	9.19
100y_4h		1:00	16.45
100y_4h		1:15	46.45
100y_4h		1:30	143.67
100y_4h		1:45	32.45
100y_4h		2:00	17.25
100y_4h		2:15	11.53
100y_4h		2:30	8.62
100y_4h		2:45	6.87
100y_4h		3:00	5.71
100y_4h		3:15	4.89
100y_4h		3:30	4.28
100y_4h		3:45	3.81
100y_4h		4:00	0
2y_4h		0:00	2.1
2y_4h		0:15	2.52
2y_4h		0:30	3.18
2y_4h		0:45	4.38
2y_4h		1:00	7.31
2y_4h		1:15	19.33
2y_4h		1:30	68.13
2y_4h		1:45	13.64
2y_4h		2:00	7.63

2y_4h	2:15	5.34
2y_4h	2:30	4.14
2y_4h	2:45	3.4
2y_4h	3:00	2.89
2y_4h	3:15	2.53
2y_4h	3:30	2.25
2y_4h	3:45	2.03
2y_4h	4:00	0

5y_4h	0:00	2.58
5y_4h	0:15	3.13
5y_4h	0:30	4.02
5y_4h	0:45	5.66
5y_4h	1:00	9.76
5y_4h	1:15	26.72
5y_4h	1:30	88.4
5y_4h	1:45	18.73
5y_4h	2:00	10.21
5y_4h	2:15	6.99
5y_4h	2:30	5.33
5y_4h	2:45	4.31
5y_4h	3:00	3.64
5y_4h	3:15	3.15
5y_4h	3:30	2.78
5y_4h	3:45	2.49
5y_4h	4:00	0

TW_Outfall	0:00:00	181.66
TW_Outfall	0:05:00	181.66
TW_Outfall	0:10:00	181.66
TW_Outfall	0:15:00	181.66
TW_Outfall	0:20:00	181.66
TW_Outfall	0:25:00	181.66
TW_Outfall	0:30:00	181.6604
TW_Outfall	0:35:00	181.6607
TW_Outfall	0:40:00	181.6608
TW_Outfall	0:45:00	181.7785
TW_Outfall	0:50:00	181.7822
TW_Outfall	0:55:00	181.7822
TW_Outfall	1:00:00	181.7822
TW_Outfall	1:05:00	181.7822
TW_Outfall	1:10:00	181.7822
TW_Outfall	1:15:00	181.7822
TW_Outfall	1:20:00	181.7822
TW_Outfall	1:25:00	181.7822
TW_Outfall	1:30:00	181.6602
TW_Outfall	1:35:00	181.7901
TW_Outfall	1:40:00	181.9718
TW_Outfall	1:45:00	182.1386
TW_Outfall	1:50:00	182.2546
TW_Outfall	1:55:00	182.3198
TW_Outfall	2:00:00	182.3548
TW_Outfall	2:05:00	182.3727
TW_Outfall	2:10:00	182.3784
TW_Outfall	2:15:00	182.3774
TW_Outfall	2:20:00	182.3711
TW_Outfall	2:25:00	182.3609

TW_Outfall	2:30:00	182.3487
TW_Outfall	2:35:00	182.3349
TW_Outfall	2:40:00	182.3202
TW_Outfall	2:45:00	182.304
TW_Outfall	2:50:00	182.2877
TW_Outfall	2:55:00	182.2715
TW_Outfall	3:00:00	182.2556
TW_Outfall	3:05:00	182.2393
TW_Outfall	3:10:00	182.226
TW_Outfall	3:15:00	182.2147
TW_Outfall	3:20:00	182.2034
TW_Outfall	3:25:00	182.1914
TW_Outfall	3:30:00	182.1793
TW_Outfall	3:35:00	182.1676
TW_Outfall	3:40:00	182.1563
TW_Outfall	3:45:00	182.1454
TW_Outfall	3:50:00	182.1343
TW_Outfall	3:55:00	182.1231
TW_Outfall	4:00:00	182.1122
TW_Outfall	4:05:00	182.101
TW_Outfall	4:10:00	182.0924
TW_Outfall	4:15:00	182.0841
TW_Outfall	4:20:00	182.0749
TW_Outfall	4:25:00	182.0649
TW_Outfall	4:30:00	182.055
TW_Outfall	4:35:00	182.0452
TW_Outfall	4:40:00	182.0356
TW_Outfall	4:45:00	182.0263
TW_Outfall	4:50:00	182.0168
TW_Outfall	4:55:00	182.0066
TW_Outfall	5:00:00	181.9968
TW_Outfall	5:05:00	181.9875
TW_Outfall	5:10:00	181.9786
TW_Outfall	5:15:00	181.9701
TW_Outfall	5:20:00	181.9621
TW_Outfall	5:25:00	181.9533
TW_Outfall	5:30:00	181.9445
TW_Outfall	5:35:00	181.9362
TW_Outfall	5:40:00	181.9284
TW_Outfall	5:45:00	181.921
TW_Outfall	5:50:00	181.9156
TW_Outfall	5:55:00	181.912
TW_Outfall	6:00:00	181.9084
TW_Outfall	6:05:00	181.9047
TW_Outfall	6:10:00	181.9011
TW_Outfall	6:15:00	181.8969
TW_Outfall	6:20:00	181.8924
TW_Outfall	6:25:00	181.888
TW_Outfall	6:30:00	181.8836
TW_Outfall	6:35:00	181.8793
TW_Outfall	6:40:00	181.8751
TW_Outfall	6:45:00	181.871
TW_Outfall	6:50:00	181.867
TW_Outfall	6:55:00	181.8631
TW_Outfall	7:00:00	181.8593
TW_Outfall	7:05:00	181.8556
TW_Outfall	7:10:00	181.852

TW_Outfall	7:15:00	181.8485
TW_Outfall	7:20:00	181.8451
TW_Outfall	7:25:00	181.8418
TW_Outfall	7:30:00	181.8382
TW_Outfall	7:35:00	181.834
TW_Outfall	7:40:00	181.8298
TW_Outfall	7:45:00	181.8259
TW_Outfall	7:50:00	181.8221
TW_Outfall	7:55:00	181.8184
TW_Outfall	8:00:00	181.8148
TW_Outfall	8:05:00	181.8123
TW_Outfall	8:10:00	181.8103
TW_Outfall	8:15:00	181.8083
TW_Outfall	8:20:00	181.8063
TW_Outfall	8:25:00	181.8043
TW_Outfall	8:30:00	181.8024
TW_Outfall	8:35:00	181.8004
TW_Outfall	8:40:00	181.7985
TW_Outfall	8:45:00	181.7966
TW_Outfall	8:50:00	181.7948
TW_Outfall	8:55:00	181.7929
TW_Outfall	9:00:00	181.7911
TW_Outfall	9:05:00	181.7894
TW_Outfall	9:10:00	181.7876
TW_Outfall	9:15:00	181.7859
TW_Outfall	9:20:00	181.7842
TW_Outfall	9:25:00	181.7826
TW_Outfall	9:30:00	181.781
TW_Outfall	9:35:00	181.7791
TW_Outfall	9:40:00	181.7766
TW_Outfall	9:45:00	181.7741
TW_Outfall	9:50:00	181.7717
TW_Outfall	9:55:00	181.7693
TW_Outfall	10:00:00	181.7673
TW_Outfall	10:05:00	181.766
TW_Outfall	10:10:00	181.7646
TW_Outfall	10:15:00	181.7633
TW_Outfall	10:20:00	181.762
TW_Outfall	10:25:00	181.7607
TW_Outfall	10:30:00	181.7593
TW_Outfall	10:35:00	181.7581
TW_Outfall	10:40:00	181.7568
TW_Outfall	10:45:00	181.7555
TW_Outfall	10:50:00	181.7542
TW_Outfall	10:55:00	181.753
TW_Outfall	11:00:00	181.7518
TW_Outfall	11:05:00	181.7506
TW_Outfall	11:10:00	181.7494
TW_Outfall	11:15:00	181.7482
TW_Outfall	11:20:00	181.747
TW_Outfall	11:25:00	181.7459
TW_Outfall	11:30:00	181.7447
TW_Outfall	11:35:00	181.7436
TW_Outfall	11:40:00	181.7425
TW_Outfall	11:45:00	181.7414
TW_Outfall	11:50:00	181.7404
TW_Outfall	11:55:00	181.7393

TW_Outfall	12:00:00	181.7383
TW_Outfall	12:05:00	181.7373
TW_Outfall	12:10:00	181.7363
TW_Outfall	12:15:00	181.7353
TW_Outfall	12:20:00	181.7343
TW_Outfall	12:25:00	181.7334
TW_Outfall	12:30:00	181.7324
TW_Outfall	12:35:00	181.7315
TW_Outfall	12:40:00	181.7306
TW_Outfall	12:45:00	181.7297
TW_Outfall	12:50:00	181.7289
TW_Outfall	12:55:00	181.728
TW_Outfall	13:00:00	181.7272
TW_Outfall	13:05:00	181.727
TW_Outfall	13:10:00	181.7254
TW_Outfall	13:15:00	181.7247
TW_Outfall	13:20:00	181.7237
TW_Outfall	13:25:00	181.7228
TW_Outfall	13:30:00	181.7221
TW_Outfall	13:35:00	181.7213
TW_Outfall	13:40:00	181.7207
TW_Outfall	13:45:00	181.7201
TW_Outfall	13:50:00	181.7156
TW_Outfall	13:55:00	181.7131
TW_Outfall	14:00:00	181.7139
TW_Outfall	14:05:00	181.7101
TW_Outfall	14:10:00	181.7086
TW_Outfall	14:15:00	181.7083
TW_Outfall	14:20:00	181.7061
TW_Outfall	14:25:00	181.7039
TW_Outfall	14:30:00	181.7013
TW_Outfall	14:35:00	181.7004
TW_Outfall	14:40:00	181.7004
TW_Outfall	14:45:00	181.6998
TW_Outfall	14:50:00	181.6968
TW_Outfall	14:55:00	181.6988
TW_Outfall	15:00:00	181.697
TW_Outfall	15:05:00	181.6945
TW_Outfall	15:10:00	181.6933
TW_Outfall	15:15:00	181.6922
TW_Outfall	15:20:00	181.6918
TW_Outfall	15:25:00	181.6908
TW_Outfall	15:30:00	181.6909
TW_Outfall	15:35:00	181.6895
TW_Outfall	15:40:00	181.6892
TW_Outfall	15:45:00	181.6872
TW_Outfall	15:50:00	181.6863
TW_Outfall	15:55:00	181.6843
TW_Outfall	16:00:00	181.6827
TW_Outfall	16:05:00	181.6834
TW_Outfall	16:10:00	181.685
TW_Outfall	16:15:00	181.6839
TW_Outfall	16:20:00	181.6831
TW_Outfall	16:25:00	181.6824
TW_Outfall	16:30:00	181.682
TW_Outfall	16:35:00	181.6814
TW_Outfall	16:40:00	181.6802

TW_Outfall	16:45:00	181.6801
TW_Outfall	16:50:00	181.6801
TW_Outfall	16:55:00	181.6801
TW_Outfall	17:00:00	181.6801
TW_Outfall	17:05:00	181.6798
TW_Outfall	17:10:00	181.6794
TW_Outfall	17:15:00	181.6787
TW_Outfall	17:20:00	181.6779
TW_Outfall	17:25:00	181.6779
TW_Outfall	17:30:00	181.677
TW_Outfall	17:35:00	181.677
TW_Outfall	17:40:00	181.6766
TW_Outfall	17:45:00	181.6761
TW_Outfall	17:50:00	181.6765
TW_Outfall	17:55:00	181.6764
TW_Outfall	18:00:00	181.6757
TW_Outfall	18:05:00	181.6754
TW_Outfall	18:10:00	181.675
TW_Outfall	18:15:00	181.6749
TW_Outfall	18:20:00	181.6744
TW_Outfall	18:25:00	181.6743
TW_Outfall	18:30:00	181.674
TW_Outfall	18:35:00	181.674
TW_Outfall	18:40:00	181.6736
TW_Outfall	18:45:00	181.6729
TW_Outfall	18:50:00	181.673
TW_Outfall	18:55:00	181.6726
TW_Outfall	19:00:00	181.6726
TW_Outfall	19:05:00	181.6724
TW_Outfall	19:10:00	181.6723
TW_Outfall	19:15:00	181.6722
TW_Outfall	19:20:00	181.6719
TW_Outfall	19:25:00	181.6719
TW_Outfall	19:30:00	181.6717
TW_Outfall	19:35:00	181.6715
TW_Outfall	19:40:00	181.6713
TW_Outfall	19:45:00	181.6712
TW_Outfall	19:50:00	181.6711
TW_Outfall	19:55:00	181.6711
TW_Outfall	20:00:00	181.6711
TW_Outfall	20:05:00	181.6696
TW_Outfall	20:10:00	181.6689
TW_Outfall	20:15:00	181.6665
TW_Outfall	20:20:00	181.6664
TW_Outfall	20:25:00	181.669
TW_Outfall	20:30:00	181.6669
TW_Outfall	20:35:00	181.6689
TW_Outfall	20:40:00	181.6689
TW_Outfall	20:45:00	181.6661
TW_Outfall	20:50:00	181.6661
TW_Outfall	20:55:00	181.666
TW_Outfall	21:00:00	181.6674
TW_Outfall	21:05:00	181.6658
TW_Outfall	21:10:00	181.6673
TW_Outfall	21:15:00	181.6654
TW_Outfall	21:20:00	181.6658
TW_Outfall	21:25:00	181.6656

TW_Outfall	21:30:00	181.6656
TW_Outfall	21:35:00	181.6656
TW_Outfall	21:40:00	181.666
TW_Outfall	21:45:00	181.6661
TW_Outfall	21:50:00	181.6657
TW_Outfall	21:55:00	181.6655
TW_Outfall	22:00:00	181.6655
TW_Outfall	22:05:00	181.6652
TW_Outfall	22:10:00	181.6661
TW_Outfall	22:15:00	181.6657
TW_Outfall	22:20:00	181.6652
TW_Outfall	22:25:00	181.6648
TW_Outfall	22:30:00	181.6648
TW_Outfall	22:35:00	181.6655
TW_Outfall	22:40:00	181.6655
TW_Outfall	22:45:00	181.6651
TW_Outfall	22:50:00	181.6654
TW_Outfall	22:55:00	181.665
TW_Outfall	23:00:00	181.6646
TW_Outfall	23:05:00	181.6646
TW_Outfall	23:10:00	181.6654
TW_Outfall	23:15:00	181.666
TW_Outfall	23:20:00	181.6657
TW_Outfall	23:25:00	181.6651
TW_Outfall	23:30:00	181.6647
TW_Outfall	23:35:00	181.6646
TW_Outfall	23:40:00	181.6656
TW_Outfall	23:45:00	181.665
TW_Outfall	23:50:00	181.6648
TW_Outfall	23:55:00	181.6652
UST	0:00	2.41
UST	0:15	2.43
UST	0:30	2.45
UST	0:45	2.46
UST	1:00	2.48
UST	1:15	2.51
UST	1:30	2.53
UST	1:45	2.55
UST	2:00	2.58
UST	2:15	2.61
UST	2:30	2.64
UST	2:45	2.67
UST	3:00	2.71
UST	3:15	2.74
UST	3:30	2.79
UST	3:45	2.83
UST	4:00	2.88
UST	4:15	2.94
UST	4:30	3
UST	4:45	3.07
UST	5:00	3.15
UST	5:15	3.23
UST	5:30	3.33
UST	5:45	3.45
UST	6:00	3.59
UST	6:15	3.75

UST	6:30	3.94
UST	6:45	4.18
UST	7:00	4.49
UST	7:15	4.89
UST	7:30	5.43
UST	7:45	6.2
UST	8:00	7.41
UST	8:15	9.56
UST	8:30	14.29
UST	8:45	32.01
UST	9:00	145.13
UST	9:15	48.51
UST	9:30	23.13
UST	9:45	15.08
UST	10:00	11.35
UST	10:15	9.23
UST	10:30	7.88
UST	10:45	6.94
UST	11:00	6.25
UST	11:15	5.73
UST	11:30	5.32
UST	11:45	4.99
UST	12:00	4.72
UST	12:15	4.49
UST	12:30	4.29
UST	12:45	4.12
UST	13:00	3.98
UST	13:15	3.85
UST	13:30	3.74
UST	13:45	3.63
UST	14:00	3.54
UST	14:15	3.46
UST	14:30	3.39
UST	14:45	3.32
UST	15:00	3.26
UST	15:15	3.2
UST	15:30	3.15
UST	15:45	3.1
UST	16:00	3.05
UST	16:15	3.01
UST	16:30	2.97
UST	16:45	2.93
UST	17:00	2.9
UST	17:15	2.87
UST	17:30	2.84
UST	17:45	2.81
UST	18:00	2.78
UST	18:15	2.76
UST	18:30	2.73
UST	18:45	2.71
UST	19:00	2.69
UST	19:15	2.67
UST	19:30	2.65
UST	19:45	2.63
UST	20:00	2.61
UST	20:15	2.59
UST	20:30	2.57

UST	20:45	2.56
UST	21:00	2.54
UST	21:15	2.53
UST	21:30	2.51
UST	21:45	2.5
UST	22:00	2.49
UST	22:15	2.47
UST	22:30	2.46
UST	22:45	2.45
UST	23:00	2.44
UST	23:15	2.43
UST	23:30	2.42
UST	23:45	2.41
UST	24:00:00	0

WQ_Storm	0:00	1.78
WQ_Storm	0:15	2.13
WQ_Storm	0:30	2.7
WQ_Storm	0:45	3.72
WQ_Storm	1:00	6.21
WQ_Storm	1:15	16.41
WQ_Storm	1:30	57.83
WQ_Storm	1:45	11.58
WQ_Storm	2:00	6.48
WQ_Storm	2:15	4.53
WQ_Storm	2:30	3.51
WQ_Storm	2:45	2.88
WQ_Storm	3:00	2.45
WQ_Storm	3:15	2.14
WQ_Storm	3:30	1.91
WQ_Storm	3:45	1.72
WQ_Storm	4:00	0

[REPORT]
;;Reporting Options
INPUT YES
CONTROLS NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]				
DIMENSIONS	326046.47455	4665712.8454	327587.14445	4666978.7826
UNITS	Meters			

[COORDINATES]		
;;Node	X-Coord	Y-Coord
;;-----	-----	-----
External_area_outlet	327196.2	4666355.3
J1	327184.879	4666573.422
J2_site_outfall	327080.95	4666256.492
Pond_outlet	327103.377	4666290.365
Outfall_culvert	327333.725	4666352.198
SU1	327070.893	4666149.071

```
[VERTICES]
;;Link      X-Coord      Y-Coord
;;-----
C2          327197.428    4666289.462
W1          327141.454    4666173.511

[POLYGONS]
;;Subcatchment  X-Coord      Y-Coord
;;-----
Dummy_Subcatchment 327116.872    4666151.377
Dummy_Subcatchment 327150.439    4666132.729
Dummy_Subcatchment 327133.034    4666105.378
Dummy_Subcatchment 327110.656    4666121.54
Dummy_Subcatchment 327116.872    4666151.377
S1            326972.035    4665999.404
S1            326977.526    4666060.815
S1            326956.963    4666061.981
S1            326959.07     4666093.695
S1            326864.255    4666100.653
S1            326879.405    4666312.048
S1            327106.072    4666291.932
S1            327088.241    4666052.146
S1            326998.737    4666058.972
S1            326993.262    4665998.222
S1            326972.035    4665999.404
S2            326116.505    4666250.722
S2            326118.623    4666409.294
S2            326248.913    4666397.174
S2            326256.459    4666413.028
S2            326274.136    4666700.163
S2            326550.255    4666673.387
S2            326611.964    4666669.461
S2            326617.074    4666726.363
S2            326619.621    4666775.59
S2            327003.713    4666735.522
S2            327013.657    4666813.874
S2            327231.639    4666788.299
S2            327252.945    4666921.24
S2            327380.248    4666909.342
S2            327357.346    4666682.892
S2            327344.123    4666585.924
S2            327340.421    4666523.314
S2            327327.94     4666279.3
S2            326306.624    4666352.315
S2            326309.925    4666322.806
S2            326405.908    4666295.029
S2            326392.562    4666100.427
S2            326275.349    4666106.963
S2            326279.39     4666044.585
S2            326247.218    4666041.381
S2            326248.498    4666234.995
S2            326116.505    4666250.722
South_Drain    326956.963    4666061.99
South_Drain    326977.526    4666060.824
South_Drain    326972.035    4665999.413
South_Drain    326993.262    4665998.231
South_Drain    326998.737    4666058.981
```


South_Drain	327088.241	4666052.164
South_Drain	327088.916	4666021.996
South_Drain	327372.978	4665993.71
South_Drain	327379.849	4665946.906
South_Drain	327517.114	4665946.733
South_Drain	327513.287	4665900.007
South_Drain	327464.588	4665885.145
South_Drain	327457.423	4665811.747
South_Drain	327059.378	4665841.555
South_Drain	327048.519	4665770.388
South_Drain	326936.205	4665778.108
South_Drain	326948.432	4665916.511
South_Drain	326386.985	4665962.406
South_Drain	326391.254	4666081.364
South_Drain	326858.796	4666039.111
South_Drain	326864.255	4666100.662
South_Drain	326959.07	4666093.704
South_Drain	326956.963	4666061.99
West_Drain	326879.405	4666312.057
West_Drain	326858.796	4666039.102
West_Drain	326391.254	4666081.355
West_Drain	326405.908	4666295.02
West_Drain	326309.925	4666322.797
West_Drain	326306.624	4666352.306
West_Drain	326879.405	4666312.057
[SYMBOLS]		
; ;Gage	X-Coord	Y-Coord
; ;-----	-----	-----

Proposed Conditions Model: PCSWMM Output Details: 1:5 Year 4 Hour Storm

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

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval

Raingage1	5y_4h	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet

Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

0.2608	0.2683	0.2758	0.2833	0.2908
0.2983	0.3058	0.3133	0.3208	0.3283
0.3358	0.3500	0.4000	0.4500	0.5000
0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch
Area:

0.0029	0.0064	0.0103	0.0148	0.0199
0.0255	0.0316	0.0382	0.0454	0.0531
0.0613	0.0701	0.0794	0.0892	0.0996
0.1105	0.1219	0.1339	0.1464	0.1594
0.1730	0.1871	0.2017	0.2169	0.2326
0.2488	0.2656	0.2829	0.3007	0.3191
0.3380	0.3574	0.3774	0.3979	0.4189
0.4404	0.4625	0.4852	0.5083	0.5320
0.5562	0.5813	0.6115	0.6479	0.6907
0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:

0.0421	0.0778	0.1096	0.1389	0.1664
0.1927	0.2182	0.2429	0.2671	0.2909
0.3143	0.3375	0.3604	0.3832	0.4057
0.4282	0.4505	0.4727	0.4948	0.5169
0.5388	0.5607	0.5826	0.6044	0.6262
0.6479	0.6695	0.6912	0.7128	0.7344
0.7560	0.7775	0.7990	0.8205	0.8420
0.8635	0.8849	0.9064	0.9278	0.9492
0.9706	0.9982	1.0284	1.0456	1.0520
1.0502	1.0424	1.0304	1.0158	1.0000

Width:

0.0409	0.0477	0.0546	0.0614	0.0683
0.0752	0.0820	0.0889	0.0957	0.1026
0.1094	0.1163	0.1232	0.1300	0.1369
0.1437	0.1506	0.1574	0.1643	0.1712
0.1780	0.1849	0.1917	0.1986	0.2054
0.2123	0.2192	0.2260	0.2329	0.2397
0.2466	0.2534	0.2603	0.2672	0.2740
0.2809	0.2877	0.2946	0.3014	0.3083
0.3152	0.3469	0.4286	0.5102	0.5918
0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	4.142	49.475
Evaporation Loss	0.000	0.000
Infiltration Loss	1.766	21.093
Surface Runoff	2.304	27.525
Final Storage	0.075	0.897
Continuity Error (%)	-0.080	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.304	23.044
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.304	23.038
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.003
Continuity Error (%)	0.011	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %
3.155 - 1.991 sec : 0.00 %
1.991 - 1.256 sec : 0.00 %
1.256 - 0.792 sec : 0.00 %
0.792 - 0.500 sec : 0.00 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	49.48	6434913.57	0.00	0.00	6435220.15	0.00	6435220.15	6.44	1.00	1.000
S1	49.48	0.00	0.00	7.78	29.26	11.05	40.31	2.14	0.90	0.815
S2	49.48	0.00	0.00	21.14	24.74	8.54	27.31	14.47	2.14	0.552
South_Drain	49.47	0.00	0.00	20.78	26.66	12.44	27.91	3.40	0.71	0.564
West_Drain	49.47	0.00	0.00	26.51	1.35	21.57	22.92	3.03	0.29	0.463

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.18	1.01	182.29	0 02:33	1.01
J1	JUNCTION	0.16	1.14	182.59	0 01:48	1.13
J2_site_outfall	JUNCTION	0.07	0.64	182.32	0 02:38	0.64
Pond_outlet	JUNCTION	0.13	0.81	182.32	0 02:38	0.81
Outfall_culvert	OUTFALL	0.18	1.01	182.16	0 02:33	1.01
SU1	STORAGE	0.30	1.13	182.33	0 02:39	1.13

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
External_area_outlet	JUNCTION	0.000	2.032	0 01:49		0	24	0.152
J1	JUNCTION	2.135	2.135	0 01:45		14.5	14.5	-0.269
J2_site_outfall	JUNCTION	0.000	0.633	0 01:55		0	10.4	0.072
Pond_outlet	JUNCTION	0.000	0.641	0 01:54		0	10.3	0.043
Outfall_culvert	OUTFALL	0.000	1.599	0 02:33		0	23	0.000
SU1	STORAGE	1.649	2.107	0 01:50		8.57	9.61	-0.036

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max		Maximum
	Volume	Pcnt	Pcnt	Pcnt		Pcnt			Outflow
	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min		CMS
SU1	1.007	12	0	0	4.200	49	0 02:39		0.616

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
Outfall_culvert	97.92	0.136	1.599	23.038
System	97.92	0.136	1.599	23.038

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.633	0 01:55	0.48	0.09	0.66
C2	CHANNEL	0.641	0 01:54	0.40	0.07	0.48
C3	CHANNEL	1.599	0 02:33	0.63	0.21	0.53
C4	CHANNEL	2.032	0 01:49	0.78	0.88	0.85
W1	CONDUIT	0.632	0 01:56	0.94	0.17	0.58
P1	PUMP	0.030	0 01:10		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Up Dry	Down Dry	Fraction of Time in Flow Class Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.86
C2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.84
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.34
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.48
W1	1.00	0.02	0.27	0.00	0.28	0.00	0.44	0.00	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Pumping Summary

Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	High
P1	56.37	2	0.00	0.02	0.03	2.244	1.54	0.0	0.0

Analysis begun on: Wed Oct 12 15:40:15 2022
Analysis ended on: Wed Oct 12 15:40:15 2022
Total elapsed time: < 1 sec

Proposed Conditions Model: PCSWMM Output Details: 1:100 Year 4 Hour Storm

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

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Raingage1	100y_4h	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

0.2608	0.2683	0.2758	0.2833	0.2908
0.2983	0.3058	0.3133	0.3208	0.3283
0.3358	0.3500	0.4000	0.4500	0.5000
0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch

Area:	0.0029	0.0064	0.0103	0.0148	0.0199
	0.0255	0.0316	0.0382	0.0454	0.0531
	0.0613	0.0701	0.0794	0.0892	0.0996
	0.1105	0.1219	0.1339	0.1464	0.1594
	0.1730	0.1871	0.2017	0.2169	0.2326
	0.2488	0.2656	0.2829	0.3007	0.3191
	0.3380	0.3574	0.3774	0.3979	0.4189
	0.4404	0.4625	0.4852	0.5083	0.5320
	0.5562	0.5813	0.6115	0.6479	0.6907
	0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:	0.0421	0.0778	0.1096	0.1389	0.1664
	0.1927	0.2182	0.2429	0.2671	0.2909
	0.3143	0.3375	0.3604	0.3832	0.4057
	0.4282	0.4505	0.4727	0.4948	0.5169
	0.5388	0.5607	0.5826	0.6044	0.6262
	0.6479	0.6695	0.6912	0.7128	0.7344
	0.7560	0.7775	0.7990	0.8205	0.8420
	0.8635	0.8849	0.9064	0.9278	0.9492
	0.9706	0.9982	1.0284	1.0456	1.0520
	1.0502	1.0424	1.0304	1.0158	1.0000

Width:	0.0409	0.0477	0.0546	0.0614	0.0683
	0.0752	0.0820	0.0889	0.0957	0.1026
	0.1094	0.1163	0.1232	0.1300	0.1369
	0.1437	0.1506	0.1574	0.1643	0.1712
	0.1780	0.1849	0.1917	0.1986	0.2054
	0.2123	0.2192	0.2260	0.2329	0.2397
	0.2466	0.2534	0.2603	0.2672	0.2740
	0.2809	0.2877	0.2946	0.3014	0.3083
	0.3152	0.3469	0.4286	0.5102	0.5918
	0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	6.831	81.587
Evaporation Loss	0.000	0.000
Infiltration Loss	2.000	23.891
Surface Runoff	4.761	56.866
Final Storage	0.076	0.906
Continuity Error (%)	-0.092	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	4.760	47.604
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	4.764	47.638
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.004
Continuity Error (%)	-0.081	

Time-Step Critical Elements

Link W1 (5.71%)

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 0.10 sec
Average Time Step : 4.90 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : -0.00
Average Iterations per Step : 2.01
Percent Not Converging : 0.03
Time Step Frequencies :
5.000 - 3.155 sec : 97.96 %
3.155 - 1.991 sec : 0.84 %
1.991 - 1.256 sec : 0.43 %
1.256 - 0.792 sec : 0.33 %
0.792 - 0.500 sec : 0.45 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	81.59	14061025.71	0.00	0.00	14061844.32	0.00	14061844.32	14.06	2.12	1.000
S1	81.59	0.00	0.00	8.09	49.26	22.98	72.24	3.83	1.65	0.885
S2	81.59	0.00	0.00	24.51	48.73	24.45	56.07	29.72	4.52	0.687
South_Drain	81.59	0.00	0.00	23.04	54.62	31.75	57.80	7.05	1.36	0.708
West_Drain	81.59	0.00	0.00	28.54	2.27	50.75	53.02	7.01	0.76	0.650

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.28	1.49	182.77	0 02:17	1.49
J1	JUNCTION	0.27	2.34	183.79	0 01:39	1.76
J2_site_outfall	JUNCTION	0.14	1.14	182.82	0 02:21	1.14
Pond_outlet	JUNCTION	0.20	1.29	182.80	0 02:20	1.29
Outfall_culvert	OUTFALL	0.28	1.49	182.64	0 02:17	1.49
SU1	STORAGE	0.39	1.64	182.84	0 02:21	1.63

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
External_area_outlet	JUNCTION	0.000	4.514	0 01:45		0	49.2	0.244
J1	JUNCTION	4.515	4.515	0 01:45		29.7	29.7	-0.568
J2_site_outfall	JUNCTION	0.000	1.558	0 02:32		0	20.3	0.059
Pond_outlet	JUNCTION	0.000	1.559	0 02:32		0	20.4	0.042
Outfall_culvert	OUTFALL	0.000	3.866	0 02:17		0	47.6	0.000
SU1	STORAGE	3.272	4.568	0 01:47		17.9	19.2	-0.024

Node Surcharge Summary

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

Node	Type	Hours	Max. Height	Min. Depth
		Surcharged	Above Crown	Below Rim
			Meters	Meters
J1	JUNCTION	1.51	1.142	0.208
J2_site_outfall	JUNCTION	0.55	0.048	0.680

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
	Volume	Pcnt	Pcnt	Pcnt	Volume	Pcnt	Occurrence	Outflow
	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min	CMS
SU1	1.377	16	0	0	6.590	77	0 02:21	1.558

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
Outfall_culvert	98.43	0.338	3.866	47.638

System 98.43 0.338 3.866 47.638

Link Flow Summary

Link	Type	Maximum	Time of Max		Maximum	Max/	Max/
		Flow CMS	days	hr:min	Veloc m/sec	Full Flow	Full Depth
C1	CONDUIT	1.559	0	02:32	0.69	0.23	1.00
C2	CHANNEL	1.579	0	02:34	0.61	0.17	0.73
C3	CHANNEL	3.866	0	02:17	0.79	0.50	0.78
C4	CHANNEL	4.514	0	01:45	1.12	1.96	1.00
W1	CONDUIT	1.558	0	02:32	1.13	0.43	1.00
P1	PUMP	0.030	0	00:56		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.81	0.00
C2	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.76	0.00
C3	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.28	0.00
C4	1.00	0.01	0.00	0.00	0.99	0.00	0.00	0.00	0.39	0.00
W1	1.00	0.01	0.22	0.00	0.35	0.00	0.43	0.00	0.00	0.00

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full		Hours Above Full		Hours Capacity
		Upstream	Dnstream	Normal Flow		Limited
C1	0.55	0.55	1.35	0.01		0.01
C4	1.36	1.51	1.85	0.71		0.56
W1	0.51	0.51	0.55	0.01		0.01

Pumping Summary

	Percent	Number of	Min	Avg	Max	Total	Power	% Time Off
			Flow	Flow	Flow	Volume	Usage	Pump Curve

Pump	Utilized	Start-Ups	CMS	CMS	CMS	10^6 ltr	Kw-hr	Low	High
P1	57.41	2	0.00	0.02	0.03	2.263	1.55	0.0	0.0

Analysis begun on: Wed Oct 12 15:51:16 2022
Analysis ended on: Wed Oct 12 15:51:16 2022
Total elapsed time: < 1 sec

Proposed Conditions Model: PCSWMM Output Details: 1:100 Year 24 Hour Storm

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

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval

Raingage1	100y_24h	INTENSITY	120 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet

Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

0.2608	0.2683	0.2758	0.2833	0.2908
0.2983	0.3058	0.3133	0.3208	0.3283
0.3358	0.3500	0.4000	0.4500	0.5000
0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch

Area:	0.0029	0.0064	0.0103	0.0148	0.0199
	0.0255	0.0316	0.0382	0.0454	0.0531
	0.0613	0.0701	0.0794	0.0892	0.0996
	0.1105	0.1219	0.1339	0.1464	0.1594
	0.1730	0.1871	0.2017	0.2169	0.2326
	0.2488	0.2656	0.2829	0.3007	0.3191
	0.3380	0.3574	0.3774	0.3979	0.4189
	0.4404	0.4625	0.4852	0.5083	0.5320
	0.5562	0.5813	0.6115	0.6479	0.6907
	0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:	0.0421	0.0778	0.1096	0.1389	0.1664
	0.1927	0.2182	0.2429	0.2671	0.2909
	0.3143	0.3375	0.3604	0.3832	0.4057
	0.4282	0.4505	0.4727	0.4948	0.5169
	0.5388	0.5607	0.5826	0.6044	0.6262
	0.6479	0.6695	0.6912	0.7128	0.7344
	0.7560	0.7775	0.7990	0.8205	0.8420
	0.8635	0.8849	0.9064	0.9278	0.9492
	0.9706	0.9982	1.0284	1.0456	1.0520
	1.0502	1.0424	1.0304	1.0158	1.0000

Width:	0.0409	0.0477	0.0546	0.0614	0.0683
	0.0752	0.0820	0.0889	0.0957	0.1026
	0.1094	0.1163	0.1232	0.1300	0.1369
	0.1437	0.1506	0.1574	0.1643	0.1712
	0.1780	0.1849	0.1917	0.1986	0.2054
	0.2123	0.2192	0.2260	0.2329	0.2397
	0.2466	0.2534	0.2603	0.2672	0.2740
	0.2809	0.2877	0.2946	0.3014	0.3083
	0.3152	0.3469	0.4286	0.5102	0.5918
	0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	9.042	108.000
Evaporation Loss	0.000	0.000
Infiltration Loss	2.411	28.797
Surface Runoff	6.363	76.008
Final Storage	0.268	3.206
Continuity Error (%)	-0.011	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	6.363	63.633
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	6.305	63.051
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.059	0.588
Continuity Error (%)	-0.009	

Time-Step Critical Elements

Link W1 (4.76%)

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 3.11 sec
Average Time Step : 4.98 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %
3.155 - 1.991 sec : 0.00 %
1.991 - 1.256 sec : 0.00 %
1.256 - 0.792 sec : 0.00 %
0.792 - 0.500 sec : 0.00 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	108.00	18384368.25	0.00	0.00	18385143.62	0.00	18385143.62	18.39	0.95	1.000
S1	108.00	0.00	0.00	13.88	65.43	27.17	92.60	4.91	0.37	0.857
S2	108.00	0.00	0.00	27.21	65.88	34.12	76.11	40.34	1.80	0.705
South_Drain	108.00	0.00	0.00	30.16	72.72	42.31	76.95	9.39	0.45	0.712
West_Drain	108.00	0.00	0.00	39.89	3.02	65.03	68.05	9.00	0.50	0.630

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.37	1.25	182.53	0 14:14	1.25
J1	JUNCTION	0.36	1.16	182.61	0 14:07	1.16
J2_site_outfall	JUNCTION	0.16	0.89	182.57	0 14:16	0.89
Pond_outlet	JUNCTION	0.25	1.05	182.56	0 14:16	1.05
Outfall_culvert	OUTFALL	0.37	1.25	182.40	0 14:14	1.25
SU1	STORAGE	0.48	1.38	182.58	0 14:16	1.38

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
External_area_outlet	JUNCTION	0.000	2.573	0 14:02		0	63.8	0.103
J1	JUNCTION	1.797	1.797	0 14:00		40.3	40.3	-0.083
J2_site_outfall	JUNCTION	0.000	1.040	0 14:27		0	24.2	0.021
Pond_outlet	JUNCTION	0.000	1.042	0 14:28		0	24	0.061
Outfall_culvert	OUTFALL	0.000	2.520	0 14:14		0	63.1	0.000
SU1	STORAGE	1.283	1.283	0 14:00		23.3	24.1	-0.002

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max		Maximum
	Volume	Pcnt	Pcnt	Pcnt		Pcnt			
	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min		Outflow
									CMS
SU1	1.665	20	0	0	5.338	63	0 14:16		1.040

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
Outfall_culvert	90.46	0.412	2.520	63.051
System	90.46	0.412	2.520	63.051

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	1.042	0 14:28	0.45	0.16	0.89
C2	CHANNEL	1.051	0 14:29	0.35	0.11	0.60
C3	CHANNEL	2.520	0 14:14	0.70	0.32	0.66
C4	CHANNEL	1.704	0 14:00	0.65	0.74	0.98
W1	CONDUIT	1.040	0 14:27	0.72	0.29	0.81
P1	PUMP	0.030	0 05:22		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Up Dry	----- Down Dry	Fraction of Time in Flow Class Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.09	0.00	0.00	0.91	0.00	0.00	0.60	0.00
C2	1.00	0.09	0.00	0.00	0.91	0.00	0.00	0.52	0.00
C3	1.00	0.09	0.00	0.00	0.91	0.00	0.00	0.16	0.00
C4	1.00	0.09	0.00	0.00	0.91	0.00	0.00	0.22	0.00
W1	1.00	0.09	0.01	0.00	0.47	0.00	0.44	0.00	0.00

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C4	0.01	0.01	0.81	0.01	0.01

Pumping Summary

Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low High
P1	48.21	2	0.00	0.03	0.03	2.384	1.74	0.0 0.0

Analysis begun on: Wed Oct 12 15:52:02 2022
Analysis ended on: Wed Oct 12 15:52:02 2022
Total elapsed time: < 1 sec

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval

Raingage1	WQ_Storm	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet

Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

0.2608	0.2683	0.2758	0.2833	0.2908
0.2983	0.3058	0.3133	0.3208	0.3283
0.3358	0.3500	0.4000	0.4500	0.5000
0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch
Area:

0.0029	0.0064	0.0103	0.0148	0.0199
0.0255	0.0316	0.0382	0.0454	0.0531
0.0613	0.0701	0.0794	0.0892	0.0996
0.1105	0.1219	0.1339	0.1464	0.1594
0.1730	0.1871	0.2017	0.2169	0.2326
0.2488	0.2656	0.2829	0.3007	0.3191
0.3380	0.3574	0.3774	0.3979	0.4189
0.4404	0.4625	0.4852	0.5083	0.5320
0.5562	0.5813	0.6115	0.6479	0.6907
0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:

0.0421	0.0778	0.1096	0.1389	0.1664
0.1927	0.2182	0.2429	0.2671	0.2909
0.3143	0.3375	0.3604	0.3832	0.4057
0.4282	0.4505	0.4727	0.4948	0.5169
0.5388	0.5607	0.5826	0.6044	0.6262
0.6479	0.6695	0.6912	0.7128	0.7344
0.7560	0.7775	0.7990	0.8205	0.8420
0.8635	0.8849	0.9064	0.9278	0.9492
0.9706	0.9982	1.0284	1.0456	1.0520
1.0502	1.0424	1.0304	1.0158	1.0000

Width:

0.0409	0.0477	0.0546	0.0614	0.0683
0.0752	0.0820	0.0889	0.0957	0.1026
0.1094	0.1163	0.1232	0.1300	0.1369
0.1437	0.1506	0.1574	0.1643	0.1712
0.1780	0.1849	0.1917	0.1986	0.2054
0.2123	0.2192	0.2260	0.2329	0.2397
0.2466	0.2534	0.2603	0.2672	0.2740
0.2809	0.2877	0.2946	0.3014	0.3083
0.3152	0.3469	0.4286	0.5102	0.5918
0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	2.679	31.995
Evaporation Loss	0.000	0.000
Infiltration Loss	1.471	17.575
Surface Runoff	1.135	13.551
Final Storage	0.075	0.890
Continuity Error (%)	-0.068	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.135	11.345
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.134	11.341
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.003
Continuity Error (%)	0.010	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %
3.155 - 1.991 sec : 0.00 %
1.991 - 1.256 sec : 0.00 %
1.256 - 0.792 sec : 0.00 %
0.792 - 0.500 sec : 0.00 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	31.99	2729740.82	0.00	0.00	2729850.94	0.00	2729850.94	2.73	0.50	1.000
S1	32.00	0.00	0.00	7.42	18.37	4.76	23.13	1.23	0.52	0.723
S2	31.99	0.00	0.00	17.03	13.29	2.17	13.94	7.39	1.06	0.436
South_Drain	32.00	0.00	0.00	17.75	13.07	3.73	13.44	1.64	0.39	0.420
West_Drain	32.00	0.00	0.00	23.69	0.85	7.40	8.25	1.09	0.12	0.258

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.13	0.70	181.98	0 01:59	0.70
J1	JUNCTION	0.11	0.88	182.33	0 01:48	0.88
J2_site_outfall	JUNCTION	0.05	0.28	181.96	0 03:08	0.28
Pond_outlet	JUNCTION	0.09	0.45	181.96	0 03:08	0.45
Outfall_culvert	OUTFALL	0.13	0.70	181.85	0 01:59	0.70
SU1	STORAGE	0.23	0.77	181.97	0 03:12	0.77

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
External_area_outlet	JUNCTION	0.000	1.039	0 01:49		0	11.9	0.214
J1	JUNCTION	1.058	1.058	0 01:45		7.39	7.39	-0.343
J2_site_outfall	JUNCTION	0.000	0.249	0 02:00		0	5.22	0.053
Pond_outlet	JUNCTION	0.000	0.224	0 01:56		0	4.97	0.048
Outfall_culvert	OUTFALL	0.000	0.745	0 01:59		0	11.3	0.000
SU1	STORAGE	0.885	0.970	0 01:50		3.96	4.74	-0.027

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max		Maximum
	Volume	Pcnt	Pcnt	Pcnt		Pcnt			Outflow
	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min		CMS
SU1	0.774	9	0	0	2.704	32	0 03:12		0.217

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
Outfall_culvert	97.47	0.067	0.745	11.341
System	97.47	0.067	0.745	11.341

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.219	0 02:00	0.45	0.03	0.33
C2	CHANNEL	0.224	0 01:56	0.26	0.02	0.30
C3	CHANNEL	0.745	0 01:59	0.52	0.10	0.37
C4	CHANNEL	1.039	0 01:49	0.67	0.45	0.65
W1	CONDUIT	0.248	0 02:01	0.69	0.07	0.25
P1	PUMP	0.030	0 01:22		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Up Dry	Down Dry	Fraction of Time in Flow Class Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.90
C2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.88
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.39
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.50
W1	1.00	0.02	0.34	0.00	0.20	0.00	0.44	0.00	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Pumping Summary

Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	High
P1	55.26	2	0.00	0.02	0.03	2.248	1.55	0.0	0.0

Analysis begun on: Wed Oct 12 15:54:24 2022
Analysis ended on: Wed Oct 12 15:54:25 2022
Total elapsed time: 00:00:01

Proposed Conditions Model: PCSWMM Output Details: Water Quality Event

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

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval

Raingage1	WQ_Storm	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet

Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

	0.2608	0.2683	0.2758	0.2833	0.2908
	0.2983	0.3058	0.3133	0.3208	0.3283
	0.3358	0.3500	0.4000	0.4500	0.5000
	0.5500	0.6000	0.6500	0.7000	0.7500
	0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch

Area:	0.0029	0.0064	0.0103	0.0148	0.0199
	0.0255	0.0316	0.0382	0.0454	0.0531
	0.0613	0.0701	0.0794	0.0892	0.0996
	0.1105	0.1219	0.1339	0.1464	0.1594
	0.1730	0.1871	0.2017	0.2169	0.2326
	0.2488	0.2656	0.2829	0.3007	0.3191
	0.3380	0.3574	0.3774	0.3979	0.4189
	0.4404	0.4625	0.4852	0.5083	0.5320
	0.5562	0.5813	0.6115	0.6479	0.6907
	0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:	0.0421	0.0778	0.1096	0.1389	0.1664
	0.1927	0.2182	0.2429	0.2671	0.2909
	0.3143	0.3375	0.3604	0.3832	0.4057
	0.4282	0.4505	0.4727	0.4948	0.5169
	0.5388	0.5607	0.5826	0.6044	0.6262
	0.6479	0.6695	0.6912	0.7128	0.7344
	0.7560	0.7775	0.7990	0.8205	0.8420
	0.8635	0.8849	0.9064	0.9278	0.9492
	0.9706	0.9982	1.0284	1.0456	1.0520
	1.0502	1.0424	1.0304	1.0158	1.0000

Width:	0.0409	0.0477	0.0546	0.0614	0.0683
	0.0752	0.0820	0.0889	0.0957	0.1026
	0.1094	0.1163	0.1232	0.1300	0.1369
	0.1437	0.1506	0.1574	0.1643	0.1712
	0.1780	0.1849	0.1917	0.1986	0.2054
	0.2123	0.2192	0.2260	0.2329	0.2397
	0.2466	0.2534	0.2603	0.2672	0.2740
	0.2809	0.2877	0.2946	0.3014	0.3083
	0.3152	0.3469	0.4286	0.5102	0.5918
	0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	2.679	31.995
Evaporation Loss	0.000	0.000
Infiltration Loss	1.471	17.575
Surface Runoff	1.135	13.551
Final Storage	0.075	0.890
Continuity Error (%)	-0.068	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.135	11.345
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.134	11.341
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.003
Continuity Error (%)	0.010	

Time-Step Critical Elements

None

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 4.50 sec
Average Time Step : 5.00 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00
Percent Not Converging : 0.00
Time Step Frequencies :
5.000 - 3.155 sec : 100.00 %
3.155 - 1.991 sec : 0.00 %
1.991 - 1.256 sec : 0.00 %
1.256 - 0.792 sec : 0.00 %
0.792 - 0.500 sec : 0.00 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	31.99	2729740.82	0.00	0.00	2729850.94	0.00	2729850.94	2.73	0.50	1.000
S1	32.00	0.00	0.00	7.42	18.37	4.76	23.13	1.23	0.52	0.723
S2	31.99	0.00	0.00	17.03	13.29	2.17	13.94	7.39	1.06	0.436
South_Drain	32.00	0.00	0.00	17.75	13.07	3.73	13.44	1.64	0.39	0.420
West_Drain	32.00	0.00	0.00	23.69	0.85	7.40	8.25	1.09	0.12	0.258

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.13	0.70	181.98	0 01:59	0.70
J1	JUNCTION	0.11	0.88	182.33	0 01:48	0.88
J2_site_outfall	JUNCTION	0.05	0.28	181.96	0 03:08	0.28
Pond_outlet	JUNCTION	0.09	0.45	181.96	0 03:08	0.45
Outfall_culvert	OUTFALL	0.13	0.70	181.85	0 01:59	0.70
SU1	STORAGE	0.23	0.77	181.97	0 03:12	0.77

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
External_area_outlet	JUNCTION	0.000	1.039	0 01:49		0	11.9	0.214
J1	JUNCTION	1.058	1.058	0 01:45		7.39	7.39	-0.343
J2_site_outfall	JUNCTION	0.000	0.249	0 02:00		0	5.22	0.053
Pond_outlet	JUNCTION	0.000	0.224	0 01:56		0	4.97	0.048
Outfall_culvert	OUTFALL	0.000	0.745	0 01:59		0	11.3	0.000
SU1	STORAGE	0.885	0.970	0 01:50		3.96	4.74	-0.027

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max		Maximum
	Volume	Pcnt	Pcnt	Pcnt		Pcnt			
	1000 m3	Full	Loss	Loss	1000 m3	Full	days hr:min		Outflow
									CMS
SU1	0.774	9	0	0	2.704	32	0 03:12		0.217

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
Outfall_culvert	97.47	0.067	0.745	11.341
System	97.47	0.067	0.745	11.341

Link Flow Summary

Link	Type	Maximum Flow CMS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.219	0 02:00	0.45	0.03	0.33
C2	CHANNEL	0.224	0 01:56	0.26	0.02	0.30
C3	CHANNEL	0.745	0 01:59	0.52	0.10	0.37
C4	CHANNEL	1.039	0 01:49	0.67	0.45	0.65
W1	CONDUIT	0.248	0 02:01	0.69	0.07	0.25
P1	PUMP	0.030	0 01:22		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Up Dry	Down Dry	Fraction of Time in Flow Class Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.90
C2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.88
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.39
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.50
W1	1.00	0.02	0.34	0.00	0.20	0.00	0.44	0.00	0.00

Conduit Surcharge Summary

No conduits were surcharged.

Pumping Summary

Pump	Percent Utilized	Number of Start-Ups	Min Flow CMS	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr	Power Usage Kw-hr	% Time Off Pump Curve Low	High
P1	55.26	2	0.00	0.02	0.03	2.248	1.55	0.0	0.0

Analysis begun on: Wed Oct 12 15:54:24 2022
Analysis ended on: Wed Oct 12 15:54:25 2022
Total elapsed time: 00:00:01

Proposed Conditions Model: PCSWMM Output Details: UST Event

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

WARNING 03: negative offset ignored for Link C1
WARNING 03: negative offset ignored for Link C2
WARNING 03: negative offset ignored for Link W1

Element Count

Number of rain gages 1
Number of subcatchments ... 5
Number of nodes 6
Number of links 6
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval

Raingage1	UST	INTENSITY	15 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet

Dummy_Subcatchment	0.00	0.01	100.00	0.1000	Raingage1	SU1
S1	5.30	153.62	62.00	1.0000	Raingage1	SU1
S2	53.00	365.52	40.00	0.1000	Raingage1	J1
South_Drain	12.20	187.69	32.86	0.1000	Raingage1	Dummy_Subcatchment
West_Drain	13.22	560.17	2.86	0.1000	Raingage1	Dummy_Subcatchment

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow

External_area_outlet	JUNCTION	181.28	2.22	0.0	
J1	JUNCTION	181.45	2.55	100.0	
J2_site_outfall	JUNCTION	181.68	1.82	0.0	
Pond_outlet	JUNCTION	181.51	1.99	0.0	
Outfall_culvert	OUTFALL	181.15	1.90	0.0	
SU1	STORAGE	181.20	2.00	0.0	

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J2_site_outfall	Pond_outlet	CONDUIT	50.0	0.3400	0.0130
C2	Pond_outlet	External_area_outlet	CONDUIT	150.0	0.1533	0.0350
C3	External_area_outlet	Outfall_culvert	CONDUIT	120.0	0.1083	0.0350
C4	J1	External_area_outlet	CONDUIT	220.0	0.0773	0.0350
W1	SU1	J2_site_outfall	CONDUIT	20.0	0.1000	0.0130
P1	SU1	J2_site_outfall	TYPE2 PUMP			

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	3.35
C2	Morgan_drain	1.90	9.44	0.82	15.20	1	9.26
C3	Morgan_drain	1.90	9.44	0.82	15.20	1	7.78
C4	NorthBranch	1.20	4.54	0.51	14.70	1	2.30
W1	HORIZ_ELLIPSE	1.09	1.54	0.34	1.73	2	1.82

Transect Summary

Transect Morgan_drain
Area:

0.0043	0.0090	0.0141	0.0198	0.0259
0.0324	0.0394	0.0469	0.0548	0.0632
0.0720	0.0813	0.0911	0.1013	0.1120
0.1231	0.1347	0.1468	0.1593	0.1723
0.1857	0.1996	0.2140	0.2288	0.2440
0.2598	0.2760	0.2926	0.3097	0.3273
0.3453	0.3638	0.3827	0.4021	0.4220
0.4423	0.4631	0.4860	0.5120	0.5411
0.5732	0.6084	0.6466	0.6879	0.7323
0.7797	0.8302	0.8837	0.9403	1.0000

Hrad:

0.0429	0.0806	0.1148	0.1463	0.1758
0.2037	0.2304	0.2562	0.2811	0.3054
0.3291	0.3523	0.3752	0.3977	0.4199
0.4418	0.4635	0.4850	0.5064	0.5275
0.5486	0.5695	0.5903	0.6110	0.6316
0.6521	0.6725	0.6929	0.7132	0.7334
0.7536	0.7737	0.7938	0.8138	0.8338
0.8538	0.8767	0.9111	0.9382	0.9590
0.9746	0.9858	0.9935	0.9984	1.0012
1.0025	1.0027	1.0021	1.0012	1.0000

Width:

0.0733	0.0808	0.0883	0.0958	0.1033
0.1108	0.1183	0.1258	0.1333	0.1408
0.1483	0.1558	0.1633	0.1708	0.1783
0.1858	0.1933	0.2008	0.2083	0.2158
0.2233	0.2308	0.2383	0.2458	0.2533

0.2608	0.2683	0.2758	0.2833	0.2908
0.2983	0.3058	0.3133	0.3208	0.3283
0.3358	0.3500	0.4000	0.4500	0.5000
0.5500	0.6000	0.6500	0.7000	0.7500
0.8000	0.8500	0.9000	0.9500	1.0000

Transect NorthBranch

Area:	0.0029	0.0064	0.0103	0.0148	0.0199
	0.0255	0.0316	0.0382	0.0454	0.0531
	0.0613	0.0701	0.0794	0.0892	0.0996
	0.1105	0.1219	0.1339	0.1464	0.1594
	0.1730	0.1871	0.2017	0.2169	0.2326
	0.2488	0.2656	0.2829	0.3007	0.3191
	0.3380	0.3574	0.3774	0.3979	0.4189
	0.4404	0.4625	0.4852	0.5083	0.5320
	0.5562	0.5813	0.6115	0.6479	0.6907
	0.7399	0.7954	0.8573	0.9255	1.0000

Hrad:	0.0421	0.0778	0.1096	0.1389	0.1664
	0.1927	0.2182	0.2429	0.2671	0.2909
	0.3143	0.3375	0.3604	0.3832	0.4057
	0.4282	0.4505	0.4727	0.4948	0.5169
	0.5388	0.5607	0.5826	0.6044	0.6262
	0.6479	0.6695	0.6912	0.7128	0.7344
	0.7560	0.7775	0.7990	0.8205	0.8420
	0.8635	0.8849	0.9064	0.9278	0.9492
	0.9706	0.9982	1.0284	1.0456	1.0520
	1.0502	1.0424	1.0304	1.0158	1.0000

Width:	0.0409	0.0477	0.0546	0.0614	0.0683
	0.0752	0.0820	0.0889	0.0957	0.1026
	0.1094	0.1163	0.1232	0.1300	0.1369
	0.1437	0.1506	0.1574	0.1643	0.1712
	0.1780	0.1849	0.1917	0.1986	0.2054
	0.2123	0.2192	0.2260	0.2329	0.2397
	0.2466	0.2534	0.2603	0.2672	0.2740
	0.2809	0.2877	0.2946	0.3014	0.3083
	0.3152	0.3469	0.4286	0.5102	0.5918
	0.6735	0.7551	0.8367	0.9184	1.0000

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

Analysis Options

Flow Units CMS
Process Models:
 Rainfall/Runoff YES
 RDII NO
 Snowmelt NO
 Groundwater NO

Flow Routing YES
Ponding Allowed YES
Water Quality NO
Infiltration Method GREEN_AMPT
Flow Routing Method DYNWAVE
Surcharge Method EXTRAN
Starting Date 11/15/2021 00:00:00
Ending Date 11/17/2021 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 1
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	12.557	149.985
Evaporation Loss	0.000	0.000
Infiltration Loss	2.586	30.888
Surface Runoff	9.695	115.807
Final Storage	0.281	3.359
Continuity Error (%)	-0.046	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	9.695	96.952
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	9.644	96.442
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.056	0.561
Continuity Error (%)	-0.053	

Time-Step Critical Elements

Link W1 (5.90%)

Highest Flow Instability Indexes

All links are stable.

Routing Time Step Summary

Minimum Time Step : 0.50 sec
Average Time Step : 4.92 sec
Maximum Time Step : 5.00 sec
Percent in Steady State : -0.00
Average Iterations per Step : 2.01
Percent Not Converging : 0.04
Time Step Frequencies :
5.000 - 3.155 sec : 98.38 %
3.155 - 1.991 sec : 0.79 %
1.991 - 1.256 sec : 0.34 %
1.256 - 0.792 sec : 0.24 %
0.792 - 0.500 sec : 0.25 %

Subcatchment Runoff Summary

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
Dummy_Subcatchment	149.98	28403158.79	0.00	0.00	28404860.80	0.00	28404860.80	28.41	2.37	1.000
S1	149.98	0.00	0.00	14.91	91.67	42.14	133.80	7.09	1.71	0.892
S2	149.99	0.00	0.00	29.17	98.81	57.14	115.96	61.46	4.67	0.773
South_Drain	149.98	0.00	0.00	32.25	110.02	68.35	116.85	14.26	1.40	0.779
West_Drain	149.99	0.00	0.00	42.94	4.23	102.79	107.02	14.15	1.02	0.714

Node Depth Summary

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
External_area_outlet	JUNCTION	0.47	1.65	182.93	0 09:45	1.65
J1	JUNCTION	0.47	2.28	183.73	0 09:08	1.94
J2_site_outfall	JUNCTION	0.23	1.33	183.01	0 09:48	1.32
Pond_outlet	JUNCTION	0.33	1.46	182.97	0 09:46	1.45
Outfall_culvert	OUTFALL	0.47	1.65	182.80	0 09:45	1.65
SU1	STORAGE	0.59	1.84	183.04	0 09:49	1.84

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max Occurrence days hr:min	Lateral	Total	Flow
		Lateral Inflow CMS	Total Inflow CMS		Inflow Volume 10^6 ltr	Inflow Volume 10^6 ltr	Balance Error Percent
External_area_outlet	JUNCTION	0.000	5.272	0 09:37	0	97.6	0.131
J1	JUNCTION	4.673	4.673	0 09:15	61.5	61.5	-0.240
J2_site_outfall	JUNCTION	0.000	2.157	0 09:56	0	36.7	0.010
Pond_outlet	JUNCTION	0.000	2.159	0 09:56	0	36.7	0.057
Outfall_culvert	OUTFALL	0.000	5.182	0 09:45	0	96.4	0.000
SU1	STORAGE	3.513	4.342	0 09:16	35.5	36.5	0.004

Node Surcharge Summary

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

Node	Type	Hours	Max. Height	Min. Depth
		Surcharged	Above Crown Meters	Below Rim Meters
J1	JUNCTION	2.19	1.084	0.266
J2_site_outfall	JUNCTION	1.36	0.233	0.495

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average	Avg	Evap	Exfil	Maximum	Max	Time of Max	Maximum
	Volume 1000 m3	Pcnt Full	Pcnt Loss	Pcnt Loss	Volume 1000 m3	Pcnt Full	Occurrence days hr:min	Outflow CMS
SU1	2.125	25	0	0	7.622	90	0 09:49	2.157

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq Pcnt	Flow CMS	Flow CMS	Volume 10^6 ltr
Outfall_culvert	97.23	0.618	5.182	96.442

System 97.23 0.618 5.182 96.442

Link Flow Summary

Link	Type	Maximum	Time of Max		Maximum	Max/	Max/
		Flow CMS	Occurrence days hr:min		Veloc m/sec	Full Flow	Full Depth
C1	CONDUIT	2.159	0	09:56	0.70	0.32	1.00
C2	CHANNEL	2.184	0	09:57	0.51	0.24	0.82
C3	CHANNEL	5.182	0	09:45	0.82	0.67	0.87
C4	CHANNEL	4.673	0	09:15	1.12	2.03	1.00
W1	CONDUIT	2.157	0	09:56	0.70	0.59	1.00
P1	PUMP	0.030	0	01:51		1.00	

Flow Classification Summary

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class								
		Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl	
C1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.59	0.00
C2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.46	0.00
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.15	0.00
C4	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.22	0.00
W1	1.00	0.02	0.00	0.00	0.55	0.00	0.43	0.00	0.00	0.00

Conduit Surcharge Summary

Conduit	----- Both Ends	Hours Full		Hours Above Full		Hours Capacity
		Upstream	Dnstream	Normal Flow		Limited
C1	1.36	1.36	2.16	0.01		0.01
C4	2.07	2.19	2.72	0.98		0.84
W1	1.34	1.34	1.36	0.01		1.05

Pumping Summary

	Percent	Number of	Min	Avg	Max	Total	Power	% Time Off
			Flow	Flow	Flow	Volume	Usage	Pump Curve

Pump	Utilized	Start-Ups	CMS	CMS	CMS	10^6 ltr	Kw-hr	Low	High
P1	47.47	2	0.00	0.03	0.03	2.382	1.56	0.0	0.0

Analysis begun on: Wed Oct 12 16:20:15 2022
Analysis ended on: Wed Oct 12 16:20:16 2022
Total elapsed time: 00:00:01

Appendix D

Water Quality Calculations

		Stormwater Management Calculations	Project:	440 Texas Road - Detailed Engineering	No.:	224361	
		Water Quality Calculations	By:	MS	Date:	2022-10-12	Page:
			Checked:	JVM	Scenario:	Proposed	1

SWMF - Water Quality Requirements	
Drainage Area	5.30 ha
Qp=0.0011m3/s/ha	
% Impervious:	62.00
Normal 70% TSS Removal	
Treatment Volume	119.33 m ³ /ha
Active Storage:	40 m ³ /ha
	212 m ³
Perm Storage:	79.33 m ³ /ha required
	420 m ³
Extended Detention Outlet	2.5 L/s average
	6 L/s max (2.4 x avg)
Erosion Control (14 L/s/ha for 5yr storm)	
	74 L/s
Erosion Control (8 L/s/ha for 5yr storm)	
	42 L/s

Notes:	Input
	Output

SWMF - Required Forebay Length	
Length to width ratio of forebay, r = 5.0:1	
Peak outflow (32 mm WQ storm), Q_p =	0.030 m ³ /s (24hr ext. det)
Target particle size =	150 mm
Settling velocity, V_s =	0.0003 m/s
Forebay Settling Length, Dist 1	
$Dist = \sqrt{\frac{rQ_p}{V_s}}$	
	22 m
Forebay Dispersion Length, Dist 2	
Desired velocity in forebay, V_f =	0.5 m/s
Peak inlet flowrate , Q_p (32 mm WQ storm)	= 1.285 m ³ /s
Depth in forebay, d =	1.0 m
$Dist_2 = \frac{8Q}{dV_f}$	
	20.56 m
Therefore, the settling length of 22 m governs the design.	
Required Length:	22 m