

# *Smart Property – Meadowbrook Public Roads*

City of Waukesha  
Waukesha County, Wisconsin

**Preliminary**

## **Storm Water Management Plan**

**Prepared by:**



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**January 27, 2026**

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## Introduction

The Smart Family Trust proposes to construct new public roads, underground utilities, and stormwater infrastructure to support future development of a parcel located north of Summit Avenue, east of Woodland Hills Drive, and west of Meadowbrook Road in the City of Waukesha, Waukesha County, Wisconsin. Figure 1 illustrates the general location of the project site.

This report documents the design computations for existing and proposed conditions and presents a plan for stormwater management that meets the requirements of the City of Waukesha and the Wisconsin Department of Natural Resources (WDNR).

## Owner/ Developer

The owner, developer, and responsible entity for installation and maintenance of the stormwater management practices:

**Smart Family Trust**  
144 W. Broadway  
Waukesha, Wisconsin 53186  
Phone: (262) 547-7755

## Design Requirements

The following design standards have been used to develop the stormwater management plan for the project:

- City of Waukesha Chapter 32 Stormwater Management and Erosion Control
- Wisconsin Department of Natural Resources (WDNR) Technical Standards, NR151, and NR216
- Summary of design requirements:
  - Peak Discharge: The peak flow discharge rates of stormwater runoff from the site under the post-development site conditions shall not exceed the rates under the pre-development conditions for the 1, 2, 10, and 100-yr, 24-hr design storms.
  - Water Quality (Total Suspended Solids): Reduce to the maximum extent practicable the total suspended solids load by 80% for new development sites, based on an average annual rainfall, as compared to no runoff management controls.
  - Infiltration: For low density residential developments one of the following shall be met:
    - Infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on an average annual rainfall.
    - No more than 1% of the project site is required as an effective infiltration area.

## Analysis Overview

The Stormwater Management Plan for the proposed development has been designed in accordance with the City of Waukesha requirements and all applicable state requirements. Existing and proposed stormwater runoff conditions for the site were analyzed for: runoff volume, peak volume, discharge, detention basin storage capacity required, outlet structure and storm sewer system requirements. The software package used for modeling and analysis was HydroCAD Version 10.10 software by HydroCAD Software Solutions. HydroCAD uses NRCS methods to generate runoff and pond routing hydrographs. The model’s capabilities include modeling simple drainage basins, combining hydrographs to determine runoff and storage requirements, and detention basin and outlet structure sizing.

MSE3 rainfall distributions were used for modeling the 1, 2, 10 and 100-year, 24-hour storm events. The corresponding rainfall data used for modeling was taken from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Frequency Tables for Wisconsin Counties and is shown in the following table.

**TABLE 1  
Design Rainfall Values**

Storm Recurrence Interval	24-hour Rainfall Depths
1-year	2.40 inches
2-year	2.70 inches
10-year	3.81 inches
100-year	6.18 inches

Soil types for the site were determined from the NRCS Soil Survey Maps for Waukesha County. The Soil Survey identifies the soils at the site as a mix of Type B soils (Hochheim soils) and Type D soils (Hochheim loam) with limited areas of Type C soils (Theresa silt loam).

## Pre-Development Watershed Description

The project site consists of approximately 21 acres located north of Summit Avenue, east of Woodland Hills Drive, and west of Meadowbrook Road in the City of Waukesha, Waukesha County, Wisconsin. The existing land cover is primarily agricultural fields and grassland. Surface drainage generally flows to the south and southwest, either toward a drainage swale located north of Tara Hill Court or toward a roadside ditch north of Summit Avenue. Both conveyances drain west to a low point at Torhorst Road before being piped to Pebble Creek. The entire site lies within the Fox River Watershed.

Figure 2, Pre-Development Conditions Plan, depicts the project location, existing land cover, drainage subareas, and flow paths. The following table summarizes the stormwater modeling results for pre-development conditions. Detailed hydrologic computations are provided in Appendix A.

**TABLE 2**  
**Pre-Development Site Conditions**

Subarea or Junction	Description	Total Area (acres)	Impervious Area (acres)	Time of Conc. (min.)	Peak Flow Rate (cfs)			
					1-year	2-year	10-year	100-year
1	Subarea	22.11	0.43	11	16.73	22.80	48.46	111.92
2	Subarea	2.87	0.04	10	2.22	3.02	6.41	14.81
2D	Existing Depression	-	-	-	1.09	2.09	6.09	14.33
3	Subarea	0.37	0.04	6	0.45	0.59	1.15	2.48
<b>1L</b>	<b>Pre-Development Outflow*</b>	<b>25.35</b>	<b>0.51</b>	<b>-</b>	<b>17.06</b>	<b>23.22</b>	<b>55.17</b>	<b>127.87</b>

\*: Flows from Woodland Hills Subdivision to the west to be incorporated into the analysis at a later date.

## Post-Development Site Drainage Description

The proposed development includes new public roads, underground utilities, and stormwater infrastructure designed to serve the road improvements and the future buildout of a single-family residential subdivision adjacent to the new public roads.

For modeling purposes, each future residential lot is assumed to have an impervious area of 4,100 square feet consisting of approximately 900 square feet of driveway and 3,200 square feet of roof area.

Stormwater management will be provided through two wet detention ponds and two infiltration basins. The proposed road and stormwater management improvements will disturb approximately 5 acres of area and result in a net increase of approximately 5.61 acres of impervious surface, which includes impervious area associated with the future subdivision.

Figure 3, Post-Development Conditions Plan, illustrates the proposed land cover, grading, drainage boundaries, flow paths, and stormwater management improvements. The following table summarizes the results of the hydrologic analysis for post-development conditions. Detailed computations are included in Appendix B.

**TABLE 3**  
**Post-Development Site Conditions**

Subarea or Junction	Description	Total Area (acres)	Impervious Area (acres)	Time of Conc. (min.)	Peak Flow Rate (cfs)			
					1-year	2-year	10-year	100-year
1	Subarea	18.73	4.73	15	19.14	24.37	45.43	94.33
1P	Proposed Pond	-	-	-	0.54	0.61	15.52	60.93
2	Subarea	2.53	0.54	11	1.26	1.85	4.49	11.38
2P	Proposed Pond	-	-	-	0.96	1.41	15.66	63.61
3	Subarea	3.30	0.63	10	4.41	5.55	10.09	20.47
3B	Proposed Infiltration Basin	-	-	-	0.80	1.20	8.16	36.23
4	Subarea	0.36	0.00	6	0.04	0.10	0.43	1.42
4B	Proposed Infiltration Basin	-	-	-	1.10	1.61	12.64	46.53
5	Subarea	0.43	0.22	6	0.83	1.02	1.75	3.35
<b>1L</b>	<b>Pre-Development Outflow*</b>	<b>25.35</b>	<b>6.12</b>	<b>-</b>	<b>1.15</b>	<b>1.70</b>	<b>12.79</b>	<b>46.82</b>

\*: Flows from Woodland Hills Subdivision to the west to be incorporated into the analysis at a later date.

## Stormwater Detention Basin Design & Summary

The stormwater management system consists of two wet detention ponds and two infiltration basins as the primary stormwater control measures for the site. All basins are designed with 4:1 side slopes, 10-foot top of berm widths, and emergency overflow spillways set above the 100-year high water elevation.

The following table summarizes the detention system routing analysis for post-development conditions. Detailed basin design information is included in Appendix B.

**TABLE 4**  
**Routing Analysis Summary**

<i><b>Pond 1P</b></i>				
System Details: Bottom elevation = 88.00 Normal water elevation = 93.00 10-foot spillway at elevation = 98.60 Top of berm elevation = 99.60		Primary Outlet Control: 3.5-inch diameter orifice at I.E. 93.00 48-inch horizontal grate at elevation 96.75 36-inch diameter outlet pipe at I.E. 92.75		
	1-year Storm	2-year Storm	10-year Storm	100-year Storm
Peak Inflow (cfs)	19.14	24.37	45.43	94.33
Peak Outflow (cfs)	0.54	0.61	15.52	60.93
Max Water Surface Elev.	96.00	96.68	97.26	98.51
Max Storage Volume (ac-ft)	0.90	1.16	1.40	2.00
<i><b>Pond 2P</b></i>				
System Details: Bottom elevation = 87.5 Normal water elevation = 92.50 Top of berm elevation = 96.50		Primary Outlet Control (Drains to Basin 3B): 36-inch diameter outlet pipe at I.E. 92.50 10-foot spillway at elevation 95.00 Secondary Outlet Control (Drains to Basin 4B): 18-inch diameter outlet pipe at I.E. 92.50		
	1-year Storm	2-year Storm	10-year Storm	100-year Storm
Peak Inflow (cfs)	1.53	2.17	16.66	70.13
Peak Outflow (cfs)	0.96	1.41	15.66	63.61
Max Water Surface Elev.	92.77	92.83	93.71	95.50
Max Storage Volume (ac-ft)	0.02	0.03	0.11	0.35
<i><b>Basin 3B</b></i>				
System Details: Bottom elevation = 82.00 10-foot spillway at elevation = 86.75 Top of berm elevation = 87.75		Outlet Control: 0.50 inch/hour native infiltration rate (Table 2) 36-inch diameter outlet pipe at I.E. 82.25		
	1-year Storm	2-year Storm	10-year Storm	100-year Storm
Peak Inflow (cfs)	4.54	5.87	11.80	59.11
Peak Outflow (cfs)	0.80	1.20	8.16	36.23
Max Water Surface Elev.	82.79	82.90	83.95	86.72
Max Storage Volume (ac-ft)	0.15	0.17	0.41	1.33

**TABLE 4**  
**Routing Analysis Summary**

<b>Basin 4B</b>				
System Details:		Outlet Control:		
Bottom elevation = 82.00		0.50 inch/hour native infiltration rate (Table 2)		
10-foot spillway at elevation = 85.70		36-inch diameter outlet pipe at I.E. 82.25		
Top of berm elevation = 86.70				
	1-year Storm	2-year Storm	10-year Storm	100-year Storm
Peak Inflow (cfs)	1.10	1.65	12.82	48.55
Peak Outflow (cfs)	1.10	1.61	12.64	46.53
Max Water Surface Elev.	82.63	82.71	83.63	85.62
Max Storage Volume (ac-ft)	0.03	0.03	0.10	0.33

### Peak Discharge Summaries

The proposed stormwater management system is designed to limit post-development peak discharge rates to no greater than pre-development rates for the 1, 2, 10, and 100-year, 24-hour design storms, in accordance with the City of Waukesha stormwater discharge criteria.

The following table provides a comparison of pre- and post-development peak discharge rates.

**TABLE 5**  
**Comparison of Peak Discharge**

	Pre-Development		Post-Development
1-year	17.06 cfs	>	1.15 cfs
2-year	23.22 cfs	>	1.70 cfs
10-year	55.17 cfs	>	12.79 cfs
100-year	127.87 cfs	>	46.82 cfs

### Water Quality

The City of Waukesha requires new development sites to achieve an 80 percent reduction in total suspended solids (TSS), based on an average annual rainfall, compared to no runoff management controls.

Stormwater quality was evaluated using winSLAMM Version 10.5.0 software, developed by Robert Pitt and John Voorhees. The analysis indicates that the proposed wet detention ponds and infiltration basins will remove approximately 80.6 percent of TSS from site runoff. Detailed results are provided in Appendix C.

### Infiltration

City of Waukesha standards require low impervious developments to infiltrate runoff such that post-development infiltration volume is at least 90% of pre-development infiltration volume, based on an

average annual rainfall. However, the ordinance limits required effective infiltration area to no more than 1% of the total project site.

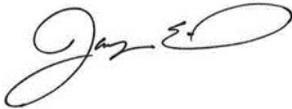
The overall development plan will disturb approximately 21 acres of area. In accordance with the City's ordinance, the maximum effective infiltration area required is approximately 0.21 acres (1% of the project site). The two proposed infiltration basins will provide a total effective infiltration area of approximately 0.21 acres. Based on this, the site meets the infiltration performance standard and no additional infiltration analysis is warranted.

## Conclusion

The proposed development complies with the City of Waukesha and the WDNR requirements for stormwater quantity control, water quality treatment, and infiltration performance. On behalf of the owner, we respectfully request approval of this Stormwater Management Plan to allow construction of the proposed public road improvements.

Prepared by:

**SOUND STORMWATER DESIGN LLC**

A handwritten signature in black ink, appearing to read "Jayme Sisel". The signature is fluid and cursive, with a large loop at the end.

Jayme Sisel, P.E.

# FIGURES

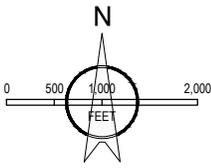
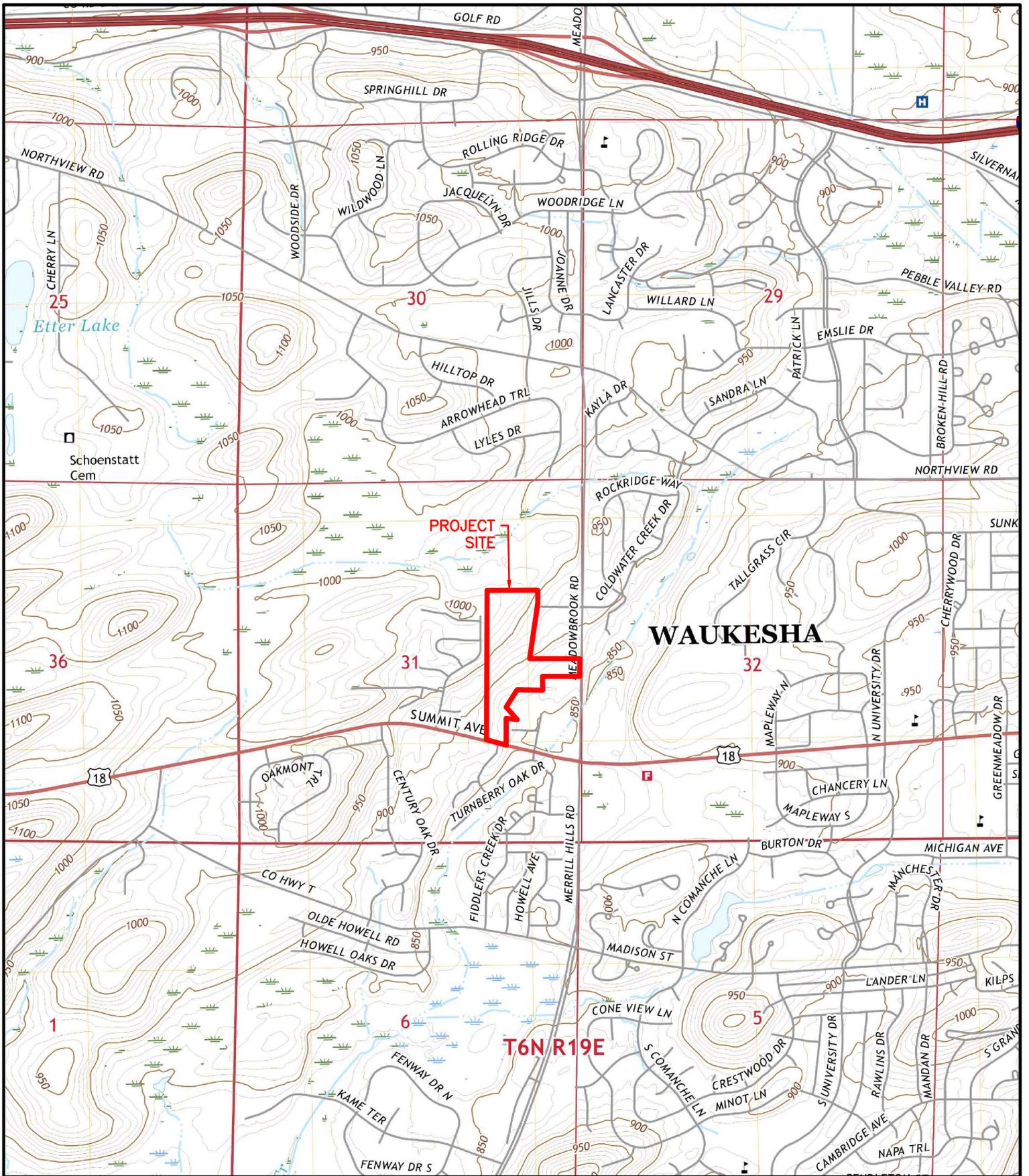
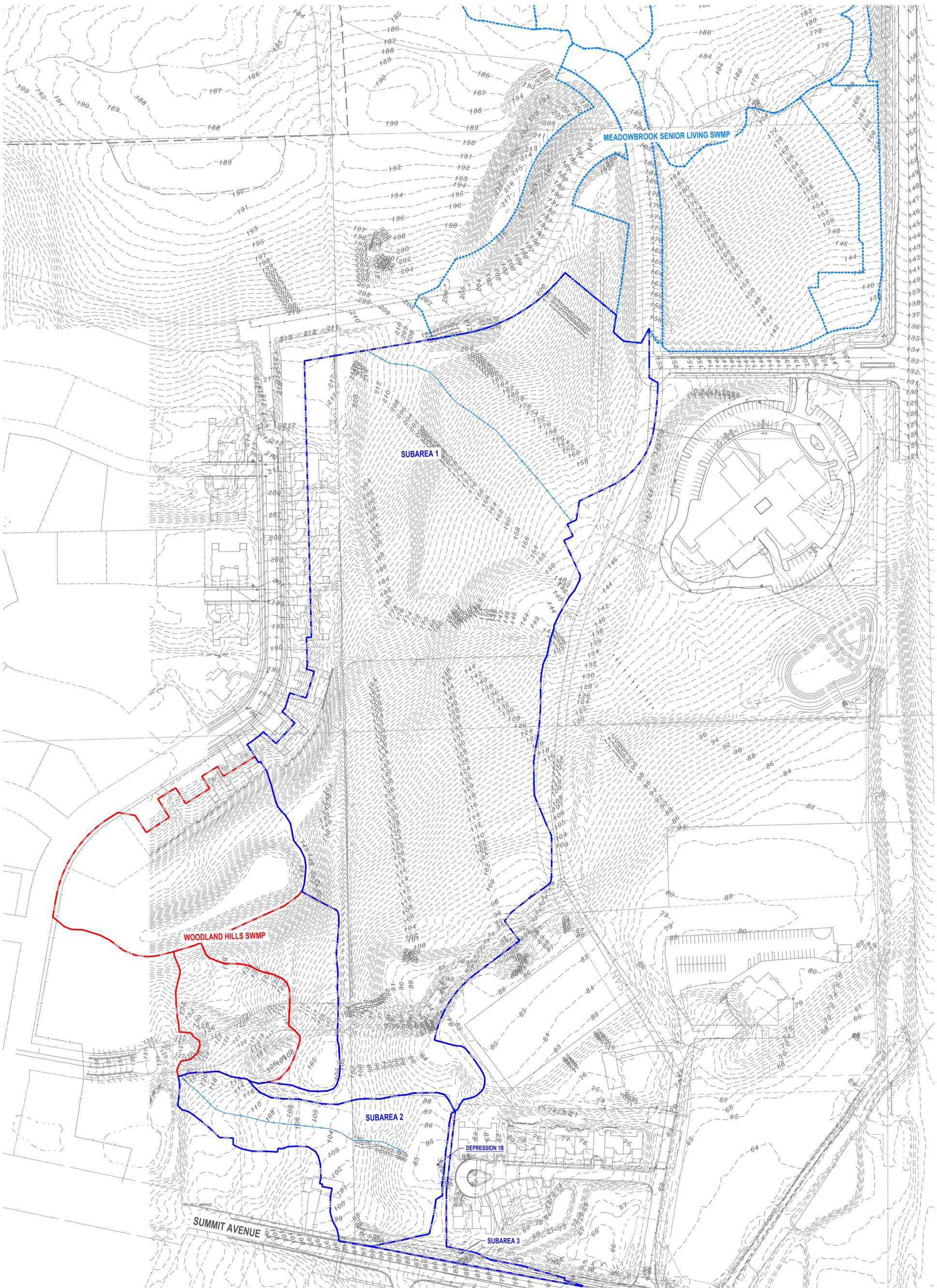


FIGURE 1

**SITE LOCATION MAP**  
**SMART PROPERTY**  
**MEADOWBROOK PUBLIC ROADS**  
**SUMMIT, WISCONSIN**



SOUND STORMWATER  
 DESIGN



# POST-DEVELOPMENT CONDITIONS

SMART PROPERTY  
 MEADOWBROOK PUBLIC ROADS  
 CITY OF WAUKESHA, WISCONSIN

**LEGEND**  
 -DRAINAGE BASIN BOUNDARY  
 -Tc LINE

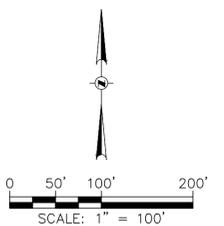
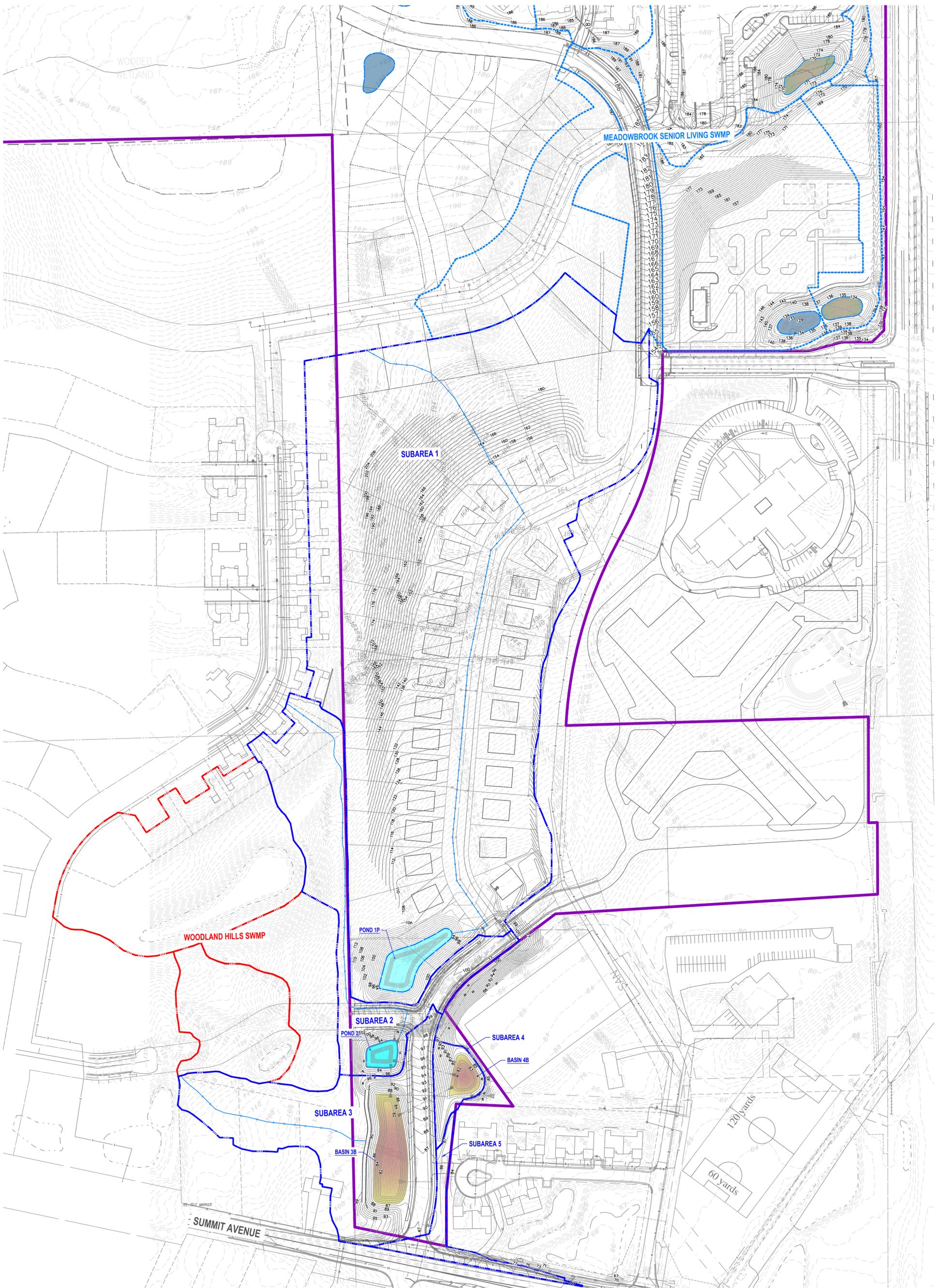


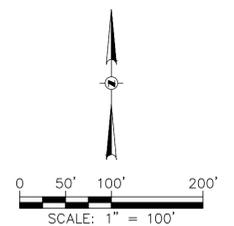
FIGURE 2



# POST-DEVELOPMENT CONDITIONS

SMART PROPERTY  
 MEADOWBROOK PUBLIC ROADS  
 CITY OF WAUKESHA, WISCONSIN

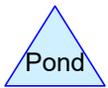
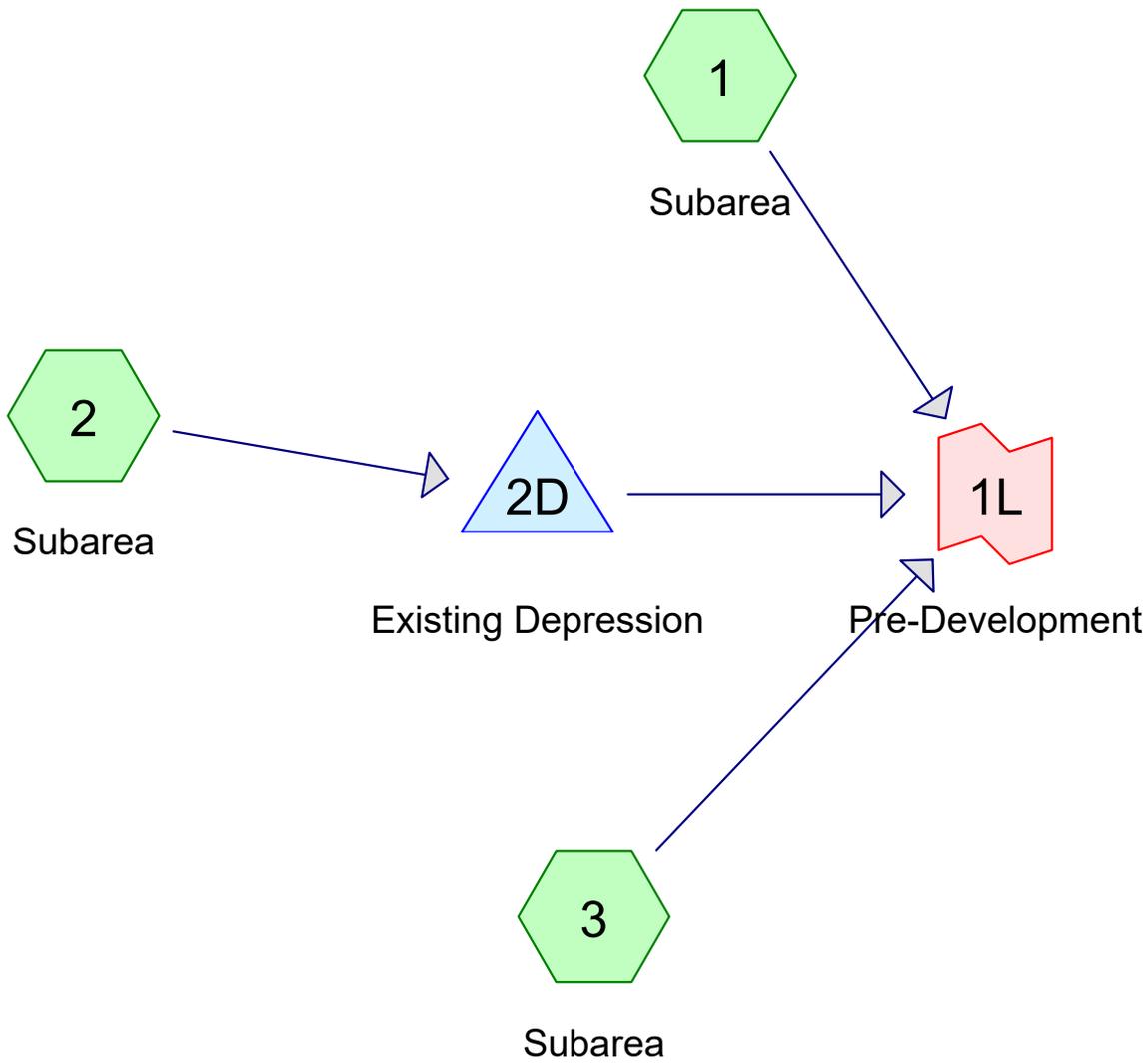
- LEGEND**
- - - - - -DRAINAGE BASIN BOUNDARY
  - >—> -T<sub>c</sub> LINE



**FIGURE 3**

# APPENDIX A

Pre-Development Hydrologic Analysis



## Existing\_029

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### Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	MSE 24-hr	3	Default	24.00	1	2.40	2
2	2-yr	MSE 24-hr	3	Default	24.00	1	2.70	2
3	10-yr	MSE 24-hr	3	Default	24.00	1	3.81	2
4	100-yr	MSE 24-hr	3	Default	24.00	1	6.18	2

## Existing\_029

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### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.270	69	cropland - B soils (1)
1.740	83	cropland - D soils (1)
0.510	98	impervious (1, 2, 3)
0.870	61	lawn - B soils (1)
0.500	74	lawn - C soils (2)
1.320	80	lawn - D soils (1, 2, 3)
2.750	58	meadow - B soils (1, 2, 3)
0.130	71	meadow - C soils (1, 2)
11.260	78	meadow - D soils (1, 2, 3)
<b>25.350</b>	<b>74</b>	<b>TOTAL AREA</b>

**Existing\_029**

MSE 24-hr 3 1-yr Rainfall=2.40"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea**

Runoff Area=22.110 ac 1.94% Impervious Runoff Depth>0.55"  
Flow Length=625' Tc=10.6 min CN=74 Runoff=16.73 cfs 1.018 af

**Subcatchment2: Subarea**

Runoff Area=2.870 ac 1.39% Impervious Runoff Depth>0.55"  
Flow Length=560' Tc=10.2 min CN=74 Runoff=2.22 cfs 0.132 af

**Subcatchment3: Subarea**

Runoff Area=0.370 ac 10.81% Impervious Runoff Depth>0.68"  
Tc=6.0 min CN=77 Runoff=0.45 cfs 0.021 af

**Pond 2D: Existing Depression**

Peak Elev=85.05' Storage=0.039 af Inflow=2.22 cfs 0.132 af  
Outflow=1.09 cfs 0.098 af

**Link 1L: Pre-Development**

Inflow=17.06 cfs 1.137 af  
Primary=17.06 cfs 1.137 af

**Total Runoff Area = 25.350 ac Runoff Volume = 1.171 af Average Runoff Depth = 0.55"**  
**97.99% Pervious = 24.840 ac 2.01% Impervious = 0.510 ac**

**Existing\_029**

MSE 24-hr 3 2-yr Rainfall=2.70"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=22.110 ac 1.94% Impervious Runoff Depth>0.72"  
Flow Length=625' Tc=10.6 min CN=74 Runoff=22.80 cfs 1.332 af

**Subcatchment2: Subarea** Runoff Area=2.870 ac 1.39% Impervious Runoff Depth>0.72"  
Flow Length=560' Tc=10.2 min CN=74 Runoff=3.02 cfs 0.173 af

**Subcatchment3: Subarea** Runoff Area=0.370 ac 10.81% Impervious Runoff Depth>0.87"  
Tc=6.0 min CN=77 Runoff=0.59 cfs 0.027 af

**Pond 2D: Existing Depression** Peak Elev=85.08' Storage=0.042 af Inflow=3.02 cfs 0.173 af  
Outflow=2.09 cfs 0.139 af

**Link 1L: Pre-Development** Inflow=23.22 cfs 1.499 af  
Primary=23.22 cfs 1.499 af

**Total Runoff Area = 25.350 ac Runoff Volume = 1.532 af Average Runoff Depth = 0.73"**  
**97.99% Pervious = 24.840 ac 2.01% Impervious = 0.510 ac**

**Existing\_029**

MSE 24-hr 3 10-yr Rainfall=3.81"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=22.110 ac 1.94% Impervious Runoff Depth>1.46"  
Flow Length=625' Tc=10.6 min CN=74 Runoff=48.46 cfs 2.685 af

**Subcatchment2: Subarea** Runoff Area=2.870 ac 1.39% Impervious Runoff Depth>1.46"  
Flow Length=560' Tc=10.2 min CN=74 Runoff=6.41 cfs 0.349 af

**Subcatchment3: Subarea** Runoff Area=0.370 ac 10.81% Impervious Runoff Depth>1.66"  
Tc=6.0 min CN=77 Runoff=1.15 cfs 0.051 af

**Pond 2D: Existing Depression** Peak Elev=85.17' Storage=0.052 af Inflow=6.41 cfs 0.349 af  
Outflow=6.09 cfs 0.315 af

**Link 1L: Pre-Development** Inflow=55.17 cfs 3.051 af  
Primary=55.17 cfs 3.051 af

**Total Runoff Area = 25.350 ac Runoff Volume = 3.085 af Average Runoff Depth = 1.46"**  
**97.99% Pervious = 24.840 ac 2.01% Impervious = 0.510 ac**

**Existing\_029**

MSE 24-hr 3 100-yr Rainfall=6.18"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=22.110 ac 1.94% Impervious Runoff Depth>3.33"  
Flow Length=625' Tc=10.6 min CN=74 Runoff=111.92 cfs 6.144 af

**Subcatchment2: Subarea** Runoff Area=2.870 ac 1.39% Impervious Runoff Depth>3.33"  
Flow Length=560' Tc=10.2 min CN=74 Runoff=14.81 cfs 0.798 af

**Subcatchment3: Subarea** Runoff Area=0.370 ac 10.81% Impervious Runoff Depth>3.64"  
Tc=6.0 min CN=77 Runoff=2.48 cfs 0.112 af

**Pond 2D: Existing Depression** Peak Elev=85.30' Storage=0.069 af Inflow=14.81 cfs 0.798 af  
Outflow=14.33 cfs 0.764 af

**Link 1L: Pre-Development** Inflow=127.87 cfs 7.019 af  
Primary=127.87 cfs 7.019 af

**Total Runoff Area = 25.350 ac Runoff Volume = 7.053 af Average Runoff Depth = 3.34"**  
**97.99% Pervious = 24.840 ac 2.01% Impervious = 0.510 ac**

**Summary for Subcatchment 1: Subarea**

Runoff = 111.92 cfs @ 12.18 hrs, Volume= 6.144 af, Depth> 3.33"  
 Routed to Link 1L : Pre-Development

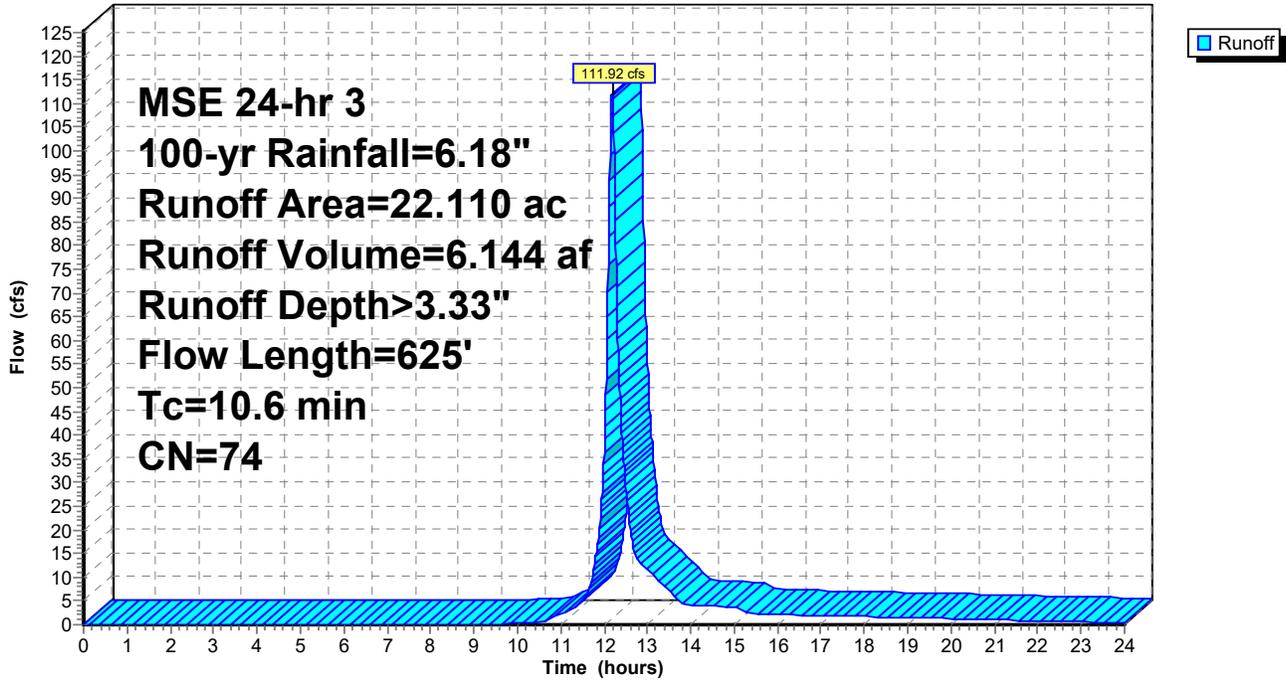
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.430	98	impervious
* 0.870	61	lawn - B soils
* 0.540	80	lawn - D soils
* 6.270	69	cropland - B soils
* 1.740	83	cropland - D soils
* 2.150	58	meadow - B soils
* 0.030	71	meadow - C soils
* 10.080	78	meadow - D soils
22.110	74	Weighted Average
21.680		98.06% Pervious Area
0.430		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0800	0.19		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
0.2	55	0.0800	4.55		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.0	360	0.1300	5.80		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.5	110	0.0500	3.60		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
10.6	625	Total			

### Subcatchment 1: Subarea

Hydrograph



**Existing\_029**

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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Subcatchment 2: Subarea**

Runoff = 14.81 cfs @ 12.18 hrs, Volume= 0.798 af, Depth> 3.33"

Routed to Pond 2D : Existing Depression

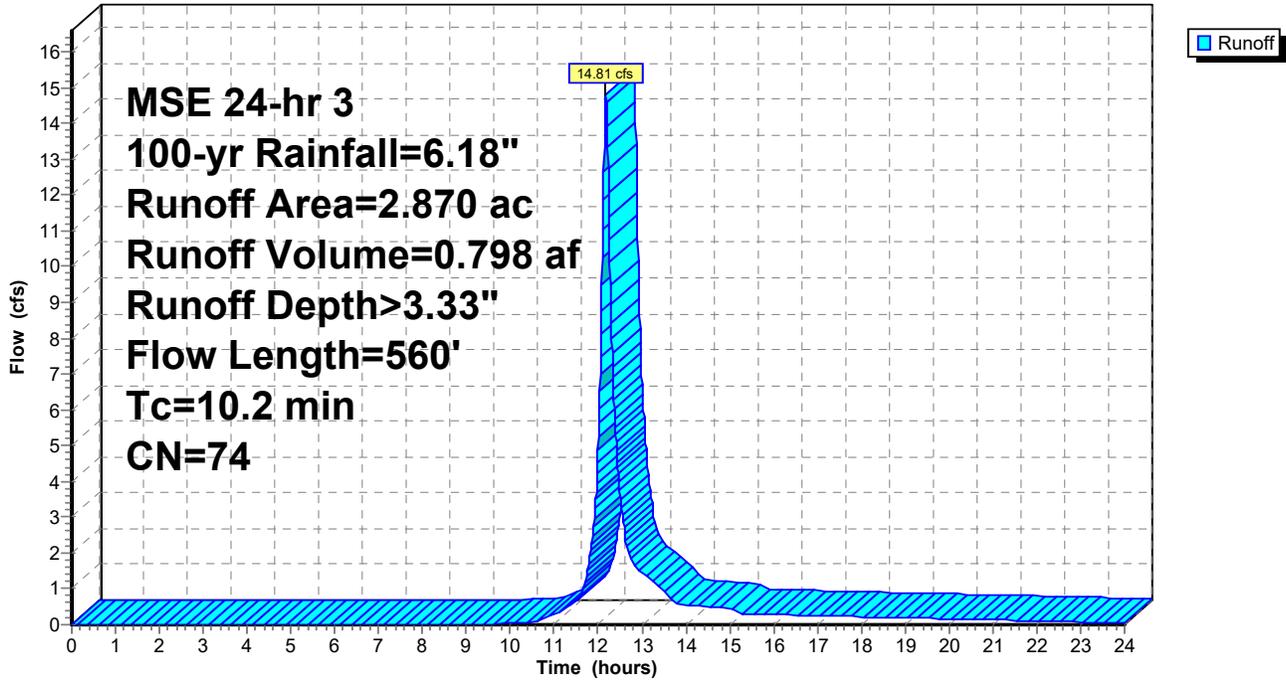
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.040	98	impervious
* 0.500	74	lawn - C soils
* 0.680	80	lawn - D soils
* 0.540	58	meadow - B soils
* 0.100	71	meadow - C soils
* 1.010	78	meadow - D soils
2.870	74	Weighted Average
2.830		98.61% Pervious Area
0.040		1.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
0.0	10	0.1000	5.09		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.7	330	0.0400	3.22		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.3	120	0.1300	5.80		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
10.2	560	Total			

### Subcatchment 2: Subarea

Hydrograph



**Existing\_029**

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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Subcatchment 3: Subarea**

Runoff = 2.48 cfs @ 12.13 hrs, Volume= 0.112 af, Depth> 3.64"

Routed to Link 1L : Pre-Development

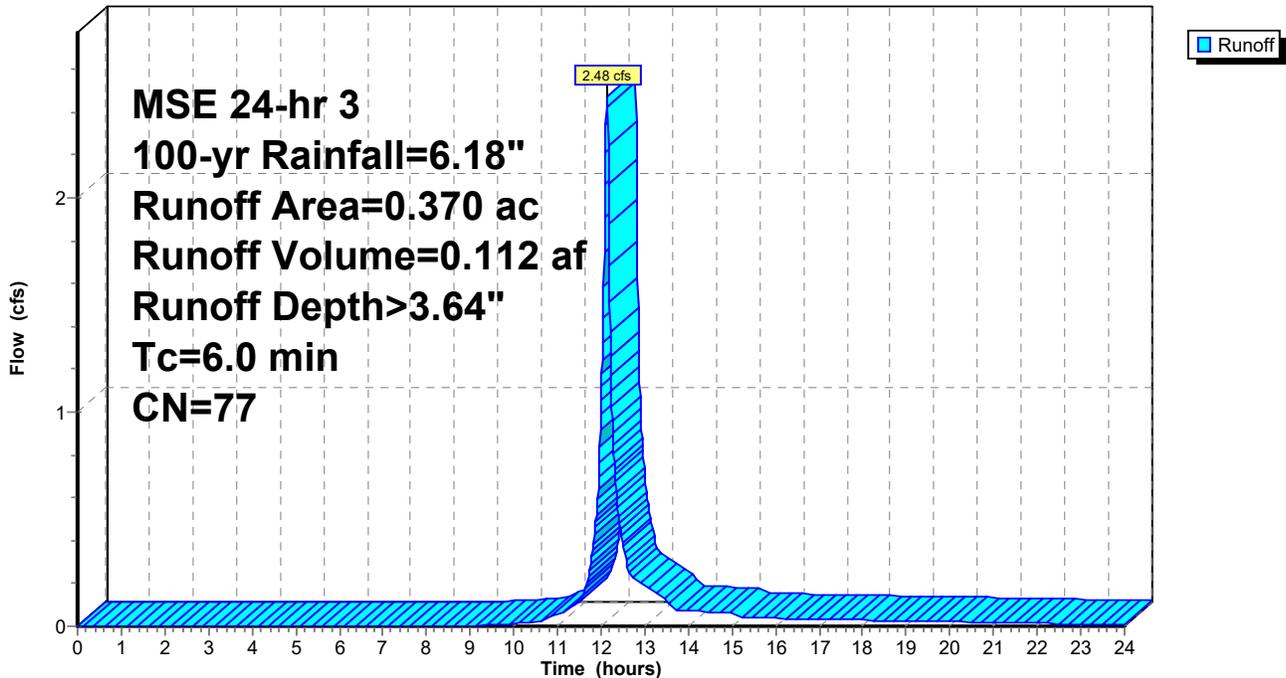
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.040	98	impervious
* 0.100	80	lawn - D soils
* 0.060	58	meadow - B soils
* 0.170	78	meadow - D soils
0.370	77	Weighted Average
0.330		89.19% Pervious Area
0.040		10.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment 3: Subarea**

Hydrograph



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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Pond 2D: Existing Depression**

Inflow Area = 2.870 ac, 1.39% Impervious, Inflow Depth > 3.33" for 100-yr event  
 Inflow = 14.81 cfs @ 12.18 hrs, Volume= 0.798 af  
 Outflow = 14.33 cfs @ 12.20 hrs, Volume= 0.764 af, Atten= 3%, Lag= 1.3 min  
 Primary = 14.33 cfs @ 12.20 hrs, Volume= 0.764 af  
 Routed to Link 1L : Pre-Development

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 85.30' @ 12.20 hrs Surf.Area= 0.142 ac Storage= 0.069 af

Plug-Flow detention time= 30.6 min calculated for 0.763 af (96% of inflow)  
 Center-of-Mass det. time= 8.9 min ( 815.9 - 807.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	84.00'	0.535 af	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

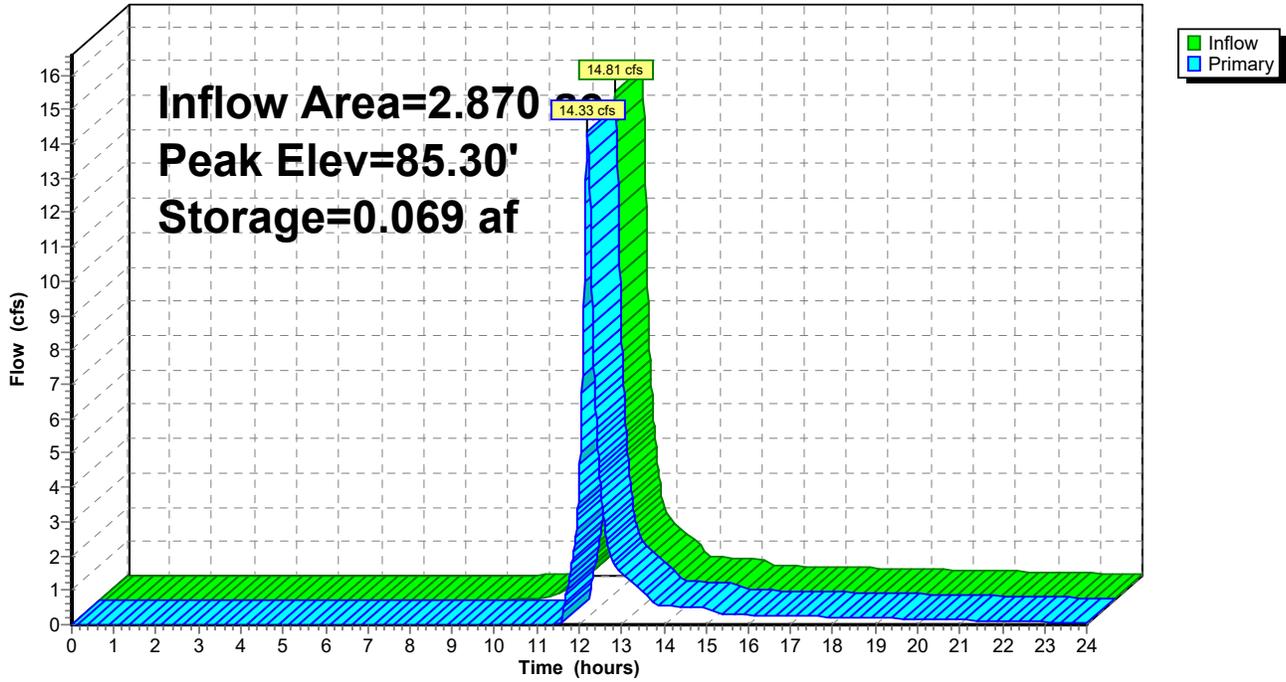
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
84.00	0.000	0.000	0.000	0.000
85.00	0.100	0.033	0.033	0.100
86.00	0.270	0.178	0.211	0.270
87.00	0.380	0.323	0.535	0.381

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	<b>35.0' long x 10.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

**Primary OutFlow** Max=14.32 cfs @ 12.20 hrs HW=85.30' TW=0.00' (Dynamic Tailwater)  
 ↑1=**Broad-Crested Rectangular Weir**(Weir Controls 14.32 cfs @ 1.38 fps)

### Pond 2D: Existing Depression

Hydrograph



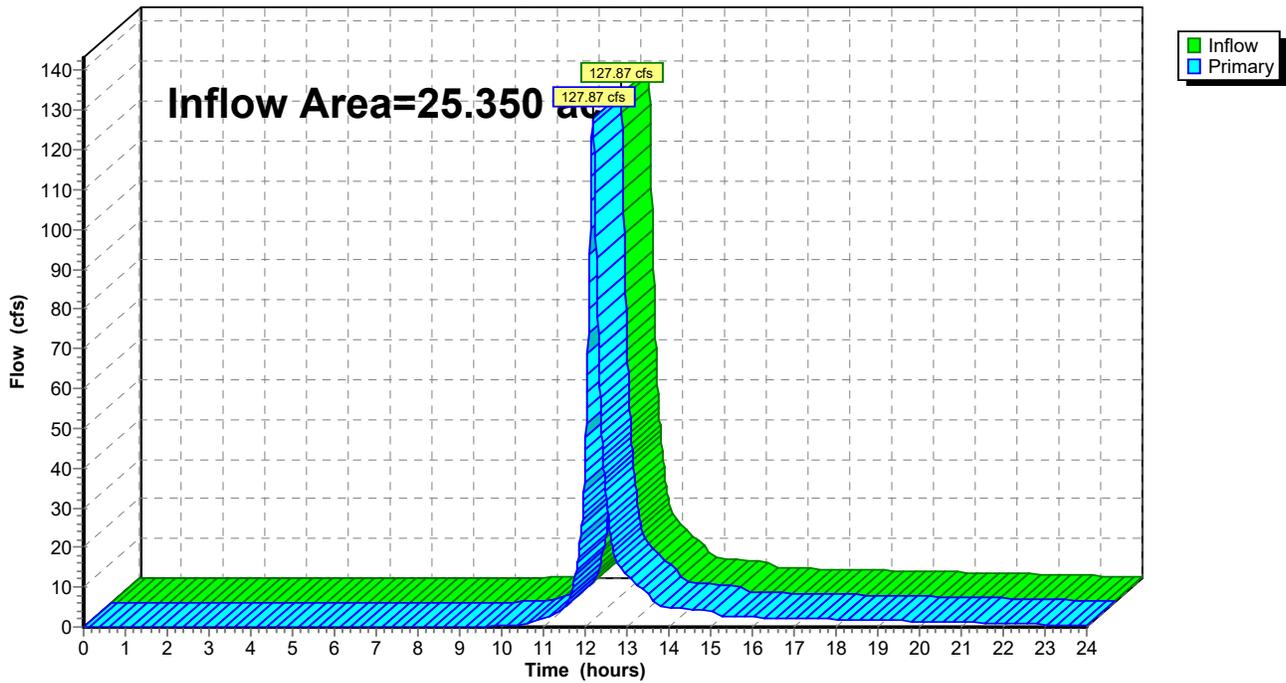
### Summary for Link 1L: Pre-Development

Inflow Area = 25.350 ac, 2.01% Impervious, Inflow Depth > 3.32" for 100-yr event  
Inflow = 127.87 cfs @ 12.19 hrs, Volume= 7.019 af  
Primary = 127.87 cfs @ 12.19 hrs, Volume= 7.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

### Link 1L: Pre-Development

Hydrograph



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*Multi-Event Tables*

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**Events for Subcatchment 1: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	16.73	1.018	0.55
2-yr	2.70	22.80	1.332	0.72
10-yr	3.81	48.46	2.685	1.46
100-yr	<b>6.18</b>	<b>111.92</b>	<b>6.144</b>	<b>3.33</b>

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*Multi-Event Tables*

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**Events for Subcatchment 2: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	2.22	0.132	0.55
2-yr	2.70	3.02	0.173	0.72
10-yr	3.81	6.41	0.349	1.46
100-yr	<b>6.18</b>	<b>14.81</b>	<b>0.798</b>	<b>3.33</b>

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*Multi-Event Tables*

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**Events for Subcatchment 3: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.45	0.021	0.68
2-yr	2.70	0.59	0.027	0.87
10-yr	3.81	1.15	0.051	1.66
100-yr	<b>6.18</b>	<b>2.48</b>	<b>0.112</b>	<b>3.64</b>

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*Multi-Event Tables*

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**Events for Pond 2D: Existing Depression**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	2.22	1.09	85.05	0.039
2-yr	3.02	2.09	85.08	0.042
10-yr	6.41	6.09	85.17	0.052
100-yr	<b>14.81</b>	<b>14.33</b>	<b>85.30</b>	<b>0.069</b>

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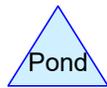
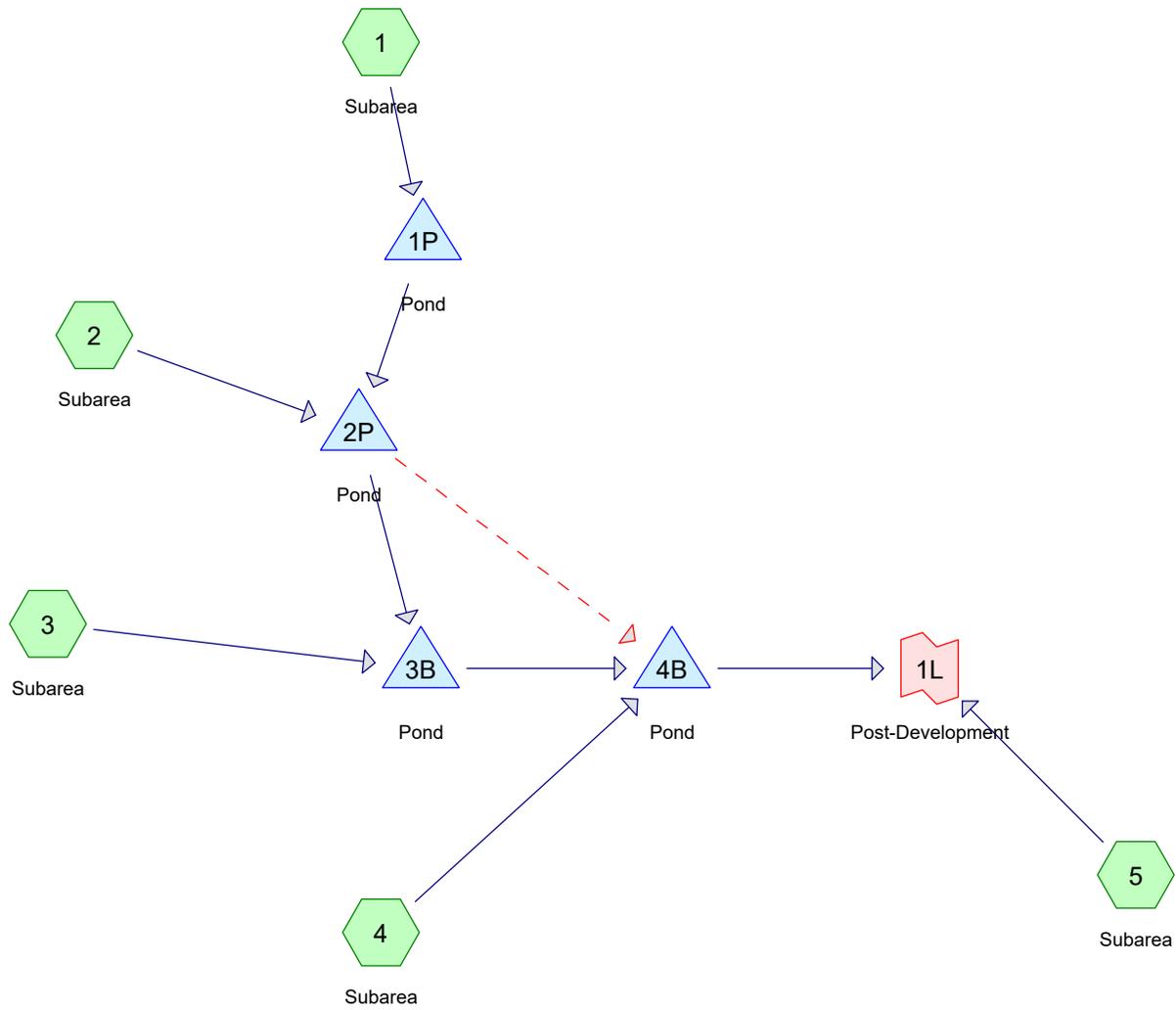
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**Events for Link 1L: Pre-Development**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-yr	17.06	17.06	<b>0.00</b>
2-yr	23.22	23.22	0.00
10-yr	55.17	55.17	0.00
100-yr	<b>127.87</b>	<b>127.87</b>	0.00

# APPENDIX B

Post-Development Hydrologic Analysis



**Routing Diagram for Proposed\_029**  
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### Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-yr	MSE 24-hr	3	Default	24.00	1	2.40	2
2	2-yr	MSE 24-hr	3	Default	24.00	1	2.70	2
3	10-yr	MSE 24-hr	3	Default	24.00	1	3.81	2
4	100-yr	MSE 24-hr	3	Default	24.00	1	6.18	2

## Proposed\_029

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### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.120	98	impervious (1, 2, 3, 5)
6.200	61	lawn - B soils (1, 2, 3, 4, 5)
0.500	74	lawn - C soils (3)
10.710	80	lawn - D soils (1, 2, 3, 5)
1.160	58	meadow - B soils (2)
0.300	71	meadow - C soils (3)
0.050	78	meadow - D soils (2)
0.310	98	water (1, 2)
<b>25.350</b>	<b>79</b>	<b>TOTAL AREA</b>

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MSE 24-hr 3 1-yr Rainfall=2.40"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=18.730 ac 26.48% Impervious Runoff Depth>0.82"  
 Flow Length=1,730' Tc=15.2 min CN=80 Runoff=19.14 cfs 1.279 af

**Subcatchment2: Subarea** Runoff Area=2.530 ac 24.51% Impervious Runoff Depth>0.41"  
 Flow Length=950' Tc=10.5 min CN=70 Runoff=1.26 cfs 0.086 af

**Subcatchment3: Subarea** Runoff Area=3.300 ac 19.09% Impervious Runoff Depth>0.87"  
 Flow Length=460' Tc=10.0 min CN=81 Runoff=4.41 cfs 0.240 af

**Subcatchment4: Subarea** Runoff Area=0.360 ac 0.00% Impervious Runoff Depth>0.17"  
 Tc=6.0 min CN=61 Runoff=0.04 cfs 0.005 af

**Subcatchment5: Subarea** Runoff Area=0.430 ac 51.16% Impervious Runoff Depth>1.04"  
 Tc=6.0 min CN=84 Runoff=0.83 cfs 0.037 af

**Pond 1P: Pond** Peak Elev=96.00' Storage=0.899 af Inflow=19.14 cfs 1.279 af  
 Outflow=0.54 cfs 0.516 af

**Pond 2P: Pond** Peak Elev=92.77' Storage=0.023 af Inflow=1.53 cfs 0.602 af  
 Primary=0.57 cfs 0.346 af Secondary=0.39 cfs 0.239 af Outflow=0.96 cfs 0.585 af

**Pond 3B: Pond** Peak Elev=82.79' Storage=0.147 af Inflow=4.54 cfs 0.586 af  
 36.0" Round Culvert n=0.013 L=124.0' S=0.0020 '/ Outflow=0.80 cfs 0.470 af

**Pond 4B: Pond** Peak Elev=82.63' Storage=0.029 af Inflow=1.10 cfs 0.714 af  
 36.0" Round Culvert n=0.013 L=42.0' S=0.0536 '/ Outflow=1.10 cfs 0.691 af

**Link 1L: Post-Development** Inflow=1.15 cfs 0.728 af  
 Primary=1.15 cfs 0.728 af

**Total Runoff Area = 25.350 ac Runoff Volume = 1.647 af Average Runoff Depth = 0.78"**  
**74.64% Pervious = 18.920 ac 25.36% Impervious = 6.430 ac**

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MSE 24-hr 3 2-yr Rainfall=2.70"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=18.730 ac 26.48% Impervious Runoff Depth>1.03"  
Flow Length=1,730' Tc=15.2 min CN=80 Runoff=24.37 cfs 1.605 af

**Subcatchment2: Subarea** Runoff Area=2.530 ac 24.51% Impervious Runoff Depth>0.55"  
Flow Length=950' Tc=10.5 min CN=70 Runoff=1.85 cfs 0.117 af

**Subcatchment3: Subarea** Runoff Area=3.300 ac 19.09% Impervious Runoff Depth>1.09"  
Flow Length=460' Tc=10.0 min CN=81 Runoff=5.55 cfs 0.299 af

**Subcatchment4: Subarea** Runoff Area=0.360 ac 0.00% Impervious Runoff Depth>0.26"  
Tc=6.0 min CN=61 Runoff=0.10 cfs 0.008 af

**Subcatchment5: Subarea** Runoff Area=0.430 ac 51.16% Impervious Runoff Depth>1.27"  
Tc=6.0 min CN=84 Runoff=1.02 cfs 0.046 af

**Pond 1P: Pond** Peak Elev=96.68' Storage=1.164 af Inflow=24.37 cfs 1.605 af  
Outflow=0.61 cfs 0.579 af

**Pond 2P: Pond** Peak Elev=92.83' Storage=0.028 af Inflow=2.17 cfs 0.696 af  
Primary=0.84 cfs 0.401 af Secondary=0.57 cfs 0.277 af Outflow=1.41 cfs 0.678 af

**Pond 3B: Pond** Peak Elev=82.90' Storage=0.169 af Inflow=5.87 cfs 0.700 af  
36.0" Round Culvert n=0.013 L=124.0' S=0.0020 '/ Outflow=1.20 cfs 0.581 af

**Pond 4B: Pond** Peak Elev=82.71' Storage=0.033 af Inflow=1.65 cfs 0.865 af  
36.0" Round Culvert n=0.013 L=42.0' S=0.0536 '/ Outflow=1.61 cfs 0.841 af

**Link 1L: Post-Development** Inflow=1.70 cfs 0.887 af  
Primary=1.70 cfs 0.887 af

**Total Runoff Area = 25.350 ac Runoff Volume = 2.074 af Average Runoff Depth = 0.98"**  
**74.64% Pervious = 18.920 ac 25.36% Impervious = 6.430 ac**

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MSE 24-hr 3 10-yr Rainfall=3.81"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=18.730 ac 26.48% Impervious Runoff Depth>1.88"  
Flow Length=1,730' Tc=15.2 min CN=80 Runoff=45.43 cfs 2.940 af

**Subcatchment2: Subarea** Runoff Area=2.530 ac 24.51% Impervious Runoff Depth>1.20"  
Flow Length=950' Tc=10.5 min CN=70 Runoff=4.49 cfs 0.254 af

**Subcatchment3: Subarea** Runoff Area=3.300 ac 19.09% Impervious Runoff Depth>1.96"  
Flow Length=460' Tc=10.0 min CN=81 Runoff=10.09 cfs 0.539 af

**Subcatchment4: Subarea** Runoff Area=0.360 ac 0.00% Impervious Runoff Depth>0.72"  
Tc=6.0 min CN=61 Runoff=0.43 cfs 0.022 af

**Subcatchment5: Subarea** Runoff Area=0.430 ac 51.16% Impervious Runoff Depth>2.20"  
Tc=6.0 min CN=84 Runoff=1.75 cfs 0.079 af

**Pond 1P: Pond** Peak Elev=97.26' Storage=1.404 af Inflow=45.43 cfs 2.940 af  
Outflow=15.52 cfs 1.813 af

**Pond 2P: Pond** Peak Elev=93.71' Storage=0.113 af Inflow=16.66 cfs 2.066 af  
Primary=9.95 cfs 1.244 af Secondary=5.70 cfs 0.804 af Outflow=15.66 cfs 2.048 af

**Pond 3B: Pond** Peak Elev=83.95' Storage=0.410 af Inflow=11.80 cfs 1.783 af  
36.0" Round Culvert n=0.013 L=124.0' S=0.0020 '/' Outflow=8.16 cfs 1.660 af

**Pond 4B: Pond** Peak Elev=83.63' Storage=0.095 af Inflow=12.82 cfs 2.486 af  
36.0" Round Culvert n=0.013 L=42.0' S=0.0536 '/' Outflow=12.64 cfs 2.462 af

**Link 1L: Post-Development** Inflow=12.79 cfs 2.541 af  
Primary=12.79 cfs 2.541 af

**Total Runoff Area = 25.350 ac Runoff Volume = 3.834 af Average Runoff Depth = 1.81"**  
**74.64% Pervious = 18.920 ac 25.36% Impervious = 6.430 ac**

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MSE 24-hr 3 100-yr Rainfall=6.18"

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Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1: Subarea** Runoff Area=18.730 ac 26.48% Impervious Runoff Depth>3.94"  
Flow Length=1,730' Tc=15.2 min CN=80 Runoff=94.33 cfs 6.150 af

**Subcatchment2: Subarea** Runoff Area=2.530 ac 24.51% Impervious Runoff Depth>2.95"  
Flow Length=950' Tc=10.5 min CN=70 Runoff=11.38 cfs 0.621 af

**Subcatchment3: Subarea** Runoff Area=3.300 ac 19.09% Impervious Runoff Depth>4.05"  
Flow Length=460' Tc=10.0 min CN=81 Runoff=20.47 cfs 1.113 af

**Subcatchment4: Subarea** Runoff Area=0.360 ac 0.00% Impervious Runoff Depth>2.13"  
Tc=6.0 min CN=61 Runoff=1.42 cfs 0.064 af

**Subcatchment5: Subarea** Runoff Area=0.430 ac 51.16% Impervious Runoff Depth>4.36"  
Tc=6.0 min CN=84 Runoff=3.35 cfs 0.156 af

**Pond 1P: Pond** Peak Elev=98.51' Storage=1.995 af Inflow=94.33 cfs 6.150 af  
Outflow=60.93 cfs 4.972 af

**Pond 2P: Pond** Peak Elev=95.50' Storage=0.350 af Inflow=70.13 cfs 5.593 af  
Primary=50.86 cfs 3.856 af Secondary=12.75 cfs 1.718 af Outflow=63.61 cfs 5.575 af

**Pond 3B: Pond** Peak Elev=86.72' Storage=1.329 af Inflow=59.11 cfs 4.969 af  
36.0" Round Culvert n=0.013 L=124.0' S=0.0020 '/' Outflow=36.23 cfs 4.839 af

**Pond 4B: Pond** Peak Elev=85.62' Storage=0.333 af Inflow=48.55 cfs 6.621 af  
36.0" Round Culvert n=0.013 L=42.0' S=0.0536 '/' Outflow=46.53 cfs 6.595 af

**Link 1L: Post-Development** Inflow=46.82 cfs 6.751 af  
Primary=46.82 cfs 6.751 af

**Total Runoff Area = 25.350 ac Runoff Volume = 8.104 af Average Runoff Depth = 3.84"**  
**74.64% Pervious = 18.920 ac 25.36% Impervious = 6.430 ac**

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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Subcatchment 1: Subarea**

Runoff = 94.33 cfs @ 12.24 hrs, Volume= 6.150 af, Depth> 3.94"  
Routed to Pond 1P : Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 4.730	98	impervious
* 5.030	61	lawn - B soils
* 8.740	80	lawn - D soils
* 0.230	98	water
18.730	80	Weighted Average
13.770		73.52% Pervious Area
4.960		26.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	100	0.0600	0.17		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
0.2	55	0.0600	3.94		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.6	260	0.2000	7.20		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
4.4	1,315		5.00		<b>Direct Entry, pipe</b>
15.2	1,730	Total			

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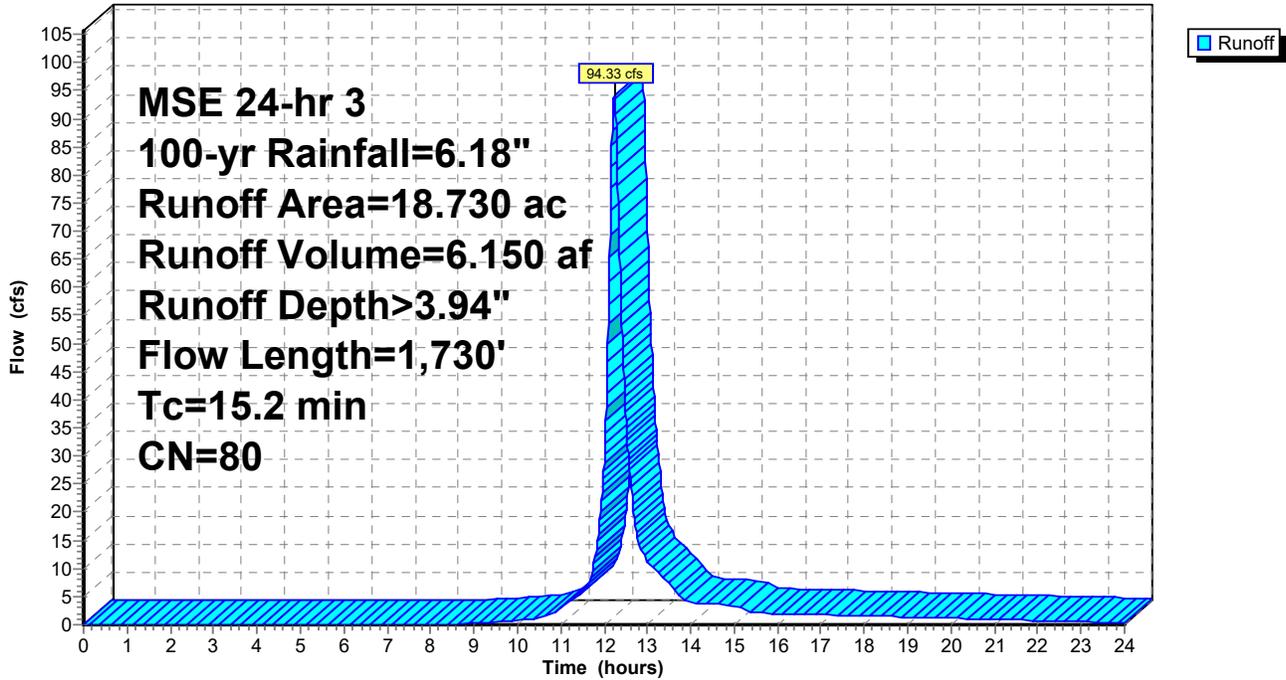
MSE 24-hr 3 100-yr Rainfall=6.18"

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**Subcatchment 1: Subarea**

Hydrograph



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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Subcatchment 2: Subarea**

Runoff = 11.38 cfs @ 12.19 hrs, Volume= 0.621 af, Depth> 2.95"  
 Routed to Pond 2P : Pond

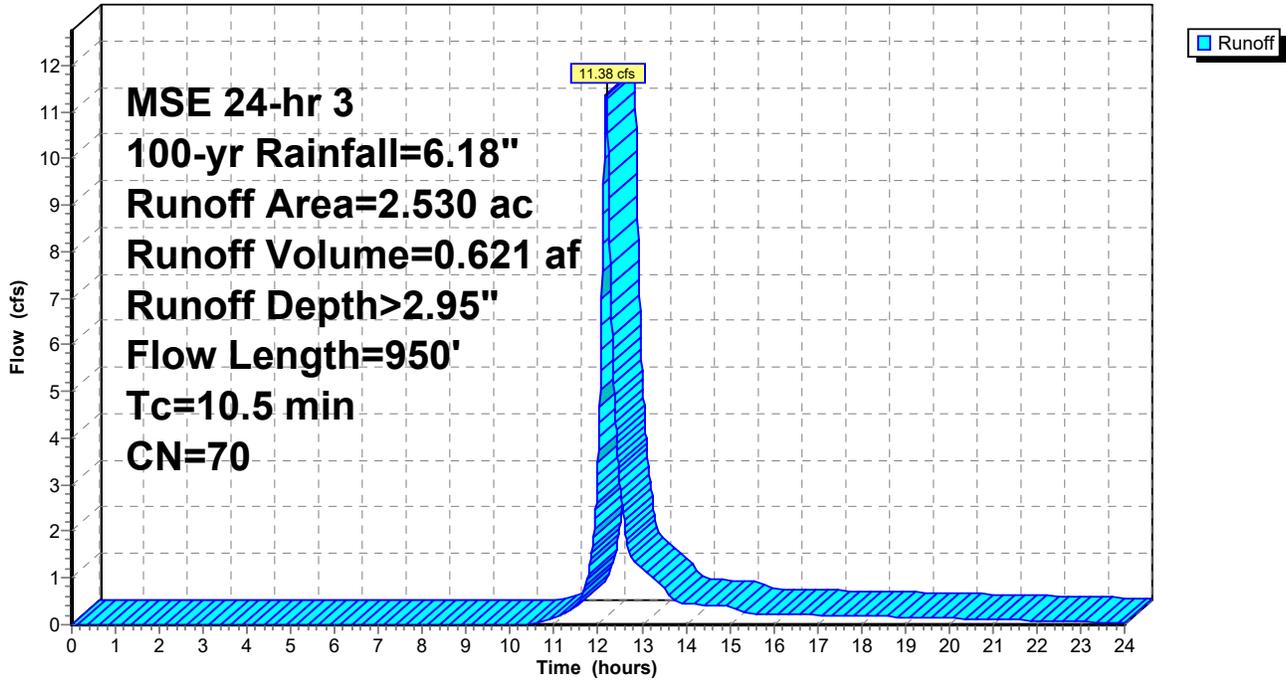
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.540	98	impervious
* 0.510	61	lawn - B soils
* 0.190	80	lawn - D soils
* 1.160	58	meadow - B soils
* 0.050	78	meadow - D soils
* 0.080	98	water
2.530	70	Weighted Average
1.910		75.49% Pervious Area
0.620		24.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	85	0.1500	0.23		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
1.7	15	0.1100	0.15		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
2.1	660	0.1100	5.34		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.4	120	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	70		5.00		<b>Direct Entry, pipe</b>
10.5	950	Total			

### Subcatchment 2: Subarea

Hydrograph



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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Subcatchment 3: Subarea**

Runoff = 20.47 cfs @ 12.17 hrs, Volume= 1.113 af, Depth> 4.05"  
 Routed to Pond 3B : Pond

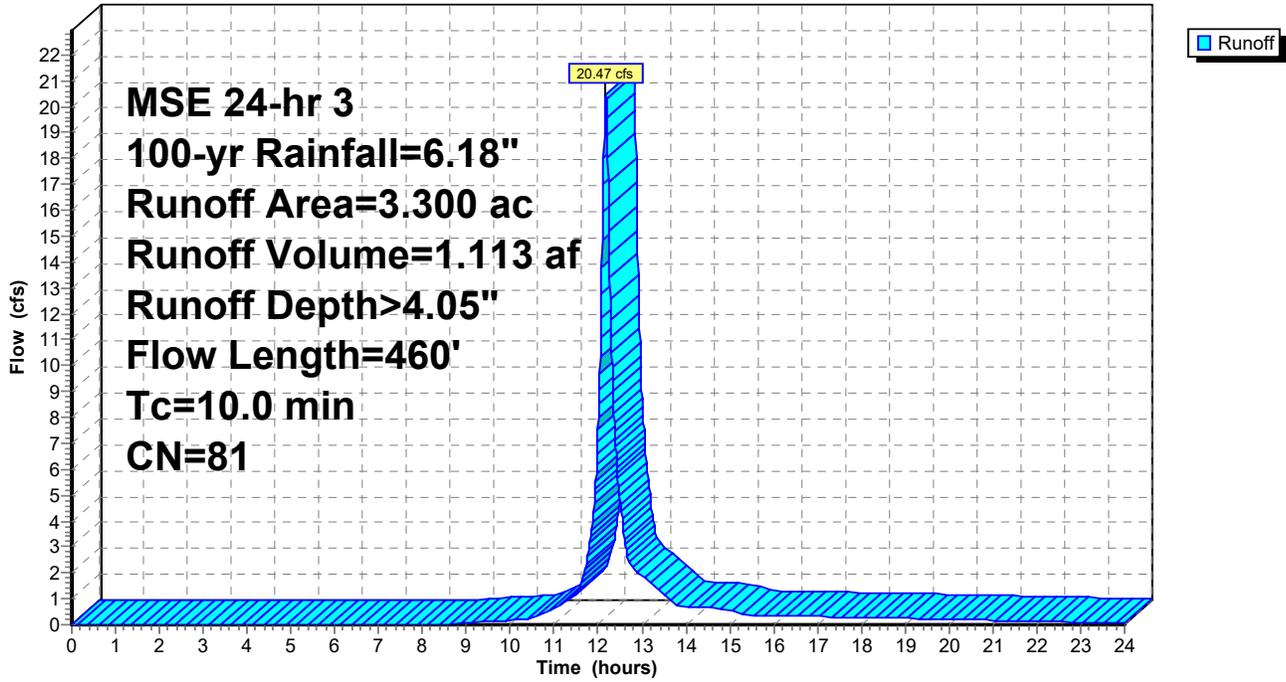
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.630	98	impervious
* 0.190	61	lawn - B soils
* 0.500	74	lawn - C soils
* 1.680	80	lawn - D soils
* 0.300	71	meadow - C soils
3.300	81	Weighted Average
2.670		80.91% Pervious Area
0.630		19.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		<b>Sheet Flow,</b> Grass: Dense n= 0.240 P2= 2.70"
0.0	10	0.1000	5.09		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.7	330	0.0400	3.22		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.1	20	0.1000	5.09		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
10.0	460	Total			

### Subcatchment 3: Subarea

Hydrograph



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**Summary for Subcatchment 4: Subarea**

Runoff = 1.42 cfs @ 12.14 hrs, Volume= 0.064 af, Depth> 2.13"  
Routed to Pond 4B : Pond

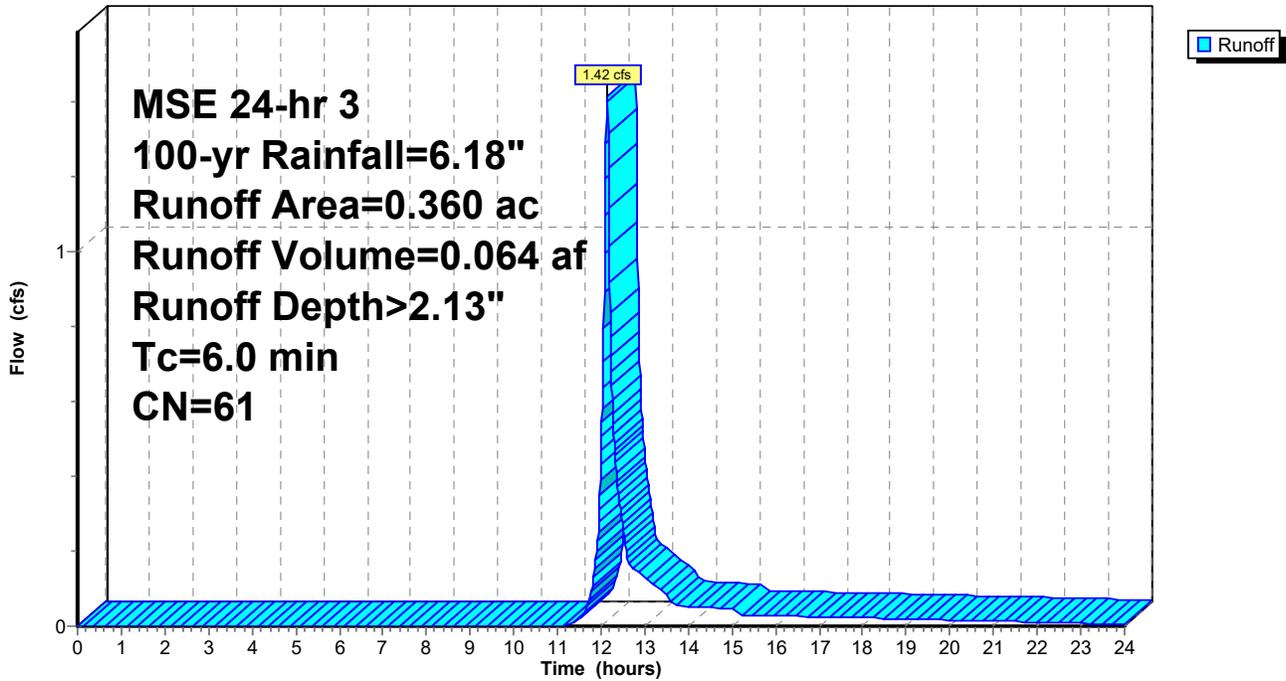
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.360	61	lawn - B soils
0.360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment 4: Subarea**

Hydrograph



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**Summary for Subcatchment 5: Subarea**

Runoff = 3.35 cfs @ 12.13 hrs, Volume= 0.156 af, Depth> 4.36"  
 Routed to Link 1L : Post-Development

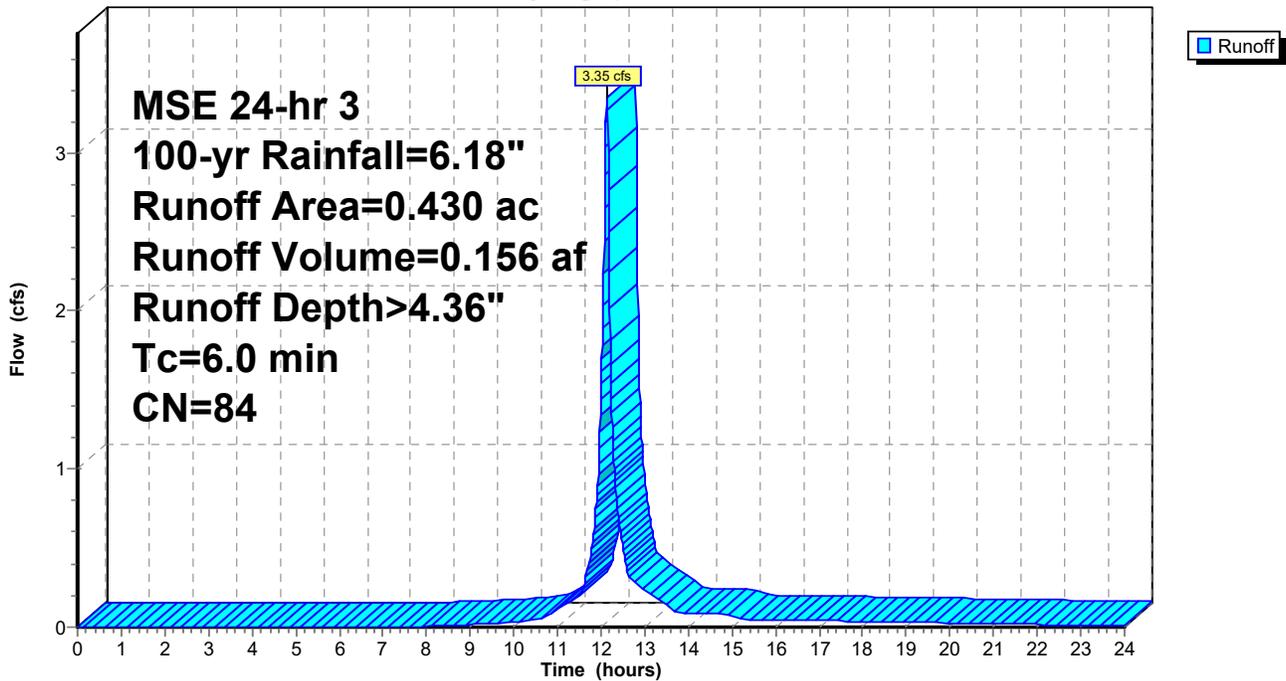
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 MSE 24-hr 3 100-yr Rainfall=6.18"

Area (ac)	CN	Description
* 0.110	61	lawn - B soils
* 0.100	80	lawn - D soils
* 0.220	98	impervious
0.430	84	Weighted Average
0.210		48.84% Pervious Area
0.220		51.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment 5: Subarea**

Hydrograph



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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Pond 1P: Pond**

Inflow Area = 18.730 ac, 26.48% Impervious, Inflow Depth > 3.94" for 100-yr event  
 Inflow = 94.33 cfs @ 12.24 hrs, Volume= 6.150 af  
 Outflow = 60.93 cfs @ 12.25 hrs, Volume= 4.972 af, Atten= 35%, Lag= 0.9 min  
 Primary = 60.93 cfs @ 12.25 hrs, Volume= 4.972 af  
 Routed to Pond 2P : Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 98.51' @ 12.39 hrs Surf.Area= 0.510 ac Storage= 1.995 af

Plug-Flow detention time= 97.3 min calculated for 4.972 af (81% of inflow)  
 Center-of-Mass det. time= 36.9 min ( 838.1 - 801.2 )

Volume	Invert	Avail.Storage	Storage Description		
#1	93.00'	2.833 af	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)	
93.00	0.230	0.000	0.000	0.230	
94.00	0.280	0.255	0.255	0.281	
95.00	0.320	0.300	0.554	0.322	
96.00	0.370	0.345	0.899	0.373	
97.00	0.420	0.395	1.294	0.424	
98.00	0.480	0.450	1.743	0.485	
99.00	0.540	0.510	2.253	0.546	
100.00	0.620	0.580	2.833	0.627	

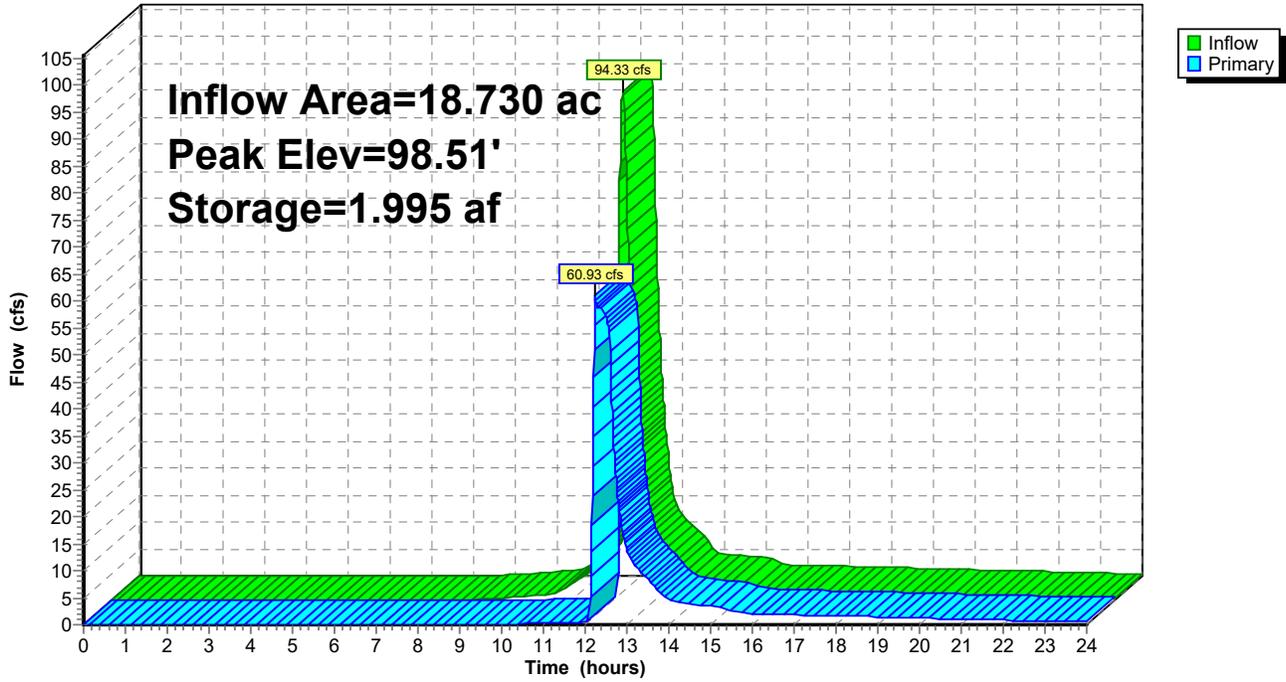
Device	Routing	Invert	Outlet Devices	
#1	Primary	92.75'	<b>36.0" Round Culvert</b> L= 102.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 92.75' / 92.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf	
#2	Device 1	93.00'	<b>3.5" Vert. Orifice</b> C= 0.600 Limited to weir flow at low heads	
#3	Device 1	96.75'	<b>48.0" Horiz. Grate</b> C= 0.600 Limited to weir flow at low heads	

**Primary OutFlow** Max=59.56 cfs @ 12.25 hrs HW=98.09' TW=95.03' (Dynamic Tailwater)

- ↑ **1=Culvert** (Inlet Controls 59.56 cfs @ 8.43 fps)
- ↑ **2=Orifice** (Passes < 0.56 cfs potential flow)
- ↑ **3=Grate** (Passes < 63.59 cfs potential flow)

### Pond 1P: Pond

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**Summary for Pond 2P: Pond**

Inflow Area = 21.260 ac, 26.25% Impervious, Inflow Depth > 3.16" for 100-yr event  
 Inflow = 70.13 cfs @ 12.25 hrs, Volume= 5.593 af  
 Outflow = 63.61 cfs @ 12.39 hrs, Volume= 5.575 af, Atten= 9%, Lag= 8.5 min  
 Primary = 50.86 cfs @ 12.39 hrs, Volume= 3.856 af  
     Routed to Pond 3B : Pond  
 Secondary = 12.75 cfs @ 12.39 hrs, Volume= 1.718 af  
     Routed to Pond 4B : Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 95.50' @ 12.39 hrs Surf.Area= 0.155 ac Storage= 0.350 af

Plug-Flow detention time= 6.9 min calculated for 5.572 af (100% of inflow)  
 Center-of-Mass det. time= 5.0 min ( 840.4 - 835.4 )

Volume	Invert	Avail.Storage	Storage Description		
#1	92.50'	0.432 af	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)	
92.50	0.080	0.000	0.000	0.080	
93.00	0.090	0.042	0.042	0.090	
94.00	0.120	0.105	0.147	0.121	
95.00	0.140	0.130	0.277	0.142	
96.00	0.170	0.155	0.432	0.172	

Device	Routing	Invert	Outlet Devices
#1	Primary	92.50'	<b>36.0" Round Culvert</b> L= 60.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 92.50' / 82.00' S= 0.1750 '/ Cc= 0.900 n= 0.013, Flow Area= 7.07 sf
#2	Primary	95.00'	<b>10.0' long x 10.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Secondary	92.50'	<b>18.0" Round Culvert</b> L= 130.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 92.50' / 82.00' S= 0.0808 '/ Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

**Primary OutFlow** Max=50.86 cfs @ 12.39 hrs HW=95.50' TW=85.69' (Dynamic Tailwater)

- ↑1=Culvert (Inlet Controls 41.66 cfs @ 5.89 fps)
- ↑2=Broad-Crested Rectangular Weir(Weir Controls 9.20 cfs @ 1.85 fps)

**Secondary OutFlow** Max=12.75 cfs @ 12.39 hrs HW=95.50' TW=84.92' (Dynamic Tailwater)

- ↑3=Culvert (Inlet Controls 12.75 cfs @ 7.22 fps)

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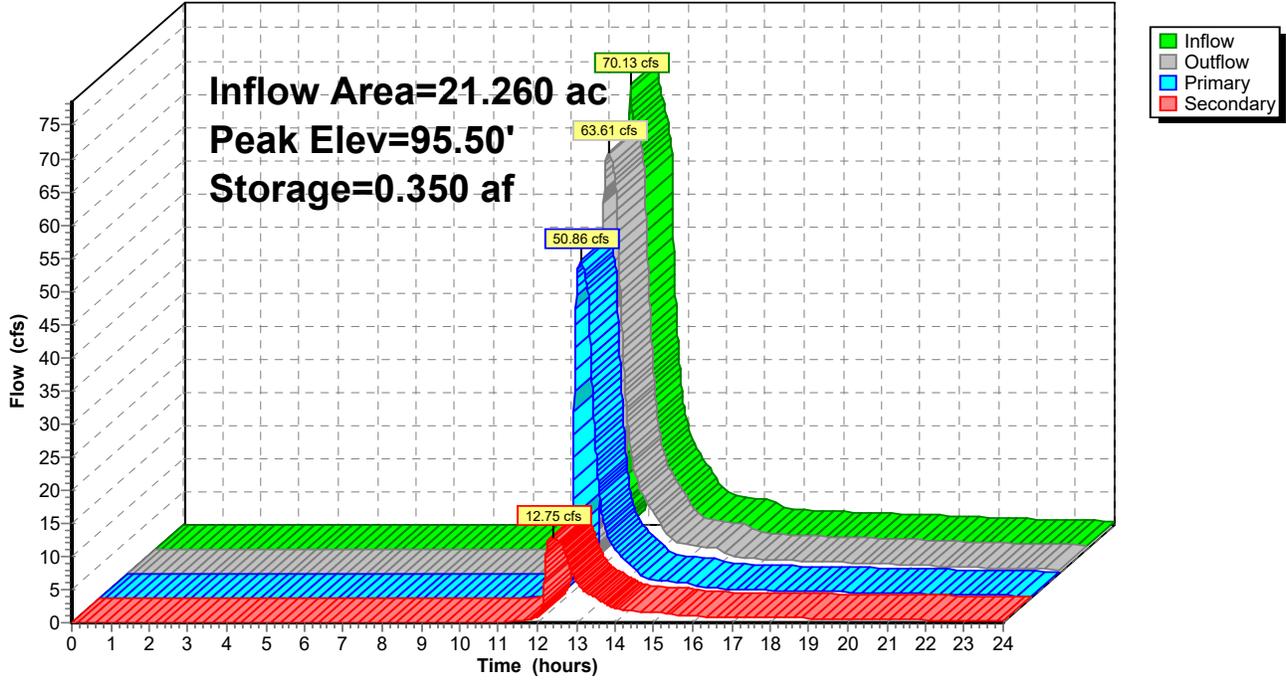
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**Pond 2P: Pond**

Hydrograph



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**Summary for Pond 3B: Pond**

Inflow Area = 24.560 ac, 25.29% Impervious, Inflow Depth > 2.43" for 100-yr event  
 Inflow = 59.11 cfs @ 12.33 hrs, Volume= 4.969 af  
 Outflow = 36.23 cfs @ 12.64 hrs, Volume= 4.839 af, Atten= 39%, Lag= 18.2 min  
 Primary = 36.23 cfs @ 12.64 hrs, Volume= 4.839 af  
 Routed to Pond 4B : Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 86.72' @ 12.69 hrs Surf.Area= 0.406 ac Storage= 1.329 af

Plug-Flow detention time= 41.4 min calculated for 4.839 af (97% of inflow)  
 Center-of-Mass det. time= 27.1 min ( 847.8 - 820.7 )

Volume	Invert	Avail.Storage	Storage Description		
#1	82.00'	1.443 af	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)		
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)	
82.00	0.170	0.000	0.000	0.170	
83.00	0.210	0.190	0.190	0.211	
84.00	0.260	0.235	0.424	0.261	
85.00	0.310	0.285	0.709	0.312	
86.00	0.370	0.340	1.048	0.373	
87.00	0.420	0.395	1.443	0.424	

Device	Routing	Invert	Outlet Devices
#1	Primary	82.25'	<b>36.0" Round Culvert</b> L= 124.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 82.25' / 82.00' S= 0.0020 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

**Primary OutFlow** Max=36.02 cfs @ 12.64 hrs HW=86.69' TW=85.57' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 36.02 cfs @ 5.10 fps)

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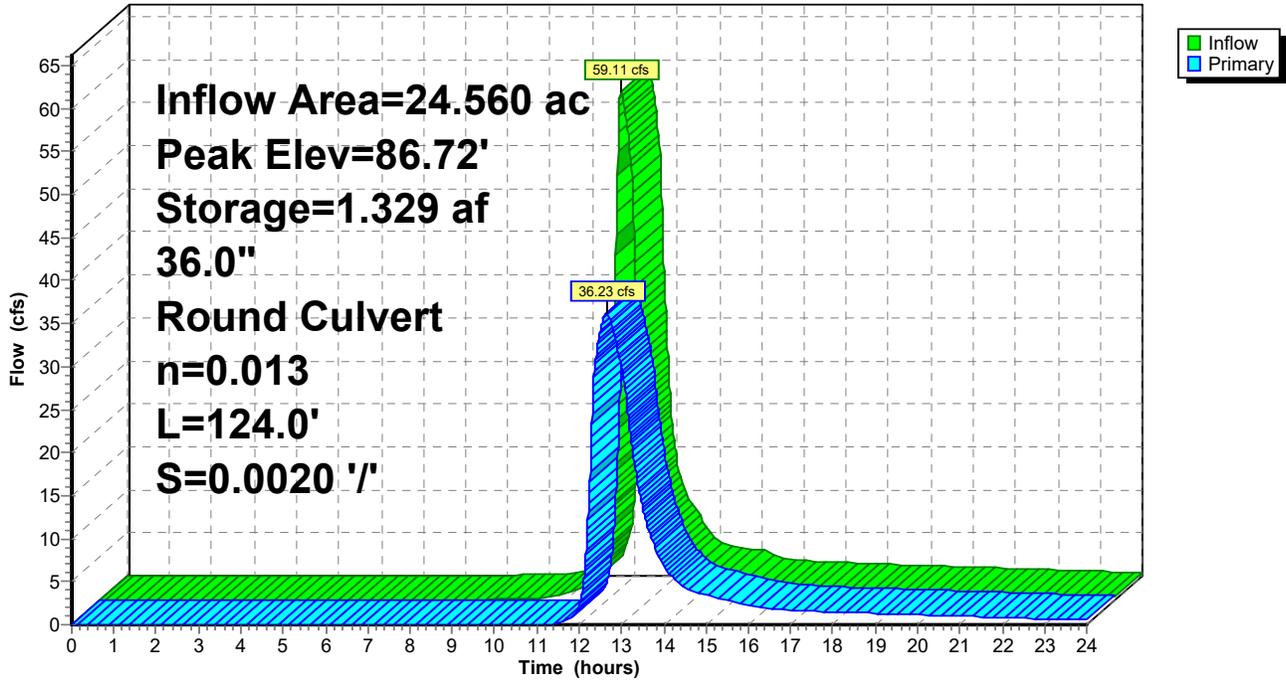
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**Pond 3B: Pond**

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MSE 24-hr 3 100-yr Rainfall=6.18"

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**Summary for Pond 4B: Pond**

Inflow Area = 24.920 ac, 24.92% Impervious, Inflow Depth > 3.19" for 100-yr event  
 Inflow = 48.55 cfs @ 12.61 hrs, Volume= 6.621 af  
 Outflow = 46.53 cfs @ 12.71 hrs, Volume= 6.595 af, Atten= 4%, Lag= 6.2 min  
 Primary = 46.53 cfs @ 12.71 hrs, Volume= 6.595 af  
 Routed to Link 1L : Post-Development

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs  
 Peak Elev= 85.62' @ 12.71 hrs Surf.Area= 0.160 ac Storage= 0.333 af

Plug-Flow detention time= 7.0 min calculated for 6.595 af (100% of inflow)  
 Center-of-Mass det. time= 4.7 min ( 857.5 - 852.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	82.00'	0.398 af	<b>Custom Stage Data (Conic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
82.00	0.040	0.000	0.000	0.040
83.00	0.060	0.050	0.050	0.060
84.00	0.100	0.079	0.129	0.101
85.00	0.130	0.115	0.243	0.131
86.00	0.180	0.154	0.398	0.182

Device	Routing	Invert	Outlet Devices
#1	Primary	82.25'	<b>36.0" Round Culvert</b> L= 42.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 82.25' / 80.00' S= 0.0536 '/' Cc= 0.900 n= 0.013, Flow Area= 7.07 sf

**Primary OutFlow** Max=46.52 cfs @ 12.71 hrs HW=85.62' TW=0.00' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 46.52 cfs @ 6.58 fps)

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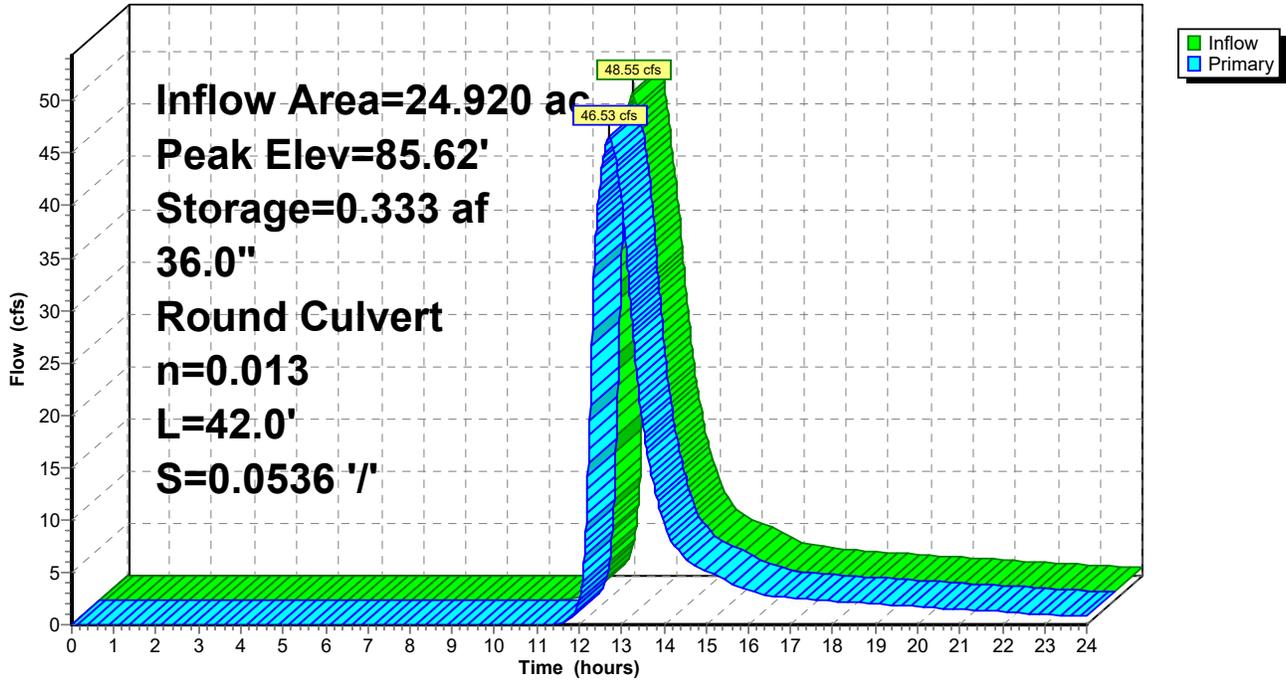
MSE 24-hr 3 100-yr Rainfall=6.18"

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**Pond 4B: Pond**

Hydrograph



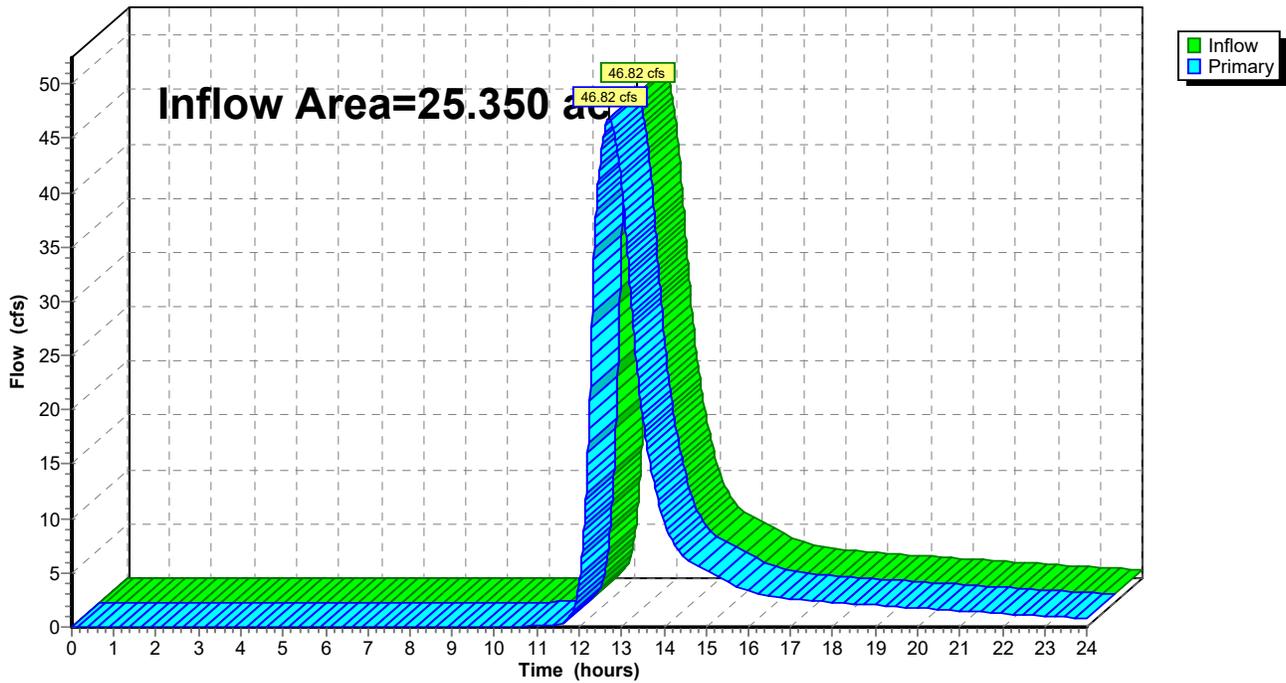
### Summary for Link 1L: Post-Development

Inflow Area = 25.350 ac, 25.36% Impervious, Inflow Depth > 3.20" for 100-yr event  
Inflow = 46.82 cfs @ 12.71 hrs, Volume= 6.751 af  
Primary = 46.82 cfs @ 12.71 hrs, Volume= 6.751 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

### Link 1L: Post-Development

Hydrograph



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**Events for Subcatchment 1: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	19.14	1.279	0.82
2-yr	2.70	24.37	1.605	1.03
10-yr	3.81	45.43	2.940	1.88
100-yr	<b>6.18</b>	<b>94.33</b>	<b>6.150</b>	<b>3.94</b>

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**Events for Subcatchment 2: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	1.26	0.086	0.41
2-yr	2.70	1.85	0.117	0.55
10-yr	3.81	4.49	0.254	1.20
100-yr	<b>6.18</b>	<b>11.38</b>	<b>0.621</b>	<b>2.95</b>

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**Events for Subcatchment 3: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	4.41	0.240	0.87
2-yr	2.70	5.55	0.299	1.09
10-yr	3.81	10.09	0.539	1.96
100-yr	<b>6.18</b>	<b>20.47</b>	<b>1.113</b>	<b>4.05</b>

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**Events for Subcatchment 4: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.04	0.005	0.17
2-yr	2.70	0.10	0.008	0.26
10-yr	3.81	0.43	0.022	0.72
100-yr	<b>6.18</b>	<b>1.42</b>	<b>0.064</b>	<b>2.13</b>

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**Events for Subcatchment 5: Subarea**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-yr	2.40	0.83	0.037	1.04
2-yr	2.70	1.02	0.046	1.27
10-yr	3.81	1.75	0.079	2.20
100-yr	<b>6.18</b>	<b>3.35</b>	<b>0.156</b>	<b>4.36</b>

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**Events for Pond 1P: Pond**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	19.14	0.54	96.00	0.899
2-yr	24.37	0.61	96.68	1.164
10-yr	45.43	15.52	97.26	1.404
100-yr	<b>94.33</b>	<b>60.93</b>	<b>98.51</b>	<b>1.995</b>

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**Events for Pond 2P: Pond**

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	1.53	0.96	0.57	0.39	92.77	0.023
2-yr	2.17	1.41	0.84	0.57	92.83	0.028
10-yr	16.66	15.66	9.95	5.70	93.71	0.113
100-yr	<b>70.13</b>	<b>63.61</b>	<b>50.86</b>	<b>12.75</b>	<b>95.50</b>	<b>0.350</b>

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**Events for Pond 3B: Pond**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	4.54	0.80	82.79	0.147
2-yr	5.87	1.20	82.90	0.169
10-yr	11.80	8.16	83.95	0.410
100-yr	<b>59.11</b>	<b>36.23</b>	<b>86.72</b>	<b>1.329</b>

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**Events for Pond 4B: Pond**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
1-yr	1.10	1.10	82.63	0.029
2-yr	1.65	1.61	82.71	0.033
10-yr	12.82	12.64	83.63	0.095
100-yr	<b>48.55</b>	<b>46.53</b>	<b>85.62</b>	<b>0.333</b>

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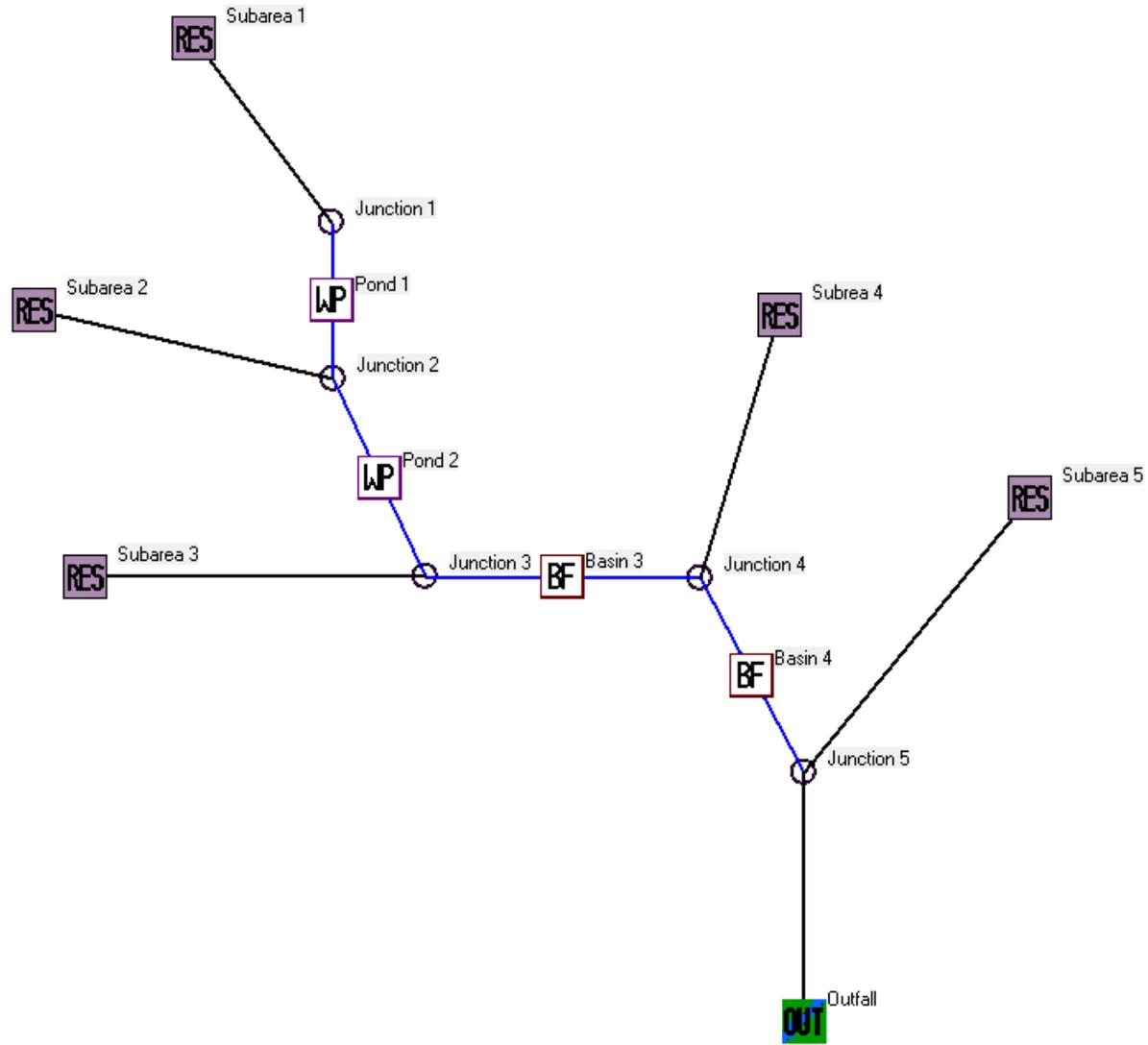
**Events for Link 1L: Post-Development**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-yr	1.15	1.15	<b>0.00</b>
2-yr	1.70	1.70	0.00
10-yr	12.79	12.79	0.00
100-yr	<b>46.82</b>	<b>46.82</b>	0.00

# APPENDIX C

## Treatment Analysis

# Treatment Analysis



SLAMM for Windows Version 10.5.0

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Data file name: C:\Data\Jobs\2025\2025-029 - Smart Property - Regional - City of Waukesha - TRIO\Project\_Information\Calcs\SLAMM\Proposed\_Connected.mdb

Data file description:

Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN

Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI\_AVG01.pscx

Runoff Coefficient file name: C:\WinSLAMM Files\WI\_SL06 Dec06.rsvx

Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI\_GEO03.ppdX

Residential Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std

Institutional Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Commercial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Industrial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std

Other Urban Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std

Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std

Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False

Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv

Cost Data file name:

If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations

Seed for random number generator: -42

Start of Winter Season: 12/06 End of Winter Season: 03/28

Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69

Date of run: 01-27-2026 Time of run: 12:30:20

Total Area Modeled (acres): 25.350

Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	707092	-	109.2	4821	-
Outfall Total with Controls:	320238	54.71%	46.87	937.0	80.56%
Annualized Total After Outfall Controls:	324685			950.1	

Data file name: C:\Data\Jobs\2025\2025-029 - Smart Property - Regional - City of Waukesha - TRIO\Project\_Information\Calcs\SLAMM\Proposed\_Connected.mdb  
WinSLAMM Version 10.5.0  
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN  
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI\_AVG01.pscx  
Runoff Coefficient file name: C:\WinSLAMM Files\WI\_SL06 Dec06.rsvx  
Residential Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std  
Institutional Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Commercial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Industrial Street Delivery file name: C:\WinSLAMM Files\WI\_Com Inst Indust Dec06.std  
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI\_Res and Other Urban Dec06.std  
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std  
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False  
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI\_GEO03.ppdx  
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv  
Cost Data file name:  
If Other Device Pollutant Load Reduction Values = 1, Off-site Pollutant Loads are Removed from Pollutant Load % Reduction calculations  
Seed for random number generator: -42  
Study period starting date: 01/05/69 Study period ending date: 12/31/69  
Start of Winter Season: 12/06 End of Winter Season: 03/28  
Date: 01-27-2026 Time: 12:30:30  
Site information:

LU# 1 - Residential: Subarea 1 Total area (ac): 18.730  
1 - Roofs 1: 0.280 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
2 - Roofs 2: 2.200 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
25 - Driveways 1: 0.590 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
31 - Sidewalks 1: 0.300 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
37 - Streets 1: 1.360 ac. Smooth Street Length = 0.2877 mi Street Width = 38.99896 ft Street Edges = 2  
Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
45 - Large Landscaped Areas 1: 5.030 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
46 - Large Landscaped Areas 2: 8.740 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
70 - Water Body Areas: 0.230 ac. Source Area PSD File:

LU# 2 - Residential: Subarea 2 Total area (ac): 2.530  
1 - Roofs 1: 0.090 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
31 - Sidewalks 1: 0.090 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
37 - Streets 1: 0.360 ac. Smooth Street Length = 0.0762 mi Street Width = 38.97638 ft Street Edges = 2  
Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
45 - Large Landscaped Areas 1: 0.510 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
46 - Large Landscaped Areas 2: 0.190 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
57 - Undeveloped Areas 1: 1.160 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
58 - Undeveloped Areas 2: 0.050 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
70 - Water Body Areas: 0.080 ac. Source Area PSD File:

LU# 3 - Residential: Subarea 3 Total area (ac): 3.300  
1 - Roofs 1: 0.040 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
31 - Sidewalks 1: 0.110 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
37 - Streets 1: 0.480 ac. Smooth Street Length = 0.1015 mi Street Width = 39.01478 ft Street Edges = 2  
Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
45 - Large Landscaped Areas 1: 0.190 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
46 - Large Landscaped Areas 2: 2.180 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
58 - Undeveloped Areas 2: 0.300 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Residential: Subarea 4 Total area (ac): 0.360  
45 - Large Landscaped Areas 1: 0.360 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Residential: Subarea 5 Total area (ac): 0.430  
 31 - Sidewalks 1: 0.030 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
 37 - Streets 1: 0.190 ac. Smooth Street Length = 0.0402 mi Street Width = 38.99254 ft Street Edges = 2  
 Default St. Dirt Accum. Annual Winter Load = 2500 lbs Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
 45 - Large Landscaped Areas 1: 0.110 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz  
 46 - Large Landscaped Areas 2: 0.100 ac. Normal Clayey Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Wet Detention Pond CP# 1 (DS) - Pond 1  
 Particle Size Distribution file name: Not needed - calculated by program  
 Initial stage elevation (ft): 5  
 Peak to Average Flow Ratio: 3.8  
 Maximum flow allowed into pond (cfs): No maximum value entered  
 Outlet Characteristics:

- Outlet type: Orifice 1
  - 1. Orifice diameter (ft): 0.29
  - 2. Number of orifices: 1
  - 3. Invert elevation above datum (ft): 5
- Outlet type: Broad Crested Weir
  - 1. Weir crest length (ft): 10
  - 2. Weir crest width (ft): 10
  - 3. Height from datum to bottom of weir opening: 10.6
- Outlet type: Vertical Stand Pipe
  - 1. Stand pipe diameter (ft): 4
  - 2. Stand pipe height above datum (ft): 8.75

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0600	0.00	0.00
2	4.00	0.1300	0.00	0.00
3	5.00	0.2300	0.00	0.00
4	6.00	0.2800	0.00	0.00
5	7.00	0.3200	0.00	0.00
6	8.00	0.3700	0.00	0.00
7	9.00	0.4200	0.00	0.00
8	10.00	0.4800	0.00	0.00
9	11.00	0.5400	0.00	0.00
10	12.00	0.6200	0.00	0.00

Control Practice 2: Wet Detention Pond CP# 2 (DS) - Pond 2  
 Particle Size Distribution file name: Not needed - calculated by program  
 Initial stage elevation (ft): 5  
 Peak to Average Flow Ratio: 3.8  
 Maximum flow allowed into pond (cfs): No maximum value entered  
 Outlet Characteristics:

- Outlet type: Orifice 1
  - 1. Orifice diameter (ft): 3
  - 2. Number of orifices: 1
  - 3. Invert elevation above datum (ft): 5
- Outlet type: Orifice 2
  - 1. Orifice diameter (ft): 1.5
  - 2. Number of orifices: 1
  - 3. Invert elevation above datum (ft): 5
- Outlet type: Broad Crested Weir
  - 1. Weir crest length (ft): 10

- 2. Weir crest width (ft): 10
- 3. Height from datum to bottom of weir opening: 7.5

Pond stage and surface area

Entry Number	Stage (ft)	Pond Area (acres)	Natural Seepage (in/hr)	Other Outflow (cfs)
0	0.00	0.0000	0.00	0.00
1	0.01	0.0100	0.00	0.00
2	4.00	0.0400	0.00	0.00
3	5.00	0.0800	0.00	0.00
4	5.50	0.0900	0.00	0.00
5	6.50	0.1200	0.00	0.00
6	7.50	0.1400	0.00	0.00
7	8.50	0.1700	0.00	0.00

Control Practice 3: Biofilter CP# 1 (DS) - Basin 3

- 1. Top area (square feet) = 18372
- 2. Bottom area (square feet) = 7277
- 3. Depth (ft): 5
- 4. Biofilter width (ft) - for Cost Purposes Only: 10
- 5. Infiltration rate (in/hr) = 0.5
- 6. Random infiltration rate generation? No
- 7. Infiltration rate fraction (side): 0.001
- 8. Infiltration rate fraction (bottom): 1
- 9. Depth of biofilter that is rock filled (ft) 0
- 10. Porosity of rock filled volume = 0
- 11. Engineered soil infiltration rate: 0
- 12. Engineered soil depth (ft) = 0
- 13. Engineered soil porosity = 0
- 14. Percent solids reduction due to flow through engineered soil = 0
- 15. Biofilter peak to average flow ratio = 3.8
- 16. Number of biofiltration control devices = 1
- 17. Particle size distribution file: Not needed - calculated by program
- 18. Initial water surface elevation (ft): 0
  - Soil Data                      Soil Type Fraction in Eng. Soil
  - Biofilter Outlet/Discharge Characteristics:
  - Outlet type: Broad Crested Weir
    - 1. Weir crest length (ft): 10
    - 2. Weir crest width (ft): 10
    - 3. Height of datum to bottom of weir opening: 4.75
  - Outlet type: Surface Discharge Pipe
    - 1. Surface discharge pipe outlet diameter (ft): 3
    - 2. Pipe invert elevation above datum (ft): 0.25
    - 3. Number of surface pipe outlets: 1

Control Practice 4: Biofilter CP# 2 (DS) - Basin 4

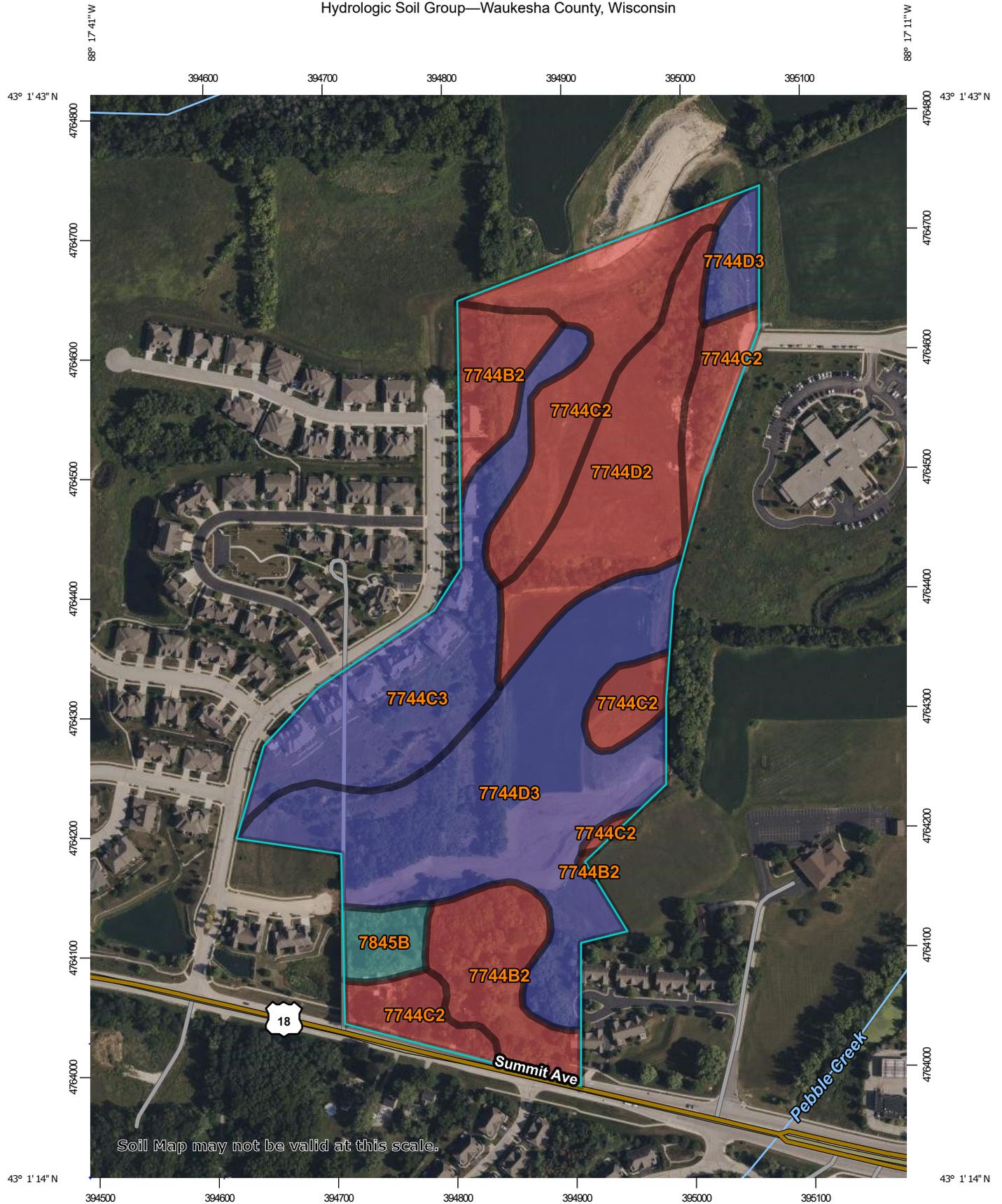
- 1. Top area (square feet) = 7970
- 2. Bottom area (square feet) = 1732
- 3. Depth (ft): 4
- 4. Biofilter width (ft) - for Cost Purposes Only: 10
- 5. Infiltration rate (in/hr) = 0.5
- 6. Random infiltration rate generation? No
- 7. Infiltration rate fraction (side): 0.001
- 8. Infiltration rate fraction (bottom): 1
- 9. Depth of biofilter that is rock filled (ft) 0
- 10. Porosity of rock filled volume = 0
- 11. Engineered soil infiltration rate: 0



# APPENDIX D

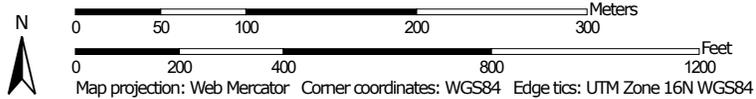
Soil Survey

Hydrologic Soil Group—Waukesha County, Wisconsin



Soil Map may not be valid at this scale.

Map Scale: 1:4,410 if printed on A portrait (8.5" x 11") sheet.



### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

**Soil Rating Lines**

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

**Soil Rating Points**

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

**Water Features**

 Streams and Canals

**Transportation**

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Waukesha County, Wisconsin  
 Survey Area Data: Version 4, Sep 10, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 4, 2022—Sep 13, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
7744B2	Hochheim loam, 2 to 6 percent slopes, eroded	D	5.0	12.4%
7744C2	Hochheim loam, 6 to 12 percent slopes, eroded	D	8.7	21.4%
7744C3	Hochheim soils, 6 to 12 percent slopes, severely eroded	B	6.7	16.4%
7744D2	Hochheim loam, 12 to 20 percent slopes, eroded	D	5.8	14.3%
7744D3	Hochheim soils, 12 to 20 percent slopes, severely eroded	B	13.3	32.9%
7845B	Theresa silt loam, 2 to 6 percent slopes	C	1.0	2.6%
<b>Totals for Area of Interest</b>			<b>40.6</b>	<b>100.0%</b>

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher