

## **Bulrush Post-Development**

Prepared by Horizons Engineering

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### **Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 5122 ME York

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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.322	39	>75% Grass cover, Good, HSG A (S12)
0.288	98	Paved parking, HSG A (S10, S12)
0.180	98	Roofs, HSG A (S11)
<b>0.790</b>	<b>74</b>	<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.790	HSG A	S10, S11, S12
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
<b>0.790</b>		<b>TOTAL AREA</b>

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## Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.322	0.000	0.000	0.000	0.000	0.322	>75% Grass cover, Good	S12
0.288	0.000	0.000	0.000	0.000	0.288	Paved parking	S10, S12
0.180	0.000	0.000	0.000	0.000	0.180	Roofs	S11
<b>0.790</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.790</b>	<b>TOTAL AREA</b>	

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## Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	S12	0.00	0.00	50.0	0.0100	0.010	0.0	15.0	0.0
2	P1	38.00	37.00	40.0	0.0250	0.012	0.0	6.0	0.0

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NRCC 24-hr D 25-Year Rainfall=6.05"

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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

**SubcatchmentS10: Parking Lot** Runoff Area=10,925 sf 100.00% Impervious Runoff Depth>5.11"  
Tc=6.0 min CN=98 Runoff=1.33 cfs 0.107 af

**SubcatchmentS11: Roof** Runoff Area=7,850 sf 100.00% Impervious Runoff Depth>5.11"  
Tc=5.0 min CN=98 Runoff=0.99 cfs 0.077 af

**SubcatchmentS12: Landscaped Area** Runoff Area=15,625 sf 10.28% Impervious Runoff Depth>0.66"  
Flow Length=286' Tc=12.4 min CN=45 Runoff=0.16 cfs 0.020 af

**Pond P1: Drywell** Peak Elev=38.32' Storage=1,579 cf Inflow=1.33 cfs 0.107 af  
Discarded=0.07 cfs 0.076 af Primary=0.25 cfs 0.011 af Outflow=0.32 cfs 0.087 af

**Pond P2: Dripline Filter** Peak Elev=42.51' Storage=651 cf Inflow=0.99 cfs 0.077 af  
Discarded=0.14 cfs 0.073 af Primary=0.45 cfs 0.004 af Outflow=0.58 cfs 0.077 af

**Link PO1: POI#1** Inflow=0.60 cfs 0.034 af  
Primary=0.60 cfs 0.034 af

**Total Runoff Area = 0.790 ac Runoff Volume = 0.203 af Average Runoff Depth = 3.09"**  
**40.75% Pervious = 0.322 ac 59.25% Impervious = 0.468 ac**

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## Summary for Subcatchment S10: Parking Lot

Runoff = 1.33 cfs @ 12.13 hrs, Volume= 0.107 af, Depth> 5.11"

Routed to Pond P1 : Drywell

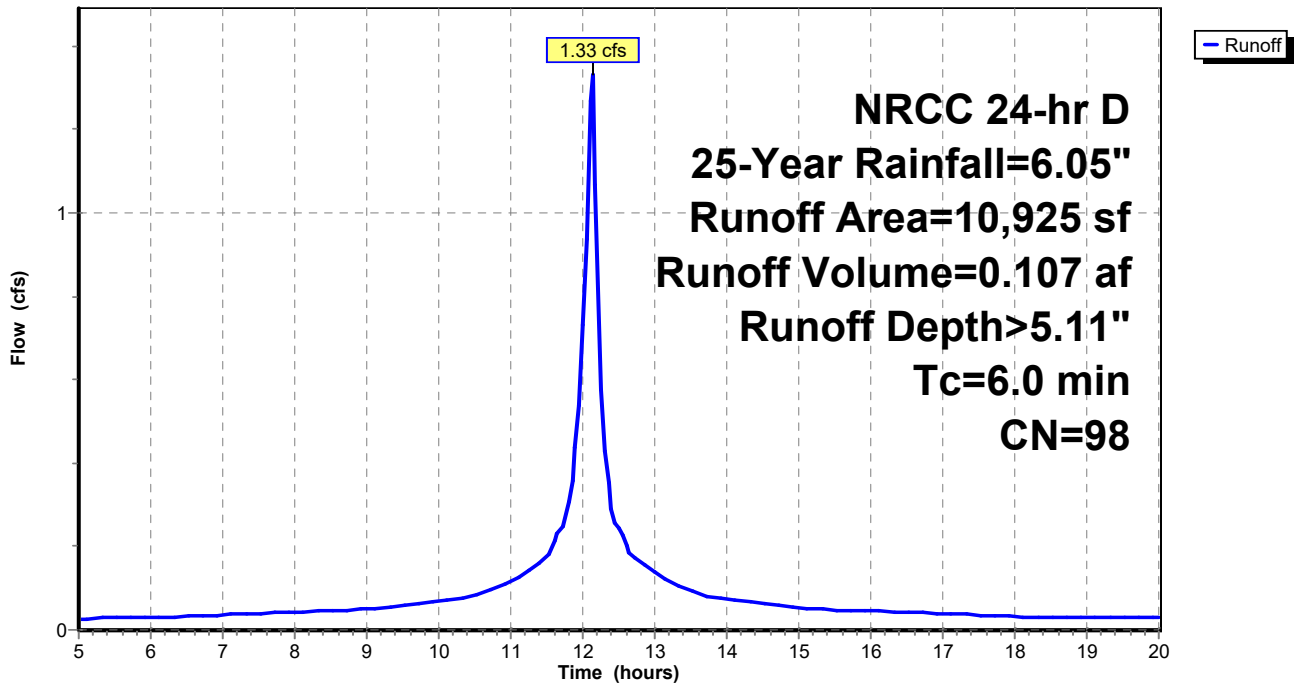
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 25-Year Rainfall=6.05"

Area (sf)	CN	Description
10,925	98	Paved parking, HSG A
10,925		100.00% Impervious Area

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

## Subcatchment S10: Parking Lot

Hydrograph





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## Summary for Subcatchment S11: Roof

Runoff = 0.99 cfs @ 12.11 hrs, Volume= 0.077 af, Depth> 5.11"

Routed to Pond P2 : Dripline Filter

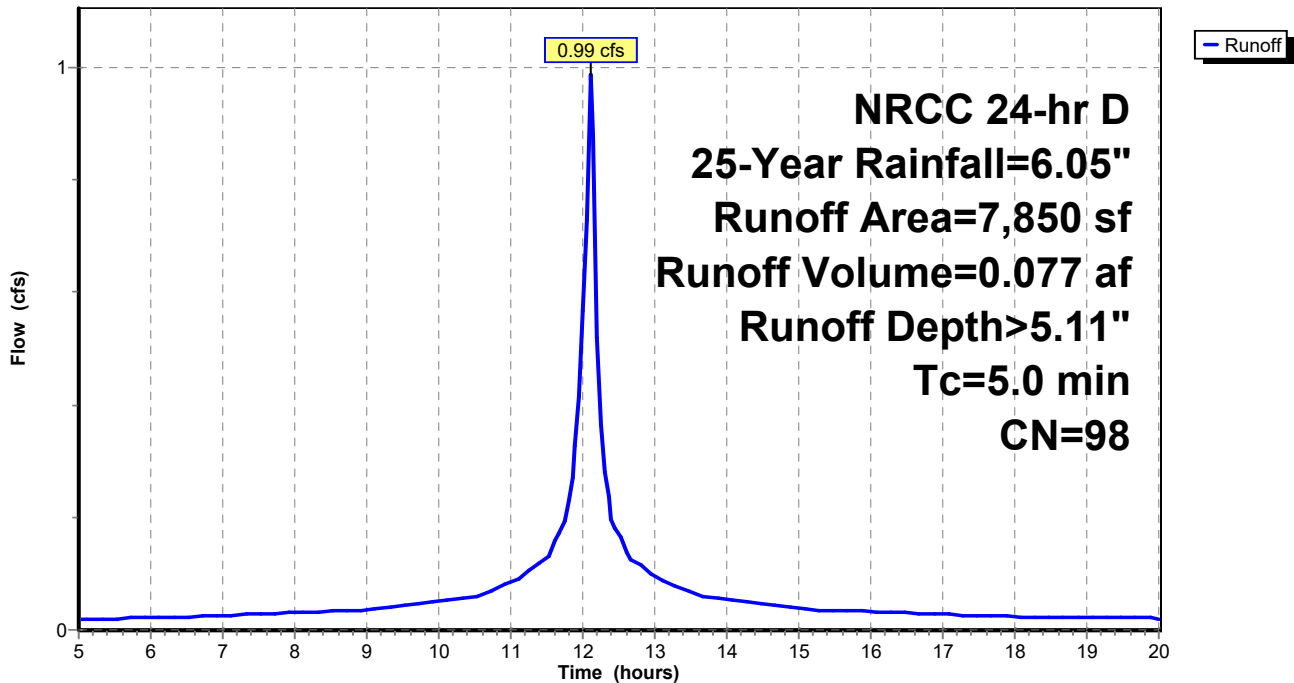
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NRCC 24-hr D 25-Year Rainfall=6.05"

Area (sf)	CN	Description
7,850	98	Roofs, HSG A
7,850		100.00% Impervious Area

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

## Subcatchment S11: Roof

Hydrograph



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**Summary for Subcatchment S12: Landscaped Area**

Runoff = 0.16 cfs @ 12.24 hrs, Volume= 0.020 af, Depth> 0.66"  
 Routed to Link POI1 : POI#1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 NRCC 24-hr D 25-Year Rainfall=6.05"

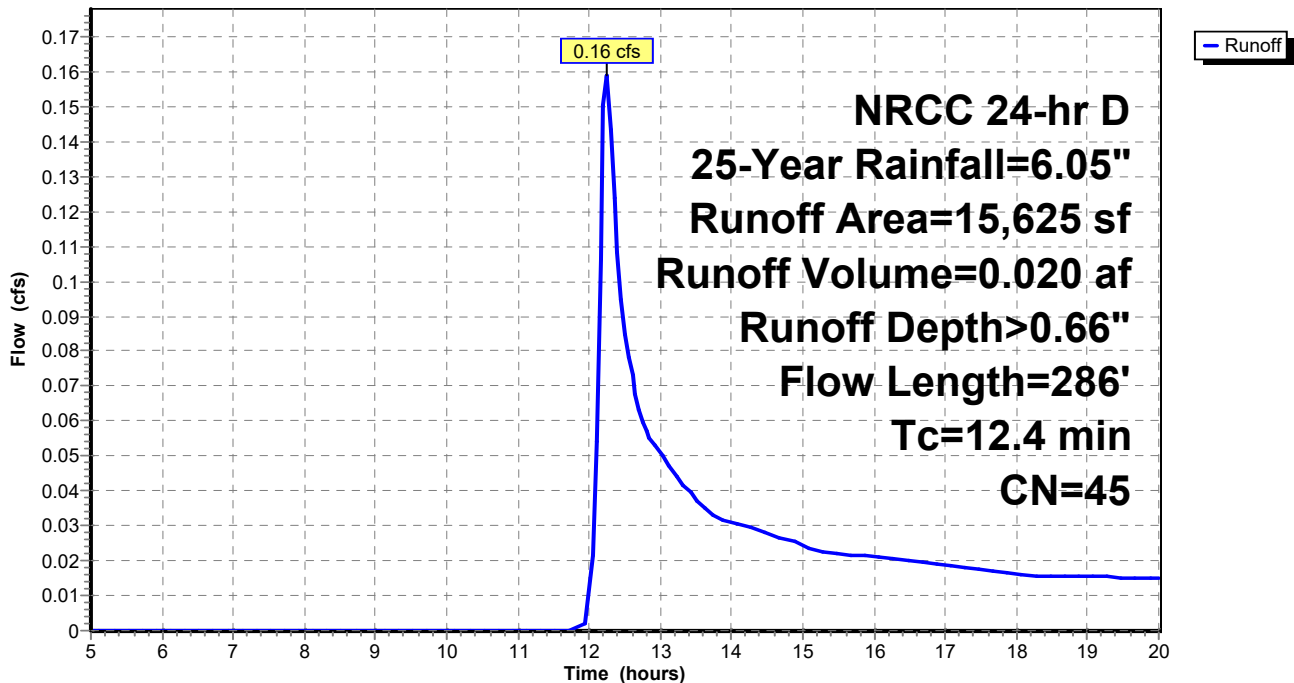
Area (sf)	CN	Description
1,606	98	Paved parking, HSG A
14,019	39	>75% Grass cover, Good, HSG A
15,625	45	Weighted Average
14,019		89.72% Pervious Area
1,606		10.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	100	0.1000	0.15		<b>Sheet Flow, A-B SHEET</b> Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	136	0.0400	3.00		<b>Shallow Concentrated Flow, B-C</b> Grassed Waterway Kv= 15.0 fps
0.1	50	0.0100	6.84	8.40	<b>Pipe Channel,</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010
12.4	286	Total			

**Subcatchment S12: Landscaped Area**

Hydrograph



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**Summary for Pond P1: Drywell**

Inflow Area = 0.251 ac, 100.00% Impervious, Inflow Depth > 5.11" for 25-Year event  
 Inflow = 1.33 cfs @ 12.13 hrs, Volume= 0.107 af  
 Outflow = 0.32 cfs @ 12.38 hrs, Volume= 0.087 af, Atten= 76%, Lag= 15.4 min  
 Discarded = 0.07 cfs @ 10.20 hrs, Volume= 0.076 af  
 Primary = 0.25 cfs @ 12.38 hrs, Volume= 0.011 af  
 Routed to Link POI1 : POI#1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 38.32' @ 12.38 hrs Surf.Area= 400 sf Storage= 1,579 cf

Plug-Flow detention time= 126.8 min calculated for 0.087 af (81% of inflow)  
 Center-of-Mass det. time= 67.2 min ( 803.2 - 736.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	30.70'	1,040 cf	<b>Custom Stage Data (Conic)</b> Listed below (Recalc) 3,200 cf Overall - 600 cf Embedded = 2,600 cf x 40.0% Voids
#2	32.00'	600 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) x 2 Inside #1
		1,640 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
30.70	400	0	0	400
38.70	400	3,200	3,200	967

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
32.00	50	0	0
38.00	50	300	300

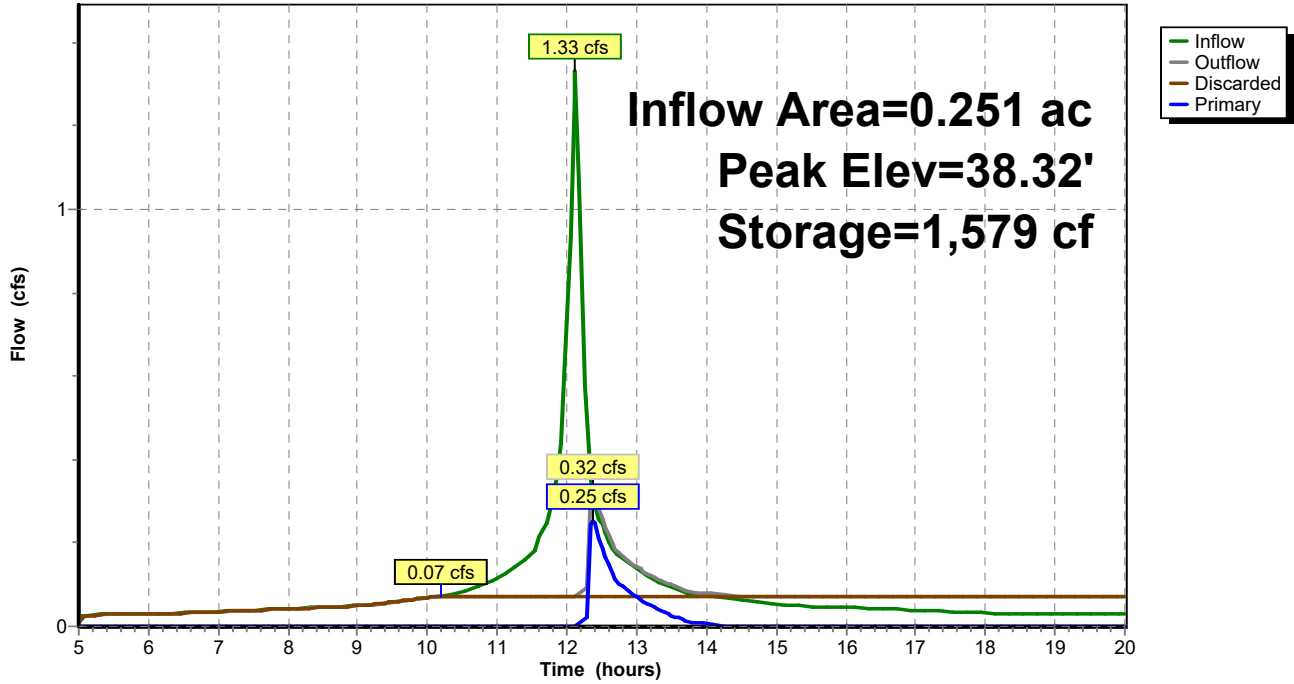
Device	Routing	Invert	Outlet Devices
#1	Discarded	30.70'	<b>7.800 in/hr Exfiltration over Surface area</b>
#2	Primary	38.00'	<b>6.0" Round Culvert</b> L= 40.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 38.00' / 37.00' S= 0.0250 '/ Cc= 0.900 n= 0.012, Flow Area= 0.20 sf

**Discarded OutFlow** Max=0.07 cfs @ 10.20 hrs HW=30.78' (Free Discharge)  
 ↖1=Exfiltration (Exfiltration Controls 0.07 cfs)

**Primary OutFlow** Max=0.25 cfs @ 12.38 hrs HW=38.31' (Free Discharge)  
 ↖2=Culvert (Inlet Controls 0.25 cfs @ 1.90 fps)

**Pond P1: Drywell**

Hydrograph



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**Summary for Pond P2: Dripline Filter**

Inflow Area = 0.180 ac, 100.00% Impervious, Inflow Depth > 5.11" for 25-Year event  
 Inflow = 0.99 cfs @ 12.11 hrs, Volume= 0.077 af  
 Outflow = 0.58 cfs @ 12.25 hrs, Volume= 0.077 af, Atten= 41%, Lag= 8.1 min  
 Discarded = 0.14 cfs @ 11.60 hrs, Volume= 0.073 af  
 Primary = 0.45 cfs @ 12.25 hrs, Volume= 0.004 af  
 Routed to Link POI1 : POI#1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 42.51' @ 12.25 hrs Surf.Area= 900 sf Storage= 651 cf

Plug-Flow detention time= 24.5 min calculated for 0.077 af (100% of inflow)  
 Center-of-Mass det. time= 24.2 min ( 759.5 - 735.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	40.70'	720 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 1,800 cf Overall x 40.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
40.70	900	0	0
42.70	900	1,800	1,800

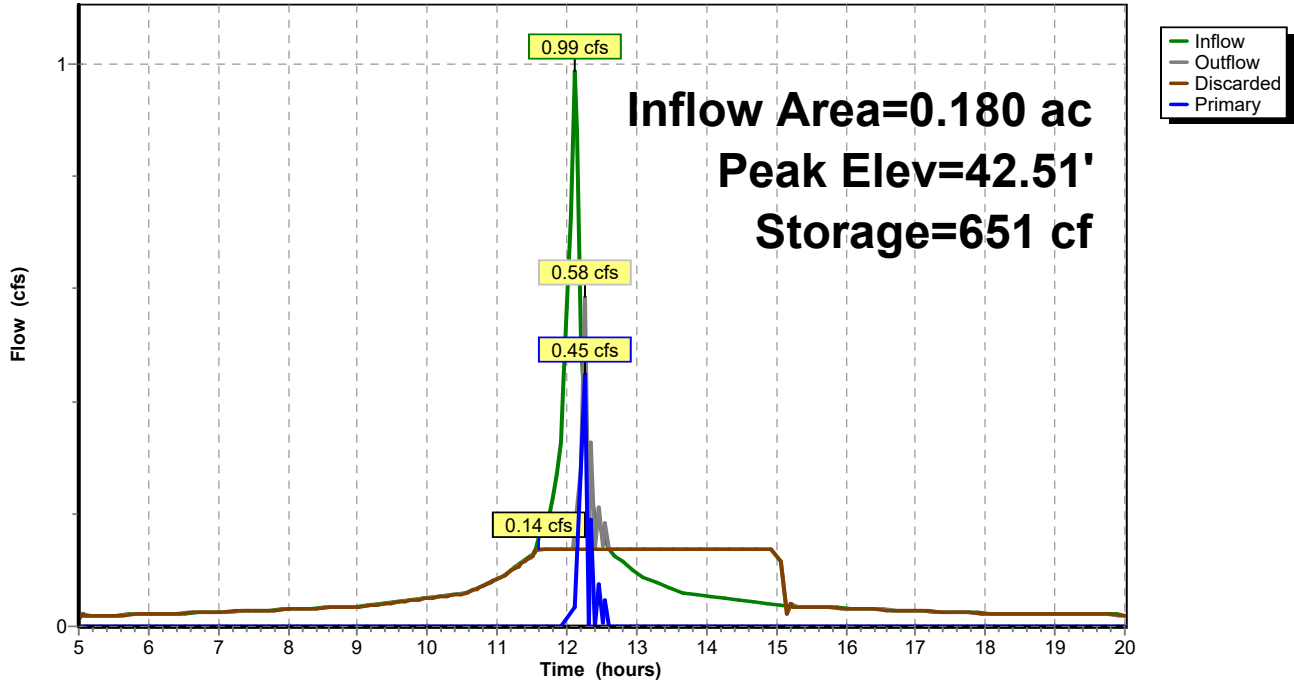
Device	Routing	Invert	Outlet Devices
#1	Discarded	40.70'	<b>6.600 in/hr Exfiltration over Surface area</b>
#2	Primary	42.50'	<b>150.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 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

**Discarded OutFlow** Max=0.14 cfs @ 11.60 hrs HW=40.73' (Free Discharge)  
 ↑1=Exfiltration (Exfiltration Controls 0.14 cfs)

**Primary OutFlow** Max=0.27 cfs @ 12.25 hrs HW=42.51' (Free Discharge)  
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 0.27 cfs @ 0.21 fps)

**Pond P2: Dripline Filter**

Hydrograph



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## Summary for Link POI1: POI#1

Inflow Area = 0.790 ac, 59.25% Impervious, Inflow Depth > 0.52" for 25-Year event  
Inflow = 0.60 cfs @ 12.25 hrs, Volume= 0.034 af  
Primary = 0.60 cfs @ 12.25 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

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

### Link POI1: POI#1

Hydrograph

