STORMWATER MANAGEMENT REPORT

Hawk's Landing Condominiums
Jills Drive/Garden Prairie Drive
CITY OF WAUKESHA, WISCONSIN

May 3, 2024
Revision #1: August 26, 2024
Revision #2: November 18, 2024

PREPARED FOR:
Standarksi Builders
720 N. East Ave
Waukesha, WI 53186

PREPARED BY:
Parish Survey & Engineering, LLC
122 Wisconsin Street,
West Bend, WI 53095

ES-10-23

PSE
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Civil Design Plans are provided as a separate attachment.

INTRODUCTION

This project is located in the City of Waukesha between the east end of Jills Drive and the west end of Garden Prairie Drive. A new private roadway will be constructed to connect the dead-end roads of Jills Drive and Garden Prairie Drive. This new private road will service six (6) new condominiums – total of 12 units – to be developed on the vacant parcels.

Stormwater discharge will be managed through one (1) wet pond located on the south side of the new development, two (2) bio-filters located centrally in the development, and one (1) rain garden located on the north end.

DESIGN STANDARDS

The target design criteria for the stormwater management facilities proposed in this report follow the City of Waukesha Chapter 32 Storm Water Management and Erosion Control and the Wisconsin NR 151 Runoff Management requirements.

Peak Discharge – NR 151.123
By design, BMPs shall be employed to maintain or reduce the 1-year, 24-hour and the 2-year, 24-hour post-construction peak runoff discharge rates to the 1-year, 24-hour and the 2-year, 24-hour pre-development peak runoff discharge rates respectively, or to the maximum extent practicable.
City of Waukesha Chapter 32
To minimize downstream bank erosion and the failure of downstream conveyance systems, the calculated post-development peak storm water discharge rate shall not exceed the calculated pre-development discharge rates for the 1-year, 2-year, 10-year, and 100-year, 24-hour design storms.

Stormwater Quality – NR 151.122
For new development, by design, reduce to the maximum extent practicable, the total suspended solids load by 80%, based on an average annual rainfall, as compared to no runoff management controls. No person shall be required to exceed an 80% total suspended solids reduction to meet the requirements of this subdivision.
City of Waukesha Chapter 32
For new land development and in-fill development, 80% reduction in total suspended solids load

Infiltration – NR 151.124
Moderate imperviousness. For development with more than 40 percent and up to 80 percent connected imperviousness, such as medium and high density residential, multi-family development, industrial and institutional development, and office parks, infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 75 percent of the pre-development infiltration volume, based on an average annual rainfall. However, when designing appropriate infiltration systems to meet this requirement, no more than 2 percent of the post-construction site is required as an effective infiltration area.
City of Waukesha Chapter 32
For >40% up to 80% connected impervious surface – medium imperviousness – the post-development infiltration volume shall be 75% of predevelopment, with the maximum effective infiltration area of 2% of the site.

Protective Areas – NR 151.125

Impervious surfaces shall be kept out of the protective area entirely or to the maximum extent practicable. If there is no practical alternative to locating an impervious surface in the protective area, the storm water management plan shall contain a written, site-specific explanation.

Where land disturbing construction activity occurs within a protective area, adequate sod or self-sustaining vegetative cover of 70 percent or greater shall be established and maintained where no impervious surface is present. The adequate sod or self-sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat, and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non-vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion such as on steep slopes or where high velocity flows occur.

Best management practices such as filter strips, swales, or wet detention ponds, that are designed to control pollutants from non-point sources, may be located in the protective area.

City of Waukesha Chapter 32

The following requirements shall be met for all land development activity located within a protective area:

1. Impervious surfaces shall be kept out of the protective area entirely, or to the maximum extent practicable, except for structures, as authorized and defined under shoreland and floodland zoning. If there is no practical alternative to locating a nonexempt impervious surface in the protective area, the storm water management plan shall contain a written, site-specific explanation and a technical exemption may applied for under sub. (e) below. The erosion control plan shall contain a written site-specific explanation for any parts of the protective area that are disturbed during construction.
2. Where land disturbing activity occurs within a protective area, and where no impervious surface is present, adequate sod or self-sustaining vegetative cover of 70% or greater shall be established and maintained. The adequate sod or self-sustaining vegetative cover shall be sufficient to provide for bank stability, maintenance of fish habitat and filtering of pollutants from upslope overland flow areas under sheet flow conditions. Non-vegetative materials, such as rock riprap, may be employed on the bank as necessary to prevent erosion, such as on steep slopes or where high velocity flows occur.
3. Best management practices such as filter strips, swales, or wet detention basins that are designed to control pollutants from non-point sources may be located in the protective area, but shall not encroach into wetlands, floodplains or primary or secondary environmental corridors.

Method of Analysis

The storm water runoff rates and quantities have been analyzed using HydroCAD® software, using the United States Department of Agriculture Soil Conservation Service Technical Release 55 (TR-55) methodology. The MSE 3, 24-hour rainfall distribution curve was used for the calculations.

The selected design storms were based on section 32.11 Technical Standards and Specifications of the City of Waukesha Chapter 32 Stormwater Management and Erosion Control.

Table 1 – Rainfall Amounts

Rainfall Amounts	
Recurrence Interval (Year)	Rainfall Depth (in)
1	2.40
2	2.70
10	3.81
100	6.18

TSS reduction results for the areas disturbed, as well as the areas draining to the ponds were analyzed with WinSLAMM Source Loading and Management Model. The "Milwaukee 1969" rainfall file was used with the winter season between December 15th to March 28th.

EXISTING SITE CONDITIONS

The existing parcel is vacant land consisting of wetland, woodland, and grassed area. There is an existing sanitary and storm sewer easement that runs along the west side of the parcel, as well as an existing 40-foot sanitary, watermain, and access easement running east-west through the property. The wetland was delineated by Wetland & Waterway Consulting, LLC in May of 2021.

An existing sanitary sewer main and watermain that connect Jills Drive and Garden Prairie Drive are within the 40-foot easement that travels through the parcel. The existing watermain already has several 1-1/4" HDPE services connected as well. There are also two (2) storm sewer inlets on the west side of the property within that same easement.

Majority of the existing site drains to the wetland to the south, and a small portion drains to the existing storm inlets, connecting to the City's storm sewer.

For this new development, the existing Outlots 1 & 2 are proposed to be combined into a single lot with a new CSM. The owner for both parcels is the same entity.

PROPOSED SITE CONDITIONS

The proposed development consists of a new private roadway that will connect Jills Drive and Garden Prairie Drive. This new roadway will consist of 11-foot lanes, 30-inch curb and gutter, and a 5-foot-wide sidewalk on the north side of the road. The roadway will have a larger width to tie into Jills Drive and then will bottle-neck down over a 30-foot taper to the narrower width of the private roadway.
There are six (6) condominium buildings - a total of 12 condominium units - proposed for this new development. There is mountable curb along the entire new private roadways to access the houses with new sidewalk along one side of the roadway.
Six (6) individual driveways will have direct access off this private driveway for three (3) of the new condominium buildings. There will be another private access off the new private roadway that runs south with an east-west tee at the south end to access the other three (3) buildings/six (6) condominium units. Each unit has an 18-foot-wide driveway that leads to the connected two-car garage, and a concrete sidewalk that connects the driveway to the front door. There are also six (6) additional parking spaces provided within the development.

To maintain existing site drainage patterns, the majority of the runoff from the development is directed to the south wet pond, which discharges to the south wetland. The wet pond high water elevation remains outside of the existing sanitary and storm sewer easement. There are two (2) bio-filters proposed between two sets of condominium, which discharge to the wet pond through a storm sewer network. There is also a proposed rain garden at the north end of the property to manage water quality and quantity from the one (1) north condominium building, which overflows to the City's storm sewer.

The private roadway is managed by the existing storm inlets, which were installed to manage street runoff. The four (4) out of the six (6) driveways that drain to the private roadway are also captured by the City's storm sewer. These portions of the development do not have any additional stormwater BMPs implemented since the storm inlets already exist. However, the entire remainder of the development is managed by the multiple BMPs mentioned above.

SUMMARY OF RESULTS

Stormwater Quantity

With the implementation of the wet pond, two (2) bio-filters, and rain garden, the proposed development is able to meet stormwater quantity requirements. Below is a summary of the run-off rates for the existing and proposed conditions. Drainage area maps, along with the HydroCAD® results can be found in Appendices C and D.

Table 2 - Water Quantity Results

Rain Event	Pre-Dev. Runoff (cu-ft/sec)	Post-Dev. Runoff (cu-ft/sec)
1-year	0.66	0.35
2-year	1.06	0.51
10-year	2.92	1.24
100-year	7.98	3.71

As shown in the table above, the site total site maintains or lowers the runoff discharge rate as compared to the existing condition.

Stormwater Quality

The post construction stormwater quality requirement for this project are met using the standard design procedure. The proposed pond, bio-filters, rain garden, swales, and filter strips will provide greater than 80% TSS reduction for the proposed development area. Appendix E contains the details of the calculations.

Table 3 - Water Quality Results

Area	Total Influent Load (lbs)	Total Effluent Load (lbs)	TSS Reduction
North	377.3	75.24	80.06%

Infiltration
This site is exempt from infiltration requirements due to the poor soil conditions. Soil test pit data is provided in Appendix B showing the infiltration rates being significantly less than 0.6 inches/hour.

Protective Areas
As previously stated, there are delineated wetlands present within this property. There is 1,092 square-feet of proposed wetland fill due to the need to grade out into the wetland area. However, there is no impervious area proposed within the wetland. A DNR General Wetland Fill permit will be applied for to be allowed to fill the proposed 1,092 square-feet as shown on the plans.

Cost Estimate for Stormwater Management BMPs
The estimated cost for the wet pond, two (2) bio-filters, one (1) rain garden, and all associated outlet structures is $150,000. The cost estimate is broken down in lump sum values below:

- Wet Pond: $100,000
- Wet Pond Outlet Structure: $20,000
- Bio-Filter, Each: $10,000 (two total = $20,000), includes standpipe outlet structure
- Rain Garden: $10,000, includes standpipe outlet structure

CONCLUSION

The stormwater management system for the proposed development will meet the post-construction stormwater requirements for the City of Waukesha and the Wisconsin DNR. The proposed stormwater management system improves the run-off rates from the site. Additionally, the infiltration requirement is exceeded, as well as the storm water quality requirements controlled at a greater rate than required per municipal code and the State Statute.

Appendix A

Location Map

PARISH SURVEY & ENGINEERING
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MAP WAUKESHA county

Waukesha County GIS Map

Legend

- Municipal Boundary_2K
- Parcel_Dimension_2K
- Note_Text_2K
- Lots_2K
  - Lot
  - Unit
  - General Common Element
  - Outlot
- SimultaneousConveyance
  - Assessor Plat
  - CSM
  - Condominium
  - Subdivision
- Cartoline_2K
  - EA-Easement_Line
  - PL-DA
  - PL-Extended_Tie_line
  - PL-Meander_Line
  - PL-Note
  - PL-Tie
  - PL-Tie_Line
  - <all other values>
- Railroad_2K

0 276.92 Feet

Notes: Location Map

Printed: 5/3/2024

Appendix B

Soils Information

PARISH SURVEY & ENGINEERING
122 Wisconsin Street | West Bend, WI 53095
www.parishse.com

Invoice

Levake Soil Testing LLC

Jeff Levake
P.O. Box 568
Lake Mills, WI 53551
920-648-7566

Date	Invoice #
8/19/2024	3931

Bill To
PSE 122 Wisconsin St. West Bend, WI 53095

P.O. No.	Terms	Project
	Due on receipt	

Quantity	Description	Rate	Amount
1	Soil Test for St Paul job with 6 test pits & drive time	1,050.00	1,050.00

Thank you for your business. 1.5% Interest Charged Per Month After 30 Days

Total $1,050.00

Attachment 2:

1002-CPS-23
Division of Industry Services
P. O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary

SOIL AND SITE EVALUATION – STORM

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road

Please print all information

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]

County: Waukesha
Parcel I.D.: WAKC 1342278
Reviewed by:
Date:

Property Owner: St Paul Condominiums
Property Owner' Mail Address:
City: Waukesha State: WI Zip Code: 53186 Phone Number:

Property Location
Govt Lot NW¼ SW¼ S 12 T 6 N R 19 (E) or W
Lot # | Block # | Subd. Name or CSM #: 10288
☒ City ☐ Village ☐ Town Nearest Road: Wauk Sills Dr

Drainage area _____ ☐ sq. ft ☐ acres

Test site suitable for (check all that apply): ☐ Site not suitable;
☐ Bioretention; ☐ Subsurface Dispersal System;
☐ Reuse; ☐ Irrigation; ☐ Other _____

Hydraulic Application Test Method
☒ Morphological Evaluation
☐ Double Ring Infiltrometer
☐ Other: (specify) _____

Soil Moisture
Date of soil borings: 8-26-24
USDA-NRCS WETS Value:
☐ Dry = 1;
☒ Normal = 2;
☐ Wet = 3.

TP1 #OBS ☒ Pit ☐ Boring Ground surface elevation 868.57 ft. Elevation of limiting factor 868.57 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-96	10YR 4/4	Mixed Fill	cl	0m	mfr	cs	15	–	.03
2	96-108	10YR 3/2	Fill 7.5YR 3/4 10YR 7/2	sil	2mgr	mfr	–	5	–	.13

Comments: Water observed @ 108"

TP2 #OBS ☒ Pit ☐ Boring Ground surface elevation 868.65 ft. Elevation of limiting factor 868.65 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-96	10YR 4/4	Mixed Fill	cl	0mg	mfr	cs	15	–	.03
2	96-108	10YR 3/2	Fill 7.5YR 3/4 10YR 7/2	sil	2mgr	mfr	–	5	–	.13

Comments: Water observed @ 108"

Name (Please Print): Jeffrey T. Levake
Signature:
Credential Number: CST #223322
Address: P.O. Box 568 Lake Mills, WI 53551
Date Evaluation Conducted: 8-26-24
Telephone Number: 920-988-7567

SBD-10793 (R01/17)

WDNR
September 2017

TP3 #OBS ☒ Pit ☐ Boring Ground surface elevation 869.89 ft. Elevation of limiting factor 869.89 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-64	10YR 4/4	Mixed Fill	cl	0m	mfr	cs	15	—	.03
2	64-108	10YR 4/2	C2d 7.5YR 5/8 10YR 7/2	scl	1msbk	mfr	—	15	—	.07

Comments: Water observed @ 99"

TP4 #OBS ☒ Pit ☐ Boring Ground surface elevation 869.75 ft. Elevation of limiting factor 869.75 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-64	10YR 4/4	Mixed Fill	cl	0m	mfr	cs	15	—	.03
2	64-108	10YR 4/2	C2d 7.5YR 5/8 10YR 7/2	scl	1msbk	mfr	—	15	—	.07

Comments: Water observed @ 97"

TP5 #OBS ☒ Pit ☐ Boring Ground surface elevation 871.5 ft. Elevation of limiting factor 871.5 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-40	10YR 4/4	Mixed Fill	cl	0m	mfr	cs	15	—	.03
2	40-48	10YR 3/2	—	sil	1mgr	mfr	cs	5	—	.13
3	48-72	10YR 4/4	C2d 7.5YR 5/8 10YR 7/2	scl	1msbk	mfr	gw	5	—	.11
4	72-120	10YR 5/4	" "	grs	0sg	ml	—	15	—	3.6

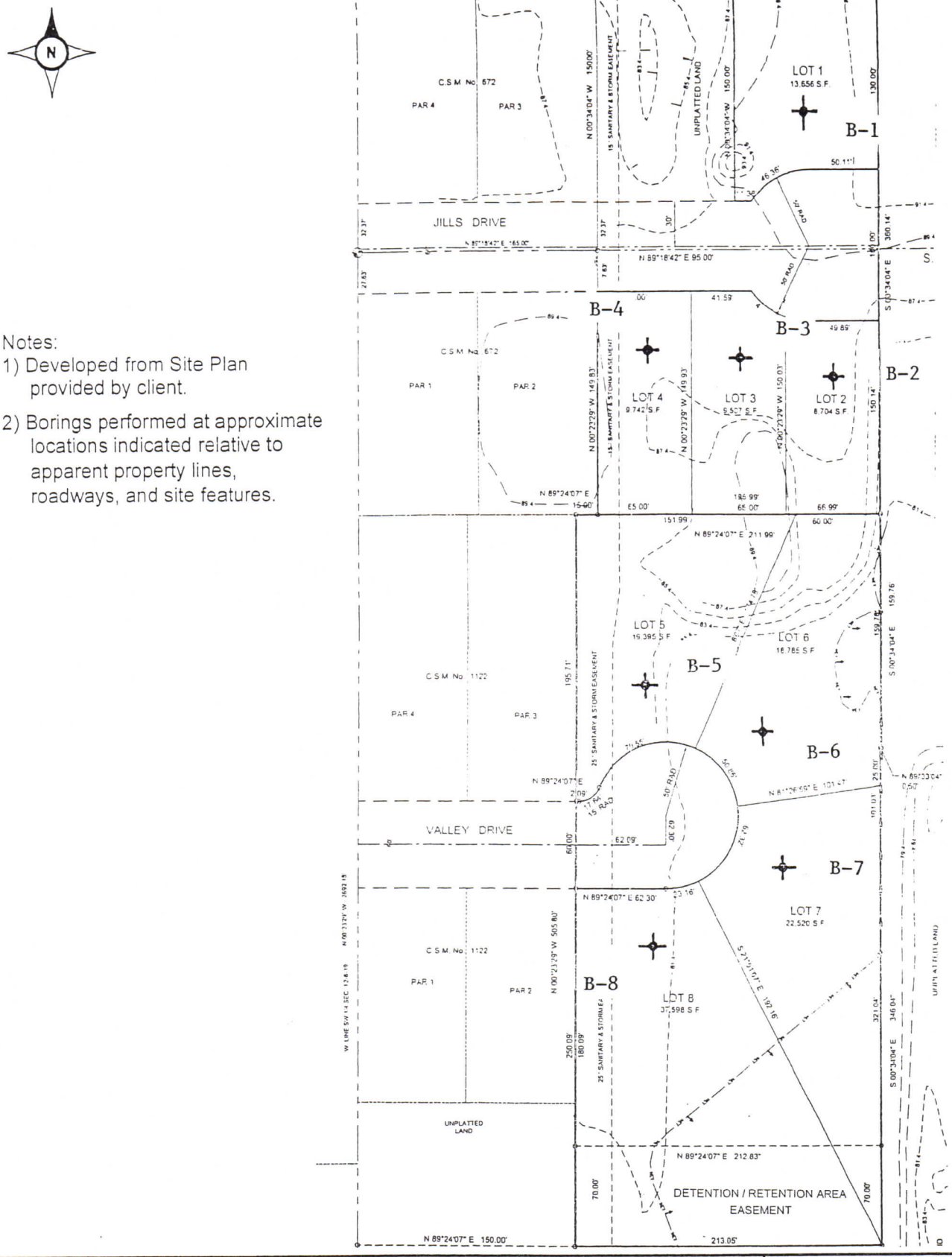
Comments:

TP6 #OBS ☒ Pit ☐ Boring Ground surface elevation 871.5 ft. Elevation of limiting factor 871.5 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines	Hydraulic App Rate Inches/Hr
1	0-40	10YR 4/4	Mixed Fill	cl	0m	mfr	cs	15	—	.03
2	40-48	10YR 3/2	—	sil	1mgr	mfr	cs	5	—	.13
3	48-72	10YR 4/4	C2d 7.5YR 5/8 10YR 7/2	scl	1msbk	mfr	gw	5	—	.11
4	72-120	10YR 5/4	" "	grs	0sg	ml	—	15	—	3.6

Comments:

Overall Site Comments:



Notes:

1) Developed from Site Plan provided by client.

2) Borings performed at approximate locations indicated relative to apparent property lines, roadways, and site features.

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BORING LOCATION PLAN

PROPOSED SUBDIVISION
JILLS DRIVE AND VALLEY DRIVE
WAUKESHA, WI

Scale: 1" ≈ 100'

Project Number: 7-63123

Date: 6-12-06, 7-3-06

Drawn By: SEE NOTES

Figure 1

midwest engineering services, inc.

SOIL BORING LOG: B-1

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: July 3, 2006
Drilled by: Pete Rotaru
Logged by: Ed Weiberg

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 90.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 89.6	Note A	1-AU	-	-	-	7	-	
2 — 88.6	Brown-Gray SAND and GRAVEL with Cobbles, Damp (Possible FILL)							
3 — 87.6		2-SS	37*	-	-	3		
4 — 86.6								
5 — 85.6		3-SS	50/6"*	-	-	3		Poor Sample
6 — 84.6								
7 — 83.6		4-SS	36*	-	-	4		Poor Sample
8 — 82.6								
9 — 81.6		5-SS	14	-	-	7		▽
10 — 80.6	Brown Silty Medium SAND and GRAVEL, Very Moist							
11 — 79.6								
12 — 78.6								
13 — 77.6	Brown Coarse SAND and GRAVEL, Wet	6-SS	7	-	-	13		
14 — 76.6								
15 — 75.6								
16 — 74.6								
17 — 73.6								
18 — 72.6								
19 — 71.6								
20 — 70.6	Gray Silty Fine SAND, Wet	7-SS	7	-	-	19		
21 — 69.6								
22 — 68.6								
23 — 67.6								
24 — 66.6								
25 — 65.6	Gray Sandy SILT, Wet	8-SS	4	-	-	22		
26 — 64.6								

End of Boring: 26½'

Notes:

Note A: 4"+/- Brown Silty SAND and GRAVEL with Root Matter, Damp (Possible TOPSOIL FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 11 ± ft (El. 79.6±) ▽

Water Level $_{\text{Upon Completion}}$: Dry

Caved at $_{\text{Upon Completion}}$: 6.5 ± ft (El. 84.1±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

midwest engineering services, inc.

SOIL BORING LOG: B-2

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: July 3, 2006
Drilled by: Pete Rotaru
Logged by: Ed Weiberg

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 87.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 86.7	Note A	1-AU	-	-	-	11	-	
2 — 85.7	Brown and Gray Silty CLAY with Sand and Gravel, trace Asphalt Fragments, Damp (FILL)							
3 — 84.7		2-SS	7	2.25	-	16	-	
4 — 83.7								
5 — 82.7		3-SS	6	-	-	14	-	
6 — 81.7								
7 — 80.7		4-SS	9	-	-	133	-	
8 — 79.7	Black Sandy SILT, Damp to Moist (Buried TOPSOIL)							
9 — 78.7	Brown to Gray Medium to Coarse Silty SAND and GRAVEL, Moist to Wet at 15'							
10 — 77.7		5-SS	9	-	-	10	-	▽ ▽
11 — 76.7								
12 — 75.7								
13 — 74.7								
14 — 73.7								
15 — 72.7		6-SS	24	-	-	9	-	
16 — 71.7								
17 — 70.7								
18 — 69.7								
19 — 68.7								
20 — 67.7		7-SS	23	-	-	10	-	
21 — 66.7								
22 — 65.7								
23 — 64.7								
24 — 63.7								
25 — 62.7	Gray Silty Fine SAND, Moist	8-SS	24	-	-	20	-	
26 — 61.7								

End of Boring: 26½'

Notes:

Note A: 12"+/- Dark Brown Silty SAND and GRAVEL, little Clay, Damp to Moist (TOPSOIL FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 10 ± ft (El. 77.7±) ▽

Water Level $_{\text{Upon Completion}}$: 11 ± ft (El. 76.7±) ▽

Caved at $_{\text{Upon Completion}}$: 11 ± ft (El. 76.7±)

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

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SOIL BORING LOG: B-3

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: July 3, 2006
Drilled by: Pete Rotaru
Logged by: Ed Weiberg

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 87.6	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 86.6	Note A	1-AU	-	-	-	13	-	
2 — 85.6	Brown Silty SAND, little Gravel, Damp (FILL)							
3 — 84.6		2-SS	6	-	-	14	-	No Recovery
4 — 83.6	Brown Silty CLAY, trace to little Sand and Gravel, Damp to Moist (FILL)							
5 — 82.6		3-SS	7	-	-	16	-	
6 — 81.6								
7 — 80.6	Black Silty CLAY, trace Sand, Moist, (Buried TOPSOIL)							
8 — 79.6		4-SS	22	-	-	10	-	▽ ▽
9 — 78.6	Gray-Brown Silty Medium to Coarse SAND and GRAVEL, Moist							▽
10 — 77.6		5-SS	13	-	-	10	-	
11 — 76.6								
12 — 75.6								
13 — 74.6								
14 — 73.6								
15 — 72.6	Orange-Brown Medium SAND and GRAVEL, trace to some Silt, Very Moist	6-SS	21	-	-	9	-	Poor Recovery
16 — 71.6								
17 — 70.6								
18 — 69.6								
19 — 68.6								
20 — 67.6		7-SS	17	-	-	19	-	
21 — 66.6								
22 — 65.6								
23 — 64.6	Gray Silty Fine SAND, Wet							
24 — 63.6								
25 — 62.6								
26 — 61.6		8-SS	15	-	-	19	-	

End of Boring: 26½'

Notes:

Note A: 9"+/- Dark Brown Sandy CLAY, Moist (TOPSOIL FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$:	10 ± ft (El. 77.6±)	▽
Water Level $_{\text{Upon Completion}}$:	9 ± ft (El. 78.6±)	▽
Caved at $_{\text{Upon Completion}}$:	11 ± ft (El. 76.6±)	
Delay Time:	4 hr(s)	
Water Level $_{\text{delayed}}$:	9 ± ft (El. 78.6±) after 4 hr(s)	▼
Caved at $_{\text{delayed}}$:	9.5 ± ft (El. 78.1±) after 4 hr(s)	

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

Estimated Fill, Peat and Groundwater Depths
Proposed Residential Development
Jills Drive and Valley Drive
Waukesha, Wisconsin
MES Project No. 7-63123

Boring No.	Ground Surface Elevation (a)	Estimated Fill and Buried Topsoil Depth (feet) (b)	Estimated Fill and Buried Topsoil Elevation (a)	Estimated Peat and Lake Marl Depth (feet) (b)	Estimated Peat and Lake Marl Elevation (a)	Estimated Groundwater Table Depth (feet) (b)	Estimated Ground Water Elevation (a)
B-1	EL. 90.6±	10±	El. 80.6±	-	-	11±	El. 79.6±
B-2	EL. 87.7±	8.5±	El. 79.2±	-	-	11±	El. 76.7±
B-3	EL. 87.6±	7.5±	El. 80.1±	-	-	10±	El. 77.6±
B-4	EL. 88.2±	6.5±	El. 81.7±	-	-	9±	El. 79.2±
B-5	EL. 83.5±	-	-	21±	El. 62.5±	11.5±	El. 72.0±
B-6	EL. 80.7±	-	-	13±	El. 67.7±	9±	El. 71.9±
B-7	EL. 80.4±	-	-	21±	El. 59.4±	8±	El. 72.4±
B-8	EL. 83.4±	8±	El. 75.4±	>26.5±	<El. 56.9±	11±	El. 72.4±

(a) Based on ground surface elevations interpolated from the grading plan provided.
(b) Depth below existing grade.

Note: It must be recognized that the above depths/elevations are estimates and variation will likely be encountered in the field.

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SOIL BORING LOG: B-4

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: July 3, 2006
Drilled by: Pete Rotaru
Logged by: Ed Weiberg

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 88.2	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 87.2	Note A	1-AU	-	-	-	9	-	
2 — 86.2	Brown Silty SAND and GRAVEL, Damp (FILL)							
3 — 85.2		2-SS	9	-	-	19	-	
4 — 84.2	Black Clayey SILT, Damp (Buried TOPSOIL)							
5 — 83.2		3-SS	5	-	-	104	-	
6 — 82.2								
7 — 81.2		4-SS	25	-	-	7	-	▼ ▽
8 — 80.2								
9 — 79.2		5-SS	24	-	-	-	-	▽
10 — 78.2								
11 — 77.2		6-SS	14	-	-	12	-	
12 — 76.2	Brown-Gray to Brown Medium to Coarse SAND, trace to little Silt, Moist to Wet at 15'							
13 — 75.2		7-SS	15	-	-	24	-	
14 — 74.2								
15 — 73.2		8-SS	19	-	-	23	-	
16 — 72.2								
17 — 71.2								
18 — 70.2								
19 — 69.2								
20 — 68.2								
21 — 67.2								
22 — 66.2								
23 — 65.2								
24 — 64.2								
25 — 63.2								
26 — 62.2	Brown Silty SAND, Wet							

End of Boring: 26½'

Notes:

Note A: 14"+/- Dark Brown Silty SAND and GRAVEL with Roots, Damp, (TOPSOIL FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$:	10 ± ft (El. 78.2±)	▽
Water Level $_{\text{Upon Completion}}$:	8 ± ft (El. 80.2±)	▽
Caved at $_{\text{Upon Completion}}$:	9 ± ft (El. 79.2±)	
Delay Time:	5 hr(s)	
Water Level $_{\text{delayed}}$:	8 ± ft (El. 80.2±) after 5 hr(s)	▼
Caved at $_{\text{delayed}}$:	8.5 ± ft (El. 79.7±) after 5 hr(s)	

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

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SOIL BORING LOG: B-5

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: June 12, 2006
Drilled by: Steve Gonyer
Logged by: Tom

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 83.5	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 – 82.5	Note A	1-AU	-	-	-	57	-	
2 – 81.5	Dark Gray Silty SAND with Organics, Damp							
3 – 80.5								
4 – 79.5		2-SS	2	-	-	-	-	Poor Recovery
5 – 78.5	Dark Brown to Black Fibrous PEAT, Moist							▽
6 – 77.5		3-SS	3	-	-	416	-	
7 – 76.5								
8 – 75.5		4-SS	2	-	-	77	-	
9 – 74.5								
10 – 73.5								
11 – 72.5		5-SS	2	-	-	262	-	
12 – 71.5	Gray Organic Clayey SILT with Sand and Shells, Moist (Lake Marl)							
13 – 70.5								
14 – 69.5								
15 – 68.5								
16 – 67.5	Dark Gray Clayey SILT, trace Organics, Very Moist (Lake Marl)	6-SS	4	-	-	35	-	
17 – 66.5								Organic Content 4.1%
18 – 65.5								
19 – 64.5								
20 – 63.5								
21 – 62.5		7-SS	15	0.25	-	-	-	
22 – 61.5	Brown to Gray Silty SAND and GRAVEL, Wet							
23 – 60.5								
24 – 59.5								▽
25 – 58.5								
26 – 57.5		8-SS	8	-	-	34	-	

End of Boring: 26½'

Notes:

Note A: 12"+/- Dark Brown to Black Silty SAND with Fibers, Damp (TOPSOIL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 24 ± ft (El. 59.5±) ▽
Water Level $_{\text{Upon Completion}}$: 5 ± ft (El. 78.5±) ▽
Caved at $_{\text{Upon Completion}}$: 17 ± ft (El. 66.5±)

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

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SOIL BORING LOG: B-6

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: June 12, 2006
Drilled by: Steve Gonyer
Logged by: Tom

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 80.7	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	Note A	1-AU	-	-	-	165	-	
1 — 79.7								
2 — 78.7								
3 — 77.7								
4 — 76.7		2-SS	2	-	-	-	-	Poor Recovery
5 — 75.7	Black Fibrous PEAT, Very Moist							
6 — 74.7		3-SS	1	-	-	225	-	
7 — 73.7								
8 — 72.7								
9 — 71.7		4-SS	13	-	-	67	-	
10 — 70.7								
11 — 69.7	Gray Clayey SILT with Shells, Very Moist (Lake Marl)	5-SS	11	-	-	39	-	
12 — 68.7								
13 — 67.7								
14 — 66.7	Gray Silty SAND and GRAVEL, Very Moist							
15 — 65.7								
16 — 64.7		6-SS	15	-	-	16	-	
17 — 63.7								
18 — 62.7								
19 — 61.7								
20 — 60.7	Brown to Brown-Gray Medium to Coarse SAND and GRAVEL with Sand Seams, trace to little Silt, Wet							
21 — 59.7		7-SS	10	-	-	18	-	▽
22 — 58.7								
23 — 57.7								
24 — 56.7								
25 — 55.7								
26 — 54.7		8-SS	15	-	-	10	-	

End of Boring: 26½'

Notes:

Note A: 6"+/- Black Clayey SILT, little Fibers, Moist (TOPSOIL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 21 ± ft (El. 59.7±) ▽

Water Level $_{\text{Upon Completion}}$: Dry

Caved at $_{\text{Upon Completion}}$: 4.5 ± ft (El. 76.2±)

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

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SOIL BORING LOG: B-7

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: June 12, 2006
Drilled by: Steve Gonyer
Logged by: Tom

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 80.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 79.4	Note A	1-AU	-	-	-	164	-	
2 — 78.4								
3 — 77.4		2-SS	1	-	-	55	-	
4 — 76.4	Black Organic Clayey SILT, trace to little Fibers, Moist (Lake Marl)							
5 — 75.4		3-SS	1	-	-	233	-	▽
6 — 74.4								
7 — 73.4								
8 — 72.4		4-SS	2	-	-	35	-	
9 — 71.4								
10 — 70.4		5-SS	2	-	-	28	-	
11 — 69.4								
12 — 68.4								
13 — 67.4								
14 — 66.4	Gray Clayey SILT, trace to little Organics, Very Moist (Lake Marl)							
15 — 65.4								
16 — 64.4		6-SS	4	-	-	36	-	Organic Content 4.1%
17 — 63.4								
18 — 62.4								
19 — 61.4								
20 — 60.4								▽
21 — 59.4		7-SS	10	-	-	22	-	
22 — 58.4								
23 — 57.4	Brown-Gray Medium to Coarse SAND and GRAVEL, trace Silt, Very Moist							
24 — 56.4								
25 — 55.4								
26 — 54.4		8-SS	22	-	-	10	-	

End of Boring: 26½'

Notes:

Note A: 12"+/- Black Silty SAND with Fibers and Root Mat, Damp (TOPSOIL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: 21 ± ft (El. 59.4±) ▽
Water Level $_{\text{Upon Completion}}$: 7 ± ft (El. 73.4±) ▽
Caved at $_{\text{Upon Completion}}$: 17 ± ft (El. 63.4±)

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

midwest engineering services, inc.

SOIL BORING LOG: B-8

Project: Judy Fuller Residential Subdivision

Location: Waukesha, Wisconsin

Project No.: 7-63123
Drill Date: June 12, 2006
Drilled by: Steve Gonyer
Logged by: Tom

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION Ground Surface Elevation: 83.4	Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
1 — 82.4	Note A	1-AU	-	-	-	12	-	
2 — 81.4								
3 — 80.4								
4 — 79.4	Brown Silty SAND and GRAVEL, little Asphalt Fragments, Damp (FILL)	2-SS	14	-	-	6	-	
5 — 78.4								
6 — 77.4		3-SS	13	-	-	10	-	
7 — 76.4								
8 — 75.4		4-SS	6	-	-	336	-	
9 — 74.4	Dark Brown to Black Fibrous PEAT, Moist							
10 — 73.4								
11 — 72.4		5-SS	5	-	-	74	-	
12 — 71.4	Gray Sandy SILT, trace Shells and Fibers, Moist (Lake Marl)							
13 — 70.4								
14 — 69.4								
15 — 68.4								
16 — 67.4		6-SS	4	0.5	-	49	-	
17 — 66.4								
18 — 65.4								
19 — 64.4								
20 — 63.4								
21 — 62.4	Gray Clayey SILT, trace to little Organics, Moist (Lake Marl)	7-SS	5	0.25	-	47	-	
22 — 61.4								
23 — 60.4								
24 — 59.4								
25 — 58.4								
26 — 57.4		8-SS	3	-	-	35	-	

End of Boring: 26½'

Notes:

Note A: 8"+/- Dark Brown to Black Silty SAND, little Fibers, trace Root Matter, Damp (TOPSOIL FILL)

Water Level / Caving Observations:

Water Level $_{\text{During Drilling}}$: Dry

Water Level $_{\text{Upon Completion}}$: Dry

Caved at $_{\text{Upon Completion}}$: 15.5 ± ft (El. 67.9±)

Additional Comments:

*Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual. Dashed lines are indicative of potentially erratic or unknown changes, such as fill-to-natural soil zone transitions.*

GENERAL NOTES

SAMPLE IDENTIFICATION

Visual soil classifications are made in general accordance with the Unified Soil Classification System on the basis of textural and particle size categorization, and various soil behavior characteristics. Visual classifications should be substantiated by appropriate laboratory testing when a more exact soil identification is required to satisfy specific project applications criteria.

PARTICLE SIZE±

Boulders:	8 inches	Coarse Sand:	2 to 4 mm	Silt:	0.005 to 0.074 mm
Cobbles:	3 to 8 inches	Medium Sand:	0.42 to 2 mm	Clay:	-0.005 mm
Gravel:	5 mm to 3 inches	Fine Sand:	0.074 to 0.42 mm		

DRILLING & SAMPLING SYMBOLS

SS:	Split-spoon, 2" O.D. by 1 3/8" I.D.		
ST:	Shelby Tube, 2" O.D. or 3" O.D., as noted in text	RB:	Roller Bit
AU:	Auger Sample	WS:	Wash Sample
DB:	Diamond Bit	BS:	Bag Sample
CB:	Carbide Bit	HA:	Hand Auger

SOIL PROPERTY SYMBOLS

N: Standard penetration count, indicating number of blows of a 140 lb. hammer with a 30 inch drop, required to advance a split-spoon sampler one foot.
Qu: Unconfined compressive strength, tons per square foot (tsf)
Qp: Calibrated hand penetrometer resistance, tsf
MC: Moisture content, %
LL: Liquid Limit PL: Plastic Limit PI: Plasticity Index
Dd: Dry Density, pounds per cubic foot (pcf)
PID: Photoionization Detector (Hnu meter) volatile vapor level, ppm

SOIL RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

NON-COHESIVE SOILS		COHESIVE SOILS		
Classifier	N-Value Range	Classifier	Qu Range (tsf)	N-Value Range
very loose	0-3	very soft	0-0.25	0-2
loose	3-7	soft	0.25-0.5	2-5
medium dense	7-15	medium stiff	0.5-1.0	5-10
dense	15-38	stiff	1.0-2.0	10-14
very dense	38+	very stiff	2.0-4.0	14-32
		hard	4.0+	32+

GROUNDWATER

: Approximate Groundwater level at time noted on soil boring log, measured in open borehole unless otherwise noted. Groundwater levels often vary with time, and are affected by soil permeability characteristics, weather conditions, & lateral drainage conditions.

Appendix C

Existing Site Conditions

PARISH SURVEY & ENGINEERING
122 Wisconsin Street | West Bend, WI 53095
www.parishse.com

1E — EXISTING WATERSHED
AREA=1.986 ACRES
CN=67

— EXISTING GRASS, HSG B
AREA=0.938 ACRES
CN=61

— EXISTING GRASS, HSG D
AREA=0.541 ACRES
CN=80

— EXISTING WOODS, HSG B
AREA=0.371 ACRES
CN=58

— EXISTING WOODS, HSG D
AREA=0.117 ACRES
CN=79

— EXISTING WETLAND
AREA=0.019 ACRES
CN=80

0 25 50

VALLEY DRIVE

JILLS DRIVE

GARDEN PRAIRIE DRIVE

EX. BUILDING

EX. BUILDING

EX. HYDRANT

EX. HYDRANT

GAS

GAS

SS

EX. CURB

EX. SIDEWALK

EX. SIDEWALK

Tc=10.2 MIN.

TREELINE

TREELINE

TREELINE

EXISTING WOODED AREA

WETLAND
(DELINEATED BY WETLAND & WATERWAY CONSULTING, LLC ON 5/1/2021) 1.343 ACRES

BRUSH LINE

1E

1E

1E

REVISIONS:

NO.	DATE	DESCRIPTION

PARISH SURVEY & ENGINEERING
122 Wisconsin Street, West Bend, WI 53095
262.346.7800
www.parishse.com

PROJECT TITLE:
ST PAUL CONDOMINIUMS
OUTLOTS 1 & 2 CSM NO 10288
WAUKESHA, WI 53186

PLAN TITLE:
EXISTING DRAINAGE MAP

DRAWN BY:
JAB

DESIGNED BY:
MBS

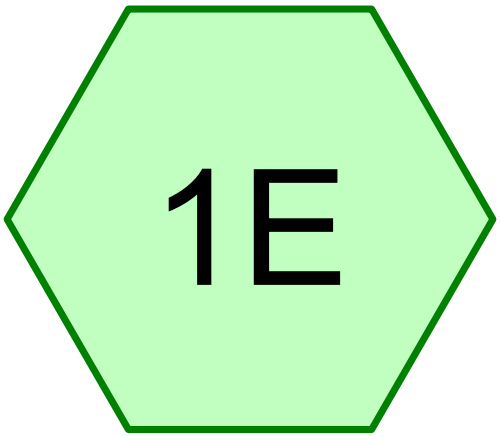
CHECKED BY:
KJP

PLAN DATE:
11-18-2024

PROJECT NO:
\ES-10-23\

SUBMITTAL

SHEET NO:
C5.01



Existing Site

Subcat Reach Pond Link

Routing Diagram for HydroCAD Existing
Prepared by {enter your company name here}, Printed 8/26/2024

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 9179 WI Milwaukee

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.938	61	>75% Grass cover, Good, HSG B (1E)
0.541	80	>75% Grass cover, Good, HSG D (1E)
0.019	80	Wetland (1E)
0.371	58	Woods/grass comb., Good, HSG B (1E)
0.117	79	Woods/grass comb., Good, HSG D (1E)
1.986	**67**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: Existing Site Runoff Area=1.986 ac 0.00% Impervious Runoff Depth>0.29"
Flow Length=241' Tc=10.2 min CN=67 Runoff=0.66 cfs 0.048 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.048 af Average Runoff Depth = 0.29"
100.00% Pervious = 1.986 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1E: Existing Site

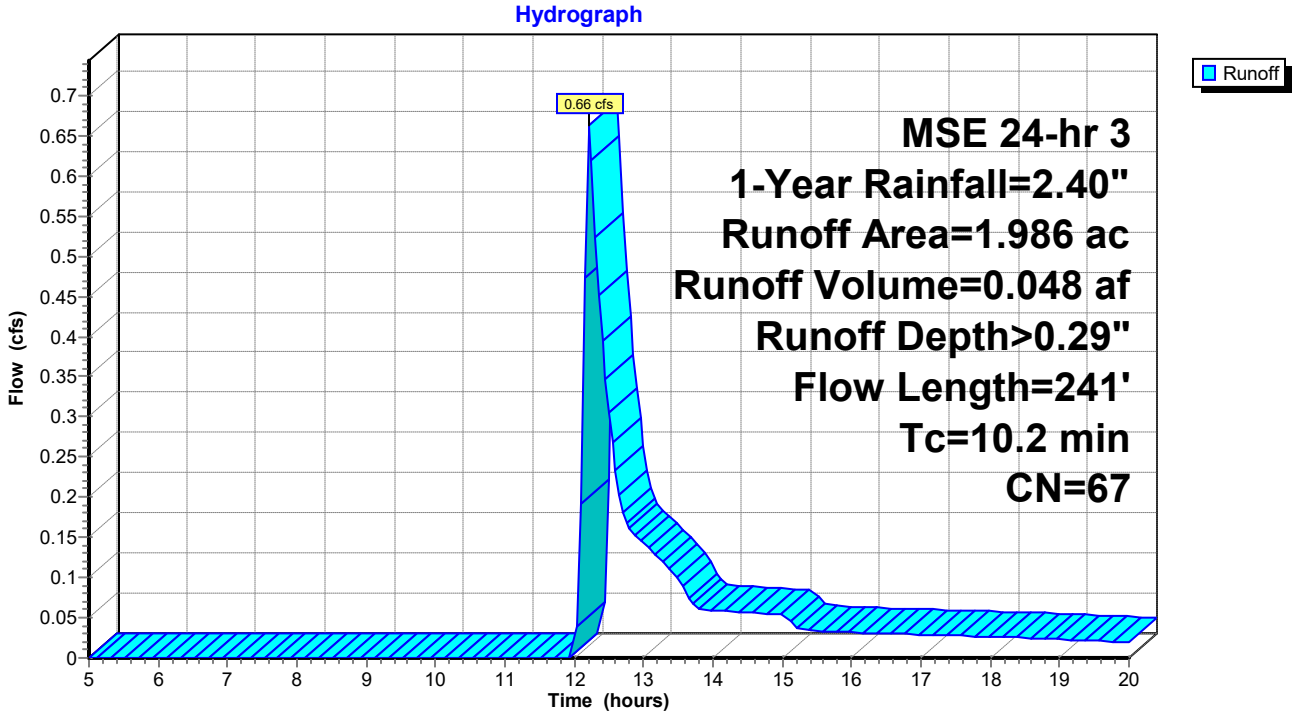
Runoff = 0.66 cfs @ 12.22 hrs, Volume= 0.048 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
	0.938	61	>75% Grass cover, Good, HSG B
*	0.019	80	Wetland
	0.371	58	Woods/grass comb., Good, HSG B
	0.541	80	>75% Grass cover, Good, HSG D
	0.117	79	Woods/grass comb., Good, HSG D
	1.986	67	Weighted Average
	1.986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"
2.0	141	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.2	241	Total			

Subcatchment 1E: Existing Site



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: Existing Site Runoff Area=1.986 ac 0.00% Impervious Runoff Depth>0.41"
Flow Length=241' Tc=10.2 min CN=67 Runoff=1.06 cfs 0.068 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.068 af Average Runoff Depth = 0.41"
100.00% Pervious = 1.986 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1E: Existing Site

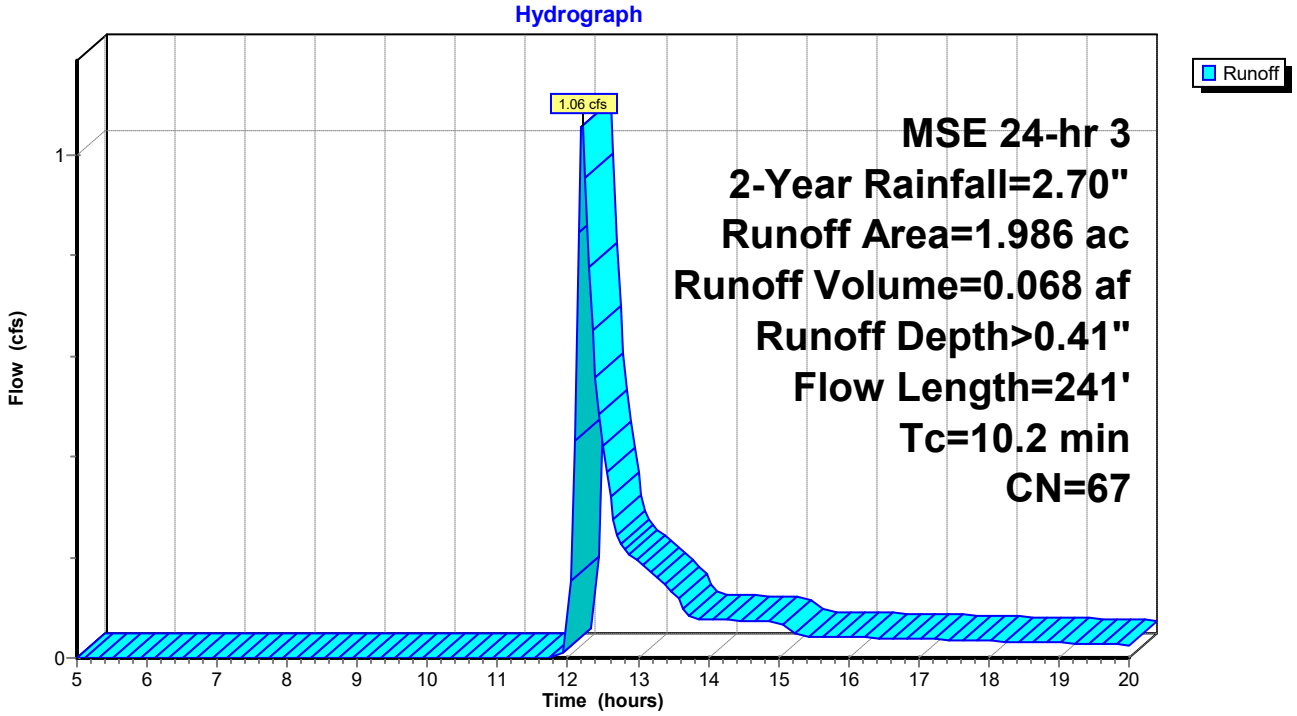
Runoff = 1.06 cfs @ 12.21 hrs, Volume= 0.068 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
	0.938	61	>75% Grass cover, Good, HSG B
*	0.019	80	Wetland
	0.371	58	Woods/grass comb., Good, HSG B
	0.541	80	>75% Grass cover, Good, HSG D
	0.117	79	Woods/grass comb., Good, HSG D
	1.986	67	Weighted Average
	1.986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"
2.0	141	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.2	241	Total			

Subcatchment 1E: Existing Site



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: Existing Site Runoff Area=1.986 ac 0.00% Impervious Runoff Depth>0.97"
Flow Length=241' Tc=10.2 min CN=67 Runoff=2.92 cfs 0.160 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.160 af Average Runoff Depth = 0.97"
100.00% Pervious = 1.986 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1E: Existing Site

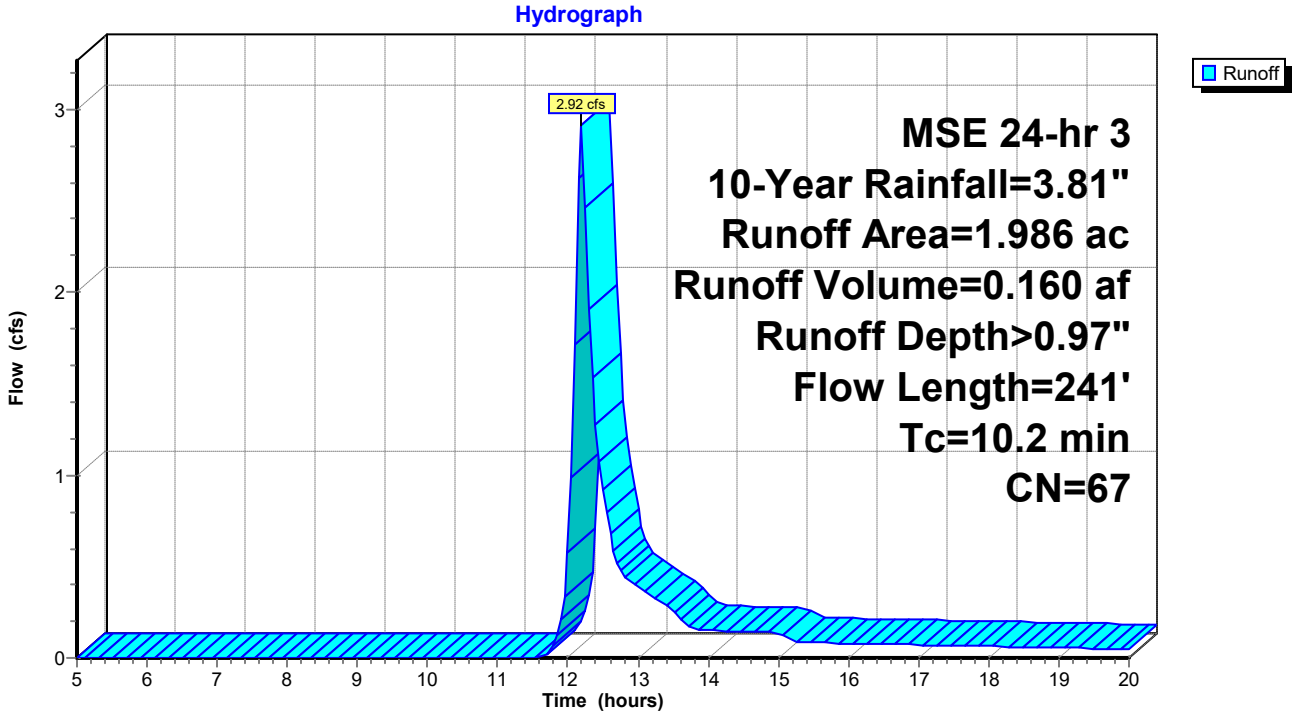
Runoff = 2.92 cfs @ 12.19 hrs, Volume= 0.160 af, Depth> 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
	0.938	61	>75% Grass cover, Good, HSG B
*	0.019	80	Wetland
	0.371	58	Woods/grass comb., Good, HSG B
	0.541	80	>75% Grass cover, Good, HSG D
	0.117	79	Woods/grass comb., Good, HSG D
	1.986	67	Weighted Average
	1.986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"
2.0	141	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.2	241	Total			

Subcatchment 1E: Existing Site



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: Existing Site Runoff Area=1.986 ac 0.00% Impervious Runoff Depth>2.54"
Flow Length=241' Tc=10.2 min CN=67 Runoff=7.98 cfs 0.420 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.420 af Average Runoff Depth = 2.54"
100.00% Pervious = 1.986 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1E: Existing Site

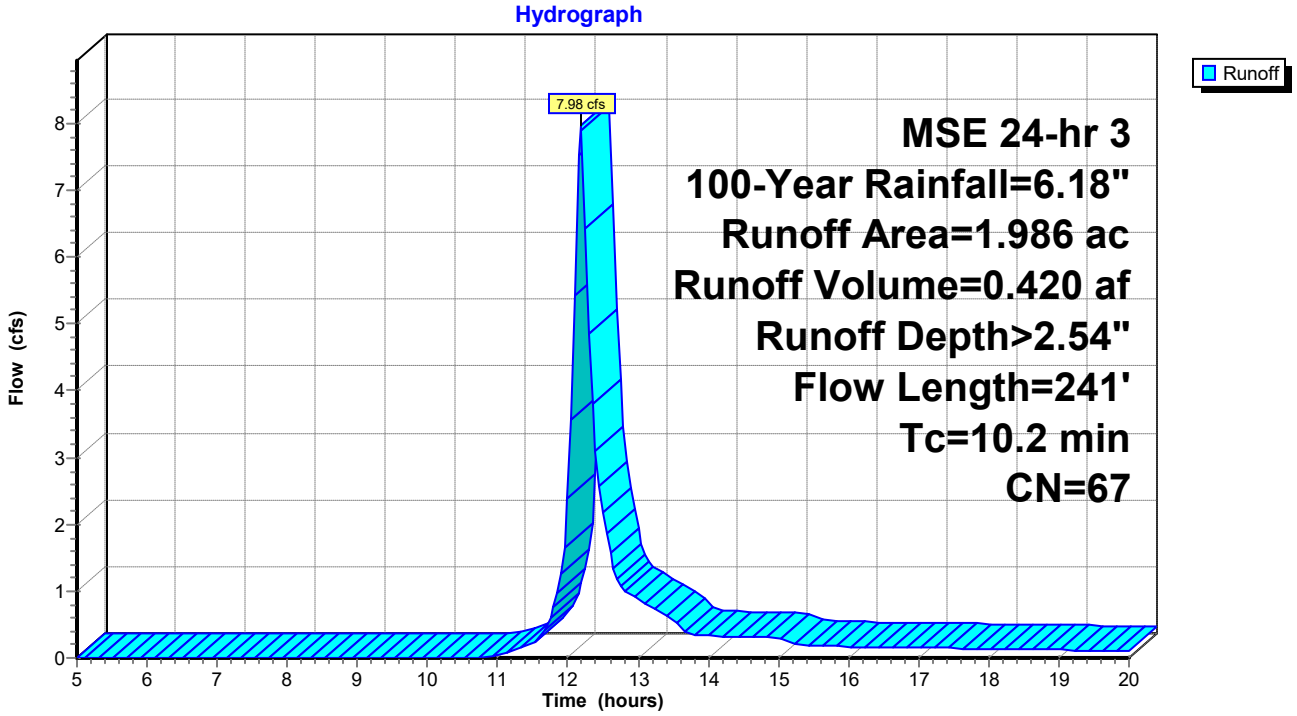
Runoff = 7.98 cfs @ 12.19 hrs, Volume= 0.420 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
	0.938	61	>75% Grass cover, Good, HSG B
*	0.019	80	Wetland
	0.371	58	Woods/grass comb., Good, HSG B
	0.541	80	>75% Grass cover, Good, HSG D
	0.117	79	Woods/grass comb., Good, HSG D
	1.986	67	Weighted Average
	1.986		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.0400	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"
2.0	141	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.2	241	Total			

Subcatchment 1E: Existing Site



Appendix D

Proposed Site Conditions

PARISH SURVEY & ENGINEERING

122 Wisconsin Street | West Bend, WI 53095
www.parishse.com

1S — PROPOSED WATERSHED TO POND
AREA=0.956 ACRES
CN=81

2S — PROPOSED WATERSHED TO SW BIOFILTER
AREA=0.112 ACRES
CN=79

3S — PROPOSED WATERSHED TO SE BIOFILTER
AREA=0.112 ACRES
CN=78

4S — PROPOSED WATERSHED TO FILTER STRIP
AREA=0.253 ACRES
CN=61

5S — PROPOSED WATERSHED TO N RAIN GARDEN
AREA=0.161 ACRES
CN=76

6S — PROPOSED WATERSHED TO S SWALE
AREA=0.118 ACRES
CN=61

7S — PROPOSED WATERSHED TO CITY STORM
AREA=0.274 ACRES
CN=76

0 25 50

VALLEY DRIVE
JILLS DRIVE
GARDEN PRAIRIE DRIVE
EX. BUILDING
EX. HYDRANT
EX. CURB
EX. SIDEWALK
CONC.
GAS
TREELINE
STANDPIPE
PROPOSED WET POND
PROPOSED DUPLEX
PROPOSED ASPHALT
PROPOSED SW BIO-FILTER #1
PROPOSED SE BIO-FILTER #2
PROPOSED RAIN GARDEN
CB #6
CB #4.1
CB #4.2
CB #5.2
INLET #2
INLET #3
INLET #5
INLET #5.1
STM MH #1
MH #6
FILTER STRIP #1
FILTER STRIP #2
EXISTING WOODED AREA
WETLAND (DELINEATED BY WETLAND & WATERWAY CONSULTING, LLC ON 5/1/2021) 1.343 ACRES

REVISIONS:

NO.	DATE	DESCRIPTION

PARISH SURVEY & ENGINEERING
122 Wisconsin Street, West Bend, WI 53095
262.346.7800
www.parishse.com

PROJECT TITLE:
ST PAUL CONDOMINIUMS
OUTLOTS 1 & 2 CSM NO 10288
WAUKESHA, WI 53186

PLAN TITLE:
PROPOSED DRAINAGE MAP

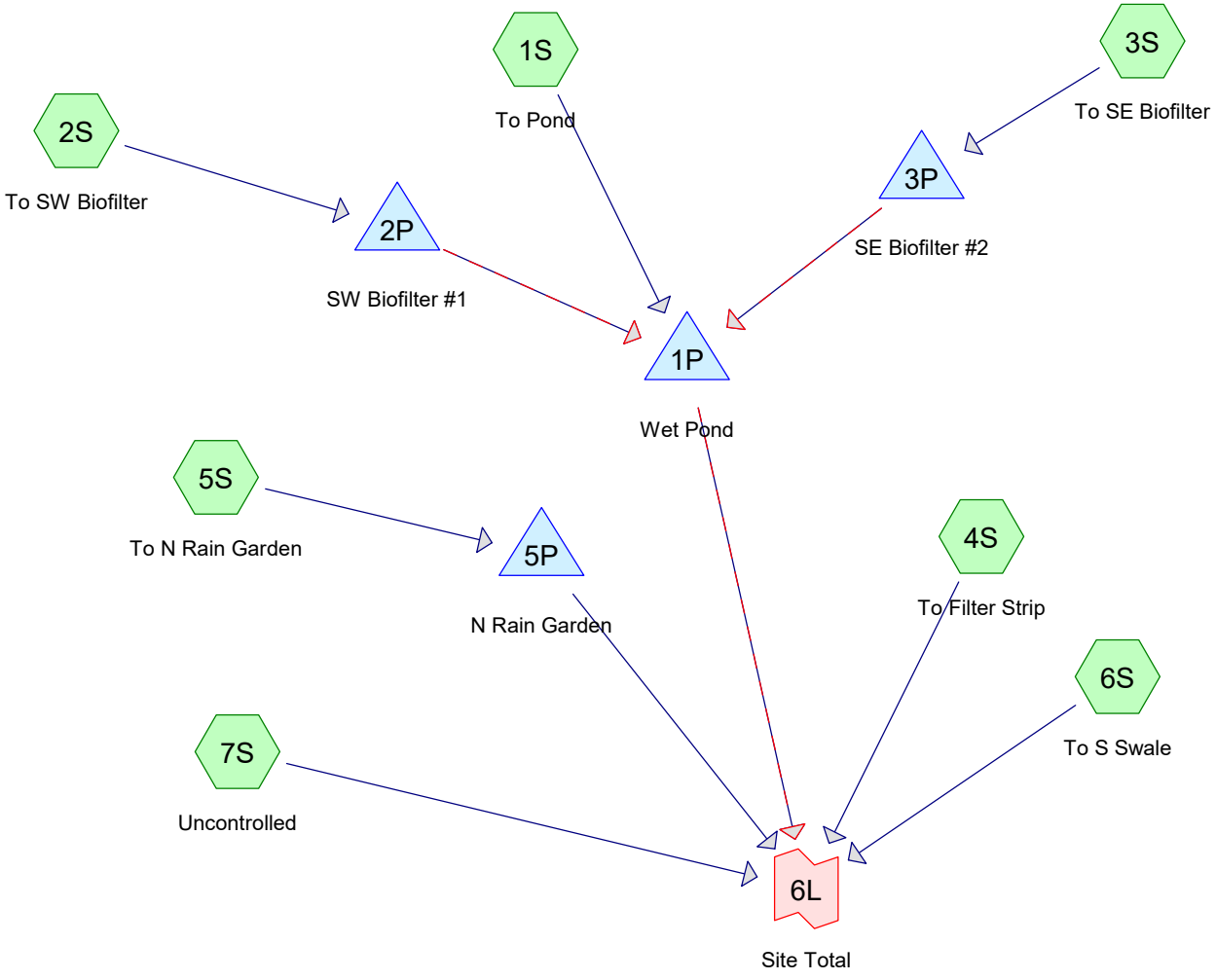
DRAWN BY: **JAB**
DESIGNED BY: **MBS**
CHECKED BY: **KJP**

PLAN DATE: **11-18-2024**

PROJECT NO: \ES-10-23\

SUBMITTAL

SHEET NO:
C5.02



Subcat Reach Pond Link

Routing Diagram for HydroCAD Proposed
Prepared by Parish Survey & Engineering, Printed 11/22/2024

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.047	61	>75% Grass cover, Good, HSG B (1S, 2S, 3S, 4S, 5S, 6S, 7S)
0.376	98	Buildings (1S, 2S, 3S, 5S)
0.131	98	Driveways (1S, 7S)
0.097	61	Grass B (7S)
0.212	98	Pavement (1S, 7S)
0.021	98	Sidewalks (1S, 4S, 5S, 7S)
0.048	98	Wet Pond (1S)
0.054	73	Woods/grass comb., Poor, HSG B (7S)
1.986	**76**	**TOTAL AREA**

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=0.956 ac 54.81% Impervious Runoff Depth>0.83"
Flow Length=80' Slope=0.0100 '/' Tc=11.9 min CN=81 Runoff=1.17 cfs 0.066 af

Subcatchment 2S: To SW Biofilter Runoff Area=0.112 ac 47.32% Impervious Runoff Depth>0.73"
Tc=6.0 min CN=79 Runoff=0.15 cfs 0.007 af

Subcatchment 3S: To SE Biofilter Runoff Area=0.112 ac 46.43% Impervious Runoff Depth>0.68"
Tc=6.0 min CN=78 Runoff=0.14 cfs 0.006 af

Subcatchment 4S: To Filter Strip Runoff Area=0.253 ac 1.19% Impervious Runoff Depth>0.15"
Tc=6.0 min CN=61 Runoff=0.03 cfs 0.003 af

Subcatchment 5S: To N Rain Garden Runoff Area=0.161 ac 40.99% Impervious Runoff Depth>0.60"
Flow Length=100' Slope=0.0100 '/' Tc=14.2 min CN=76 Runoff=0.12 cfs 0.008 af

Subcatchment 6S: To S Swale Runoff Area=0.118 ac 0.00% Impervious Runoff Depth>0.15"
Tc=6.0 min CN=61 Runoff=0.01 cfs 0.001 af

Subcatchment 7S: Uncontrolled Runoff Area=0.274 ac 32.85% Impervious Runoff Depth>0.60"
Tc=6.0 min CN=76 Runoff=0.30 cfs 0.014 af

Pond 1P: Wet Pond Peak Elev=861.15' Storage=2,246 cf Inflow=1.29 cfs 0.074 af
Primary=0.05 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.028 af

Pond 2P: SW Biofilter #1 Peak Elev=865.19' Storage=83 cf Inflow=0.15 cfs 0.007 af
Primary=0.12 cfs 0.005 af Secondary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.005 af

Pond 3P: SE Biofilter #2 Peak Elev=865.07' Storage=153 cf Inflow=0.14 cfs 0.006 af
Primary=0.02 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.003 af

Pond 5P: N Rain Garden Peak Elev=870.76' Storage=219 cf Inflow=0.12 cfs 0.008 af
Outflow=0.02 cfs 0.003 af

Link 6L: Site Total Inflow=0.35 cfs 0.050 af
Primary=0.35 cfs 0.050 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.105 af Average Runoff Depth = 0.64"
60.32% Pervious = 1.198 ac 39.68% Impervious = 0.788 ac

Summary for Subcatchment 1S: To Pond

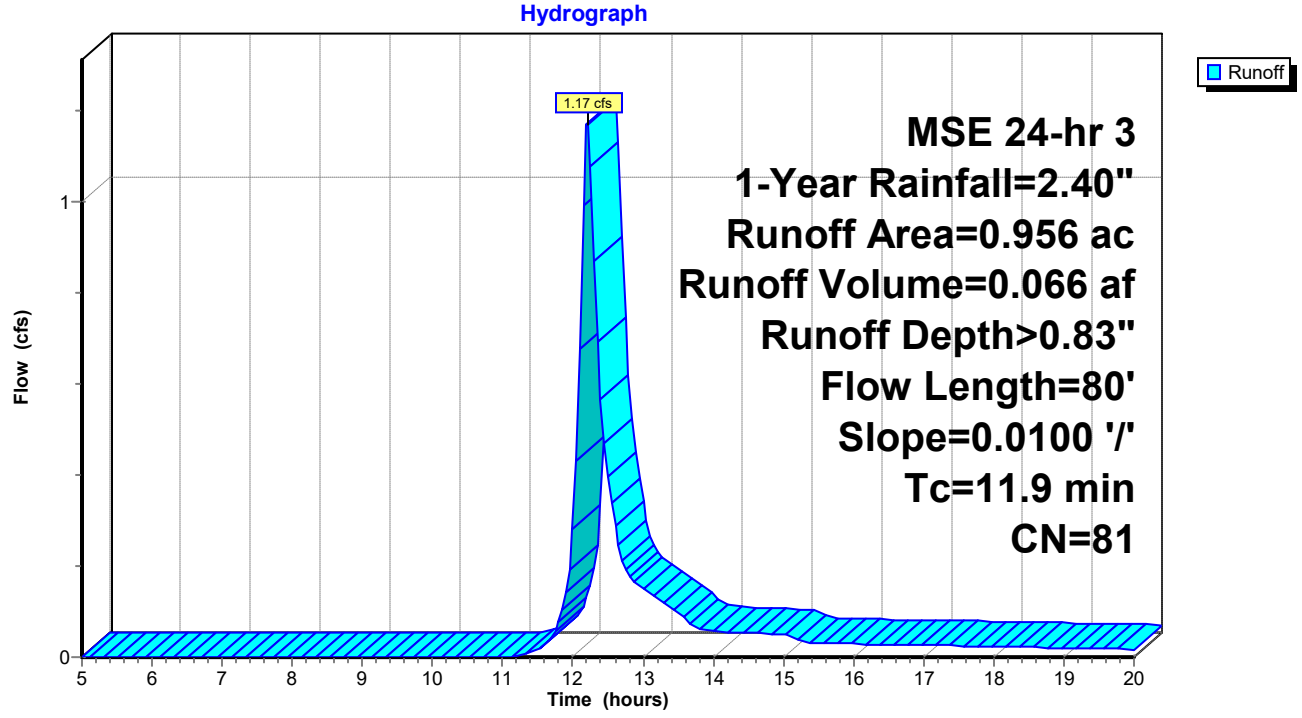
Runoff = 1.17 cfs @ 12.21 hrs, Volume= 0.066 af, Depth> 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.208	98	Buildings
*	0.207	98	Pavement
*	0.050	98	Driveways
*	0.011	98	Sidewalks
	0.432	61	>75% Grass cover, Good, HSG B
*	0.048	98	Wet Pond
	0.956	81	Weighted Average
	0.432		45.19% Pervious Area
	0.524		54.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	80	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To SW Biofilter

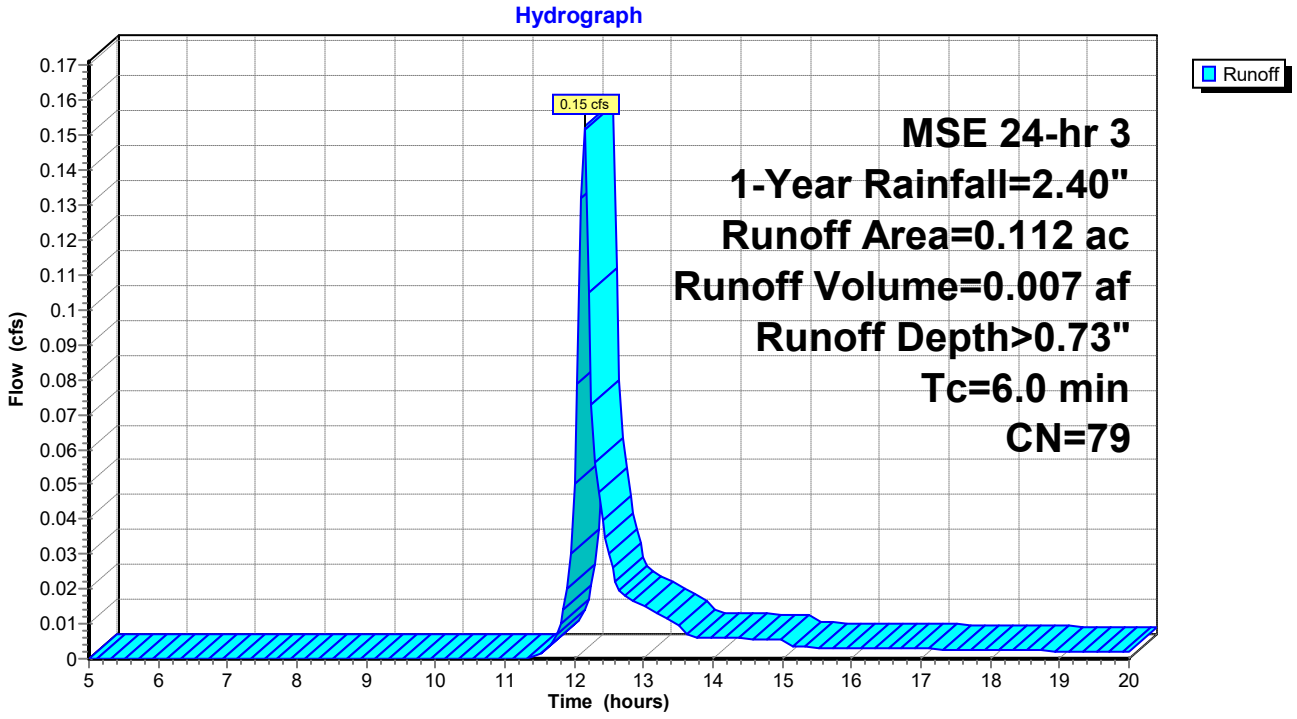
Runoff = 0.15 cfs @ 12.14 hrs, Volume= 0.007 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.053	98	Buildings
	0.059	61	>75% Grass cover, Good, HSG B
	0.112	79	Weighted Average
	0.059		52.68% Pervious Area
	0.053		47.32% Impervious Area

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

Subcatchment 2S: To SW Biofilter



Summary for Subcatchment 3S: To SE Biofilter

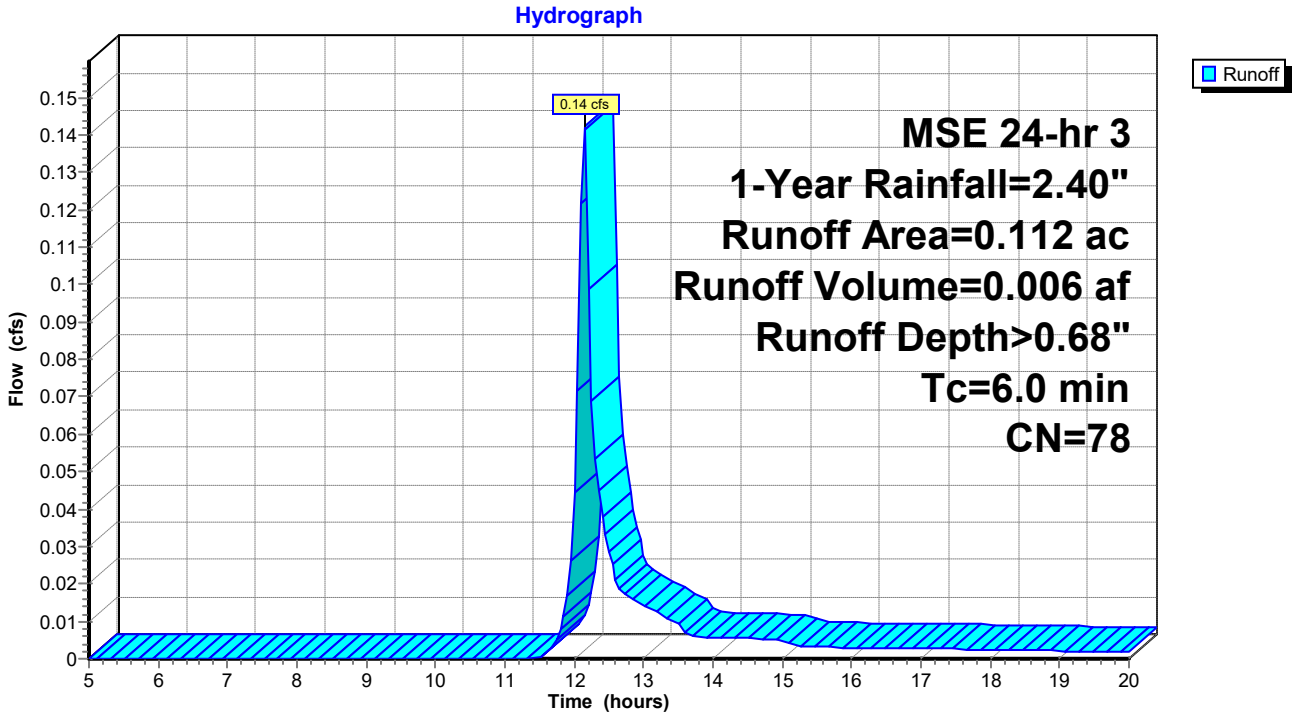
Runoff = 0.14 cfs @ 12.14 hrs, Volume= 0.006 af, Depth> 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.052	98	Buildings
	0.060	61	>75% Grass cover, Good, HSG B
	0.112	78	Weighted Average
	0.060		53.57% Pervious Area
	0.052		46.43% Impervious Area

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

Subcatchment 3S: To SE Biofilter



Summary for Subcatchment 4S: To Filter Strip

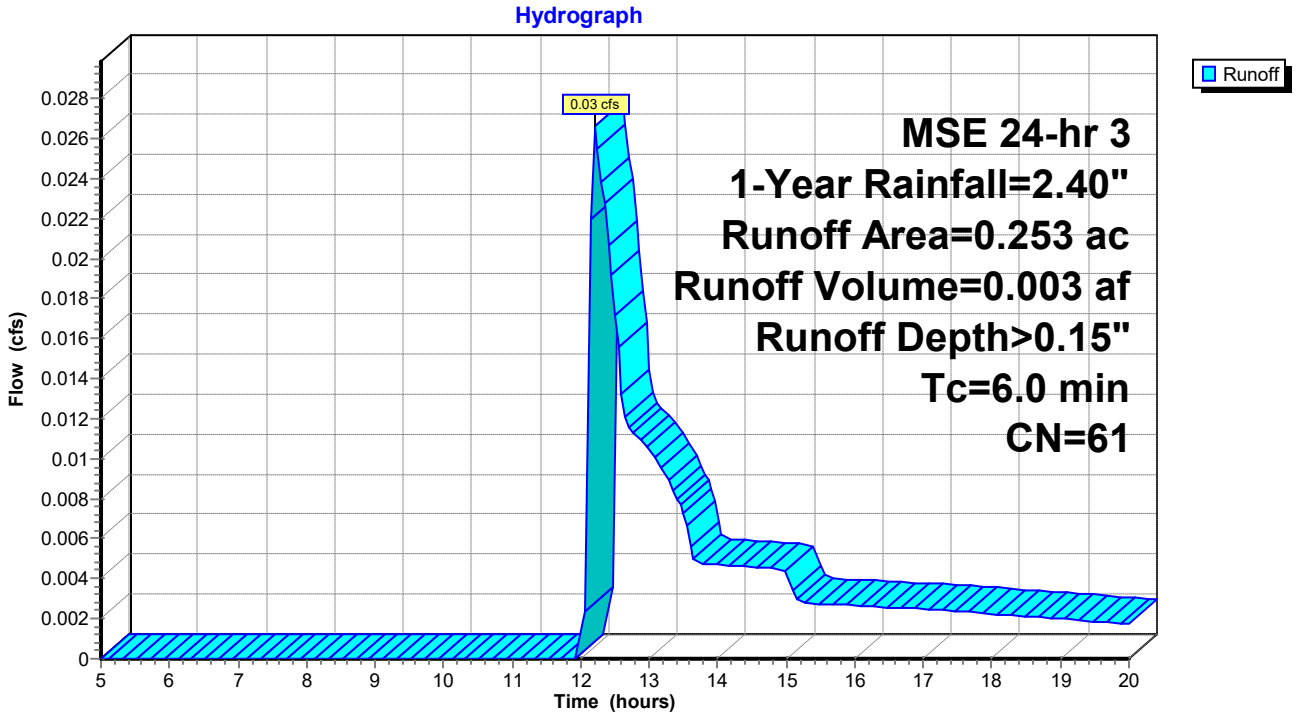
Runoff = 0.03 cfs @ 12.22 hrs, Volume= 0.003 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
	0.250	61	>75% Grass cover, Good, HSG B
*	0.003	98	Sidewalks
	0.253	61	Weighted Average
	0.250		98.81% Pervious Area
	0.003		1.19% Impervious Area

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

Subcatchment 4S: To Filter Strip



Summary for Subcatchment 5S: To N Rain Garden

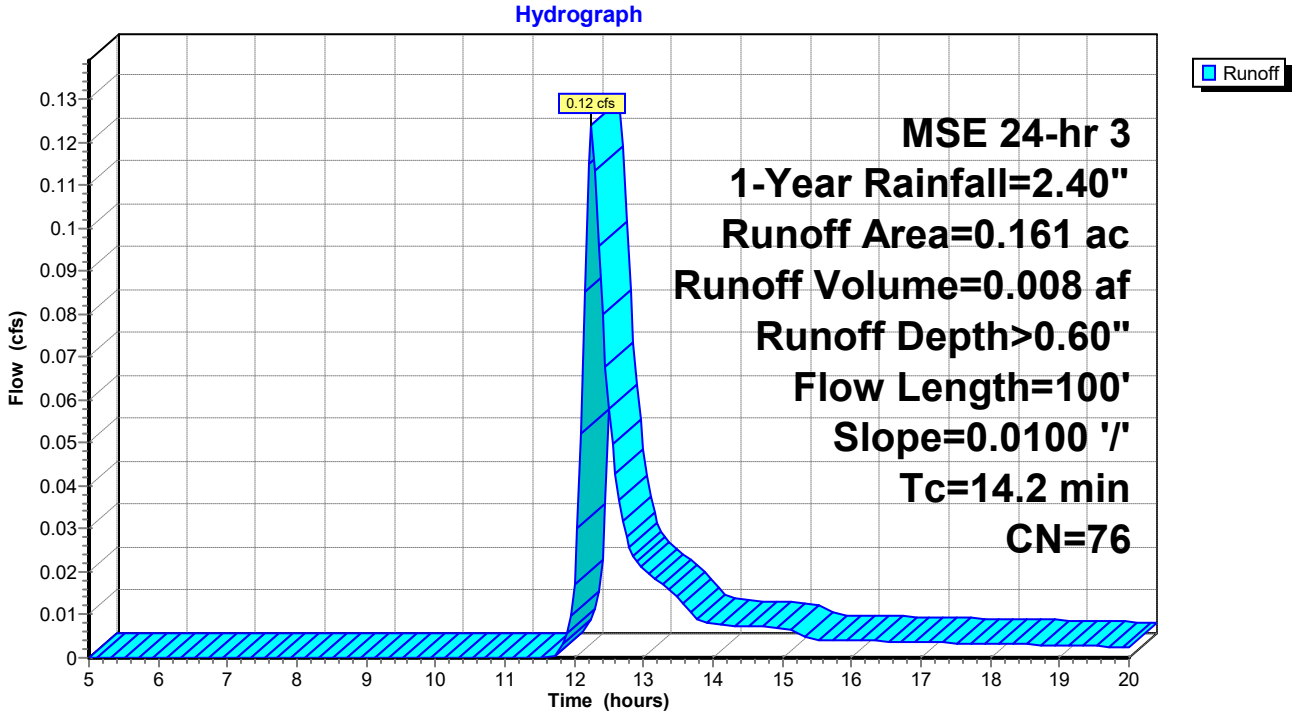
Runoff = 0.12 cfs @ 12.25 hrs, Volume= 0.008 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.063	98	Buildings
*	0.003	98	Sidewalks
	0.095	61	>75% Grass cover, Good, HSG B
	0.161	76	Weighted Average
	0.095		59.01% Pervious Area
	0.066		40.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 5S: To N Rain Garden



Summary for Subcatchment 6S: To S Swale

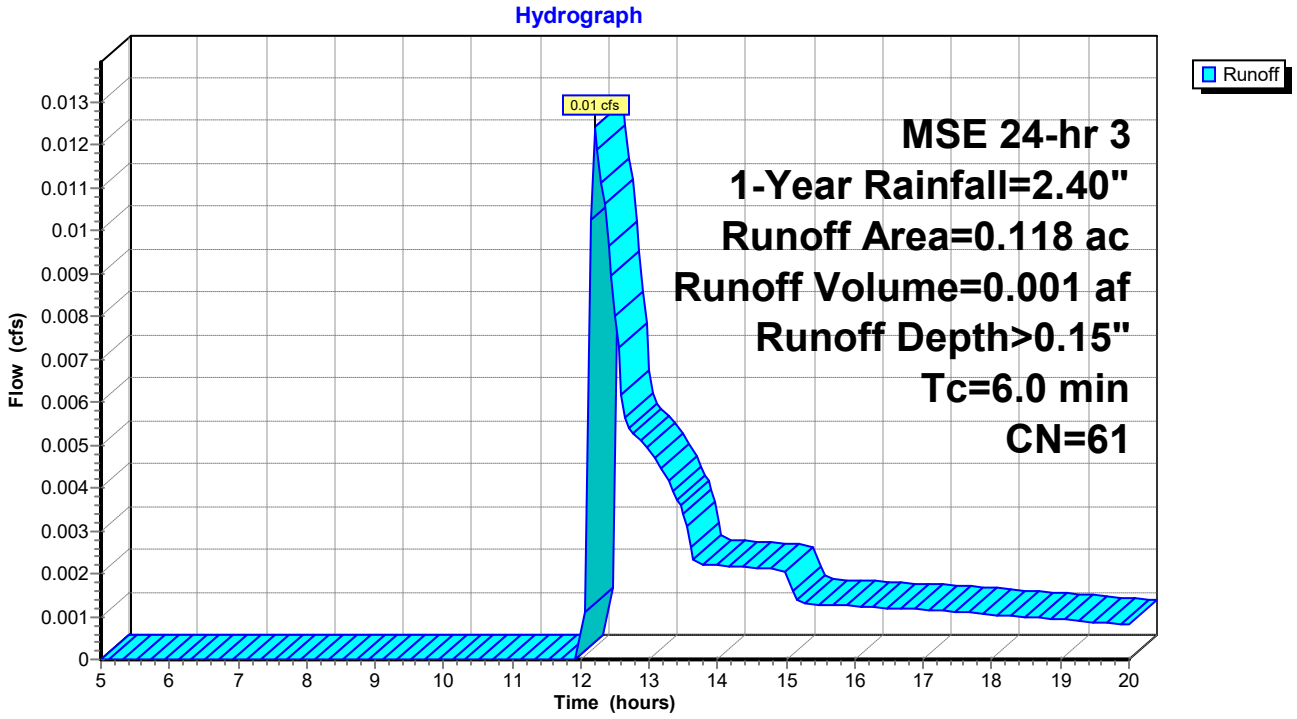
Runoff = 0.01 cfs @ 12.22 hrs, Volume= 0.001 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.118	61	>75% Grass cover, Good, HSG B
	0.118		100.00% Pervious Area

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

Subcatchment 6S: To S Swale



Summary for Subcatchment 7S: Uncontrolled

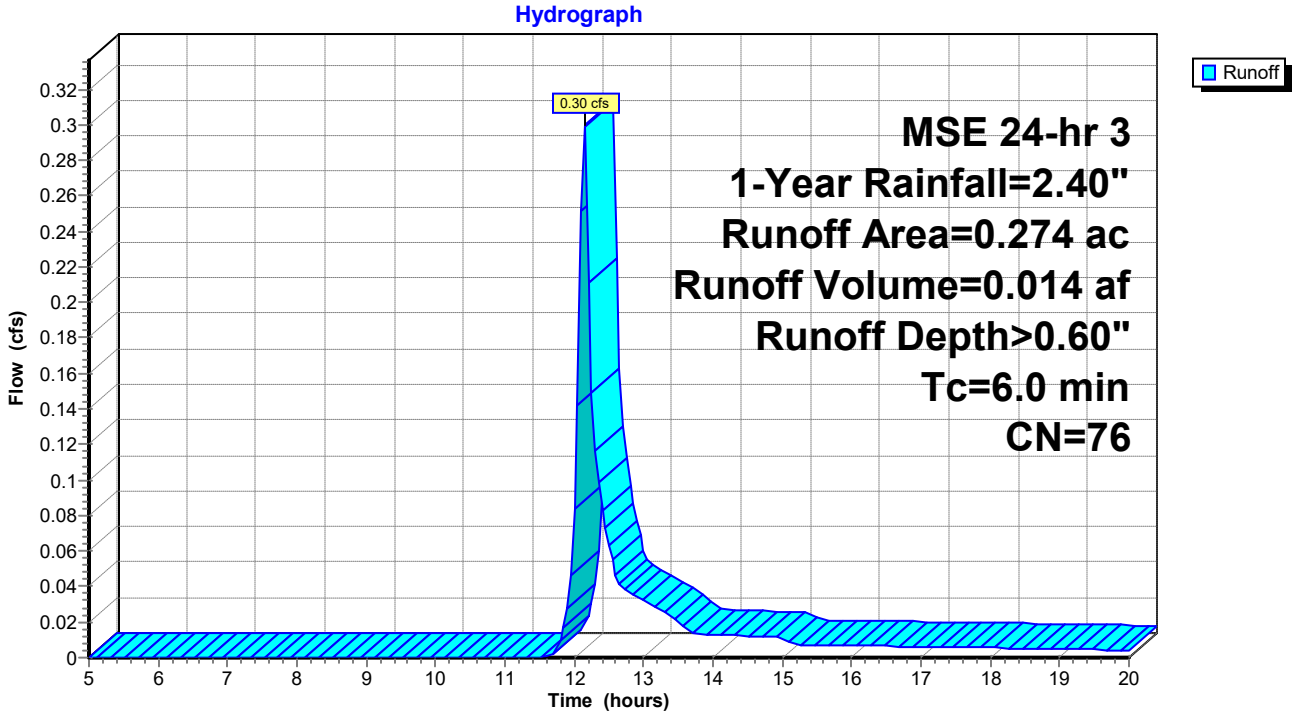
Runoff = 0.30 cfs @ 12.14 hrs, Volume= 0.014 af, Depth> 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 1-Year Rainfall=2.40"

	Area (ac)	CN	Description
*	0.005	98	Pavement
*	0.081	98	Driveways
*	0.004	98	Sidewalks
	0.033	61	>75% Grass cover, Good, HSG B
*	0.097	61	Grass B
	0.054	73	Woods/grass comb., Poor, HSG B
	0.274	76	Weighted Average
	0.184		67.15% Pervious Area
	0.090		32.85% Impervious Area

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

Subcatchment 7S: Uncontrolled



Summary for Pond 1P: Wet Pond

Inflow Area = 1.180 ac, 53.31% Impervious, Inflow Depth > 0.75" for 1-Year event
Inflow = 1.29 cfs @ 12.21 hrs, Volume= 0.074 af
Outflow = 0.05 cfs @ 15.21 hrs, Volume= 0.028 af, Atten= 96%, Lag= 180.3 min
Primary = 0.05 cfs @ 15.21 hrs, Volume= 0.028 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 861.15' @ 15.21 hrs Surf.Area= 3,877 sf Storage= 2,246 cf

Plug-Flow detention time= 238.7 min calculated for 0.028 af (38% of inflow)
Center-of-Mass det. time= 160.0 min (967.7 - 807.7)

Volume	Invert	Avail.Storage	Storage Description
#1	860.50'	18,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

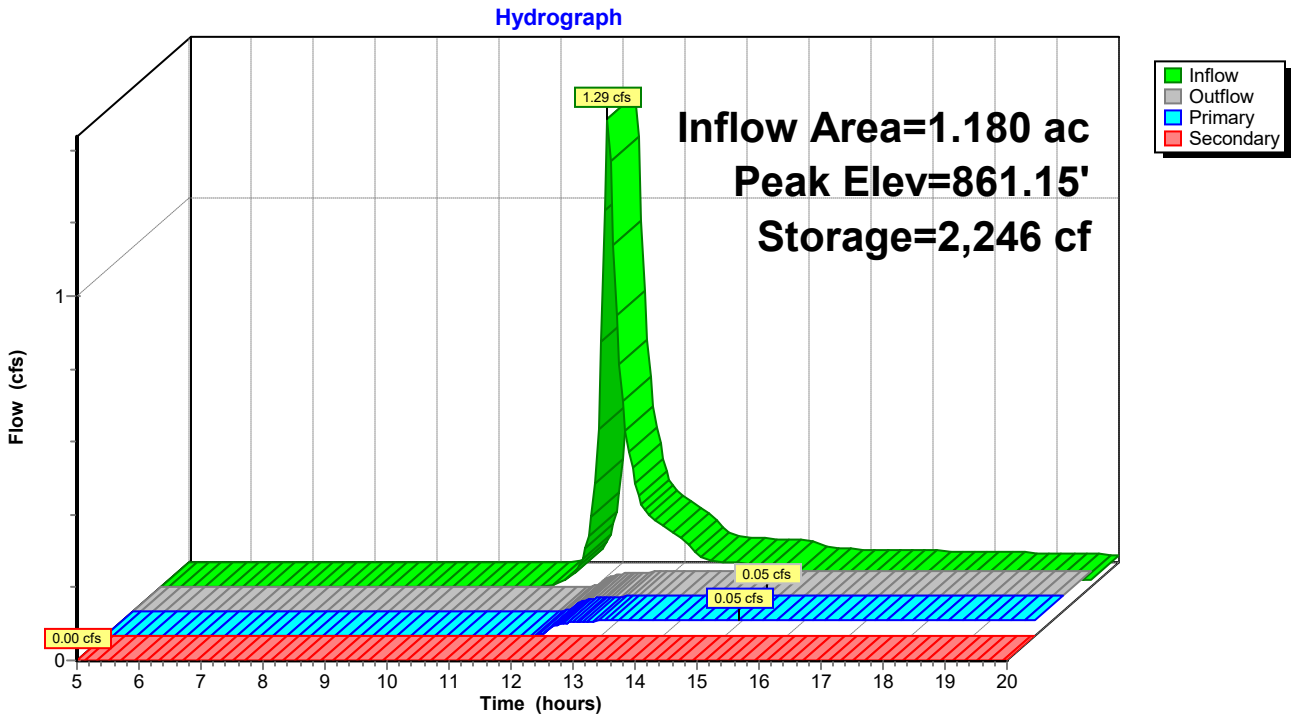
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.50	3,050	0	0
861.00	3,680	1,683	1,683
862.00	5,000	4,340	6,023
863.00	6,400	5,700	11,723
864.00	7,780	7,090	18,813

Device	Routing	Invert	Outlet Devices
#1	Primary	860.11'	**12.0" Round Culvert** L= 22.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 860.11' / 860.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	862.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	860.50'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	863.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** 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=0.05 cfs @ 15.21 hrs HW=861.15' (Free Discharge)
└**1=Culvert** (Passes 0.05 cfs of 2.12 cfs potential flow)
  └**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 3.69 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=860.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Wet Pond



Summary for Pond 2P: SW Biofilter #1

Inflow Area = 0.112 ac, 47.32% Impervious, Inflow Depth > 0.73" for 1-Year event
Inflow = 0.15 cfs @ 12.14 hrs, Volume= 0.007 af
Outflow = 0.12 cfs @ 12.21 hrs, Volume= 0.005 af, Atten= 24%, Lag= 4.4 min
Primary = 0.12 cfs @ 12.21 hrs, Volume= 0.005 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.19' @ 12.21 hrs Surf.Area= 365 sf Storage= 83 cf

Plug-Flow detention time= 79.2 min calculated for 0.005 af (79% of inflow)
Center-of-Mass det. time= 26.2 min (828.0 - 801.8)

Volume	Invert	Avail.Storage	Storage Description
#1	864.50'	120 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 365 cf Overall x 33.0% Voids
#2	865.50'	197 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 730 cf Overall x 27.0% Voids
#3	867.50'	485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.50	365	0	0
865.50	365	365	365

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.50	365	0	0
867.50	365	730	730

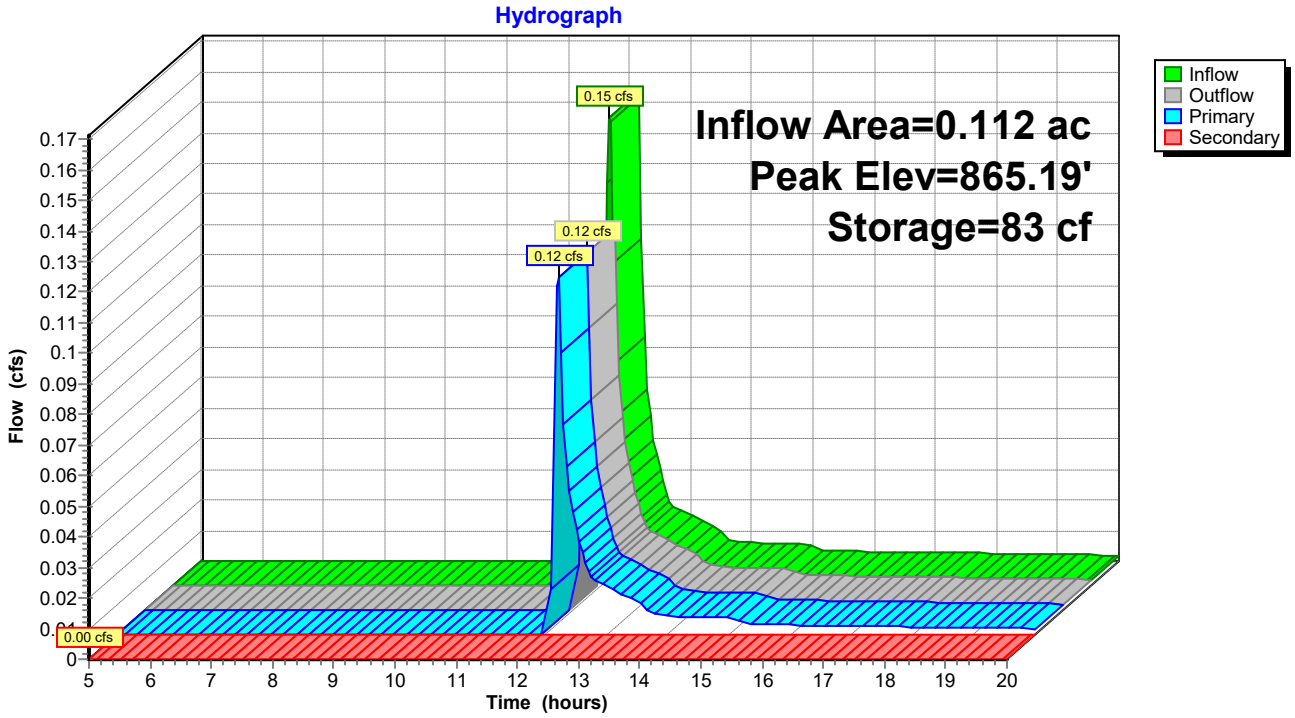
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.50	350	0	0
868.00	1,590	485	485

Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 41.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Standpipe** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.11 cfs @ 12.21 hrs HW=865.18' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 0.11 cfs potential flow)
└─**2=Drain Tile** (Tube Controls 0.11 cfs @ 0.56 fps)
└─**3=Standpipe** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SW Biofilter #1



Summary for Pond 3P: SE Biofilter #2

Inflow Area = 0.112 ac, 46.43% Impervious, Inflow Depth > 0.68" for 1-Year event
Inflow = 0.14 cfs @ 12.14 hrs, Volume= 0.006 af
Outflow = 0.02 cfs @ 12.74 hrs, Volume= 0.003 af, Atten= 88%, Lag= 35.9 min
Primary = 0.02 cfs @ 12.74 hrs, Volume= 0.003 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.07' @ 12.74 hrs Surf.Area= 880 sf Storage= 153 cf

Plug-Flow detention time= 165.0 min calculated for 0.003 af (47% of inflow)
Center-of-Mass det. time= 89.2 min (893.2 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 440 cf Overall x 33.0% Voids
#2	865.00'	238 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 880 cf Overall x 27.0% Voids
#3	867.00'	985 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		1,368 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	440	0	0
865.00	440	440	440

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.00	440	0	0
867.00	440	880	880

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	440	0	0
868.00	1,530	985	985

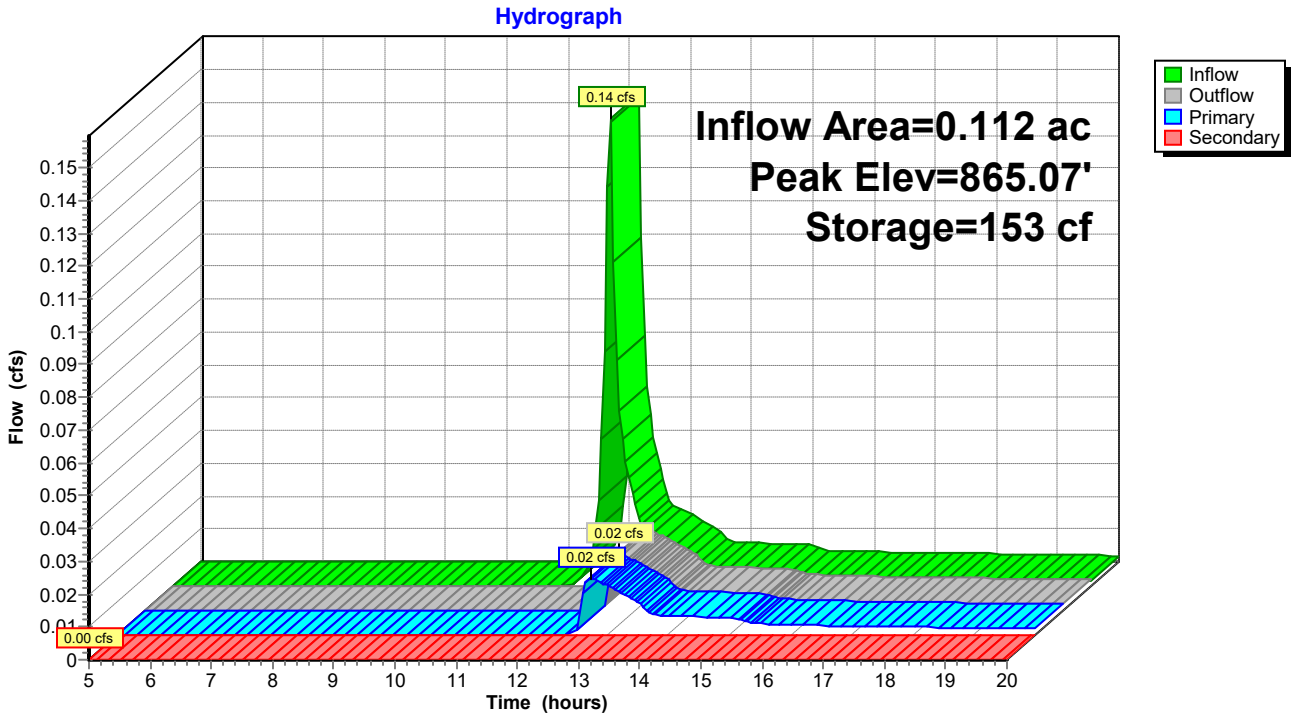
Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0097 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 45.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.02 cfs @ 12.74 hrs HW=865.07' (Free Discharge)
└─**1=Culvert** (Inlet Controls 0.02 cfs @ 0.70 fps)
└─**2=Drain Tile** (Passes 0.02 cfs of 0.02 cfs potential flow)
└─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SE Biofilter #2



Summary for Pond 5P: N Rain Garden

Inflow Area = 0.161 ac, 40.99% Impervious, Inflow Depth > 0.60" for 1-Year event
Inflow = 0.12 cfs @ 12.25 hrs, Volume= 0.008 af
Outflow = 0.02 cfs @ 13.31 hrs, Volume= 0.003 af, Atten= 86%, Lag= 63.6 min
Primary = 0.02 cfs @ 13.31 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 870.76' @ 13.31 hrs Surf.Area= 418 sf Storage= 219 cf

Plug-Flow detention time= 198.3 min calculated for 0.003 af (38% of inflow)
Center-of-Mass det. time= 117.4 min (932.4 - 815.0)

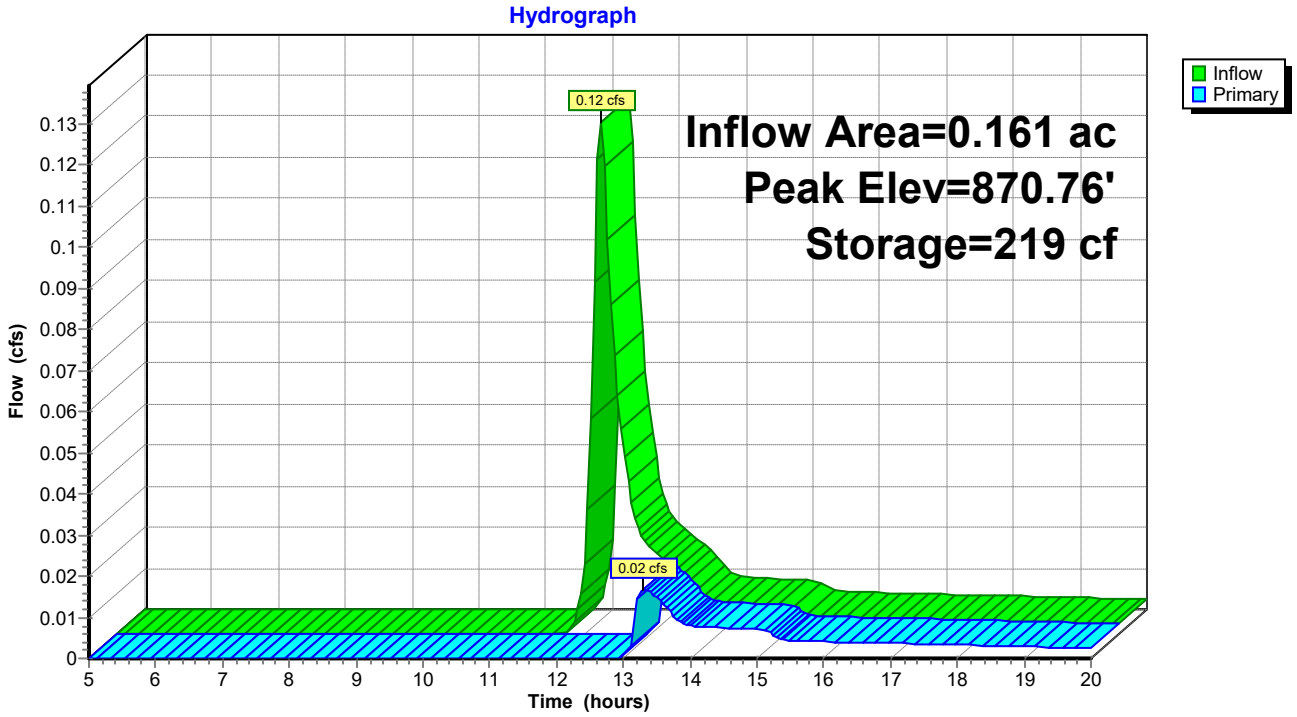
Volume	Invert	Avail.Storage	Storage Description
#1	870.00'	330 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
870.00	160	0	0
871.00	500	330	330

Device	Routing	Invert	Outlet Devices
#1	Primary	870.75'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.02 cfs @ 13.31 hrs HW=870.76' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.02 cfs @ 0.22 fps)

Pond 5P: N Rain Garden

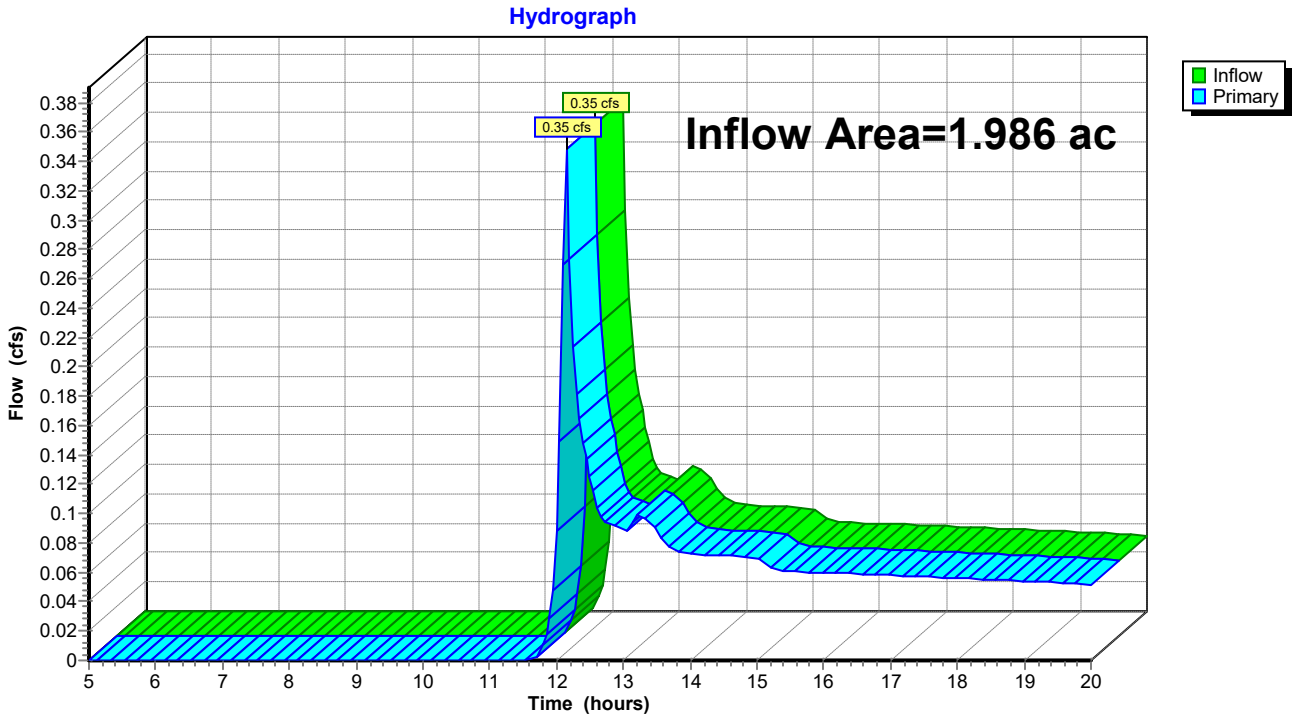


Summary for Link 6L: Site Total

Inflow Area = 1.986 ac, 39.68% Impervious, Inflow Depth > 0.30" for 1-Year event
Inflow = 0.35 cfs @ 12.15 hrs, Volume= 0.050 af
Primary = 0.35 cfs @ 12.15 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Site Total



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=0.956 ac 54.81% Impervious Runoff Depth>1.03"
Flow Length=80' Slope=0.0100 '/' Tc=11.9 min CN=81 Runoff=1.47 cfs 0.082 af

Subcatchment 2S: To SW Biofilter Runoff Area=0.112 ac 47.32% Impervious Runoff Depth>0.92"
Tc=6.0 min CN=79 Runoff=0.19 cfs 0.009 af

Subcatchment 3S: To SE Biofilter Runoff Area=0.112 ac 46.43% Impervious Runoff Depth>0.87"
Tc=6.0 min CN=78 Runoff=0.18 cfs 0.008 af

Subcatchment 4S: To Filter Strip Runoff Area=0.253 ac 1.19% Impervious Runoff Depth>0.24"
Tc=6.0 min CN=61 Runoff=0.07 cfs 0.005 af

Subcatchment 5S: To N Rain Garden Runoff Area=0.161 ac 40.99% Impervious Runoff Depth>0.77"
Flow Length=100' Slope=0.0100 '/' Tc=14.2 min CN=76 Runoff=0.16 cfs 0.010 af

Subcatchment 6S: To S Swale Runoff Area=0.118 ac 0.00% Impervious Runoff Depth>0.24"
Tc=6.0 min CN=61 Runoff=0.03 cfs 0.002 af

Subcatchment 7S: Uncontrolled Runoff Area=0.274 ac 32.85% Impervious Runoff Depth>0.77"
Tc=6.0 min CN=76 Runoff=0.39 cfs 0.018 af

Pond 1P: Wet Pond Peak Elev=861.32' Storage=2,946 cf Inflow=1.63 cfs 0.094 af
Primary=0.05 cfs 0.033 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.033 af

Pond 2P: SW Biofilter #1 Peak Elev=865.24' Storage=89 cf Inflow=0.19 cfs 0.009 af
Primary=0.17 cfs 0.007 af Secondary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.007 af

Pond 3P: SE Biofilter #2 Peak Elev=865.12' Storage=160 cf Inflow=0.18 cfs 0.008 af
Primary=0.05 cfs 0.005 af Secondary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.005 af

Pond 5P: N Rain Garden Peak Elev=870.77' Storage=223 cf Inflow=0.16 cfs 0.010 af
Outflow=0.05 cfs 0.005 af

Link 6L: Site Total Inflow=0.51 cfs 0.063 af
Primary=0.51 cfs 0.063 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.134 af Average Runoff Depth = 0.81"
60.32% Pervious = 1.198 ac 39.68% Impervious = 0.788 ac

Summary for Subcatchment 1S: To Pond

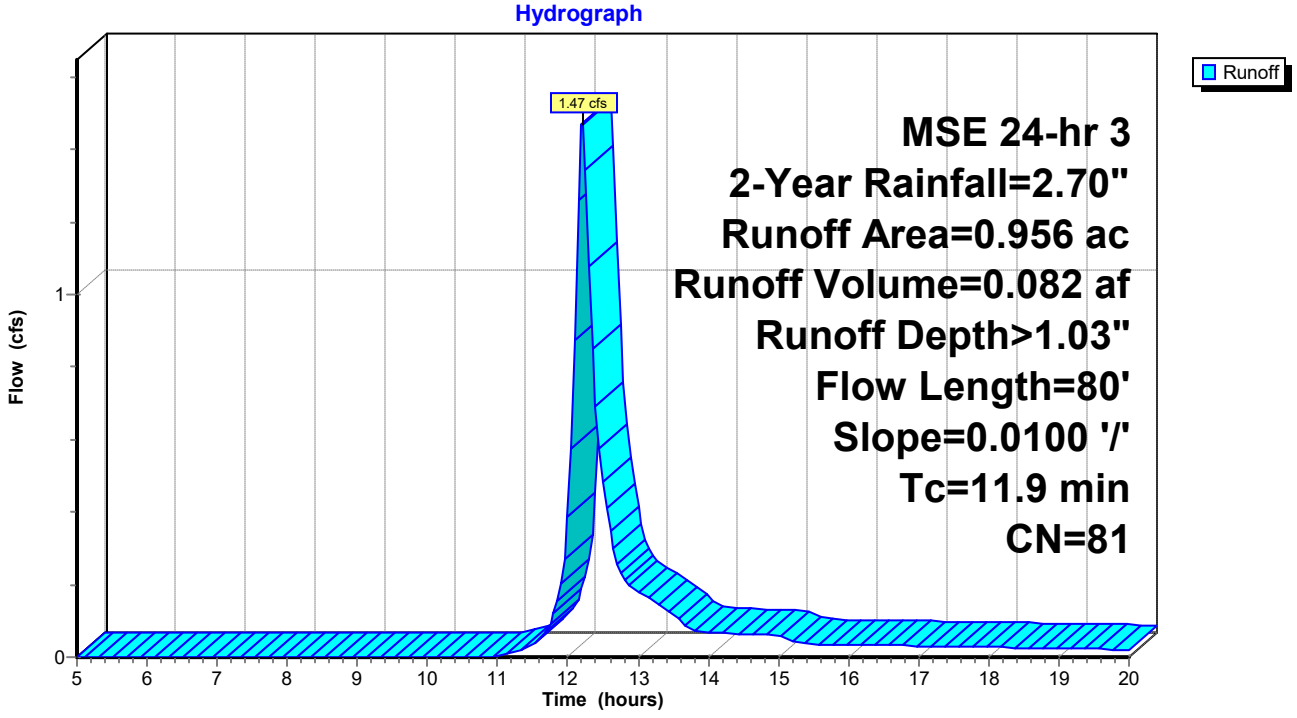
Runoff = 1.47 cfs @ 12.21 hrs, Volume= 0.082 af, Depth> 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.208	98	Buildings
*	0.207	98	Pavement
*	0.050	98	Driveways
*	0.011	98	Sidewalks
	0.432	61	>75% Grass cover, Good, HSG B
*	0.048	98	Wet Pond
	0.956	81	Weighted Average
	0.432		45.19% Pervious Area
	0.524		54.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	80	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To SW Biofilter

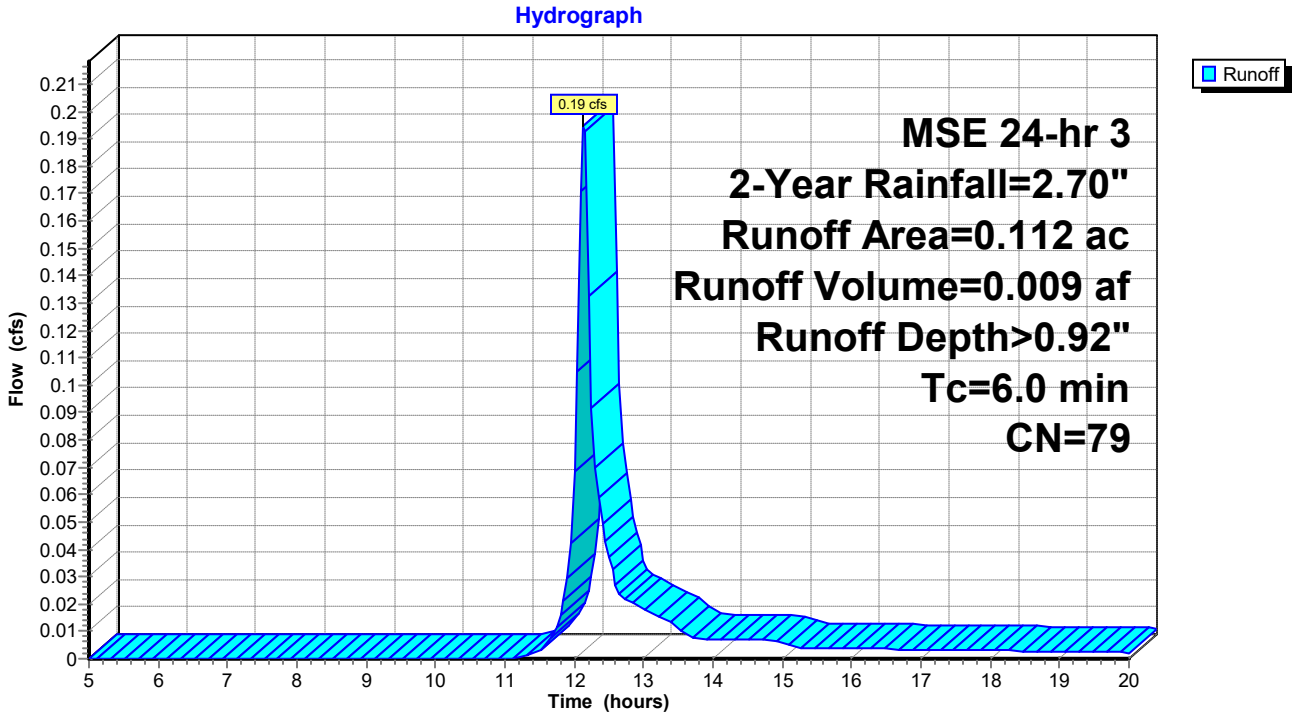
Runoff = 0.19 cfs @ 12.14 hrs, Volume= 0.009 af, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.053	98	Buildings
	0.059	61	>75% Grass cover, Good, HSG B
	0.112	79	Weighted Average
	0.059		52.68% Pervious Area
	0.053		47.32% Impervious Area

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

Subcatchment 2S: To SW Biofilter



Summary for Subcatchment 3S: To SE Biofilter

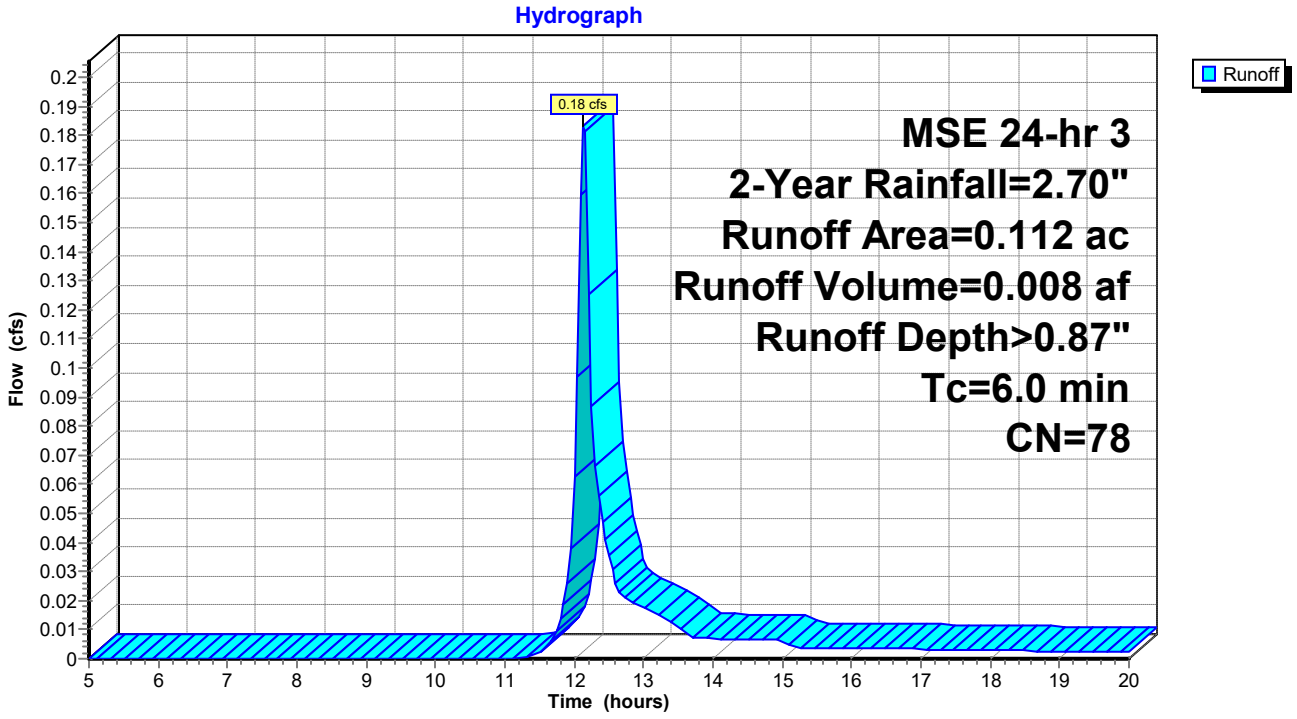
Runoff = 0.18 cfs @ 12.14 hrs, Volume= 0.008 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.052	98	Buildings
	0.060	61	>75% Grass cover, Good, HSG B
	0.112	78	Weighted Average
	0.060		53.57% Pervious Area
	0.052		46.43% Impervious Area

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

Subcatchment 3S: To SE Biofilter



Summary for Subcatchment 4S: To Filter Strip

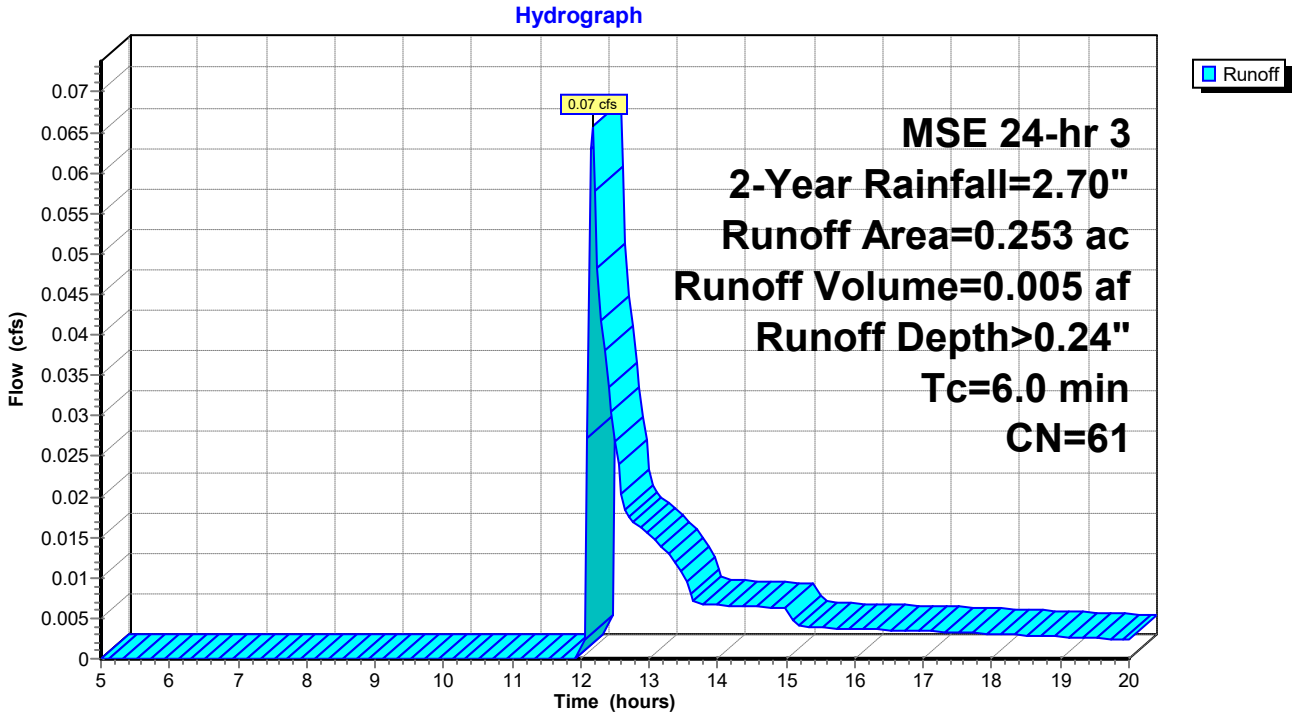
Runoff = 0.07 cfs @ 12.17 hrs, Volume= 0.005 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
	0.250	61	>75% Grass cover, Good, HSG B
*	0.003	98	Sidewalks
	0.253	61	Weighted Average
	0.250		98.81% Pervious Area
	0.003		1.19% Impervious Area

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

Subcatchment 4S: To Filter Strip



Summary for Subcatchment 5S: To N Rain Garden

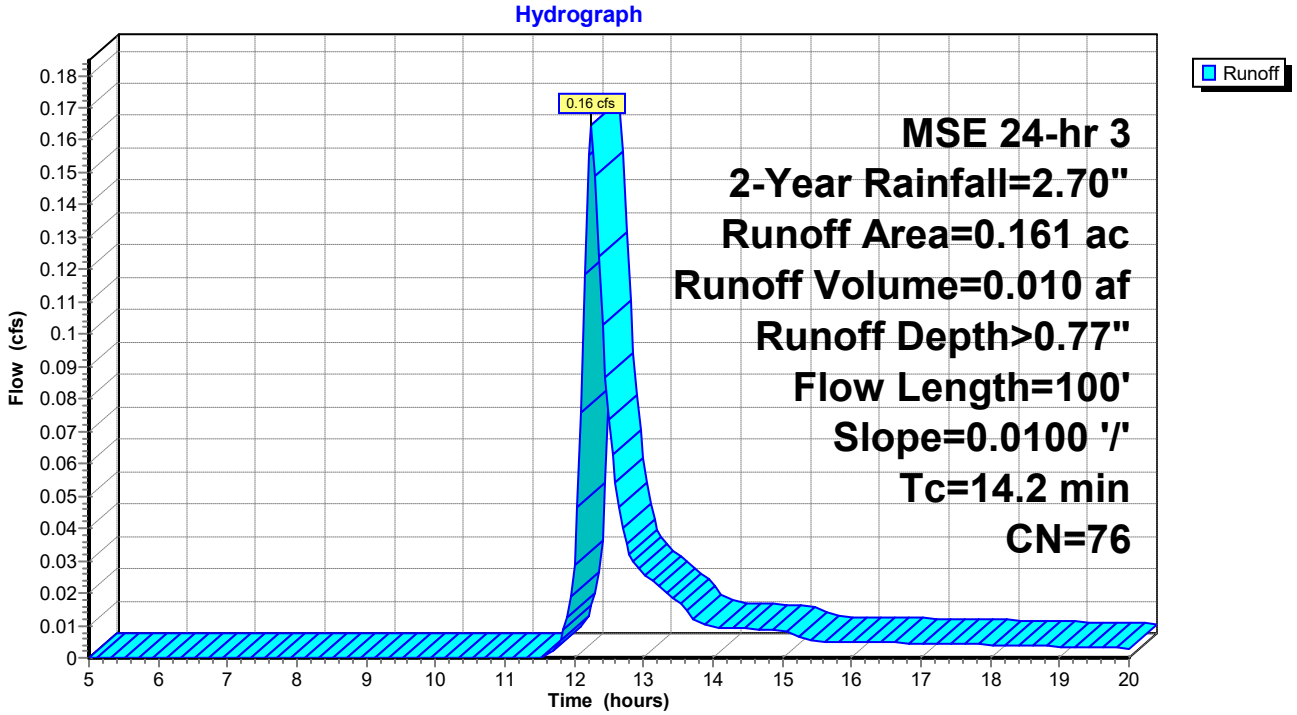
Runoff = 0.16 cfs @ 12.24 hrs, Volume= 0.010 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.063	98	Buildings
*	0.003	98	Sidewalks
	0.095	61	>75% Grass cover, Good, HSG B
	0.161	76	Weighted Average
	0.095		59.01% Pervious Area
	0.066		40.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 5S: To N Rain Garden



Summary for Subcatchment 6S: To S Swale

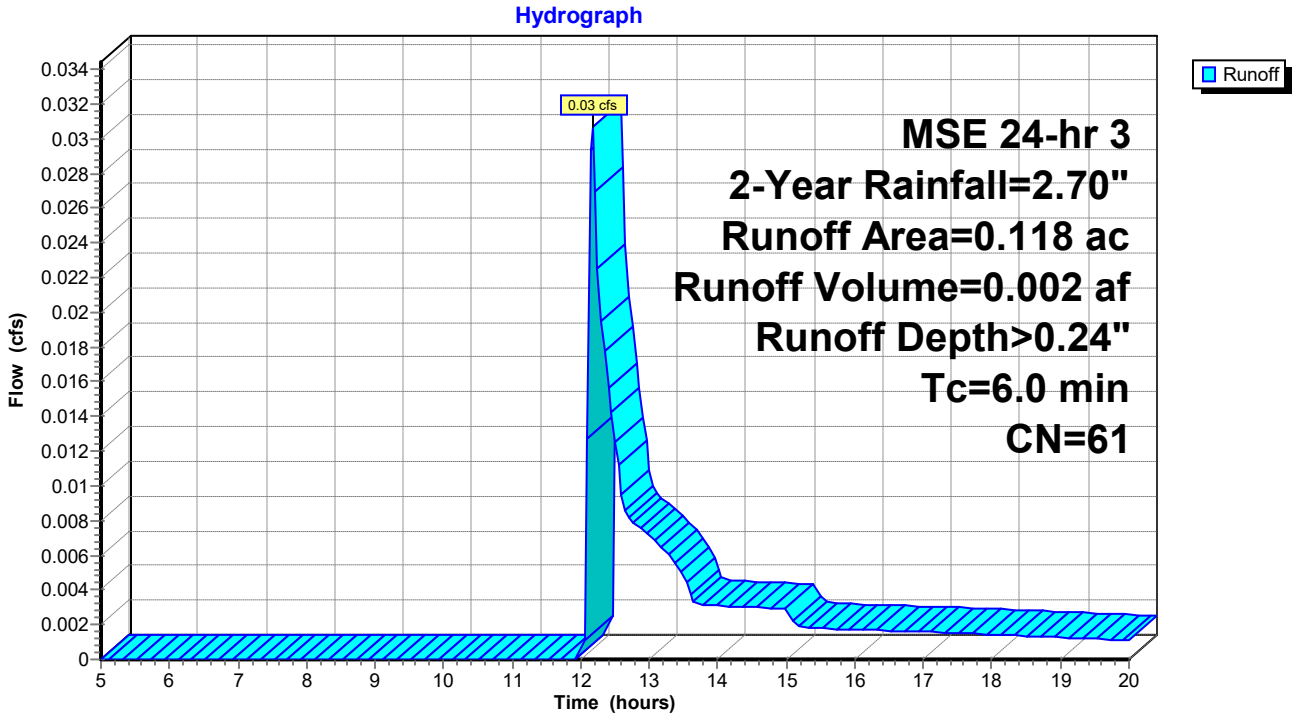
Runoff = 0.03 cfs @ 12.17 hrs, Volume= 0.002 af, Depth> 0.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.118	61	>75% Grass cover, Good, HSG B
	0.118		100.00% Pervious Area

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

Subcatchment 6S: To S Swale



Summary for Subcatchment 7S: Uncontrolled

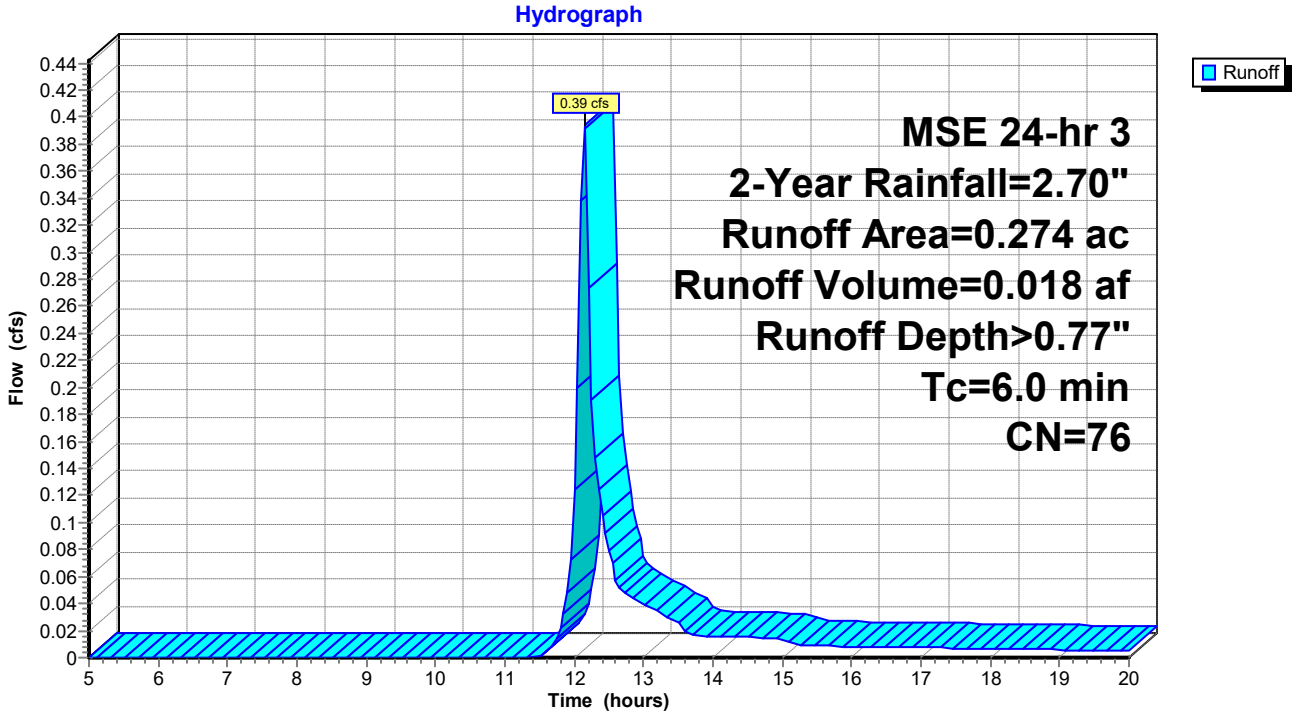
Runoff = 0.39 cfs @ 12.14 hrs, Volume= 0.018 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2-Year Rainfall=2.70"

	Area (ac)	CN	Description
*	0.005	98	Pavement
*	0.081	98	Driveways
*	0.004	98	Sidewalks
	0.033	61	>75% Grass cover, Good, HSG B
*	0.097	61	Grass B
	0.054	73	Woods/grass comb., Poor, HSG B
	0.274	76	Weighted Average
	0.184		67.15% Pervious Area
	0.090		32.85% Impervious Area

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

Subcatchment 7S: Uncontrolled



Summary for Pond 1P: Wet Pond

Inflow Area = 1.180 ac, 53.31% Impervious, Inflow Depth > 0.96" for 2-Year event
Inflow = 1.63 cfs @ 12.20 hrs, Volume= 0.094 af
Outflow = 0.05 cfs @ 15.24 hrs, Volume= 0.033 af, Atten= 97%, Lag= 182.4 min
Primary = 0.05 cfs @ 15.24 hrs, Volume= 0.033 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 861.32' @ 15.24 hrs Surf.Area= 4,108 sf Storage= 2,946 cf

Plug-Flow detention time= 240.8 min calculated for 0.033 af (35% of inflow)
Center-of-Mass det. time= 164.1 min (967.0 - 802.9)

Volume	Invert	Avail.Storage	Storage Description
#1	860.50'	18,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

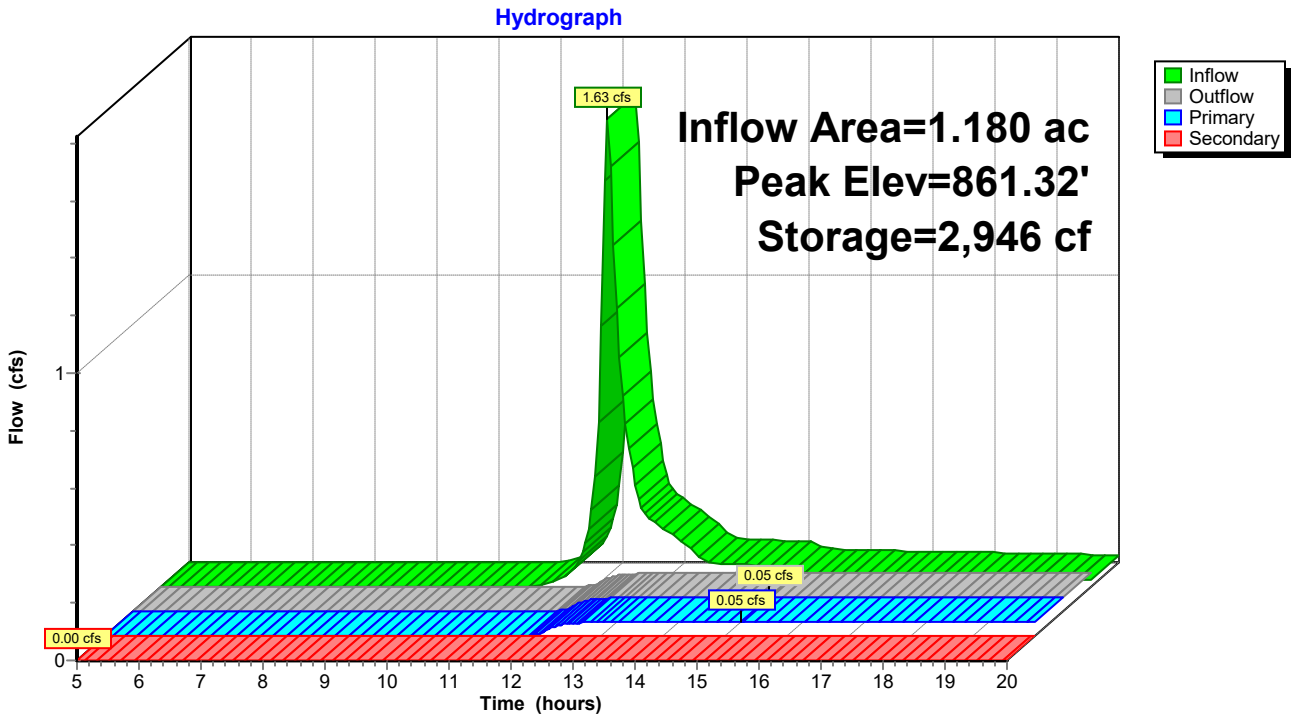
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.50	3,050	0	0
861.00	3,680	1,683	1,683
862.00	5,000	4,340	6,023
863.00	6,400	5,700	11,723
864.00	7,780	7,090	18,813

Device	Routing	Invert	Outlet Devices
#1	Primary	860.11'	**12.0" Round Culvert** L= 22.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 860.11' / 860.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	862.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	860.50'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	863.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** 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=0.05 cfs @ 15.24 hrs HW=861.32' (Free Discharge)
└**1=Culvert** (Passes 0.05 cfs of 2.52 cfs potential flow)
  └**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.05 cfs @ 4.20 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=860.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Wet Pond



Summary for Pond 2P: SW Biofilter #1

Inflow Area = 0.112 ac, 47.32% Impervious, Inflow Depth > 0.92" for 2-Year event
Inflow = 0.19 cfs @ 12.14 hrs, Volume= 0.009 af
Outflow = 0.17 cfs @ 12.18 hrs, Volume= 0.007 af, Atten= 15%, Lag= 2.5 min
Primary = 0.17 cfs @ 12.18 hrs, Volume= 0.007 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.24' @ 12.18 hrs Surf.Area= 365 sf Storage= 89 cf

Plug-Flow detention time= 65.7 min calculated for 0.007 af (83% of inflow)
Center-of-Mass det. time= 20.0 min (817.8 - 797.7)

Volume	Invert	Avail.Storage	Storage Description
#1	864.50'	120 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 365 cf Overall x 33.0% Voids
#2	865.50'	197 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 730 cf Overall x 27.0% Voids
#3	867.50'	485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.50	365	0	0
865.50	365	365	365

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.50	365	0	0
867.50	365	730	730

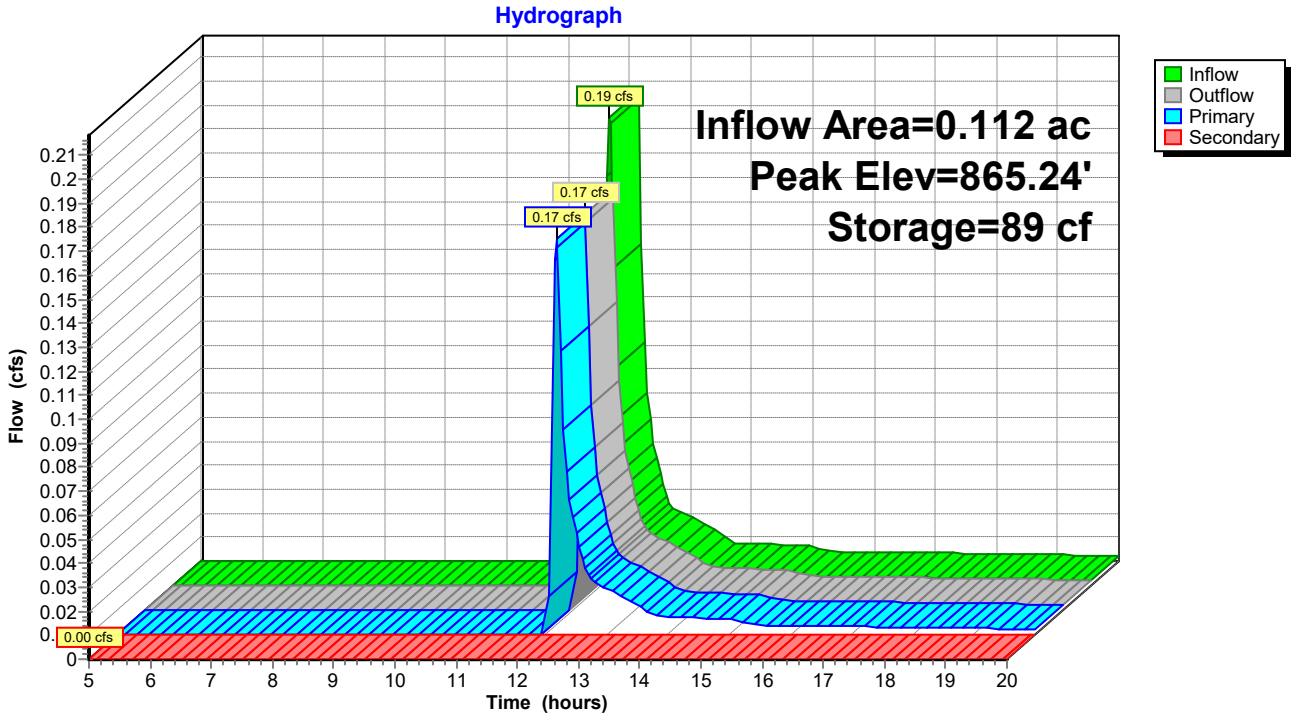
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.50	350	0	0
868.00	1,590	485	485

Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 41.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Standpipe** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.16 cfs @ 12.18 hrs HW=865.23' (Free Discharge)
└─**1=Culvert** (Passes 0.16 cfs of 0.18 cfs potential flow)
└─**2=Drain Tile** (Tube Controls 0.16 cfs @ 0.81 fps)
└─**3=Standpipe** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SW Biofilter #1



Summary for Pond 3P: SE Biofilter #2

Inflow Area = 0.112 ac, 46.43% Impervious, Inflow Depth > 0.87" for 2-Year event
Inflow = 0.18 cfs @ 12.14 hrs, Volume= 0.008 af
Outflow = 0.05 cfs @ 12.38 hrs, Volume= 0.005 af, Atten= 72%, Lag= 14.7 min
Primary = 0.05 cfs @ 12.38 hrs, Volume= 0.005 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.12' @ 12.38 hrs Surf.Area= 880 sf Storage= 160 cf

Plug-Flow detention time= 126.6 min calculated for 0.005 af (58% of inflow)
Center-of-Mass det. time= 58.6 min (858.3 - 799.7)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 440 cf Overall x 33.0% Voids
#2	865.00'	238 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 880 cf Overall x 27.0% Voids
#3	867.00'	985 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		1,368 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	440	0	0
865.00	440	440	440

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.00	440	0	0
867.00	440	880	880

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	440	0	0
868.00	1,530	985	985

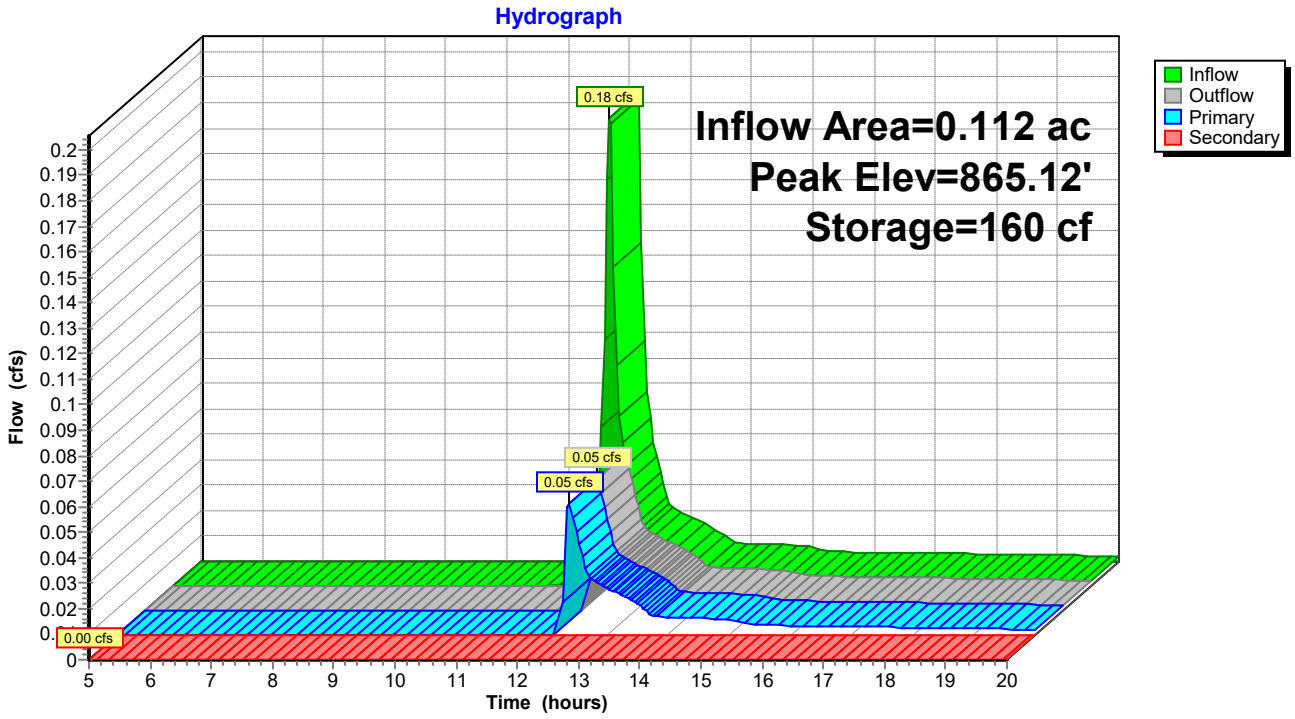
Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0097 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 45.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.05 cfs @ 12.38 hrs HW=865.12' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.05 cfs @ 0.94 fps)
└**2=Drain Tile** (Passes 0.05 cfs of 0.06 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SE Biofilter #2



Summary for Pond 5P: N Rain Garden

Inflow Area = 0.161 ac, 40.99% Impervious, Inflow Depth > 0.77" for 2-Year event
Inflow = 0.16 cfs @ 12.24 hrs, Volume= 0.010 af
Outflow = 0.05 cfs @ 12.65 hrs, Volume= 0.005 af, Atten= 70%, Lag= 24.2 min
Primary = 0.05 cfs @ 12.65 hrs, Volume= 0.005 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 870.77' @ 12.65 hrs Surf.Area= 421 sf Storage= 223 cf

Plug-Flow detention time= 144.4 min calculated for 0.005 af (52% of inflow)
Center-of-Mass det. time= 71.2 min (881.5 - 810.3)

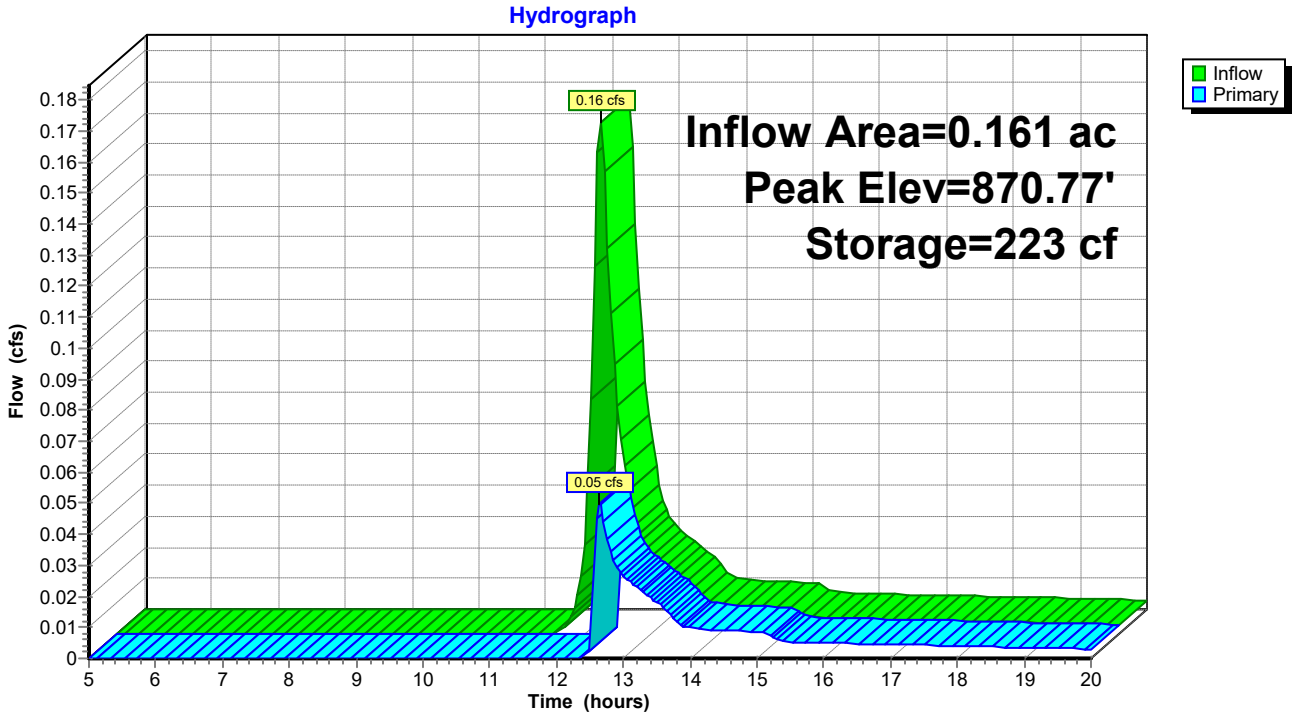
Volume	Invert	Avail.Storage	Storage Description
#1	870.00'	330 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
870.00	160	0	0
871.00	500	330	330

Device	Routing	Invert	Outlet Devices
#1	Primary	870.75'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.05 cfs @ 12.65 hrs HW=870.77' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.05 cfs @ 0.33 fps)

Pond 5P: N Rain Garden

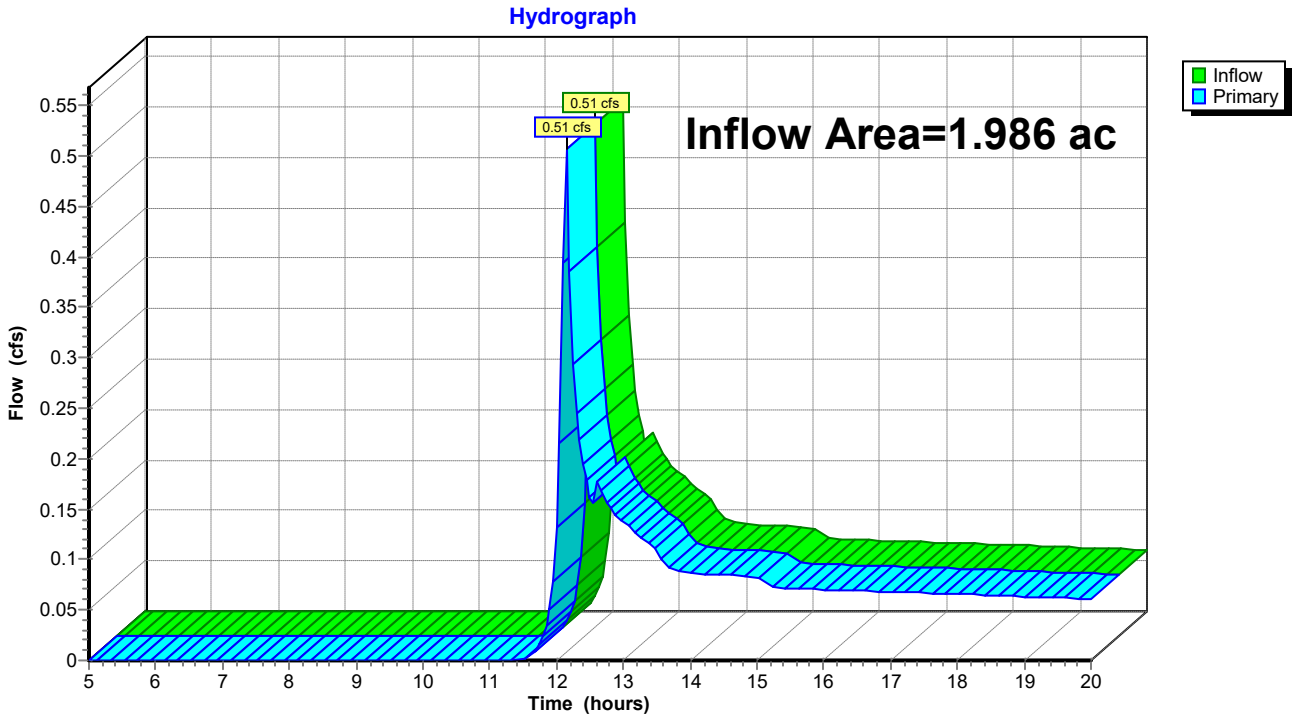


Summary for Link 6L: Site Total

Inflow Area = 1.986 ac, 39.68% Impervious, Inflow Depth > 0.38" for 2-Year event
Inflow = 0.51 cfs @ 12.15 hrs, Volume= 0.063 af
Primary = 0.51 cfs @ 12.15 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Site Total



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=0.956 ac 54.81% Impervious Runoff Depth>1.88"
Flow Length=80' Slope=0.0100 '/' Tc=11.9 min CN=81 Runoff=2.68 cfs 0.149 af

Subcatchment 2S: To SW Biofilter Runoff Area=0.112 ac 47.32% Impervious Runoff Depth>1.73"
Tc=6.0 min CN=79 Runoff=0.36 cfs 0.016 af

Subcatchment 3S: To SE Biofilter Runoff Area=0.112 ac 46.43% Impervious Runoff Depth>1.66"
Tc=6.0 min CN=78 Runoff=0.35 cfs 0.015 af

Subcatchment 4S: To Filter Strip Runoff Area=0.253 ac 1.19% Impervious Runoff Depth>0.67"
Tc=6.0 min CN=61 Runoff=0.29 cfs 0.014 af

Subcatchment 5S: To N Rain Garden Runoff Area=0.161 ac 40.99% Impervious Runoff Depth>1.51"
Flow Length=100' Slope=0.0100 '/' Tc=14.2 min CN=76 Runoff=0.33 cfs 0.020 af

Subcatchment 6S: To S Swale Runoff Area=0.118 ac 0.00% Impervious Runoff Depth>0.67"
Tc=6.0 min CN=61 Runoff=0.13 cfs 0.007 af

Subcatchment 7S: Uncontrolled Runoff Area=0.274 ac 32.85% Impervious Runoff Depth>1.52"
Tc=6.0 min CN=76 Runoff=0.78 cfs 0.035 af

Pond 1P: Wet Pond Peak Elev=861.98' Storage=5,914 cf Inflow=3.27 cfs 0.176 af
Primary=0.07 cfs 0.046 af Secondary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.046 af

Pond 2P: SW Biofilter #1 Peak Elev=865.38' Storage=106 cf Inflow=0.36 cfs 0.016 af
Primary=0.34 cfs 0.015 af Secondary=0.00 cfs 0.000 af Outflow=0.34 cfs 0.015 af

Pond 3P: SE Biofilter #2 Peak Elev=865.38' Storage=190 cf Inflow=0.35 cfs 0.015 af
Primary=0.33 cfs 0.012 af Secondary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.012 af

Pond 5P: N Rain Garden Peak Elev=870.82' Storage=244 cf Inflow=0.33 cfs 0.020 af
Outflow=0.33 cfs 0.015 af

Link 6L: Site Total Inflow=1.24 cfs 0.116 af
Primary=1.24 cfs 0.116 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.257 af Average Runoff Depth = 1.55"
60.32% Pervious = 1.198 ac 39.68% Impervious = 0.788 ac

Summary for Subcatchment 1S: To Pond

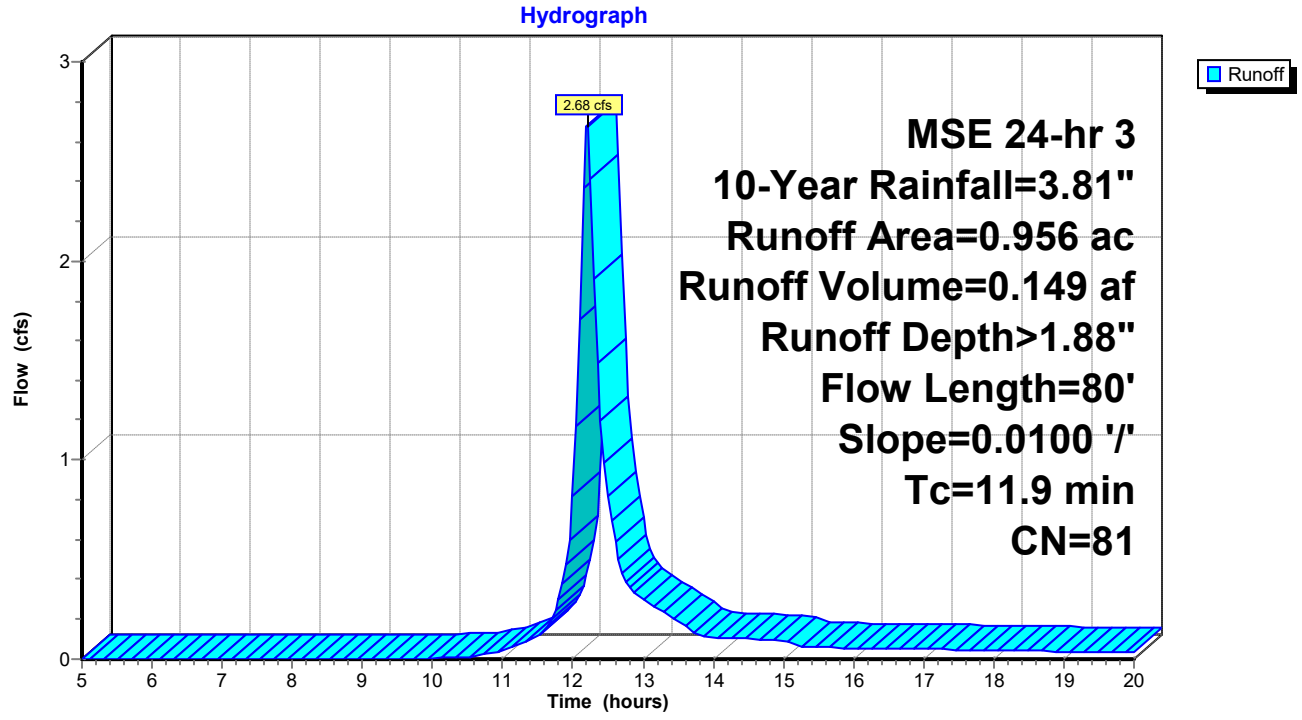
Runoff = 2.68 cfs @ 12.20 hrs, Volume= 0.149 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.208	98	Buildings
*	0.207	98	Pavement
*	0.050	98	Driveways
*	0.011	98	Sidewalks
	0.432	61	>75% Grass cover, Good, HSG B
*	0.048	98	Wet Pond
	0.956	81	Weighted Average
	0.432		45.19% Pervious Area
	0.524		54.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	80	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To SW Biofilter

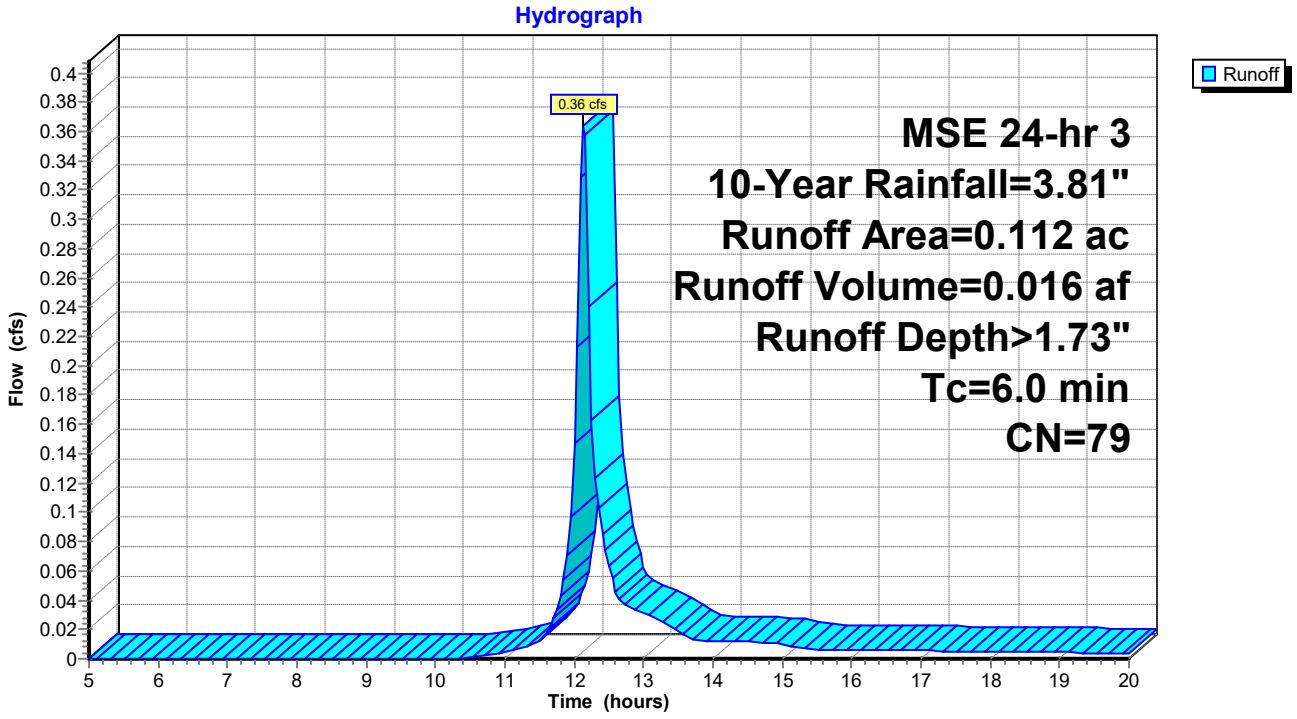
Runoff = 0.36 cfs @ 12.13 hrs, Volume= 0.016 af, Depth> 1.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.053	98	Buildings
	0.059	61	>75% Grass cover, Good, HSG B
	0.112	79	Weighted Average
	0.059		52.68% Pervious Area
	0.053		47.32% Impervious Area

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

Subcatchment 2S: To SW Biofilter



Summary for Subcatchment 3S: To SE Biofilter

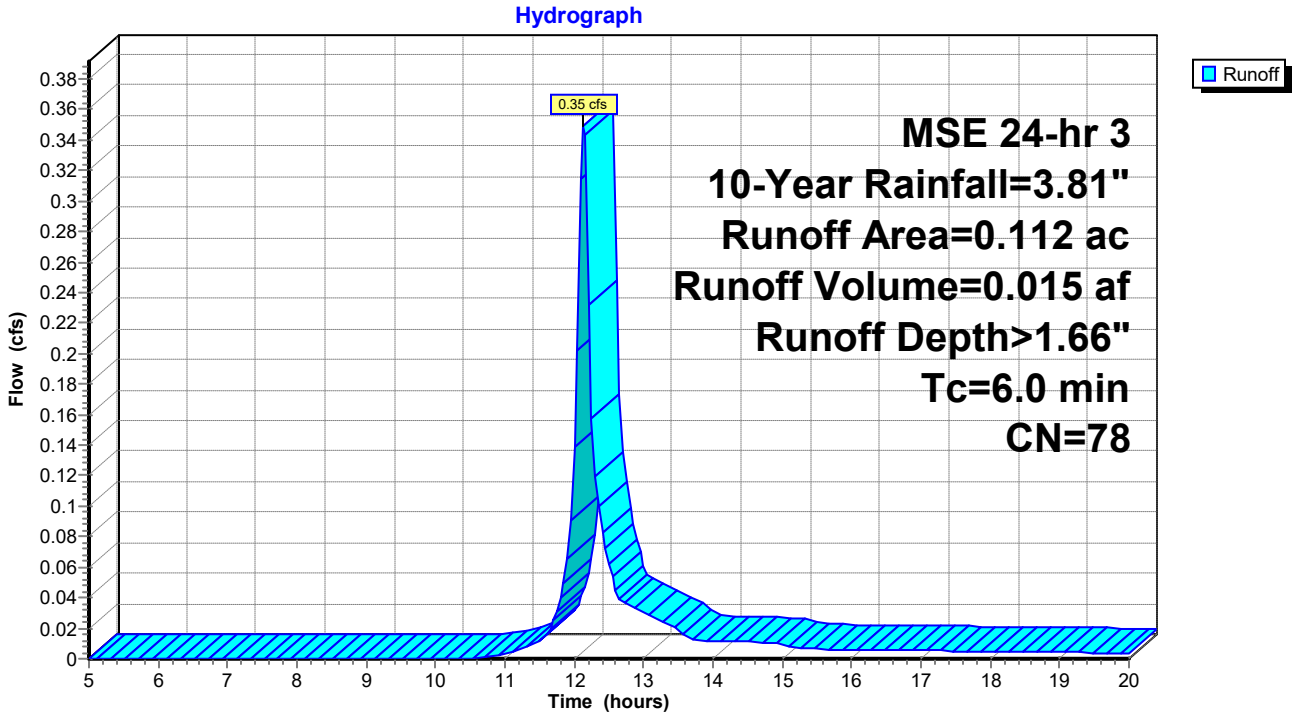
Runoff = 0.35 cfs @ 12.14 hrs, Volume= 0.015 af, Depth> 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.052	98	Buildings
	0.060	61	>75% Grass cover, Good, HSG B
	0.112	78	Weighted Average
	0.060		53.57% Pervious Area
	0.052		46.43% Impervious Area

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

Subcatchment 3S: To SE Biofilter



Summary for Subcatchment 4S: To Filter Strip

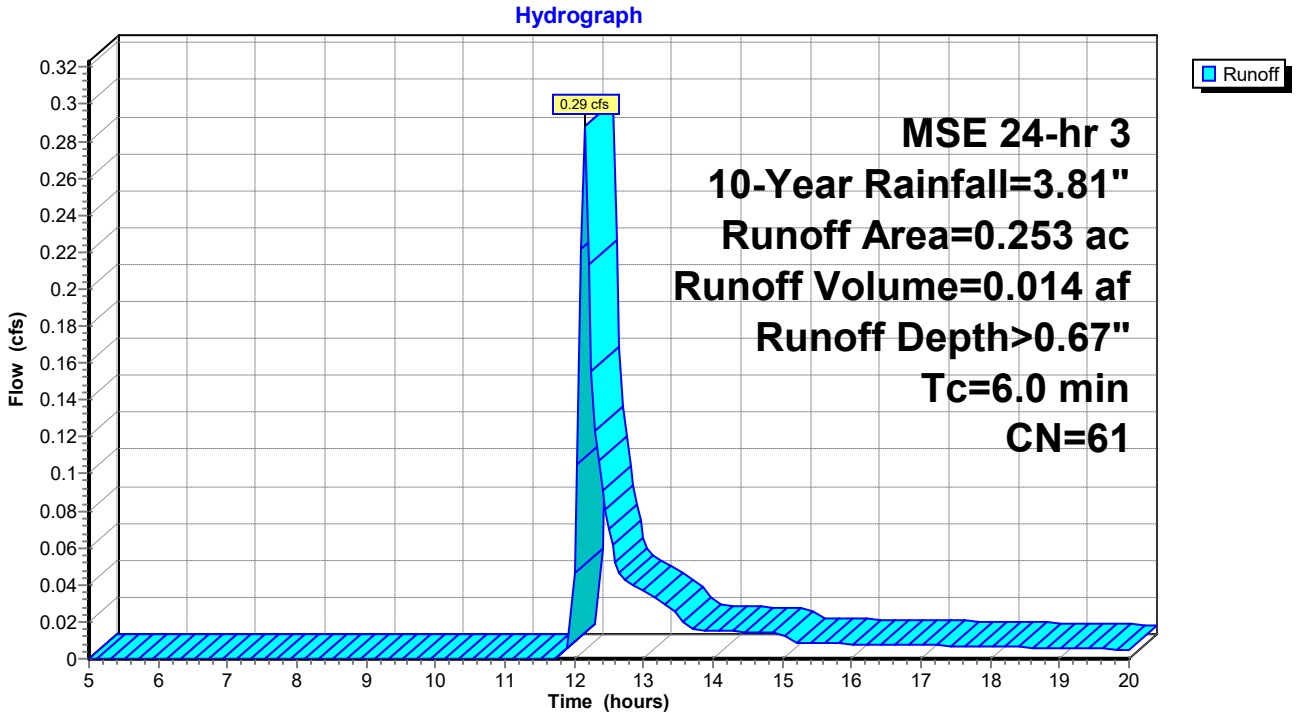
Runoff = 0.29 cfs @ 12.15 hrs, Volume= 0.014 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
	0.250	61	>75% Grass cover, Good, HSG B
*	0.003	98	Sidewalks
	0.253	61	Weighted Average
	0.250		98.81% Pervious Area
	0.003		1.19% Impervious Area

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

Subcatchment 4S: To Filter Strip



Summary for Subcatchment 5S: To N Rain Garden

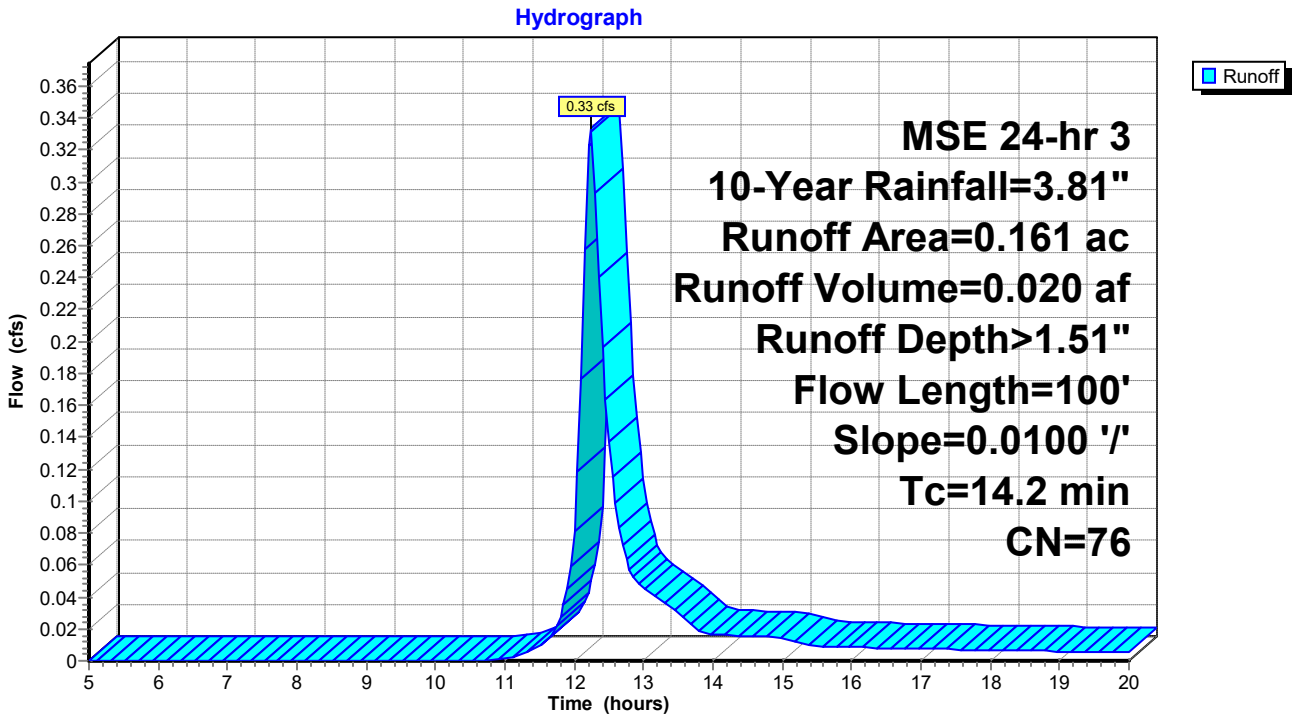
Runoff = 0.33 cfs @ 12.23 hrs, Volume= 0.020 af, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.063	98	Buildings
*	0.003	98	Sidewalks
	0.095	61	>75% Grass cover, Good, HSG B
	0.161	76	Weighted Average
	0.095		59.01% Pervious Area
	0.066		40.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 5S: To N Rain Garden



Summary for Subcatchment 6S: To S Swale

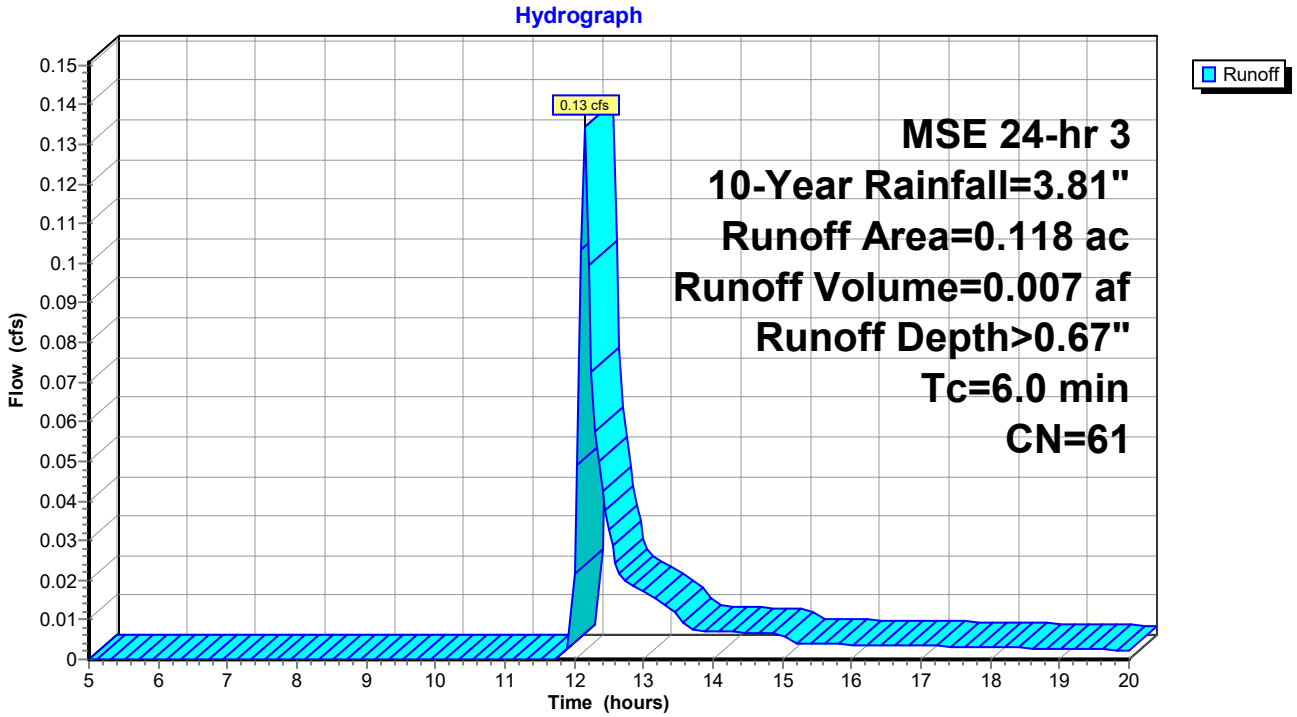
Runoff = 0.13 cfs @ 12.15 hrs, Volume= 0.007 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.118	61	>75% Grass cover, Good, HSG B
	0.118		100.00% Pervious Area

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

Subcatchment 6S: To S Swale



Summary for Subcatchment 7S: Uncontrolled

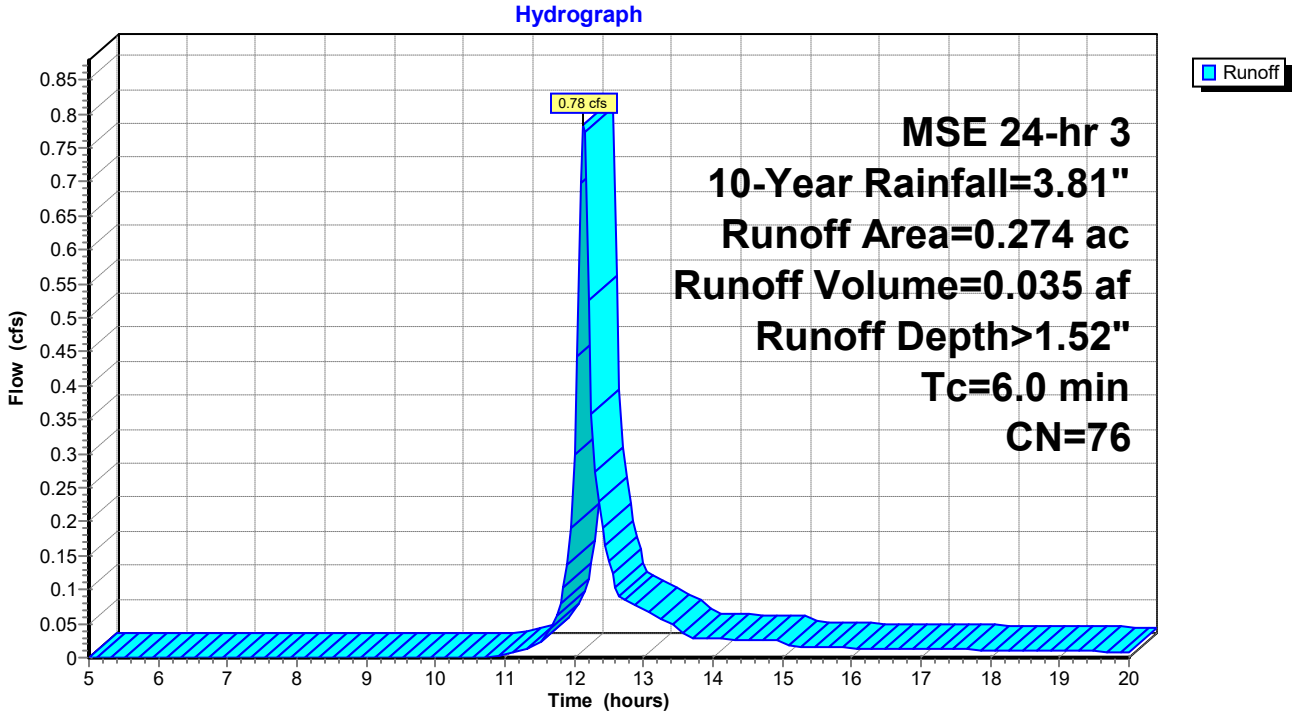
Runoff = 0.78 cfs @ 12.14 hrs, Volume= 0.035 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Year Rainfall=3.81"

	Area (ac)	CN	Description
*	0.005	98	Pavement
*	0.081	98	Driveways
*	0.004	98	Sidewalks
	0.033	61	>75% Grass cover, Good, HSG B
*	0.097	61	Grass B
	0.054	73	Woods/grass comb., Poor, HSG B
	0.274	76	Weighted Average
	0.184		67.15% Pervious Area
	0.090		32.85% Impervious Area

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

Subcatchment 7S: Uncontrolled



Summary for Pond 1P: Wet Pond

Inflow Area = 1.180 ac, 53.31% Impervious, Inflow Depth > 1.79" for 10-Year event
Inflow = 3.27 cfs @ 12.19 hrs, Volume= 0.176 af
Outflow = 0.07 cfs @ 15.65 hrs, Volume= 0.046 af, Atten= 98%, Lag= 207.3 min
Primary = 0.07 cfs @ 15.65 hrs, Volume= 0.046 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 861.98' @ 15.65 hrs Surf.Area= 4,971 sf Storage= 5,914 cf

Plug-Flow detention time= 247.5 min calculated for 0.046 af (26% of inflow)
Center-of-Mass det. time= 172.0 min (963.3 - 791.3)

Volume	Invert	Avail.Storage	Storage Description
#1	860.50'	18,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

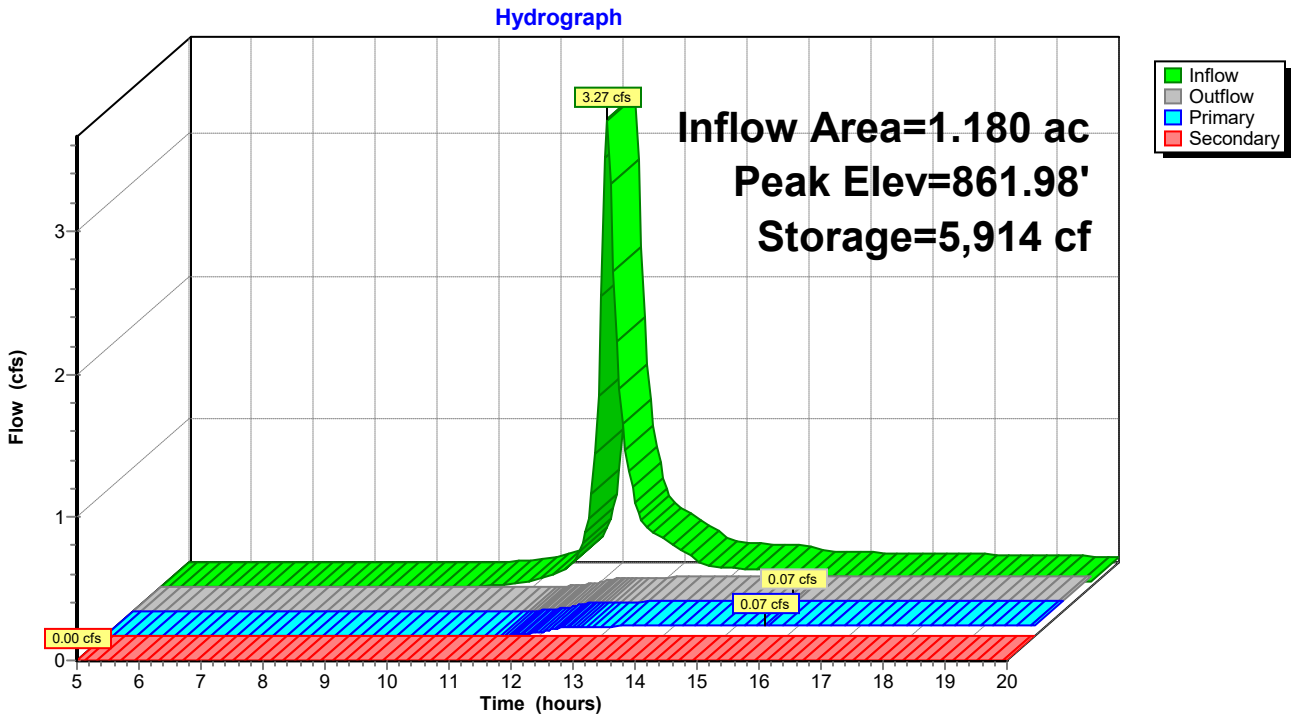
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.50	3,050	0	0
861.00	3,680	1,683	1,683
862.00	5,000	4,340	6,023
863.00	6,400	5,700	11,723
864.00	7,780	7,090	18,813

Device	Routing	Invert	Outlet Devices
#1	Primary	860.11'	**12.0" Round Culvert** L= 22.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 860.11' / 860.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	862.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	860.50'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	863.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** 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=0.07 cfs @ 15.65 hrs HW=861.98' (Free Discharge)
└**1=Culvert** (Passes 0.07 cfs of 3.49 cfs potential flow)
  └**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.07 cfs @ 5.73 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=860.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Wet Pond



Summary for Pond 2P: SW Biofilter #1

Inflow Area = 0.112 ac, 47.32% Impervious, Inflow Depth > 1.73" for 10-Year event
Inflow = 0.36 cfs @ 12.13 hrs, Volume= 0.016 af
Outflow = 0.34 cfs @ 12.16 hrs, Volume= 0.015 af, Atten= 6%, Lag= 1.3 min
Primary = 0.34 cfs @ 12.16 hrs, Volume= 0.015 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.38' @ 12.16 hrs Surf.Area= 365 sf Storage= 106 cf

Plug-Flow detention time= 40.8 min calculated for 0.015 af (91% of inflow)
Center-of-Mass det. time= 12.1 min (799.4 - 787.3)

Volume	Invert	Avail.Storage	Storage Description
#1	864.50'	120 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 365 cf Overall x 33.0% Voids
#2	865.50'	197 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 730 cf Overall x 27.0% Voids
#3	867.50'	485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.50	365	0	0
865.50	365	365	365

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.50	365	0	0
867.50	365	730	730

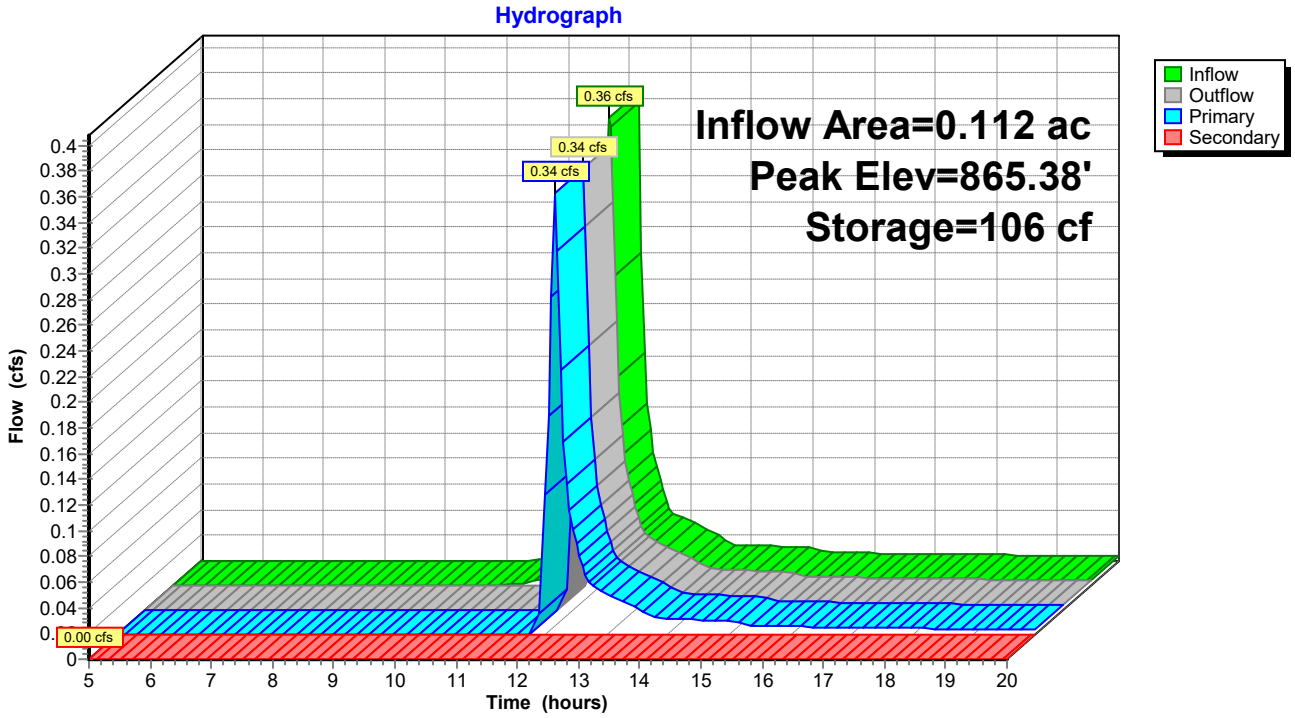
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.50	350	0	0
868.00	1,590	485	485

Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 41.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Standpipe** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.34 cfs @ 12.16 hrs HW=865.38' (Free Discharge)
└**1=Culvert** (Passes 0.34 cfs of 0.45 cfs potential flow)
└**2=Drain Tile** (Tube Controls 0.34 cfs @ 1.71 fps)
└**3=Standpipe** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SW Biofilter #1



Summary for Pond 3P: SE Biofilter #2

Inflow Area = 0.112 ac, 46.43% Impervious, Inflow Depth > 1.66" for 10-Year event
Inflow = 0.35 cfs @ 12.14 hrs, Volume= 0.015 af
Outflow = 0.33 cfs @ 12.17 hrs, Volume= 0.012 af, Atten= 6%, Lag= 2.2 min
Primary = 0.33 cfs @ 12.17 hrs, Volume= 0.012 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.38' @ 12.17 hrs Surf.Area= 880 sf Storage= 190 cf

Plug-Flow detention time= 75.1 min calculated for 0.012 af (78% of inflow)
Center-of-Mass det. time= 25.2 min (814.2 - 789.0)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 440 cf Overall x 33.0% Voids
#2	865.00'	238 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 880 cf Overall x 27.0% Voids
#3	867.00'	985 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		1,368 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	440	0	0
865.00	440	440	440

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.00	440	0	0
867.00	440	880	880

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	440	0	0
868.00	1,530	985	985

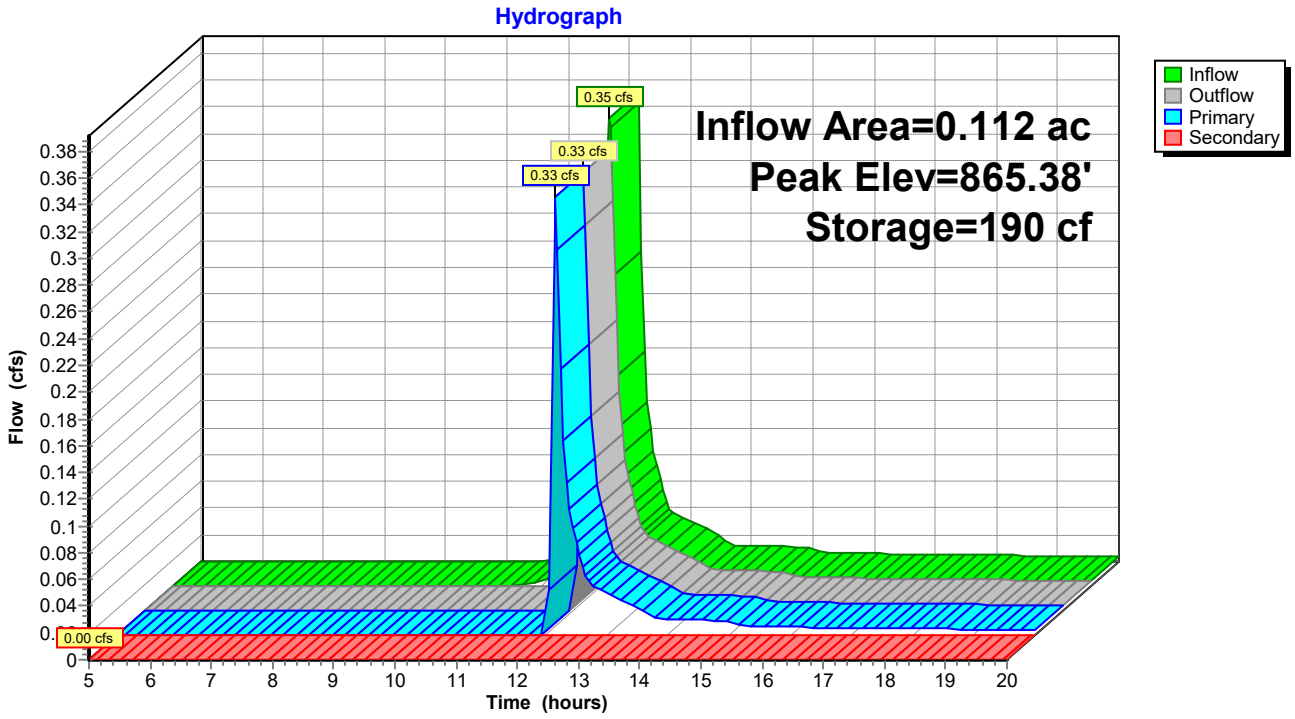
Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0097 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 45.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.30 cfs @ 12.17 hrs HW=865.35' (Free Discharge)
└**1=Culvert** (Passes 0.30 cfs of 0.39 cfs potential flow)
└**2=Drain Tile** (Tube Controls 0.30 cfs @ 1.51 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SE Biofilter #2



Summary for Pond 5P: N Rain Garden

Inflow Area = 0.161 ac, 40.99% Impervious, Inflow Depth > 1.51" for 10-Year event
Inflow = 0.33 cfs @ 12.23 hrs, Volume= 0.020 af
Outflow = 0.33 cfs @ 12.31 hrs, Volume= 0.015 af, Atten= 0%, Lag= 4.3 min
Primary = 0.33 cfs @ 12.31 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 870.82' @ 12.31 hrs Surf.Area= 438 sf Storage= 244 cf

Plug-Flow detention time= 79.1 min calculated for 0.015 af (75% of inflow)
Center-of-Mass det. time= 26.7 min (825.5 - 798.8)

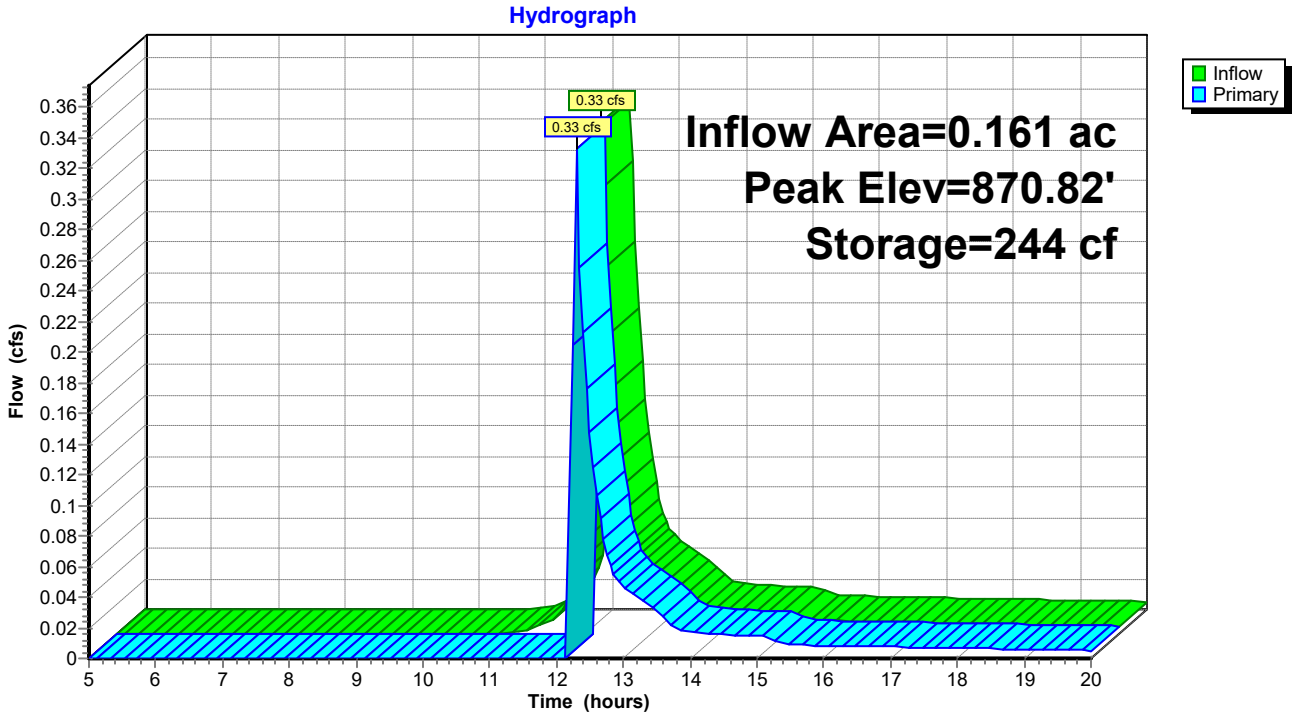
Volume	Invert	Avail.Storage	Storage Description
#1	870.00'	330 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
870.00	160	0	0
871.00	500	330	330

Device	Routing	Invert	Outlet Devices
#1	Primary	870.75'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.32 cfs @ 12.31 hrs HW=870.82' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.32 cfs @ 0.61 fps)

Pond 5P: N Rain Garden

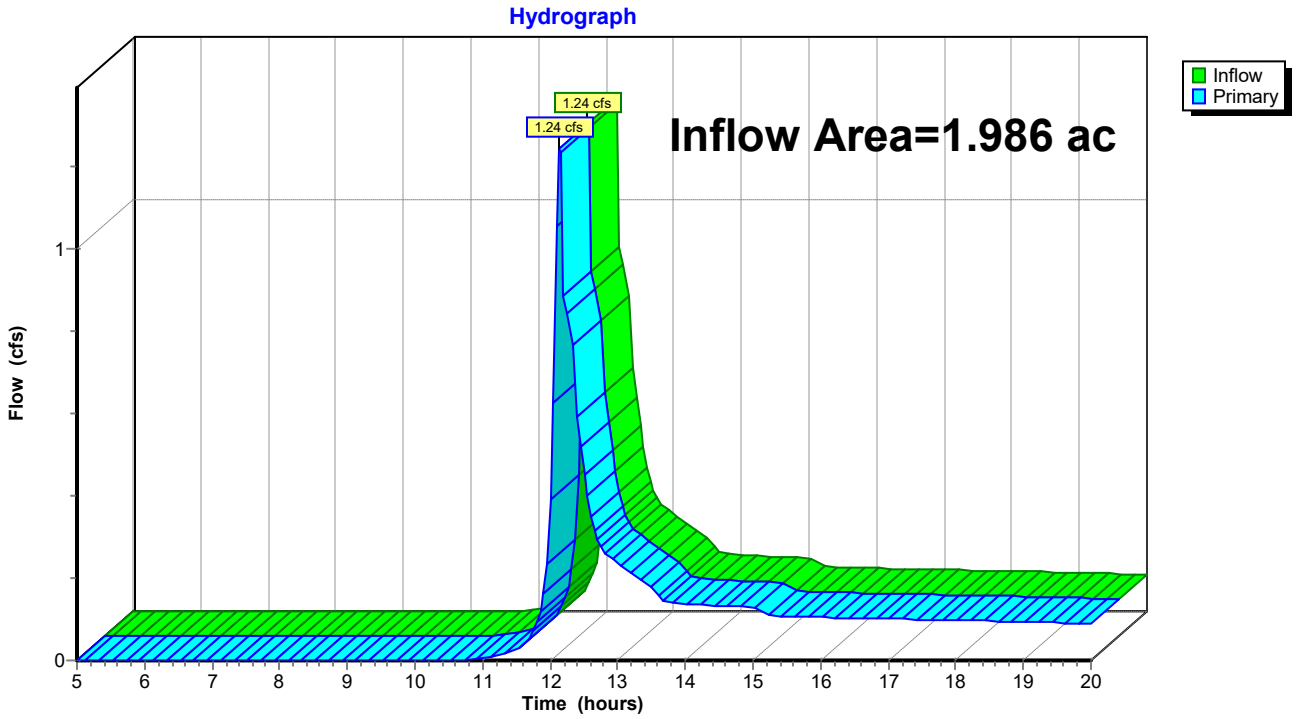


Summary for Link 6L: Site Total

Inflow Area = 1.986 ac, 39.68% Impervious, Inflow Depth > 0.70" for 10-Year event
Inflow = 1.24 cfs @ 12.14 hrs, Volume= 0.116 af
Primary = 1.24 cfs @ 12.14 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Site Total



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: To Pond Runoff Area=0.956 ac 54.81% Impervious Runoff Depth>3.89"
Flow Length=80' Slope=0.0100 '/' Tc=11.9 min CN=81 Runoff=5.45 cfs 0.310 af

Subcatchment 2S: To SW Biofilter Runoff Area=0.112 ac 47.32% Impervious Runoff Depth>3.69"
Tc=6.0 min CN=79 Runoff=0.76 cfs 0.034 af

Subcatchment 3S: To SE Biofilter Runoff Area=0.112 ac 46.43% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=78 Runoff=0.74 cfs 0.034 af

Subcatchment 4S: To Filter Strip Runoff Area=0.253 ac 1.19% Impervious Runoff Depth>2.02"
Tc=6.0 min CN=61 Runoff=0.96 cfs 0.042 af

Subcatchment 5S: To N Rain Garden Runoff Area=0.161 ac 40.99% Impervious Runoff Depth>3.39"
Flow Length=100' Slope=0.0100 '/' Tc=14.2 min CN=76 Runoff=0.75 cfs 0.045 af

Subcatchment 6S: To S Swale Runoff Area=0.118 ac 0.00% Impervious Runoff Depth>2.02"
Tc=6.0 min CN=61 Runoff=0.45 cfs 0.020 af

Subcatchment 7S: Uncontrolled Runoff Area=0.274 ac 32.85% Impervious Runoff Depth>3.39"
Tc=6.0 min CN=76 Runoff=1.72 cfs 0.077 af

Pond 1P: Wet Pond Peak Elev=862.62' Storage=9,375 cf Inflow=6.70 cfs 0.373 af
Primary=1.75 cfs 0.174 af Secondary=0.00 cfs 0.000 af Outflow=1.75 cfs 0.174 af

Pond 2P: SW Biofilter #1 Peak Elev=865.80' Storage=150 cf Inflow=0.76 cfs 0.034 af
Primary=0.66 cfs 0.033 af Secondary=0.00 cfs 0.000 af Outflow=0.66 cfs 0.033 af

Pond 3P: SE Biofilter #2 Peak Elev=865.77' Storage=236 cf Inflow=0.74 cfs 0.034 af
Primary=0.63 cfs 0.030 af Secondary=0.00 cfs 0.000 af Outflow=0.63 cfs 0.030 af

Pond 5P: N Rain Garden Peak Elev=870.87' Storage=266 cf Inflow=0.75 cfs 0.045 af
Outflow=0.74 cfs 0.040 af

Link 6L: Site Total Inflow=3.71 cfs 0.354 af
Primary=3.71 cfs 0.354 af

Total Runoff Area = 1.986 ac Runoff Volume = 0.563 af Average Runoff Depth = 3.40"
60.32% Pervious = 1.198 ac 39.68% Impervious = 0.788 ac

Summary for Subcatchment 1S: To Pond

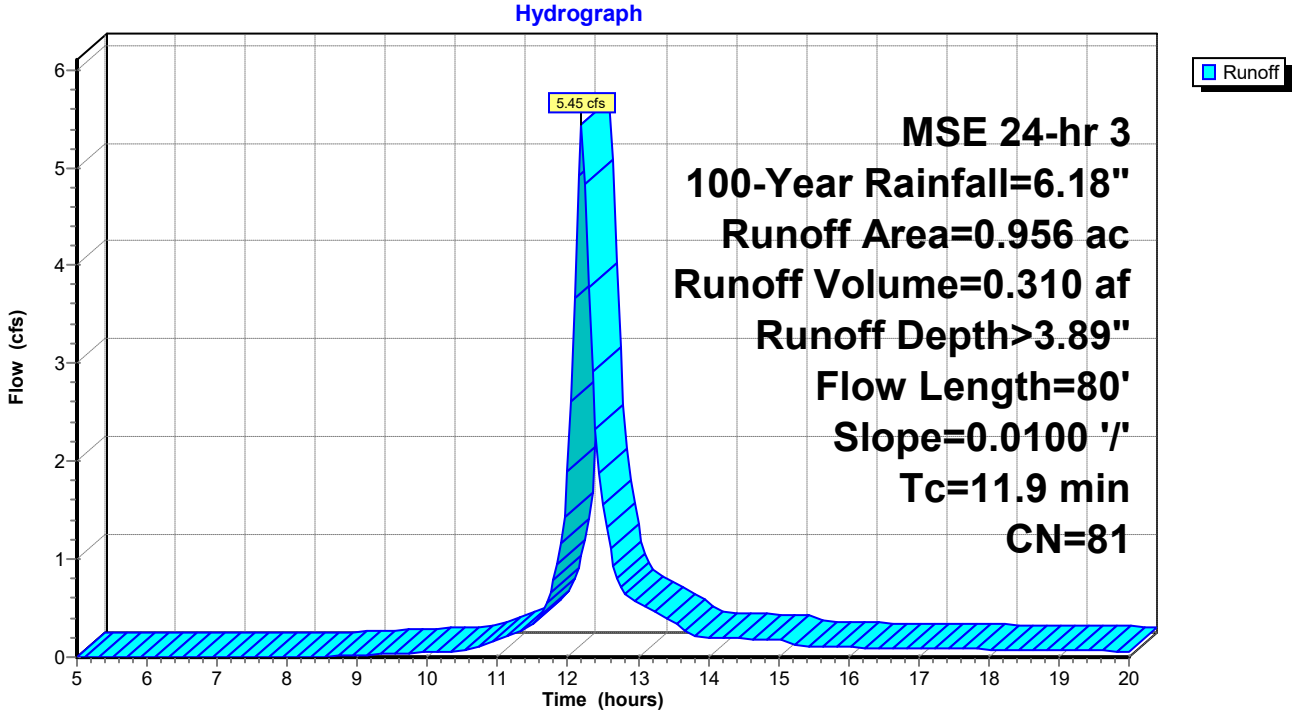
Runoff = 5.45 cfs @ 12.20 hrs, Volume= 0.310 af, Depth> 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.208	98	Buildings
*	0.207	98	Pavement
*	0.050	98	Driveways
*	0.011	98	Sidewalks
	0.432	61	>75% Grass cover, Good, HSG B
*	0.048	98	Wet Pond
	0.956	81	Weighted Average
	0.432		45.19% Pervious Area
	0.524		54.81% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	80	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 1S: To Pond



Summary for Subcatchment 2S: To SW Biofilter

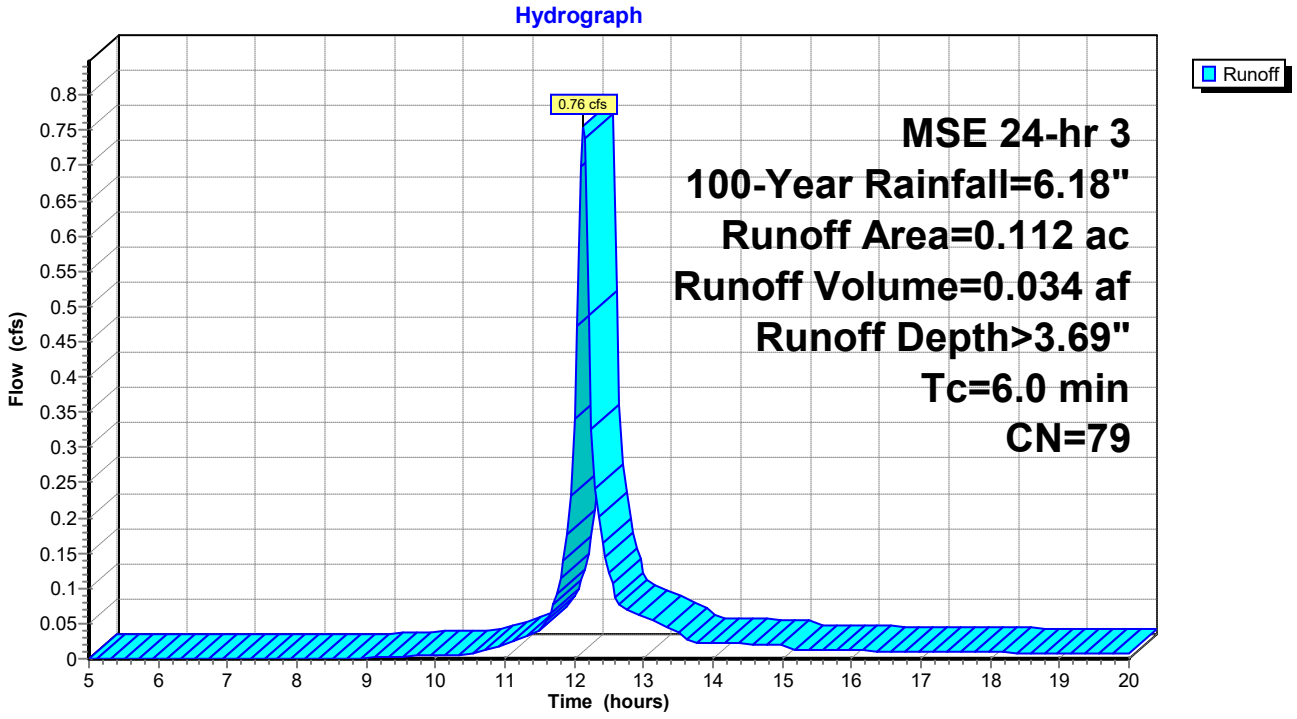
Runoff = 0.76 cfs @ 12.13 hrs, Volume= 0.034 af, Depth> 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.053	98	Buildings
	0.059	61	>75% Grass cover, Good, HSG B
	0.112	79	Weighted Average
	0.059		52.68% Pervious Area
	0.053		47.32% Impervious Area

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

Subcatchment 2S: To SW Biofilter



Summary for Subcatchment 3S: To SE Biofilter

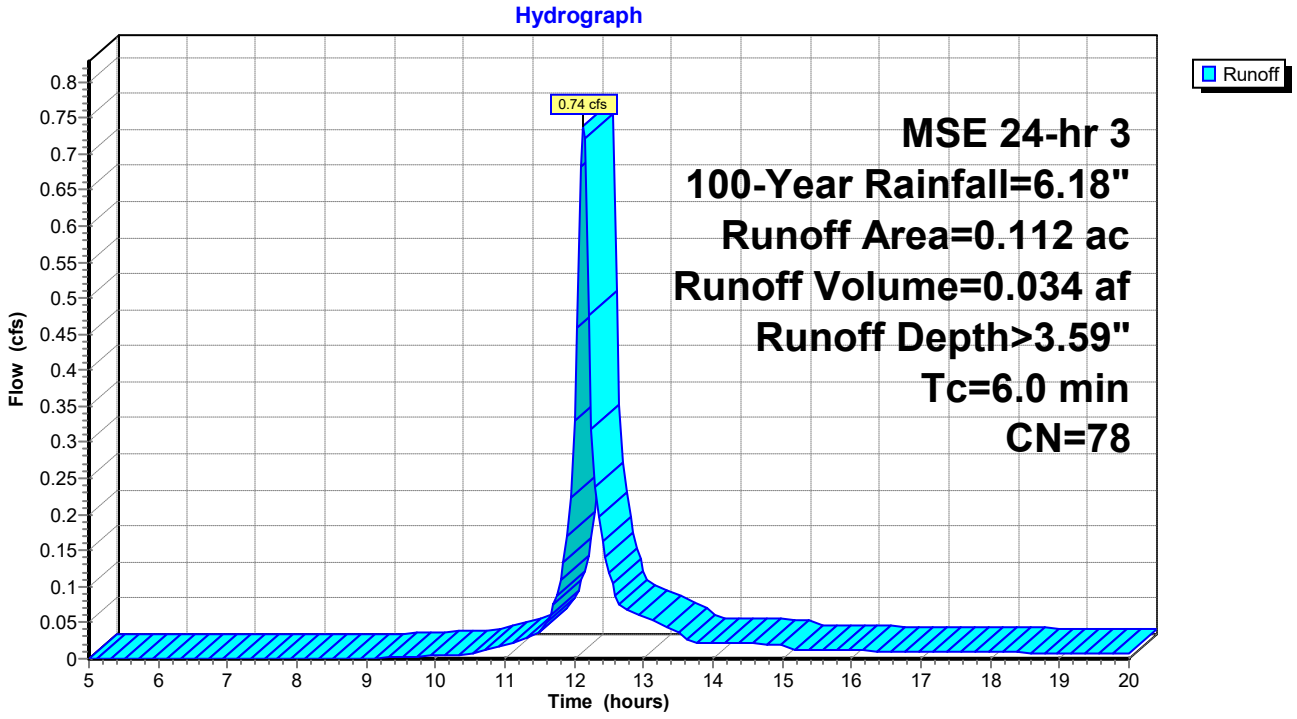
Runoff = 0.74 cfs @ 12.13 hrs, Volume= 0.034 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.052	98	Buildings
	0.060	61	>75% Grass cover, Good, HSG B
	0.112	78	Weighted Average
	0.060		53.57% Pervious Area
	0.052		46.43% Impervious Area

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

Subcatchment 3S: To SE Biofilter



Summary for Subcatchment 4S: To Filter Strip

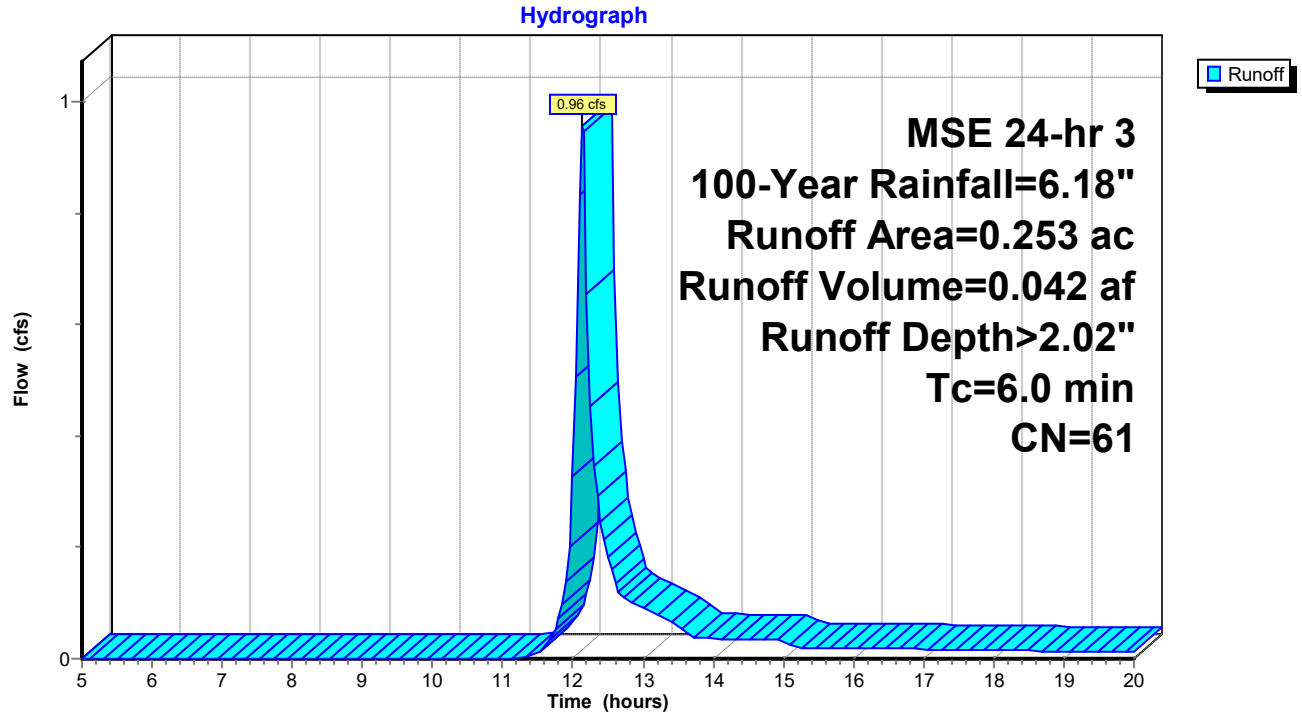
Runoff = 0.96 cfs @ 12.14 hrs, Volume= 0.042 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
	0.250	61	>75% Grass cover, Good, HSG B
*	0.003	98	Sidewalks
	0.253	61	Weighted Average
	0.250		98.81% Pervious Area
	0.003		1.19% Impervious Area

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

Subcatchment 4S: To Filter Strip



Summary for Subcatchment 5S: To N Rain Garden

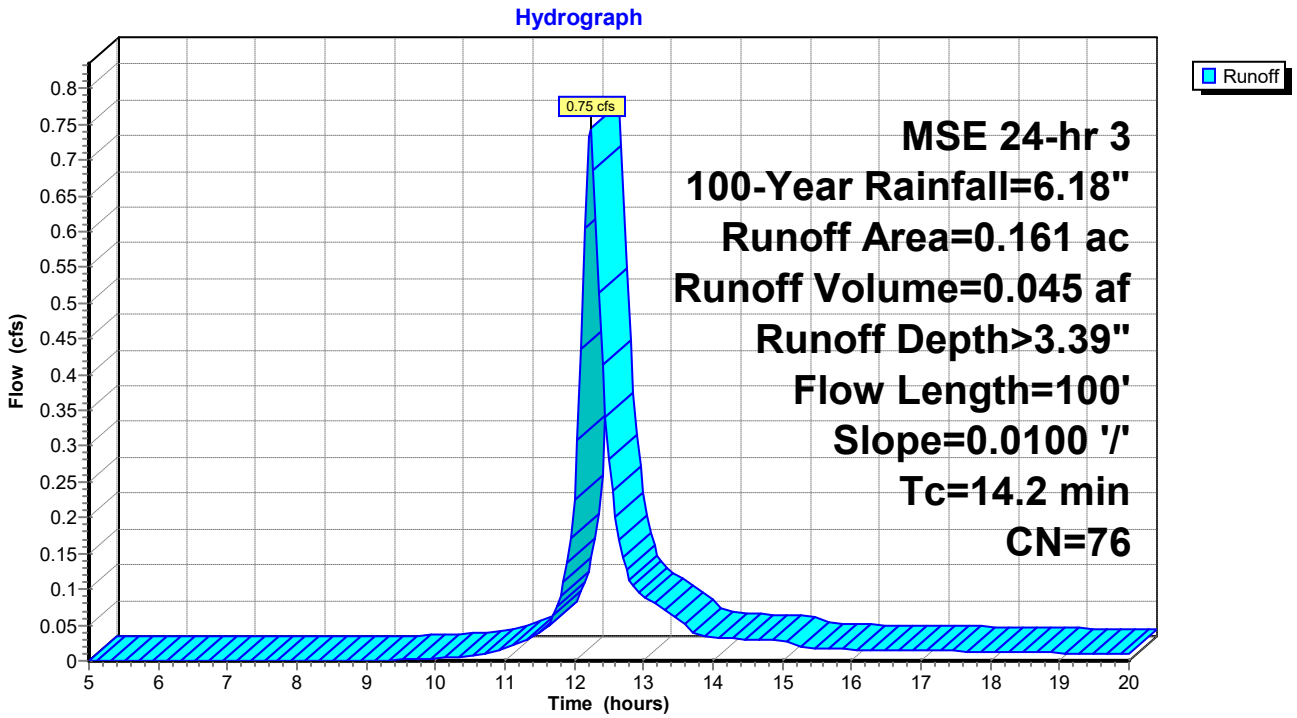
Runoff = 0.75 cfs @ 12.23 hrs, Volume= 0.045 af, Depth> 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.063	98	Buildings
*	0.003	98	Sidewalks
	0.095	61	>75% Grass cover, Good, HSG B
	0.161	76	Weighted Average
	0.095		59.01% Pervious Area
	0.066		40.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	100	0.0100	0.12		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.64"

Subcatchment 5S: To N Rain Garden



Summary for Subcatchment 6S: To S Swale

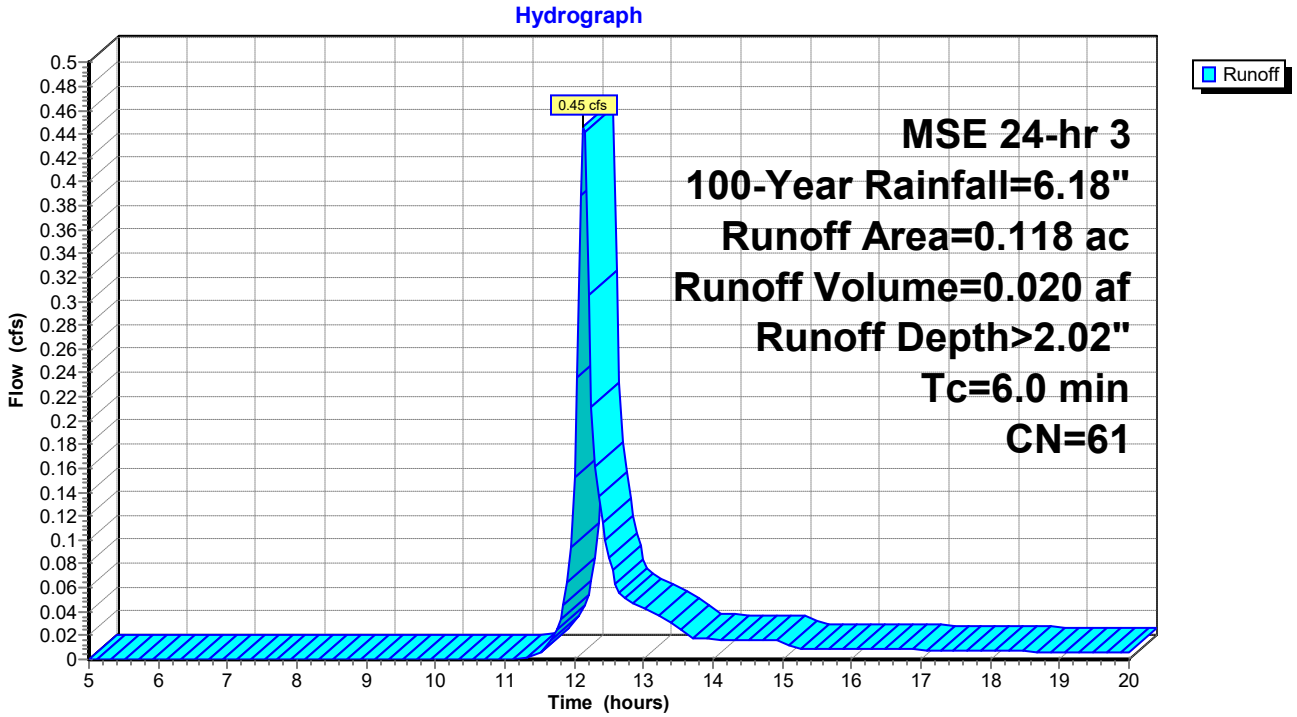
Runoff = 0.45 cfs @ 12.14 hrs, Volume= 0.020 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.118	61	>75% Grass cover, Good, HSG B
	0.118		100.00% Pervious Area

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

Subcatchment 6S: To S Swale



Summary for Subcatchment 7S: Uncontrolled

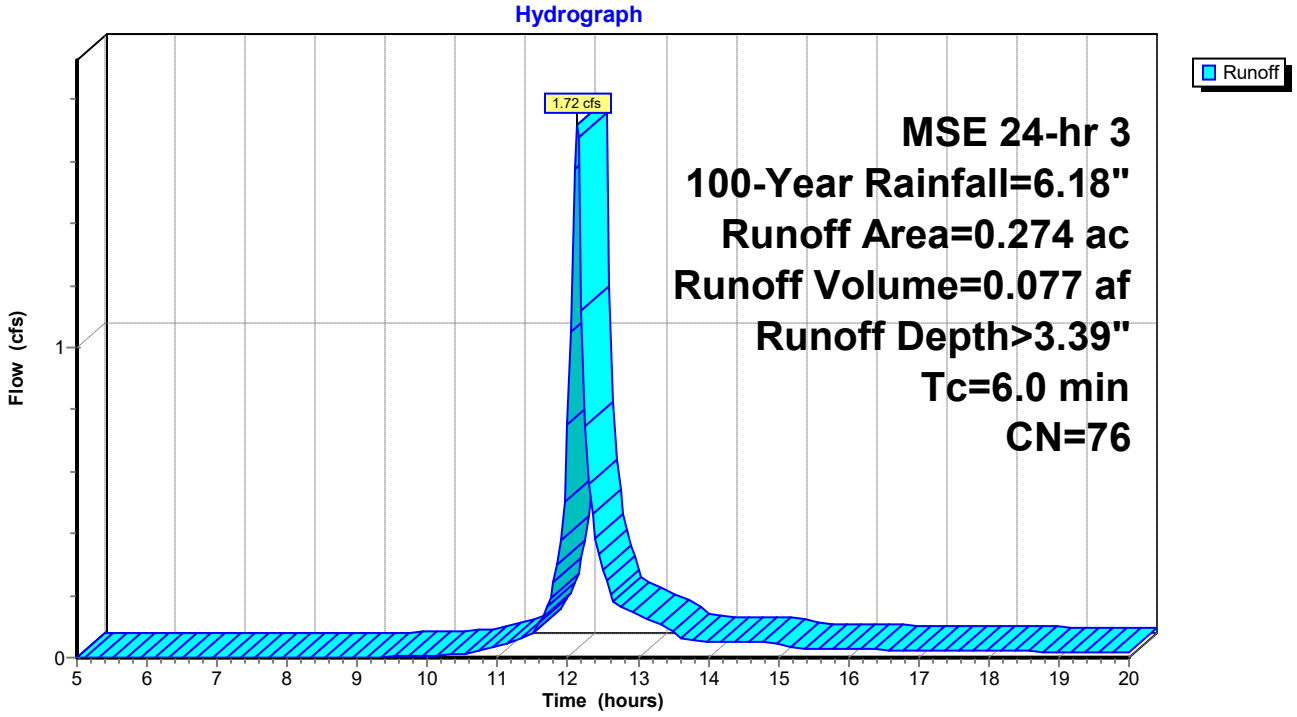
Runoff = 1.72 cfs @ 12.13 hrs, Volume= 0.077 af, Depth> 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (ac)	CN	Description
*	0.005	98	Pavement
*	0.081	98	Driveways
*	0.004	98	Sidewalks
	0.033	61	>75% Grass cover, Good, HSG B
*	0.097	61	Grass B
	0.054	73	Woods/grass comb., Poor, HSG B
	0.274	76	Weighted Average
	0.184		67.15% Pervious Area
	0.090		32.85% Impervious Area

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

Subcatchment 7S: Uncontrolled



Summary for Pond 1P: Wet Pond

Inflow Area = 1.180 ac, 53.31% Impervious, Inflow Depth > 3.79" for 100-Year event
Inflow = 6.70 cfs @ 12.19 hrs, Volume= 0.373 af
Outflow = 1.75 cfs @ 12.52 hrs, Volume= 0.174 af, Atten= 74%, Lag= 19.8 min
Primary = 1.75 cfs @ 12.52 hrs, Volume= 0.174 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 862.62' @ 12.52 hrs Surf.Area= 5,864 sf Storage= 9,375 cf

Plug-Flow detention time= 139.9 min calculated for 0.174 af (47% of inflow)
Center-of-Mass det. time= 76.0 min (854.4 - 778.4)

Volume	Invert	Avail.Storage	Storage Description
#1	860.50'	18,813 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

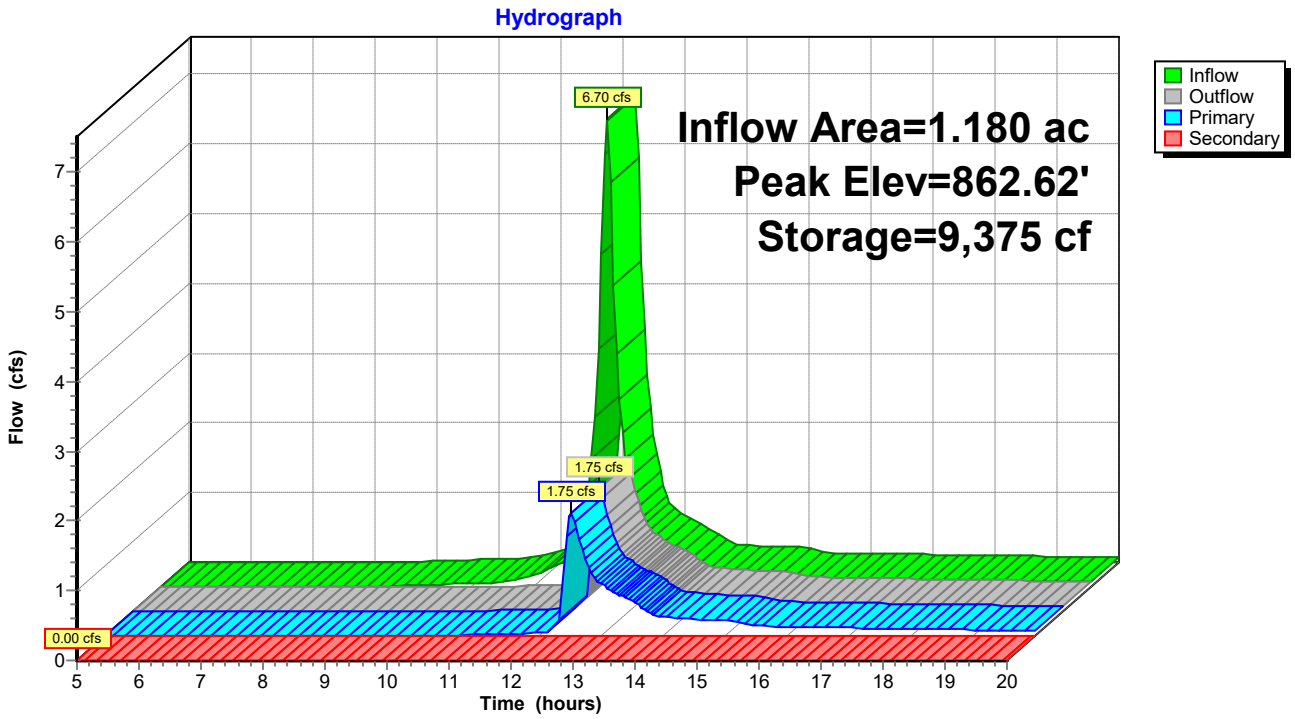
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
860.50	3,050	0	0
861.00	3,680	1,683	1,683
862.00	5,000	4,340	6,023
863.00	6,400	5,700	11,723
864.00	7,780	7,090	18,813

Device	Routing	Invert	Outlet Devices
#1	Primary	860.11'	**12.0" Round Culvert** L= 22.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 860.11' / 860.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	862.50'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	860.50'	**1.5" Vert. Orifice/Grate** C= 0.600
#4	Secondary	863.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** 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=1.70 cfs @ 12.52 hrs HW=862.62' (Free Discharge)
└**1=Culvert** (Passes 1.70 cfs of 4.23 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 1.61 cfs @ 1.11 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.90 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=860.50' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Wet Pond



Summary for Pond 2P: SW Biofilter #1

Inflow Area = 0.112 ac, 47.32% Impervious, Inflow Depth > 3.69" for 100-Year event
Inflow = 0.76 cfs @ 12.13 hrs, Volume= 0.034 af
Outflow = 0.66 cfs @ 12.16 hrs, Volume= 0.033 af, Atten= 13%, Lag= 2.0 min
Primary = 0.66 cfs @ 12.16 hrs, Volume= 0.033 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.80' @ 12.16 hrs Surf.Area= 730 sf Storage= 150 cf

Plug-Flow detention time= 24.7 min calculated for 0.033 af (96% of inflow)
Center-of-Mass det. time= 8.8 min (783.6 - 774.8)

Volume	Invert	Avail.Storage	Storage Description
#1	864.50'	120 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 365 cf Overall x 33.0% Voids
#2	865.50'	197 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 730 cf Overall x 27.0% Voids
#3	867.50'	485 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.50	365	0	0
865.50	365	365	365

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.50	365	0	0
867.50	365	730	730

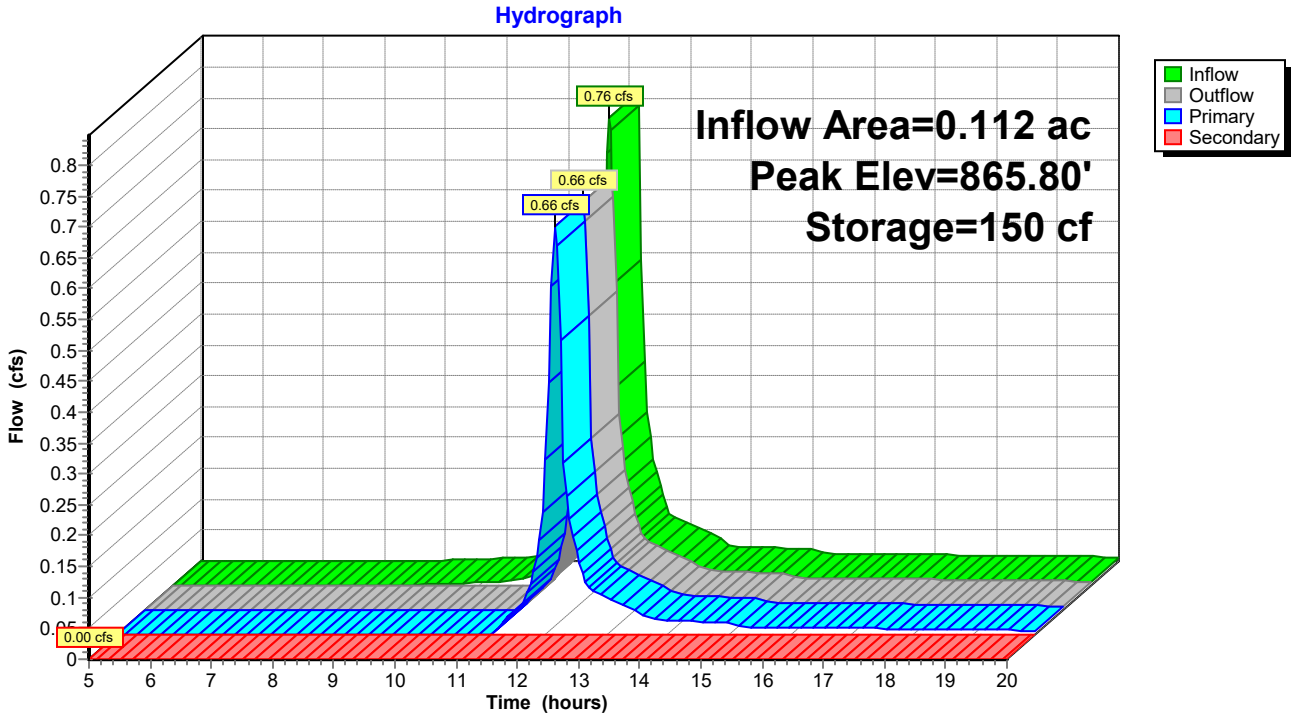
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.50	350	0	0
868.00	1,590	485	485

Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 16.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 41.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Standpipe** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.65 cfs @ 12.16 hrs HW=865.78' (Free Discharge)
└─**1=Culvert** (Passes 0.65 cfs of 1.55 cfs potential flow)
└─**2=Drain Tile** (Tube Controls 0.65 cfs @ 3.30 fps)
└─**3=Standpipe** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.50' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SW Biofilter #1



Summary for Pond 3P: SE Biofilter #2

Inflow Area = 0.112 ac, 46.43% Impervious, Inflow Depth > 3.59" for 100-Year event
Inflow = 0.74 cfs @ 12.13 hrs, Volume= 0.034 af
Outflow = 0.63 cfs @ 12.17 hrs, Volume= 0.030 af, Atten= 15%, Lag= 2.2 min
Primary = 0.63 cfs @ 12.17 hrs, Volume= 0.030 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 865.77' @ 12.17 hrs Surf.Area= 880 sf Storage= 236 cf

Plug-Flow detention time= 45.7 min calculated for 0.030 af (90% of inflow)
Center-of-Mass det. time= 14.2 min (790.5 - 776.3)

Volume	Invert	Avail.Storage	Storage Description
#1	864.00'	145 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 440 cf Overall x 33.0% Voids
#2	865.00'	238 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) 880 cf Overall x 27.0% Voids
#3	867.00'	985 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		1,368 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
864.00	440	0	0
865.00	440	440	440

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.00	440	0	0
867.00	440	880	880

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
867.00	440	0	0
868.00	1,530	985	985

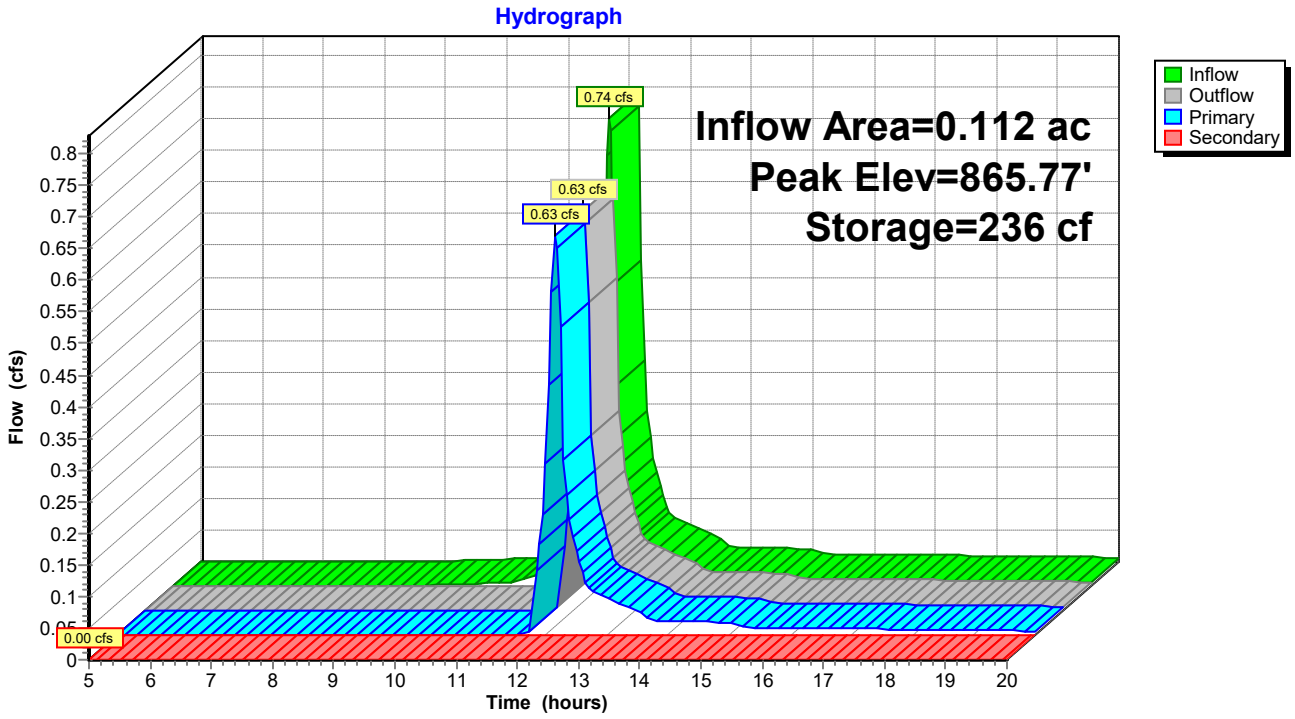
Device	Routing	Invert	Outlet Devices
#1	Primary	865.00'	**12.0" Round Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 865.00' / 864.68' S= 0.0097 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	865.00'	**Drain Tile** 6.000" Diameter, C= 0.600 45.0' Long Tube, Hazen-Williams C= 130 Inlet / Outlet Elev. = 865.00' / 865.00'
#3	Device 1	868.00'	**36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	867.85'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.62 cfs @ 12.17 hrs HW=865.74' (Free Discharge)
└**1=Culvert** (Passes 0.62 cfs of 1.45 cfs potential flow)
└**2=Drain Tile** (Tube Controls 0.62 cfs @ 3.16 fps)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=864.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SE Biofilter #2



Summary for Pond 5P: N Rain Garden

Inflow Area = 0.161 ac, 40.99% Impervious, Inflow Depth > 3.39" for 100-Year event
Inflow = 0.75 cfs @ 12.23 hrs, Volume= 0.045 af
Outflow = 0.74 cfs @ 12.24 hrs, Volume= 0.040 af, Atten= 0%, Lag= 1.0 min
Primary = 0.74 cfs @ 12.24 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 870.87' @ 12.24 hrs Surf.Area= 454 sf Storage= 266 cf

Plug-Flow detention time= 45.9 min calculated for 0.040 af (89% of inflow)
Center-of-Mass det. time= 13.4 min (799.2 - 785.8)

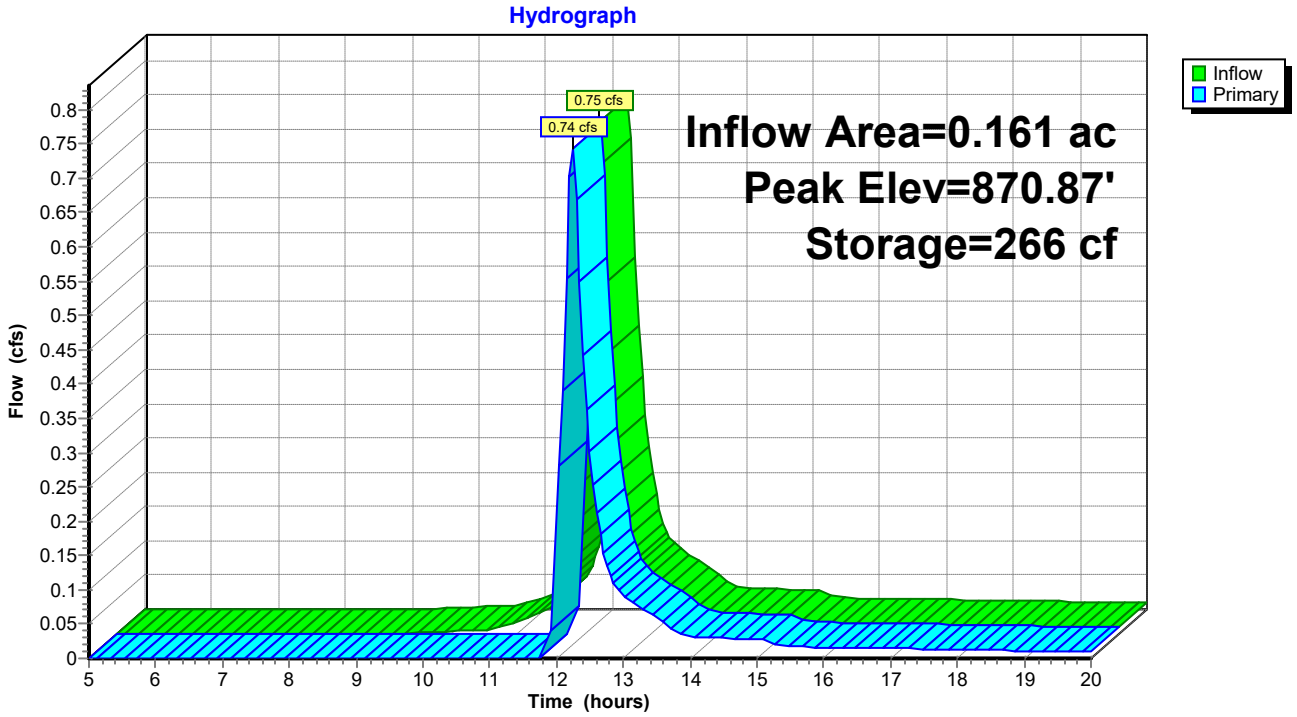
Volume	Invert	Avail.Storage	Storage Description
#1	870.00'	330 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
870.00	160	0	0
871.00	500	330	330

Device	Routing	Invert	Outlet Devices
#1	Primary	870.75'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.74 cfs @ 12.24 hrs HW=870.86' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.74 cfs @ 0.80 fps)

Pond 5P: N Rain Garden

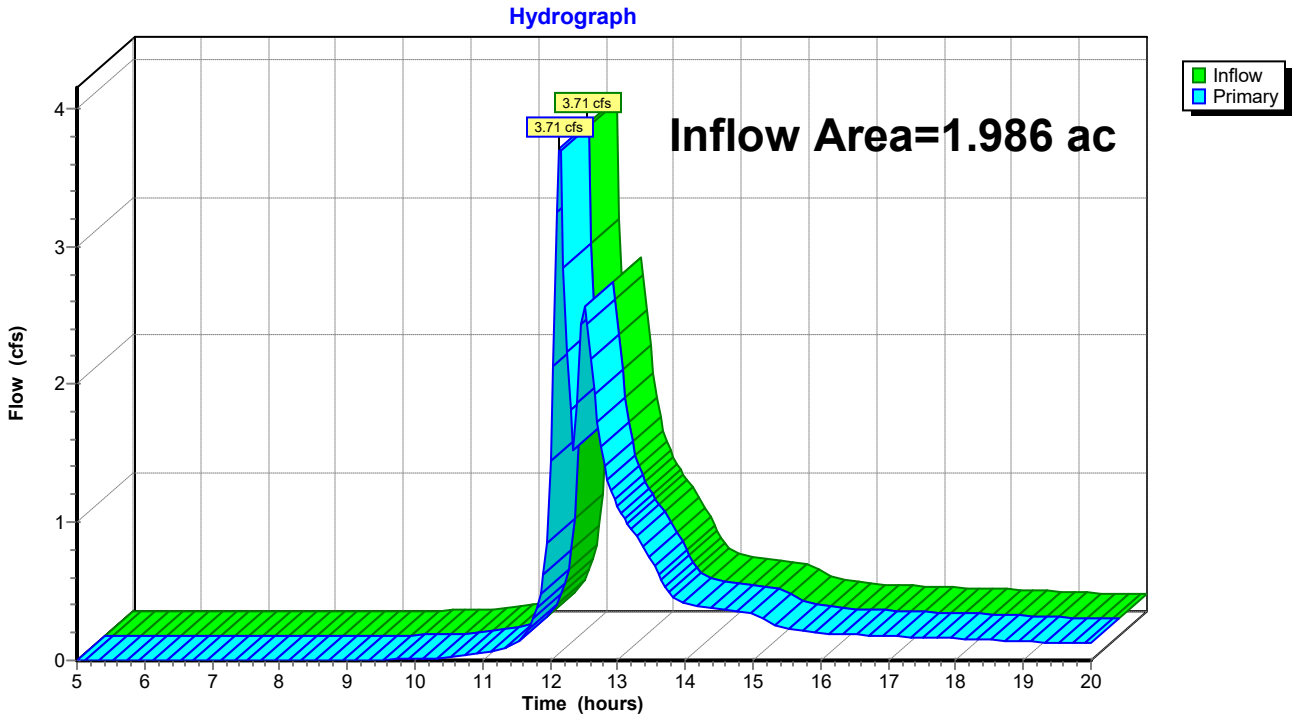


Summary for Link 6L: Site Total

Inflow Area = 1.986 ac, 39.68% Impervious, Inflow Depth > 2.14" for 100-Year event
Inflow = 3.71 cfs @ 12.14 hrs, Volume= 0.354 af
Primary = 3.71 cfs @ 12.14 hrs, Volume= 0.354 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

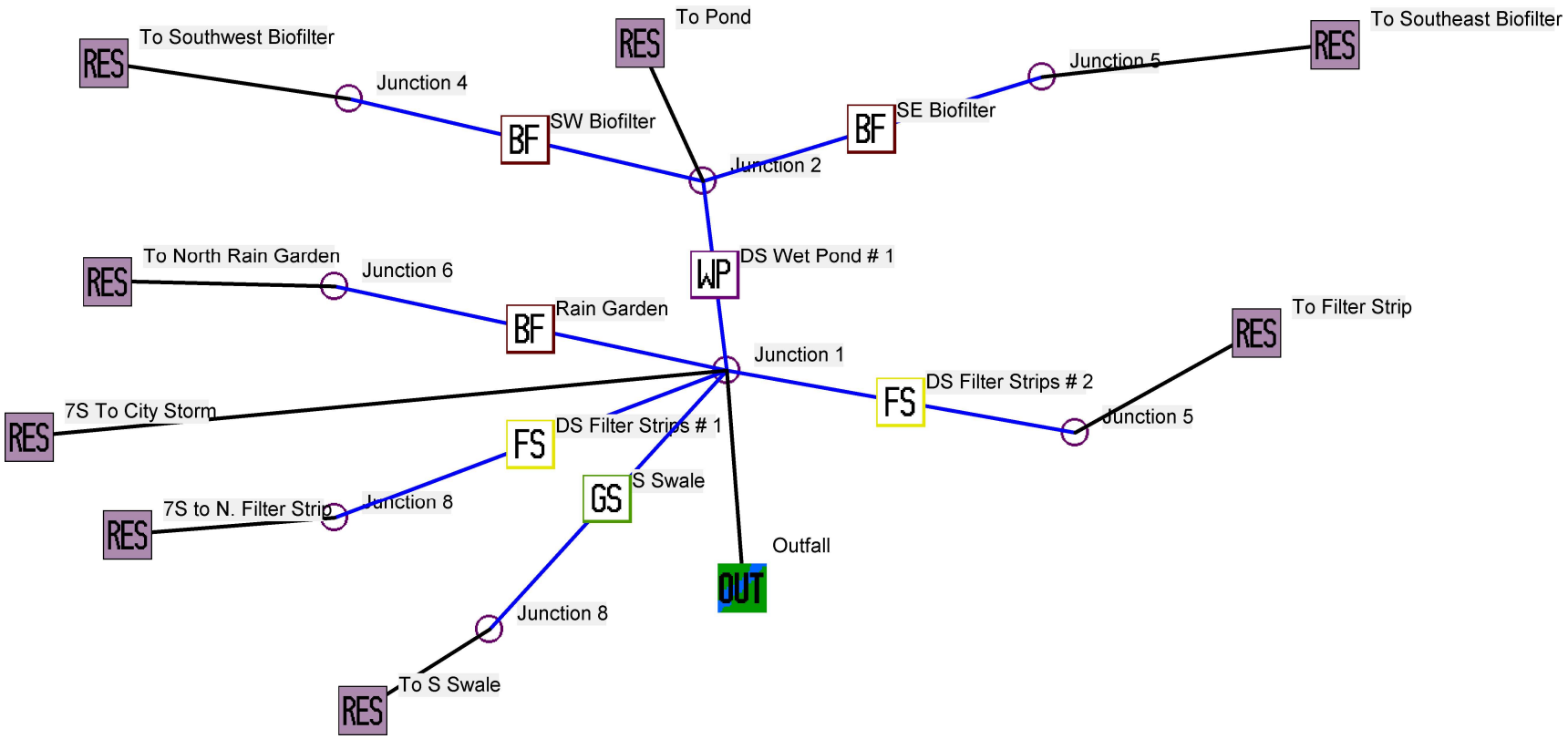
Link 6L: Site Total



Appendix E

TSS Reduction Calculations

PARISH SURVEY & ENGINEERING
122 Wisconsin Street | West Bend, WI 53095
www.parishse.com


RES
To Southwest Biofilter
Junction 4
BF
SW Biofilter
RES
To Pond
BF
SE Biofilter
Junction 5
RES
To Southeast Biofilter
Junction 2
RES
To North Rain Garden
Junction 6
WP
DS Wet Pond # 1
BF
Rain Garden
Junction 1
RES
To Filter Strip
FS
DS Filter Strips # 2
Junction 5
RES
7S To City Storm
FS
DS Filter Strips # 1
GS
S Swale
RES
7S to N. Filter Strip
Junction 8
Outfall
OUT
Junction 8
RES
To S Swale

Wet Detention Control Device

Pond Number 1

Drainage System Control Practice

	Stage (ft)	Area (acres)	Cumulative Volume (ac-ft)
0	0.00	0.0000	0.000
1	0.01	0.0008	0.000
2	1.00	0.0038	0.002
3	2.00	0.0087	0.009
4	2.50	0.0119	0.014
5	3.00	0.0334	0.025
6	3.50	0.0700	0.051
7	4.00	0.0845	0.089
8	5.00	0.1148	0.189
9	6.00	0.1469	0.320
10	7.00	0.1786	0.483
11			
12			
13			
14			
15			
16			
17			

Initial Stage Elevation (ft): 3.50

Maximum Inflow into Pond (cfs)
Enter 0 or leave blank for no limit:

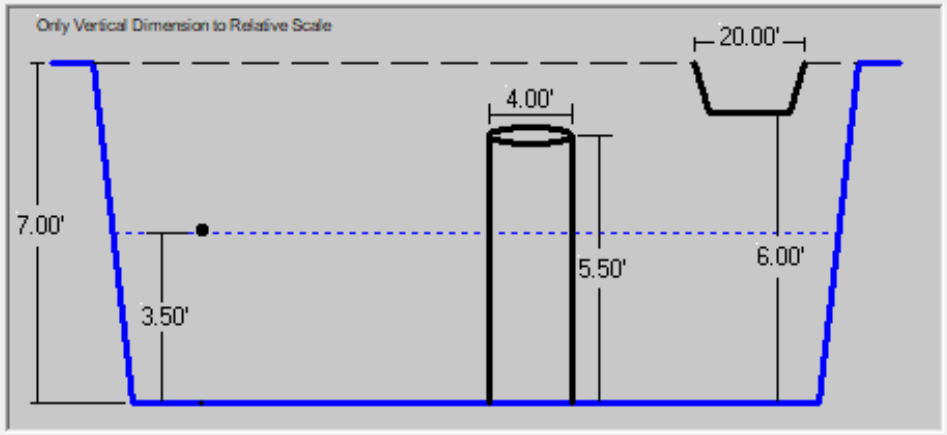
Copy Pond Data | Paste Pond Data

Create Pond Stage-Area Values | Refresh Schematic

Enter fraction (greater than 0) that you want to modify all pond areas by and then select 'Modify Pond Areas' button: 0.00

Modify Pond Areas

Recalculate Cumulative Volume



Delete Pond | Cancel | Continue | Press 'F1' for Help

Control Practice # : 1 | CP Index # : 1

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

Add **V-Notch Weir**

Weir Angle (<180 degrees)	
Height from datum to bottom of weir opening (ft)	
Number of V-Notch weirs	

Remove **Orifice Set 1**

Orifice Diameter (ft)	0.12
Invert elevation above datum (ft)	3.50
Number of orifices in set	1

Add **Orifice Set 2**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Orifice Set 3**

Orifice Diameter (ft)	
Invert elevation above datum (ft)	
Number of orifices in set	

Add **Stone Weeper**

Width at bottom of weeper (ft)	
Weeper side slope (_H:1V)	
Upstream side slope (_H:1V)	
Downstream side slope (_H:1V)	
Horizontal flow path length at top of weeper (ft)	
Average rock diameter (ft)	
Distance from bottom to top of weeper (ft)	
Height from datum to bottom of weeper (ft)	

Remove **Vertical Stand Pipe**

Pipe diameter (ft)	4.00
Height above datum (ft)	5.50

Add | Add

Month	Evaporation (in/day)	Water Withdraw Rate (ac-ft/day)
Jan	0.00	0.000
Feb	0.00	0.000
Mar	0.00	0.000
Apr	0.00	0.000
May	0.00	0.000
Jun	0.00	0.000
Jul	0.00	0.000
Aug	0.00	0.000
Sep	0.00	0.000
Oct	0.00	0.000
Nov	0.00	0.000
Dec	0.00	0.000

Add | Add

Stage (ft)	Natural Seepage Rate (in/hr)	Other Outflow Rate (cfs)
0.00	0.00	0.000
0.01	0.00	0.000
1.00	0.00	0.000
2.00	0.00	0.000
2.50	0.00	0.000
3.00	0.00	0.000
3.50	0.00	0.000

Remove **Broad Crested Weir (Required)**

Weir crest length (ft)	20.00
Weir crest width (ft)	10.00
Height from datum to bottom of weir opening (ft)	6.00

Add **Seepage Basin**

Infiltration rate (in/hr)	
Width of device (ft)	
Length of device (ft)	
Invert elevation of seepage basin inlet above datum (ft)	

Add **Pump**

Southwest Biofilter #1

Biofiltration Control Device

Drainage System Control Practice

Device Properties	Biofilter Number 1
Top Area (sf)	1590
Bottom Area (sf)	365
Total Depth (ft)	4.00
Typical Width (ft) (Cost est. only)	10.00
Native Soil Infiltration Rate (in/hr)	0.130
Native Soil Infiltration Rate COV	N/A
Infil. Rate Fraction-Bottom (0.001-1)	1.000
Infil. Rate Fraction-Sides (0.001-1)	0.001
Rock Filled Depth (ft)	1.00
Rock Fill Porosity (0-1)	0.33
Engineered Media Type	Media Data
Engineered Media Infiltration Rate	3.60
Engineered Media Infiltration Rate COV	N/A
Engineered Media Depth (ft)	1.50
Engineered Media Porosity (0-1)	0.27
Percent solids reduction due to Engineered Media (0 -100)	80.00
Inflow Hydrograph Peak to Average Flow Ratio	3.80
Number of Devices in Source Area or Upstream Drainage System	1

Activate Pipe or Box Storage — Pipe — Box

Diameter (ft)	
Length (ft)	
Within Biofilter (check if Yes)	
Perforated (check if Yes)	
Bottom Elevation (ft above datum)	
Discharge Orifice Diameter (ft)	

Select Native Soil Infiltration Rate

- Sand - 8 in/hr
- Loamy sand - 2.5 in/hr
- Sandy loam - 1.0 in/hr
- Loam - 0.5 in/hr
- Silt loam - 0.3 in/hr
- Sandy silt loam - 0.2 in/hr
- Clay loam - 0.1 in/hr
- Silty clay loam - 0.05 in/hr
- Sandy clay - 0.05 in/hr
- Silty clay - 0.04 in/hr
- Clay - 0.02 in/hr
- Rain Barrel/Cistern - 0.00 in/hr

Use Random Number Generation to Account for Infiltration Rate Uncertainty

Copy Biofilter Data

Paste Biofilter Data

Estimated Surface Drain Time = 3.33 hrs.

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

Remove **Broad Crested Weir-Reqrd**

Weir crest length (ft)	10.00
Weir crest width (ft)	5.00
Height from datum to bottom of weir opening (ft)	3.50

Add **Vertical Stand Pipe**

Pipe diameter (ft)	
Height above datum (ft)	

Add **Surface Discharge Pipe**

Pipe Diameter (ft)	
Invert elevation above datum (ft)	
Number of pipes at invert elev.	

Remove **Drain Tile/Underdrain**

Pipe Diameter (ft)	0.50
Invert elevation above datum (ft)	0.50
Number of pipes at invert elev.	1

Add **Other Outlet**

Stage Number	Stage (ft)	Other Outflow Rate (cfs)
1		
2		
3		
4		
5		

Add **Evapotranspiration**

Soil porosity (saturation moisture content, 0-1)	
Soil field moisture capacity (0-1)	
Permanent wilting point (0-1)	
Supplemental irrigation used?	☐
Fraction of available capacity when irrigation starts (0-1)	
Fraction of available capacity when irrigation stops (0-1)	

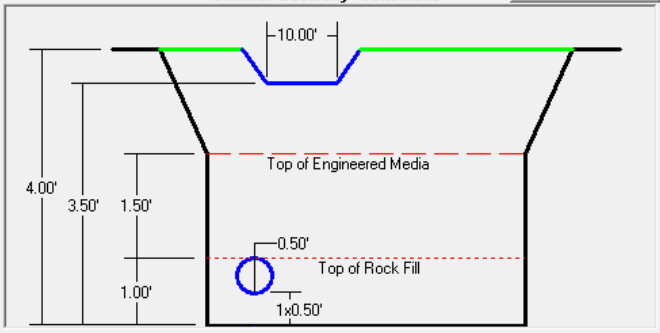
Evaporation Add

Month	Evapotrans-piration (in/day)	Evaporation (in/day)
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		

Plant Types

	1	2	3	4
Fraction of biofilter that is vegetated				
Plant type				
Root depth (ft)				
ET Crop Adjustment Factor				

Biofilter Geometry Schematic — Refresh Schematic



Press 'F1' for Help

Delete — Cancel — Continue

Control Practice # : 3 — CP Index # : 3

Southeast Biofilter #2

Biofiltration Control Device

Drainage System Control Practice

Device Properties	Biofilter Number 2
Top Area (sf)	1530
Bottom Area (sf)	440
Total Depth (ft)	4.00
Typical Width (ft) (Cost est. only)	10.00
Native Soil Infiltration Rate (in/hr)	0.070
Native Soil Infiltration Rate COV	N/A
Infil. Rate Fraction-Bottom (0.001-1)	1.000
Infil. Rate Fraction-Sides (0.001-1)	0.001
Rock Filled Depth (ft)	1.00
Rock Fill Porosity (0-1)	0.33
Engineered Media Type	Media Data
Engineered Media Infiltration Rate	3.60
Engineered Media Infiltration Rate COV	N/A
Engineered Media Depth (ft)	1.50
Engineered Media Porosity (0-1)	0.27
Percent solids reduction due to Engineered Media (0 -100)	80.00
Inflow Hydrograph Peak to Average Flow Ratio	3.80
Number of Devices in Source Area or Upstream Drainage System	1

Activate Pipe or Box Storage — Pipe — Box

Diameter (ft)	
Length (ft)	
Within Biofilter (check if Yes)	
Perforated (check if Yes)	
Bottom Elevation (ft above datum)	
Discharge Orifice Diameter (ft)	

Select Native Soil Infiltration Rate

- Sand - 8 in/hr
- Loamy sand - 2.5 in/hr
- Sandy loam - 1.0 in/hr
- Loam - 0.5 in/hr
- Silt loam - 0.3 in/hr
- Sandy silt loam - 0.2 in/hr
- Clay loam - 0.1 in/hr
- Silty clay loam - 0.05 in/hr
- Sandy clay - 0.05 in/hr
- Silty clay - 0.04 in/hr
- Clay - 0.02 in/hr
- Rain Barrel/Cistern - 0.00 in/hr

Use Random Number Generation to Account for Infiltration Rate Uncertainty

Copy Biofilter Data

Paste Biofilter Data

Estimated Surface Drain Time = 3.33 hrs.

Add **Sharp Crested Weir**

Weir Length (ft)	
Height from datum to bottom of weir opening (ft)	

Remove **Broad Crested Weir-Reqrd**

Weir crest length (ft)	10.00
Weir crest width (ft)	5.00
Height from datum to bottom of weir opening (ft)	3.50

Add **Vertical Stand Pipe**

Pipe diameter (ft)	
Height above datum (ft)	

Add **Surface Discharge Pipe**

Pipe Diameter (ft)	
Invert elevation above datum (ft)	
Number of pipes at invert elev.	

Remove **Drain Tile/Underdrain**

Pipe Diameter (ft)	0.50
Invert elevation above datum (ft)	0.50
Number of pipes at invert elev.	1

Add **Other Outlet**

Stage Number	Stage (ft)	Other Outflow Rate (cfs)
1		
2		
3		
4		
5		

Add **Evapotranspiration**

Soil porosity (saturation moisture content, 0-1)	
Soil field moisture capacity (0-1)	
Permanent wilting point (0-1)	
Supplemental irrigation used?	☐
Fraction of available capacity when irrigation starts (0-1)	
Fraction of available capacity when irrigation stops (0-1)	

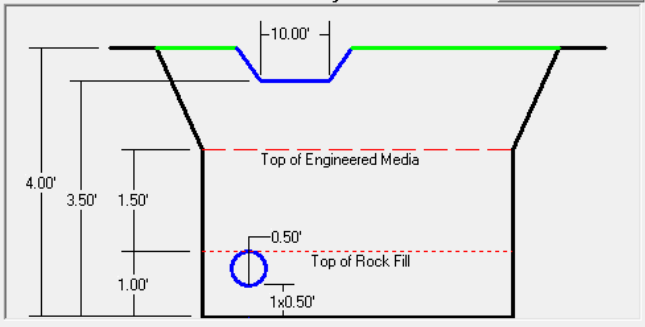
Evaporation Add

Month	Evapotrans-piration (in/day)	Evaporation (in/day)
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		
Nov		
Dec		

Plant Types

	1	2	3	4
Fraction of biofilter that is vegetated				
Plant type				
Root depth (ft)				
ET Crop Adjustment Factor				

Biofilter Geometry Schematic — Refresh Schematic

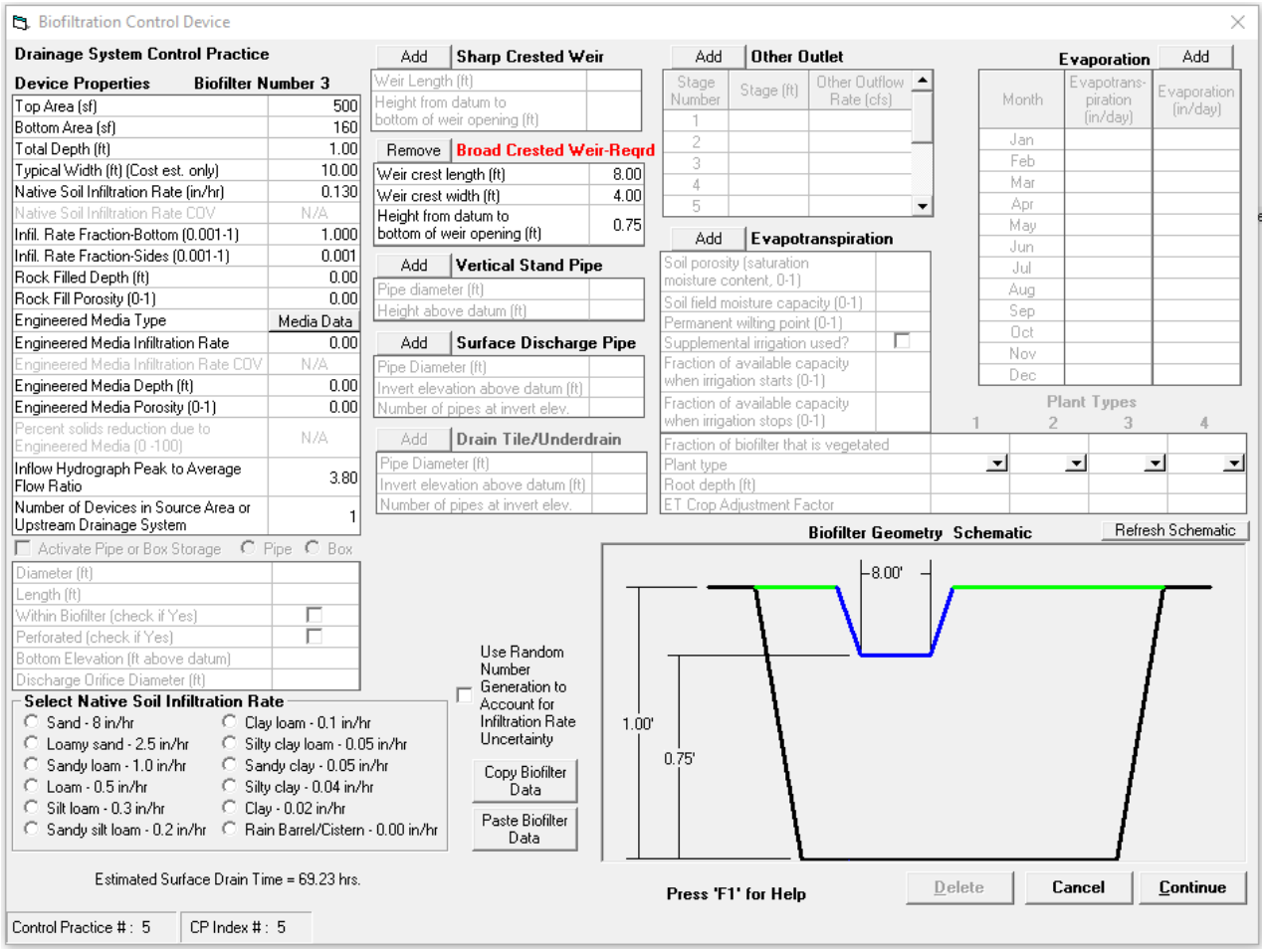


Press 'F1' for Help

Delete — Cancel — Continue

Control Practice # : 4 — CP Index # : 4

N. Rain Garden



Data file name: W:\Projects\ES-10-23\Stormwater\Proposed Option 2.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.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:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/15 End of Winter Season: 03/28
Date: 11-22-2024 Time: 09:28:25
Site information:

Pre-Development Area Description	Pre-Development Area (ac)	Pre-Development CN
	1.828	66
Total Area (ac)/Composite CN	1.828	66

LU# 1 - Residential: To Pond Total area (ac): 0.956
1 - Roofs 1: 0.208 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
25 - Driveways 1: 0.207 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
26 - Driveways 2: 0.050 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.011 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.432 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
70 - Water Body Areas: 0.048 ac. Source Area PSD File:

LU# 2 - Residential: 7S To City Storm Total area (ac): 0.132
25 - Driveways 1: 0.055 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.004 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.073 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 3 - Residential: To Southwest Biofilter Total area (ac): 0.112
1 - Roofs 1: 0.053 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

45 - Large Landscaped Areas 1: 0.059 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Residential: To Filter Strip Total area (ac): 0.253
31 - Sidewalks 1: 0.003 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.250 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 5 - Residential: To Southeast Biofilter Total area (ac): 0.112
1 - Roofs 1: 0.053 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.059 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 6 - Residential: To North Rain Garden Total area (ac): 0.161
1 - Roofs 1: 0.063 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
31 - Sidewalks 1: 0.003 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.095 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 7 - Residential: To S Swale Total area (ac): 0.118
45 - Large Landscaped Areas 1: 0.118 ac. Normal Silty Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 8 - Residential: 7S to N. Filter Strip Total area (ac): 0.142
25 - Driveways 1: 0.031 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
45 - Large Landscaped Areas 1: 0.111 ac. Normal Sandy Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

Control Practice 1: Wet Detention Pond CP# 1 (DS) - DS Wet Pond # 1
Particle Size Distribution file name: Not needed - calculated by program
Initial stage elevation (ft): 3.5
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): 0.12
2. Number of orifices: 1
3. Invert elevation above datum (ft): 3.5

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 20
2. Weir crest width (ft): 10
3. Height from datum to bottom of weir opening: 6

Outlet type: Vertical Stand Pipe

1. Stand pipe diameter (ft): 4
2. Stand pipe height above datum (ft): 5.5

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	0.0008	0.00	0.00
2	1.00	0.0038	0.00	0.00
3	2.00	0.0087	0.00	0.00
4	2.50	0.0119	0.00	0.00
5	3.00	0.0334	0.00	0.00
6	3.50	0.0700	0.00	0.00
7	4.00	0.0845	0.00	0.00
8	5.00	0.1148	0.00	0.00
9	6.00	0.1469	0.00	0.00
10	7.00	0.1786	0.00	0.00

Control Practice 2: Filter Strip CP# 1 (DS) - DS Filter Strips # 2

Total drainage area (acres)= 0.253
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 475.0
Effective flow length (ft) = 25
Infiltration rate (in/hr)= 0.035
Typical longitudinal slope (ft.H/ft.V) = 0.150
Typical grass height (in) = 6.0
Swale retardance factor = C
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

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

1. Top area (square feet) = 1590
2. Bottom aea (square feet) = 365
3. Depth (ft): 4
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.13
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) 1

10. Porosity of rock filled volume = 0.33
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 1.5
13. Engineered soil porosity = 0.27
14. Percent solids reduction due to flow through engineered soil = 80
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

User-Defined Soil Type 1.000

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 5
3. Height of datum to bottom of weir opening: 3.5

Outlet type: Drain Tile/Underdrain

1. Underdrain outlet diameter (ft): 0.5
2. Invert elevation above datum (ft): 0.5
3. Number of underdrain outlets: 1

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

1. Top area (square feet) = 1530
2. Bottom aea (square feet) = 440
3. Depth (ft): 4
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.07
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) 1
10. Porosity of rock filled volume = 0.33
11. Engineered soil infiltration rate: 3.6
12. Engineered soil depth (ft) = 1.5
13. Engineered soil porosity = 0.27
14. Percent solids reduction due to flow through engineered soil = 80
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

User-Defined Soil Type 1.000

Biofilter Outlet/Discharge Characteristics:

Outlet type: Broad Crested Weir

1. Weir crest length (ft): 10
2. Weir crest width (ft): 5
3. Height of datum to bottom of weir opening: 3.5

Outlet type: Drain Tile/Underdrain

1. Underdrain outlet diameter (ft): 0.5
2. Invert elevation above datum (ft): 0.5
3. Number of underdrain outlets: 1

Control Practice 5: Biofilter CP# 3 (DS) - Rain Garden

1. Top area (square feet) = 500
2. Bottom aea (square feet) = 160
3. Depth (ft): 1
4. Biofilter width (ft) - for Cost Purposes Only: 10
5. Infiltration rate (in/hr) = 0.13
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): 8
2. Weir crest width (ft): 4
3. Height of datum to bottom of weir opening: 0.75

Control Practice 6: Grass Swale CP# 1 (DS) - S Swale

Total drainage area (acres)= 0.118
Fraction of drainage area served by swales (ac) = 1.00
Swale density (ft/ac) = 3145.04
Total swale length (ft) = 412
Average swale length to outlet (ft)= 412
Typical bottom width (ft) = 10.0
Typical swale side slope (_H:1V) = 3.0
Typical longitudinal slope (ft.H/ft.V) = 0.014
Swale retardance factor: D
Typical grass height (in) = 10.0
Swale dynamic infiltration rate (in/hr)= 0.065
Typical swale depth (ft) for cost analysis (optional) = 0.0
Particle size distribution file name: Not needed - calculated by program
Use total swale length instead of swale density for infiltration calculations: True

Control Practice 7: Filter Strip CP# 2 (DS) - DS Filter Strips # 1
Total drainage area (acres)= 0.142
Fraction of drainage area served by filter strips (ac) = 1.00
Total filter strip width (ft) = 160.0
Effective flow length (ft) = 22
Infiltration rate (in/hr)= 0.035
Typical longitudinal slope (ft.H/ft.V) = 0.045
Typical grass height (in) = 6.0
Swale retardance factor = B
Use stochastic analysis to determine infiltration rate: False
Infiltration rate coeficient of variation (COV) = 0.00
Particle size distribution file name: Not needed - calculated by program
Surface Clogging Load (lbs/sf) = 3.50

SLAMM for Windows Version 10.4.1

Data file name: W:\Projects\ES-10-23\Stormwater\Proposed Option 2.mdb
WinSLAMM Version 10.4.1
Rain file name: C:\WinSLAMM Files\Rain Files\WI Milwaukee 69.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:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/15 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 11-22-2024 Time of run: 09:25:53
Total Area Modeled (acres): 1.986
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:	72706	-	83.12	377.3	-
Outfall Total with Controls:	58734	19.22%	20.52	75.24	80.06%
Annualized Total After Outfall Controls:	59550			76.29	

Appendix F

Storm Sewer Sizing Calculations

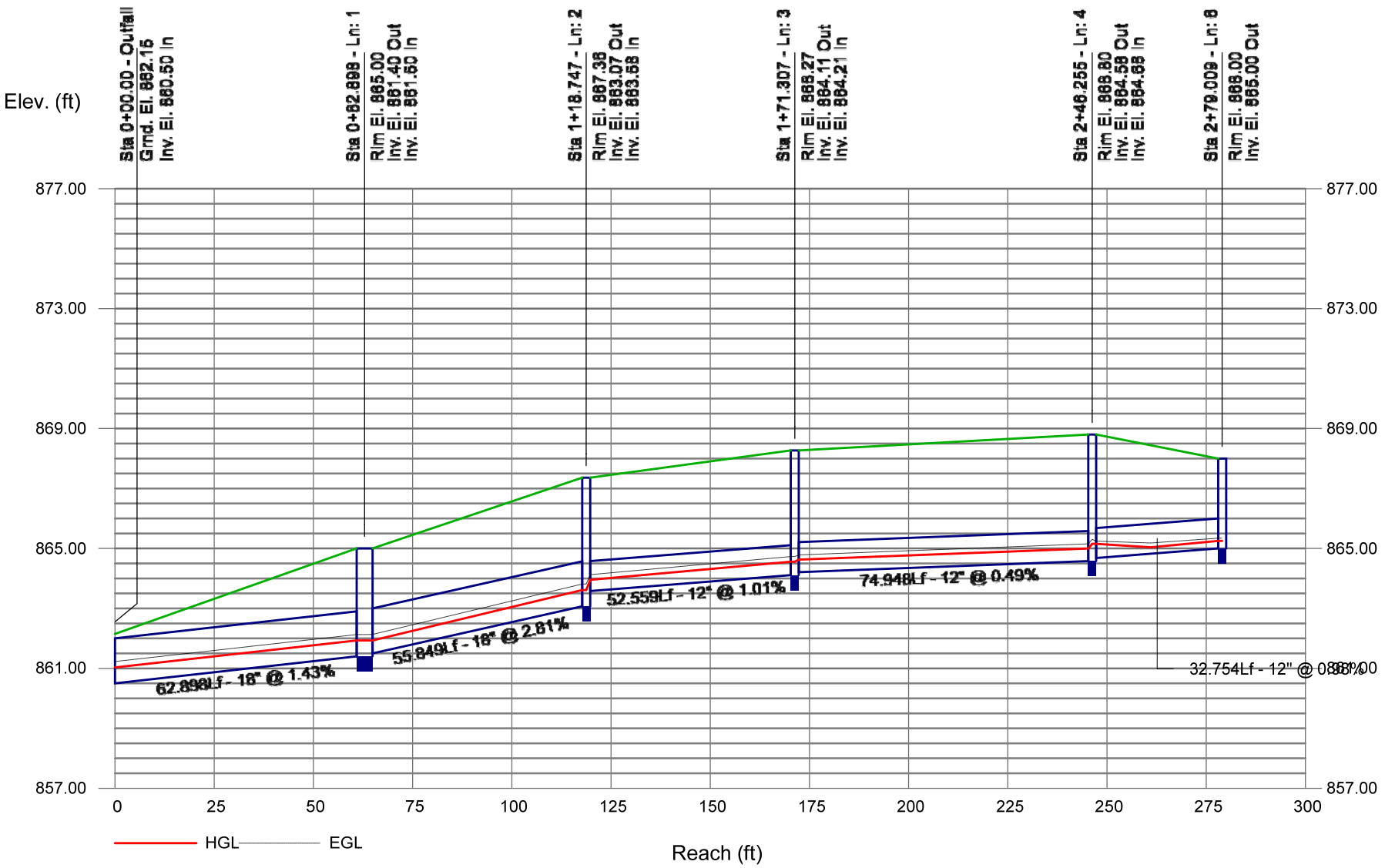
PARISH SURVEY & ENGINEERING
122 Wisconsin Street | West Bend, WI 53095
www.parishse.com

Line	To Line	Line Length	Incr. Area	Total Area	Runoff Coeff.	Incr C x A	Total C x A	Inlet Time	Time Conc	Rnfal Int	Total Runoff	Adnl Flow	Total Flow	Capac Full	Veloc	Pipe Size	Pipe Slope
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/ hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/ s)	(in)	(%)
1	Outfall	62.898	0.00	0.71	0.50	0.00	0.36	6.0	9.4	5.6	2.00	0.00	2.00	13.61	3.57	18	1.43
2	1	55.849	0.33	0.71	0.50	0.17	0.36	6.0	8.6	5.8	2.07	0.00	2.07	19.07	4.25	18	2.81
3	2	52.559	0.07	0.38	0.50	0.04	0.19	6.0	8.1	6.0	1.14	0.00	1.14	3.87	3.81	12	1.01
4	3	74.948	0.09	0.31	0.50	0.05	0.16	6.0	7.1	6.3	0.98	0.00	0.98	2.71	3.16	12	0.49
5	4	15.833	0.11	0.11	0.50	0.06	0.06	6.0	6.0	6.8	0.37	0.00	0.37	5.48	1.71	12	2.02
6	4	32.754	0.11	0.11	0.50	0.06	0.06	6.0	6.0	6.8	0.37	0.00	0.37	3.81	1.71	12	0.98

Line	Inv Elev Dn	Inv Elev Up	HGL Dn	HGL Up	Gmd/ Rim Dn	Gmd/ Rim Up	Line ID
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	860.50	861.40	861.03	861.93	862.15	865.00	Pipe - (18)
2	861.50	863.07	861.93	863.61	865.00	867.36	Pipe - (17)
3	863.58	864.11	863.95	864.56	867.36	868.27	Pipe - (16) (1)
4	864.21	864.58	864.63	865.00	868.27	868.80	Pipe - (20)
5	864.68	865.00	865.15	865.25	868.80	868.00	Pipe - (4)
6	864.68	865.00	865.15	865.25	868.80	868.00	Pipe - (21)

Storm Sewer Profile

Proj. file: Middle Biofilters.stm

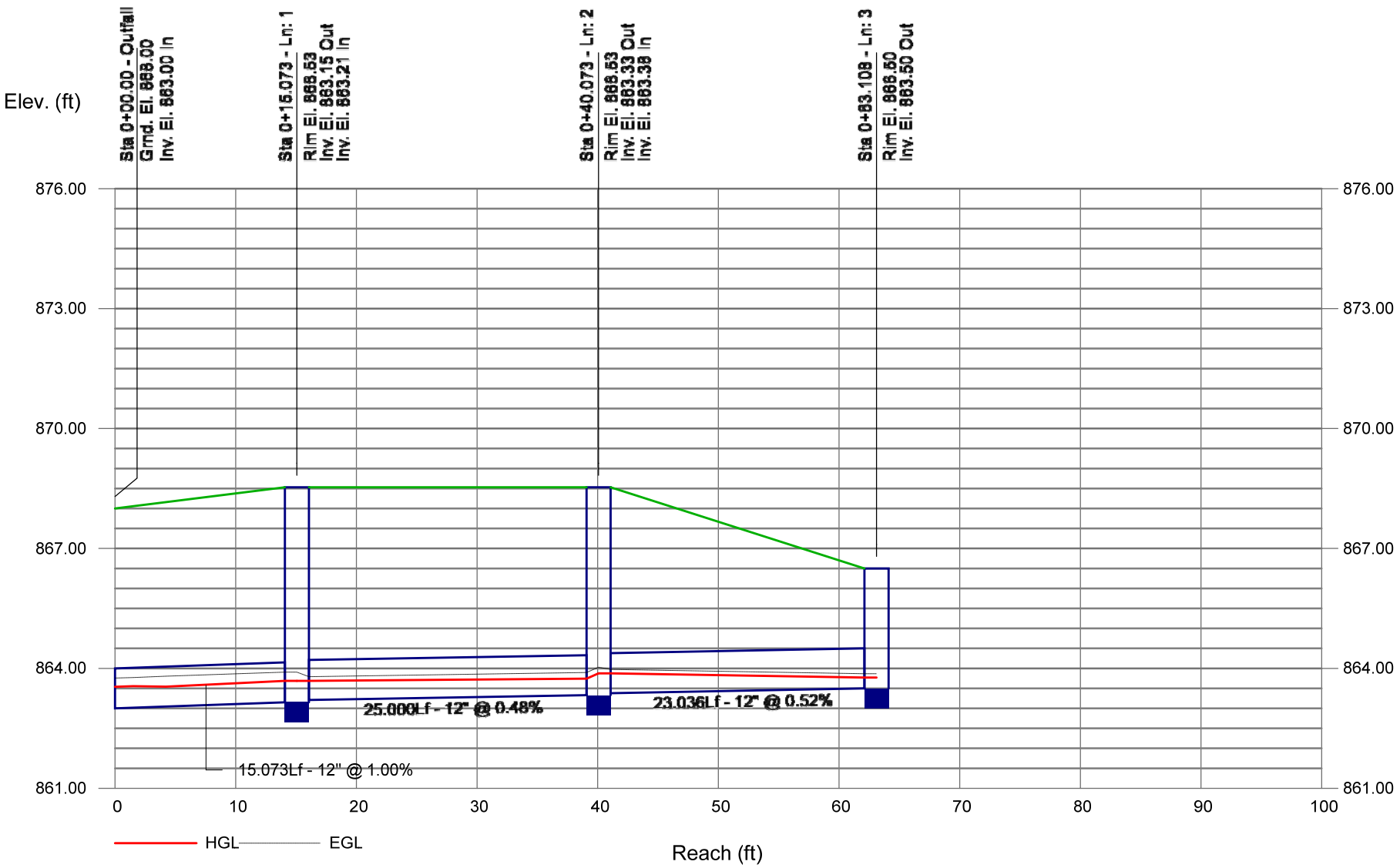


Line	To Line	Line Length	Incr. Area	Total Area	Runoff Coeff.	Incr C x A	Total C x A	Inlet Time	Time Conc	Rnfal Int	Total Runoff	Adnl Flow	Total Flow	Capac Full	Veloc	Pipe Size	Pipe Slope
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/ hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/ s)	(in)	(%)
1	Outfall	15.073	0.21	0.68	0.50	0.11	0.25	6.0	7.0	6.4	1.61	0.00	1.61	3.85	3.73	12	1.00
2	1	25.000	0.17	0.47	0.50	0.09	0.15	6.0	6.7	6.5	0.96	0.00	0.96	2.67	2.86	12	0.48
3	2	23.036	0.30	0.30	0.21	0.06	0.06	6.0	6.0	6.8	0.43	0.00	0.43	2.78	1.80	12	0.52

Line	Inv Elev Dn	Inv Elev Up	HGL Dn	HGL Up	Gmd/ Rim Dn	Gmd/ Rim Up	Line ID
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	863.00	863.15	863.54	863.69	0.00	868.53	Pipe - (75)
2	863.21	863.33	863.69	863.74	868.53	868.53	Pipe - (76)
3	863.38	863.50	863.88	863.77	868.53	866.50	Pipe - (10)

Storm Sewer Profile

Proj. file: Road Crossing.stm

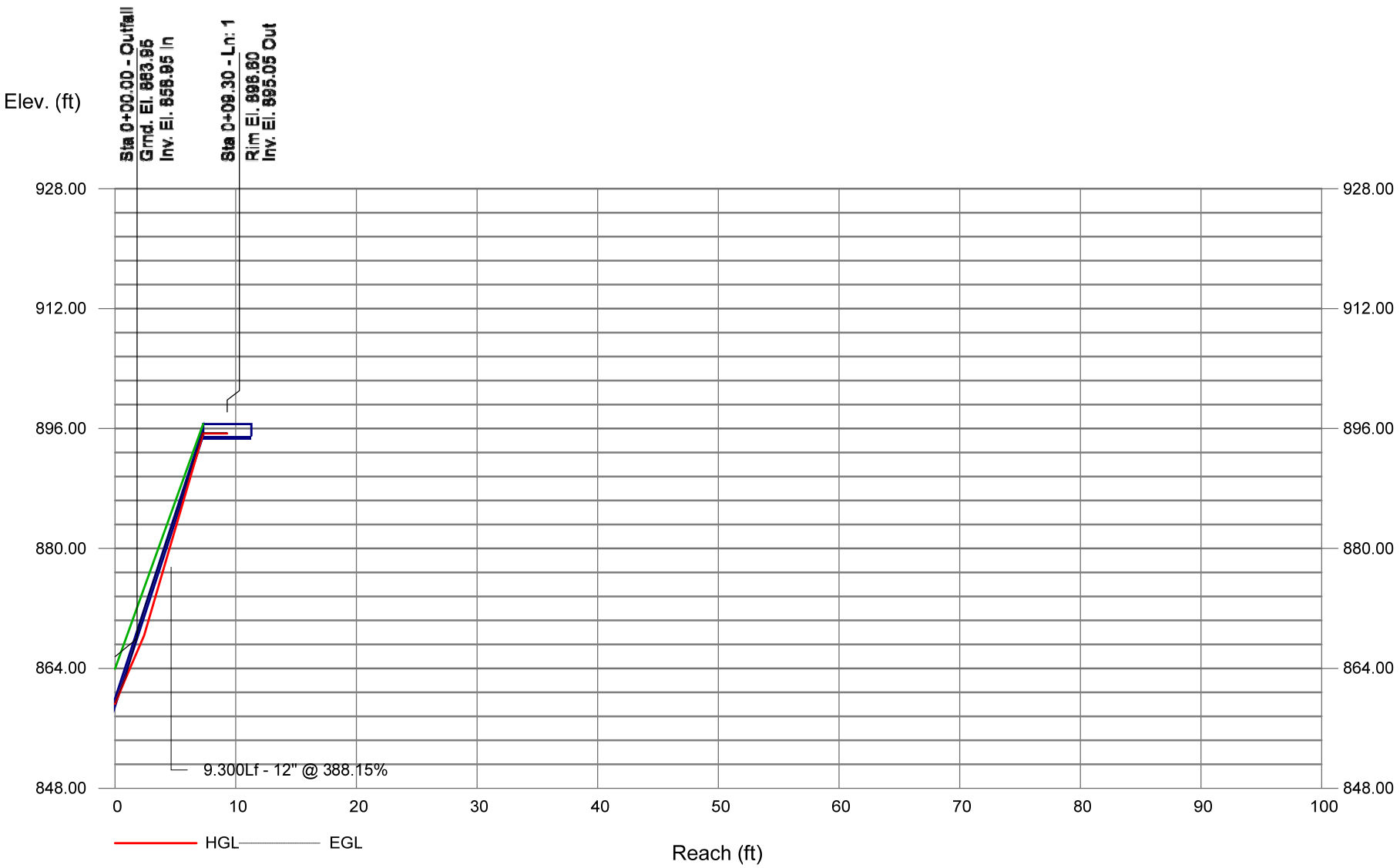


Line	To Line	Line Length	Incr. Area	Total Area	Runoff Coeff.	Incr C x A	Total C x A	Inlet Time	Time Conc	Rnfal Int	Total Runoff	Adnl Flow	Total Flow	Capac Full	Veloc	Pipe Size	Pipe Slope
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/ hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/ s)	(in)	(%)
1	Outfall	9.300	0.15	0.15	0.50	0.08	0.08	6.0	6.0	6.8	0.51	0.00	0.51	76.01	2.60	12	388.15

Line	Inv Elev Dn	Inv Elev Up	HGL Dn	HGL Up	Gmd/ Rim Dn	Gmd/ Rim Up	Line ID
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	858.95	895.05	859.25	895.35	0.00	896.60	Pipe - (53)

Storm Sewer Profile

Proj. file: West Catch Basin.stm



Appendix G

Stormwater Maintenance Agreements

PARISH SURVEY & ENGINEERING

122 Wisconsin Street | West Bend, WI 53095
www.parishse.com

Storm Water Management Practice Maintenance Agreement

Document Number:

St. Paul Rental Properties LLC as "Owner" of the property described below, in accordance with Chapter 32 City of Waukesha Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The owner further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by the City of Waukesha, for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Owner showing design and construction details. The addendum(s) may contain several additional exhibits, including certification of City of Waukesha of Storm Water and Erosion Control Permit termination, as described below.

Return Address:
St Paul Rental Properties LLC
P.O. Box 375
Waukesha, WI 53187

City of Waukesha
201 Delafield Street
Waukesha, WI 53188

PIN: TBD with new CSM.

Through this Agreement, the Owner hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Owner shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water and Erosion Control Permit termination by the City of Waukesha in accordance with Chapter 32 of the City Code of Ordinances.
2. After Storm Water and Erosion Control Permit termination under 1., the current Owner(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
3. The Owner(s) shall, at their own cost, complete inspections of the storm water management practices at the time intervals listed in Exhibit C, and conduct the inspections by a a qualified professional, file the reports with the City of Waukesha after each inspection and complete any maintenance or repair work recommended in the report. The Owner(s) shall be liable for the failure to undertake any maintenance or repairs. After the work is completed by the Contractor, the qualified professional shall verify that the work was properly completed and submit the follow-up report to the City within 30 days.
4. In addition, and independent of the requirements under paragraph 3 above, the City of Waukesha, or its designee, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with the intent of this Agreement and the activities prescribed in Exhibit C. The City of Waukesha may require work to be done which differs from the report described in paragraph 3 above, if the City of Waukesha reasonably concludes that such work is necessary and consistent with the intent of this agreement. Upon notification by the City of Waukesha of required maintenance or repairs, the Owner(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Waukesha.
5. If the Owner(s) do not complete an inspection under 3. above or required maintenance or repairs under 4. above within the specified time period, the City of Waukesha is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Waukesha, no notice shall be required prior to the City of Waukesha performing emergency maintenance or repairs. The City of Waukesha may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. or subch. VII of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Owner records the addendum noted above, the City of Waukesha shall have the sole authority to modify this agreement upon a 30-day notice to the current Owner(s).

Dated this ___ day of _____, 202_.

Owner: St. Paul Rental Properties LLC

_____
Signature

_____
Name Print

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ____ day of _____, 202_, the above named ___ _____ _____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
Name:
Notary Public, Waukesha County, WI
My commission expires:_____.

This document was drafted by:

McKenzie Swartwout, PE

Parish Survey & Engineering, LLC

For Certification Stamp

City of Waukesha Common Council Approval

Dated this ___ day of _____, 202_.

_____
Shawn N. Reilly, Mayor

_____
Anthony Brown, Interim City Clerk

Acknowledgements

State of Wisconsin:
County of Waukesha

Personally came before me this ___ day of _____, 202_, the above named _____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
Name:
Notary Public, Waukesha County, WI
My commission expires:_____.

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Waukesha County Register of Deeds office.

Project Identifier: **Hawk's Landing Condominiums** Acres**: 3.69**
Date of Recording:
Map Produced By: **Parish Survey & Engineering, LLC, 122 Wisconsin Street, West Bend, WI**
Legal Description: **TBD with new CSM.**

Hawk's Landing Condominiums

Drainage Easement Restrictions: Highlighted areas on map indicates a drainage easement for storm water collection, conveyance and treatment. These areas also include the access easement, minimum of 15-feet-wide. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt storm water flows in any way. See Exhibit C for specific maintenance requirements for storm water management practices within this area. See subdivision plat for details on location.

N

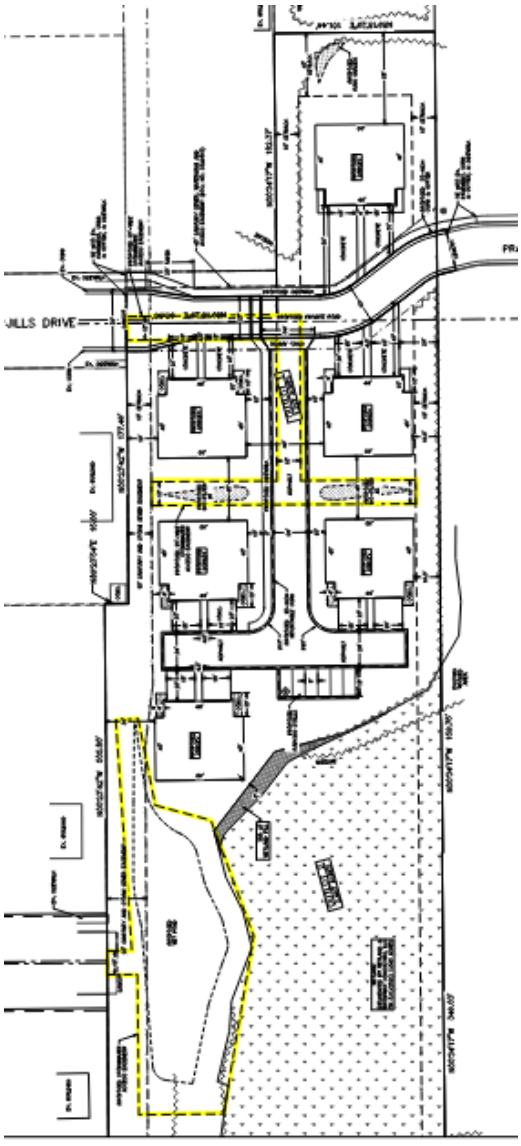
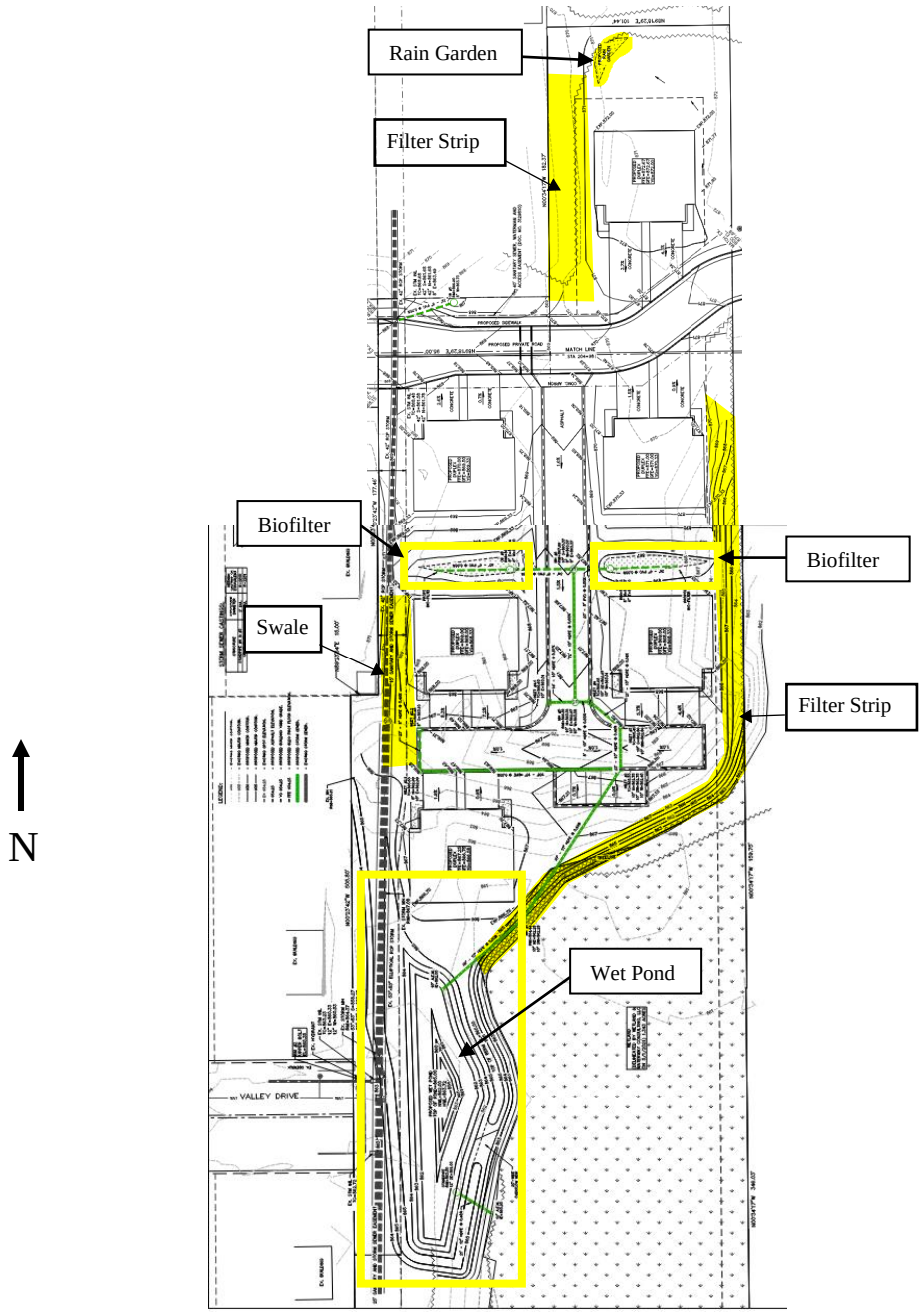


Exhibit B - Location Map
Storm Water Management Practices Covered by this Agreement

The storm water management practices covered by this Agreement are depicted in the reduced copy of a portion of the construction plans, as shown below. The practices include one wet detention basin, two biofilters, one rain garden,and all associated pipes, earthen berms, and other components of these practices. All of the noted storm water management practices are located within a drainage easement, as noted in Exhibit A.

Subdivision Name**:** **Hawk's Landing Condominiums**
Storm water Practices**:** **Wet Detention Basin (1), Biofilters (2), Rain Garden (1)**
Location of Practices**:** **TBD with new CSM.**

Figure 1
Plan View of Storm Water Practices



Maintenance Provisions for Stormwater BMPs

System Description:
Infiltration basins are designed to reduce runoff volumes from a site after development by intercepting the runoff and allowing it to slowly seep (infiltrate) into the underlying soil and groundwater. Most are designed to infiltrate the first 1/2" to 1" of runoff in an attempt to meet average annual predevelopment runoff volumes.

The stormwater BMPs have been designed to reduce peak flows by temporarily detaining runoff from larger storms and releasing it through outlet pipes or other controlled discharge devices. Pretreatment of the runoff is often provided for infiltration devises to reduce sedimentation in the basin and prevent the risk of groundwater pollution.

Minimum Maintenance Requirements:

Rain Garden & Bio-Filters
To ensure the proper function of storm water rain garden and bio-filter basins, the following list of maintenance activities are recommended:

1. A minimum of 70% soil cover made up of native grasses must be maintained on the basin bottom to ensure infiltration rates. Periodic burning or mowing is recommended to enhance establishment of the prairie grasses (which may take 2-3 years) and maintain the minimum native cover. To reduce competition from cool season grasses (bluegrass, fescues, quack, etc.) and other weeds:
    - For the first year, cut to a 6" height three times – once each in June, July and early August. To prevent damage to the native grasses, do not mow below a 6" height. Remove excessive accumulation of clippings to avoid smothering next year's seedlings.
    - After the first year, mowing may only be needed in early June each year to help control the spread of cool season plants. The mowing should also be raised to 10-12" to avoid damage to the warm season plants.
    - Burning may also be used to manage weeds in 2-5 years intervals. Late spring burns (mid-late May) provide maximum stimulus to warm season grasses and work well to control cool season grasses. Burn when the cool season grasses are growing and the warm season plants are just barely starting to grow to get maximum control of cool season species.
    - Any major bare areas or areas taken over by nonnative species must be reseeded. To clear area of weeds and cool season grasses, treat with an herbicide that contains glysophosphate in accordance with manufacture's instructions. Ensure a firm seedbed is prepared to a depth of 3 inches (a roller is recommended). Seeding should occur in early-mid June. Seed with Big Bluestem, Indian Grass, Little Blue Stem or Switchgrass (preferably an equal mix of all four types). A companion crop of oats is recommended. Seed must be placed at a depth of 1/4 – 1/2" and a minimum rate of 1/4 pound per 100 square feet. If broadcast seeding by hand, drag leaf rake over soil surface after seeding. Then roll it again and cover with a light layer of mulch and staked erosion control netting to hold it in place until germination. For other planting details, see NRCS standard 342 (Critical Area Planting).
2. Invasive plant and animal species shall be managed in compliance with Wisconsin Administrative Code Chapter NR 40. This may require eradication of invasive species in some cases.
3. The basin and all components (grass swales, forebay, inlets, outlets, etc.) should be inspected after each heavy rain, but at a minimum of once per year. If the basin is not draining properly (within 72 hours), further inspection may be required by persons with expertise in storm water management and/or soils.
    - If soil testing shows that the soil surface has become crusted, sealed or compacted, some deep tillage should be performed. Deep tillage will cut through the underlying soils at a 2-3 foot depth, loosening the soil and improving infiltration rates, with minimal disturbance of the surface vegetation. Types of tillage equipment that can be used include a subsoiler or straight, narrow-shanked chisel plow.

- If sedimentation is determined to be causing the failure, the accumulated sediment must be removed and the area reseeded in accordance with the notes above.
- If inspection of the monitoring well shows that groundwater is regularly near the surface, additional design features may need to be considered, such as subsurface drainage or conversion to a wetland treatment system.
- If the washed stone trench has become clogged, the stone – and possibly the soil immediately around the stone - must be replaced.

4. All outlet pipes, stone trenches and other flow control devices must be kept free of debris. Any blockage must be removed immediately.
5. Any eroding areas must be repaired immediately to prevent premature sediment build-up in the system. Erosion matting is recommended for repairing grassed areas.
6. Heavy equipment and vehicles must be kept off of the bottom and side slopes of infiltration basins to prevent soil compaction. Soil compaction will reduce infiltration rates and may cause failure of the basin, resulting in ponding and possible growth of wetland plants.
7. No trees are to be planted or allowed to grow on the earthen berms of the bottom of the basin. On the berms, tree root systems can reduce soil compaction and cause berm failure. On the basin bottom, trees may shade out the native grasses. The basin must be inspected annually and any woody vegetation removed.
8. Grass swales leading to the basin shall be preserved to allow free flowing of surface runoff in accordance with approved grading plans. No buildings or other structures are allowed in these areas. No grading or filling is allowed that may interrupt flows in any way.
9. If floating algae or weed growth becomes a nuisance in the forebay (decay odors, etc.), it must be removed and deposited where it cannot drain back into the basin or forebay. Removal of the vegetation from the water reduces regrowth the following season (by harvesting the nutrients). Wetland vegetation must be maintained along the waters edge for safety and pollutant removal purposes.
10. When sediment in the forebay has accumulated to an elevation of three feet below the outlet elevation, it must be removed (refer to figure). All removed sediment must be placed in an appropriate upland disposal site and stabilized (grass cover) to prevent sediment from washing back into the basin. Failure to remove sediment from the forebays will cause resuspension of previously trapped sediments and increase deposition in the infiltration basin.
11. No grading or filling of the basin or berms other than for sediment removal is allowed.
12. Periodic mowing of the grass swales will encourage rigorous grass cover and allow better inspections for erosion. Waiting until after August 1 will avoid disturbing nesting wildlife. Mowing around forebay may attract nuisance populations of geese to the property and is not necessary or recommended.
13. Any other repair or maintenance needed to ensure the continued function of the infiltration basin as ordered by the City of Waukesha under the provisions listed on page 1 of this Agreement.
14. The titleholder(s) or their designee must document all inspections as specified above. Documentation shall include as a minimum: (a) Inspectors Name, Address and Telephone Number, (b) Date of Inspections, (c) Condition Report of the Storm Water Management Practice, (d) Corrective Actions to be Taken and Time Frame for Completion, (e) Follow-up Documentation after Completion of the Maintenance Activities. All documentation is to be delivered to the attention of the City Engineer at the City of Waukesha Engineering Department on January 10th and July 10th each year.

<u>Wet Pond</u>

All components of the stormwater management system shall be inspected at least semiannually in early spring and early autumn or more frequently as described below. Repairs will be made whenever the performance of the system is compromised as described below.

1. Vegetation
   - Turf along the side slopes and top of containment berms for the detention pond shall be watered as needed during first growing season.

- Woody vegetation (trees and shrubs) shall not be allowed to grow within the detention pond and shall be removed when discovered.
- After initial establishment of vegetation, any area in excess of 1 square foot where vegetation has died or is missing shall be revegetated.

2. Earthworks
   - Side slope areas of the detention pond shall be inspected for occurrences of erosion and slumping of bank material. Evidences of failure will require regrading and stabilization.
3. Inlet and outlet structures.
   - These types of structures shall be inspected monthly for obstructions that may reduce their hydraulic capacity. Structure openings should immediately be cleared of any accumulated debris. Debris should be properly disposed of outside of stormwater storage areas. Evidence of structural or foundation material failure should be repaired immediately.
4. Trash and Debris
   - The stormwater pond shall be inspected monthly for trash and debris. Trash and debris shall be properly disposed of outside of stormwater storage areas
5. Pond Storage Volume
   - The owner shall complete an 'as-built' survey of the pond at the time that the site is substantially stabilized. The survey shall be sufficient to determine the as-built volume of the pond permanent pool and live storage areas. Additionally, the survey shall identify the pond average bottom elevation and at least two full depth cross-sections. If the pond does not substantially conform to the approved design the pond shall be modified until it conforms to the approved plan and meets the approval of the City engineer.
   - Every 10 years after the pond's initial construction, and any time ownership of the property where the pond is located is sold, the pond shall be surveyed in accordance with the previous paragraph. This survey shall be provided to the City engineer. If accumulated sediment has resulted in any portion of the 'sediment storage area' (those areas beyond any safety shelf) to be within three (3) feet of the normal pool elevation the pond shall be dredged to restore the original planned sediment storage volume. The City engineer shall be notified at least two weeks in advance of any scheduled dredging and shall be notified again on the day that dredging is to occur. Record of the dredging including documentation of sediment volumes removed shall be provided to the City engineer within one month of completion of dredging.
   - The City engineer may adjust the required time interval (longer or shorter) between scheduled surveys depending upon the observed rate of sediment accumulation within the pond.

The owner shall maintain records of the dates and findings of inspections of the stormwater management system and the cleaning and replacement of system components. The owner shall provide copies of all records to the City upon request.

Applications of fertilizers are prohibited for areas below the top of slope of the wet pond.