

Summary for Pond IN1: Biofilter Forebay

Inflow Area = 1.633 ac, 14.27% Impervious, Inflow Depth = 0.33" for Custom event
 Inflow = 0.52 cfs @ 12.24 hrs, Volume= 0.044 af
 Outflow = 0.13 cfs @ 12.94 hrs, Volume= 0.044 af, Atten= 75%, Lag= 41.8 min
 Primary = 0.13 cfs @ 12.94 hrs, Volume= 0.044 af
 Routed to Pond 5P : Infiltration Basin
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 947.14' @ 12.94 hrs Surf.Area= 3,411 sf Storage= 476 cf

Plug-Flow detention time= 33.6 min calculated for 0.044 af (100% of inflow)
 Center-of-Mass det. time= 33.6 min (911.3 - 877.6)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	14,802 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	3,348	0	0
948.00	3,795	3,572	3,572
949.00	4,266	4,031	7,602
949.50	4,636	2,226	9,828
950.00	5,020	2,414	12,242
950.50	5,220	2,560	14,802

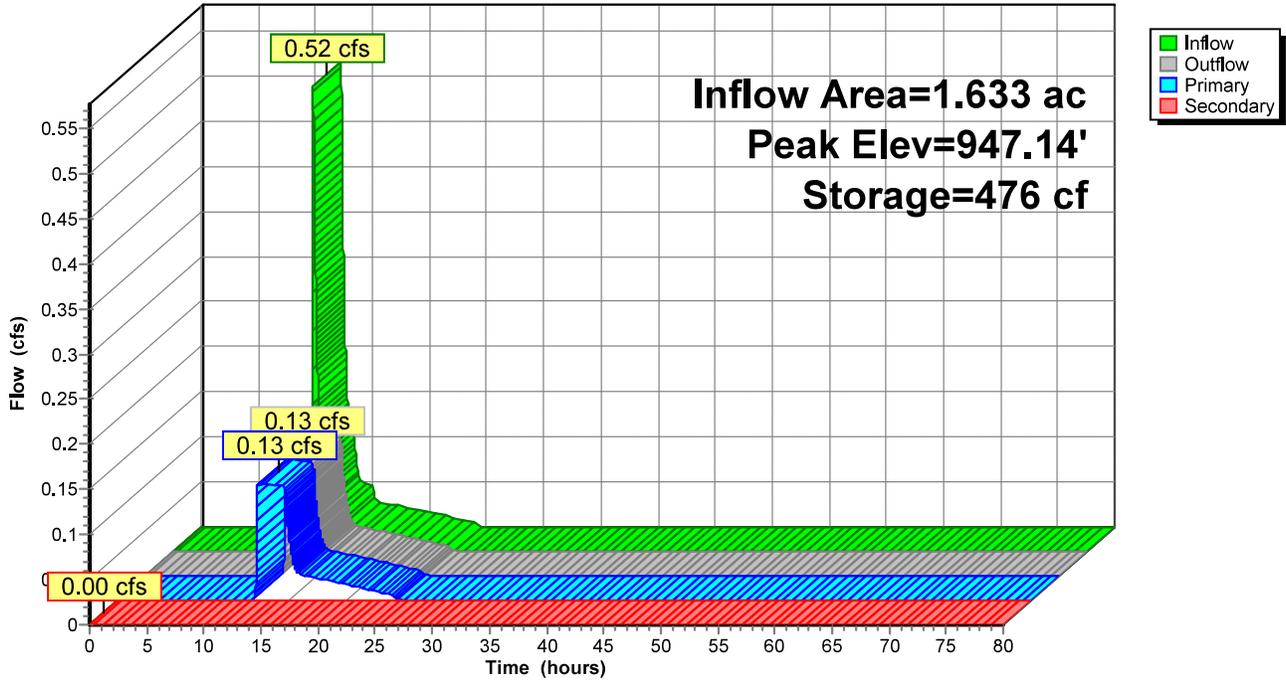
Device	Routing	Invert	Outlet Devices
#1	Secondary	949.00'	23.0' long x 14.8' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.67 2.69 2.70 2.64 2.63 2.64 2.64 2.63
#2	Primary	947.00'	1.630 in/hr Exfiltration over Surface area

Primary OutFlow Max=0.13 cfs @ 12.94 hrs HW=947.14' (Free Discharge)
 ↑2=Exfiltration (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=947.00' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond IN1: Biofilter Forebay

Hydrograph

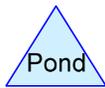
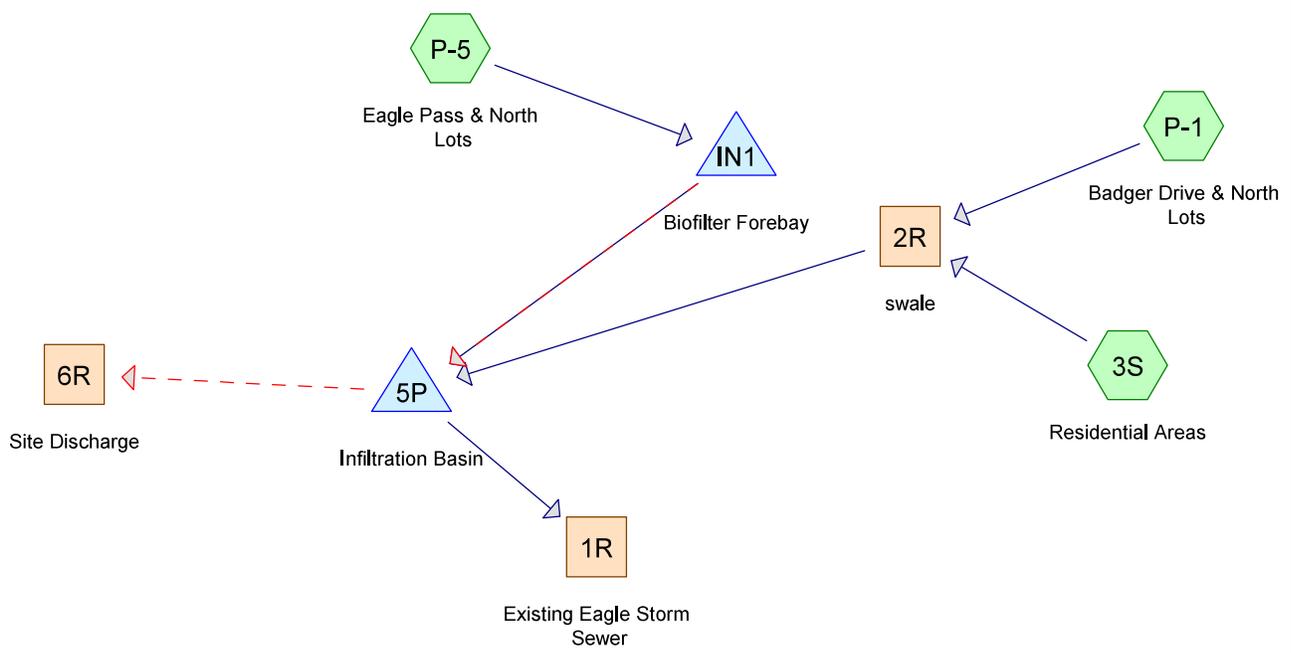


Stage-Discharge for Pond IN1: Biofilter Forebay

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
947.00	0.00	0.00	0.00	949.60	29.04	0.18	28.86
947.05	0.13	0.13	0.00	949.65	32.54	0.18	32.36
947.10	0.13	0.13	0.00	949.70	36.15	0.18	35.97
947.15	0.13	0.13	0.00	949.75	39.85	0.18	39.66
947.20	0.13	0.13	0.00	949.80	43.63	0.18	43.45
947.25	0.13	0.13	0.00	949.85	47.72	0.19	47.54
947.30	0.13	0.13	0.00	949.90	51.93	0.19	51.75
947.35	0.13	0.13	0.00	949.95	56.25	0.19	56.06
947.40	0.13	0.13	0.00	950.00	60.68	0.19	60.49
947.45	0.13	0.13	0.00	950.05	65.34	0.19	65.14
947.50	0.13	0.13	0.00	950.10	70.11	0.19	69.92
947.55	0.14	0.14	0.00	950.15	75.00	0.19	74.81
947.60	0.14	0.14	0.00	950.20	80.01	0.19	79.82
947.65	0.14	0.14	0.00	950.25	85.05	0.19	84.86
947.70	0.14	0.14	0.00	950.30	90.19	0.19	90.00
947.75	0.14	0.14	0.00	950.35	95.44	0.19	95.24
947.80	0.14	0.14	0.00	950.40	100.78	0.20	100.58
947.85	0.14	0.14	0.00	950.45	106.11	0.20	105.92
947.90	0.14	0.14	0.00	950.50	111.54	0.20	111.34
947.95	0.14	0.14	0.00				
948.00	0.14	0.14	0.00				
948.05	0.14	0.14	0.00				
948.10	0.14	0.14	0.00				
948.15	0.15	0.15	0.00				
948.20	0.15	0.15	0.00				
948.25	0.15	0.15	0.00				
948.30	0.15	0.15	0.00				
948.35	0.15	0.15	0.00				
948.40	0.15	0.15	0.00				
948.45	0.15	0.15	0.00				
948.50	0.15	0.15	0.00				
948.55	0.15	0.15	0.00				
948.60	0.15	0.15	0.00				
948.65	0.15	0.15	0.00				
948.70	0.16	0.16	0.00				
948.75	0.16	0.16	0.00				
948.80	0.16	0.16	0.00				
948.85	0.16	0.16	0.00				
948.90	0.16	0.16	0.00				
948.95	0.16	0.16	0.00				
949.00	0.16	0.16	0.00				
949.05	0.85	0.16	0.69				
949.10	2.11	0.16	1.94				
949.15	3.73	0.17	3.57				
949.20	5.66	0.17	5.49				
949.25	7.86	0.17	7.69				
949.30	10.30	0.17	10.13				
949.35	12.96	0.17	12.79				
949.40	15.82	0.17	15.65				
949.45	18.87	0.17	18.69				
949.50	22.09	0.17	21.92				
949.55	25.48	0.18	25.31				

Stage-Area-Storage for Pond IN1: Biofilter Forebay

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
947.00	3,348	0	949.60	4,713	10,295
947.05	3,370	168	949.65	4,751	10,532
947.10	3,393	337	949.70	4,790	10,770
947.15	3,415	507	949.75	4,828	11,011
947.20	3,437	679	949.80	4,866	11,253
947.25	3,460	851	949.85	4,905	11,497
947.30	3,482	1,025	949.90	4,943	11,743
947.35	3,504	1,199	949.95	4,982	11,991
947.40	3,527	1,375	950.00	5,020	12,242
947.45	3,549	1,552	950.05	5,040	12,493
947.50	3,572	1,730	950.10	5,060	12,746
947.55	3,594	1,909	950.15	5,080	12,999
947.60	3,616	2,089	950.20	5,100	13,254
947.65	3,639	2,271	950.25	5,120	13,509
947.70	3,661	2,453	950.30	5,140	13,765
947.75	3,683	2,637	950.35	5,160	14,023
947.80	3,706	2,821	950.40	5,180	14,281
947.85	3,728	3,007	950.45	5,200	14,541
947.90	3,750	3,194	950.50	5,220	14,802
947.95	3,773	3,382			
948.00	3,795	3,572			
948.05	3,819	3,762			
948.10	3,842	3,953			
948.15	3,866	4,146			
948.20	3,889	4,340			
948.25	3,913	4,535			
948.30	3,936	4,731			
948.35	3,960	4,929			
948.40	3,983	5,127			
948.45	4,007	5,327			
948.50	4,031	5,528			
948.55	4,054	5,730			
948.60	4,078	5,933			
948.65	4,101	6,138			
948.70	4,125	6,343			
948.75	4,148	6,550			
948.80	4,172	6,758			
948.85	4,195	6,967			
948.90	4,219	7,178			
948.95	4,242	7,389			
949.00	4,266	7,602			
949.05	4,303	7,816			
949.10	4,340	8,032			
949.15	4,377	8,250			
949.20	4,414	8,470			
949.25	4,451	8,692			
949.30	4,488	8,915			
949.35	4,525	9,140			
949.40	4,562	9,368			
949.45	4,599	9,597			
949.50	4,636	9,828			
949.55	4,674	10,060			



Routing Diagram for Hartland Subdivision Post-Dev Frozen Condition 2025-0721
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Hartland Subdivision Post-Dev Frozen Condition 2025-0721

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	100-Year	MSE 24-hr	3	Default	24.00	1	6.16	2
2	Custom	MSE 24-hr	3	Default	24.00	1	2.50	2

Hartland Subdivision Post-Dev Frozen Condition 2025-0721

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.630	61	>75% Grass cover, Good, HSG B (3S, P-1, P-5)
0.453	98	Paved roads w/curbs & sewers, HSG B (P-1, P-5)
5.083	64	TOTAL AREA

Hartland Subdivision Post-Dev Frozen Condition 2025-0721

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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)	Node Name
1	5P	946.40	945.50	54.0	0.0167	0.012	0.0	12.0	0.0	

Time span=0.00-80.00 hrs, dt=0.01 hrs, 8001 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 3S: Residential Areas Runoff Area=1.800 ac 0.00% Impervious Runoff Depth=2.11"
 Flow Length=115' Slope=0.0300 '/' Tc=9.9 min CN=61 Runoff=5.86 cfs 0.317 af

Subcatchment P-1: Badger Drive & North Runoff Area=1.650 ac 13.33% Impervious Runoff Depth=2.56"
 Flow Length=194' Tc=11.6 min CN=66 Runoff=6.11 cfs 0.352 af

Subcatchment P-5: Eagle Pass & North Runoff Area=1.633 ac 14.27% Impervious Runoff Depth=2.56"
 Flow Length=315' Tc=12.1 min CN=66 Runoff=5.97 cfs 0.348 af

Reach 1R: Existing Eagle Storm Sewer Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Reach 2R: swale Avg. Flow Depth=0.71' Max Vel=0.83 fps Inflow=11.90 cfs 0.669 af
 n=0.150 L=280.0' S=0.0179 '/' Capacity=20.16 cfs Outflow=10.04 cfs 0.669 af

Reach 6R: Site Discharge Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Pond 5P: Infiltration Basin Peak Elev=946.25' Storage=36,707 cf Inflow=10.04 cfs 0.843 af
 Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond IN1: Biofilter Forebay Peak Elev=949.08' Storage=7,965 cf Inflow=5.97 cfs 0.348 af
 Primary=0.00 cfs 0.000 af Secondary=1.37 cfs 0.174 af Outflow=1.37 cfs 0.174 af

Total Runoff Area = 5.083 ac Runoff Volume = 1.017 af Average Runoff Depth = 2.40"
91.09% Pervious = 4.630 ac 8.91% Impervious = 0.453 ac

Summary for Subcatchment 3S: Residential Areas

Runoff = 5.86 cfs @ 12.18 hrs, Volume= 0.317 af, Depth= 2.11"
 Routed to Reach 2R : swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100-Year Rainfall=6.16"

Area (ac)	CN	Description	Land Use
1.800	61	>75% Grass cover, Good, HSG B	Open Space
1.800		100.00% Pervious Area	

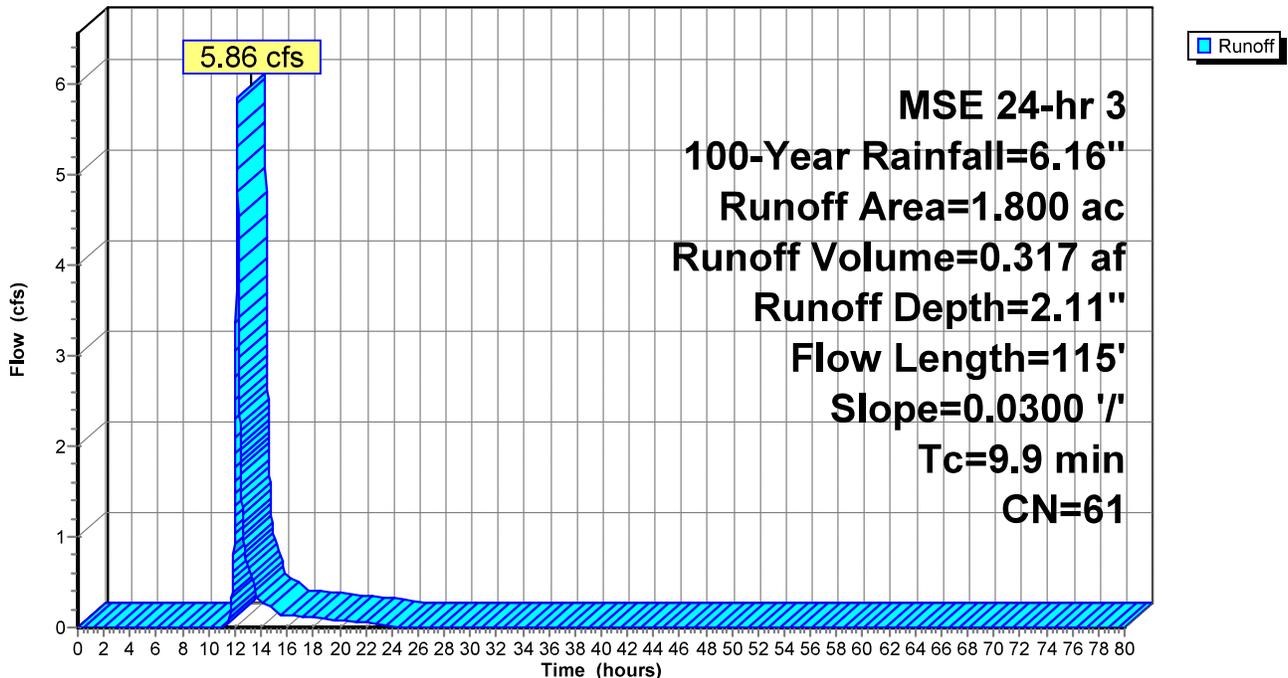
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	115	0.0300	0.19		Sheet Flow, Uncaptured By Swale Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.800	Open Space	185.89	1.49
1.800	Total	185.89	1.49

Subcatchment 3S: Residential Areas

Hydrograph



Summary for Subcatchment P-1: Badger Drive & North Lots

Runoff = 6.11 cfs @ 12.20 hrs, Volume= 0.352 af, Depth= 2.56"
 Routed to Reach 2R : swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100-Year Rainfall=6.16"

Area (ac)	CN	Description	Land Use
1.430	61	>75% Grass cover, Good, HSG B	Open Space
0.220	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.650	66	Weighted Average	
1.430		86.67% Pervious Area	
0.220		13.33% Impervious Area	

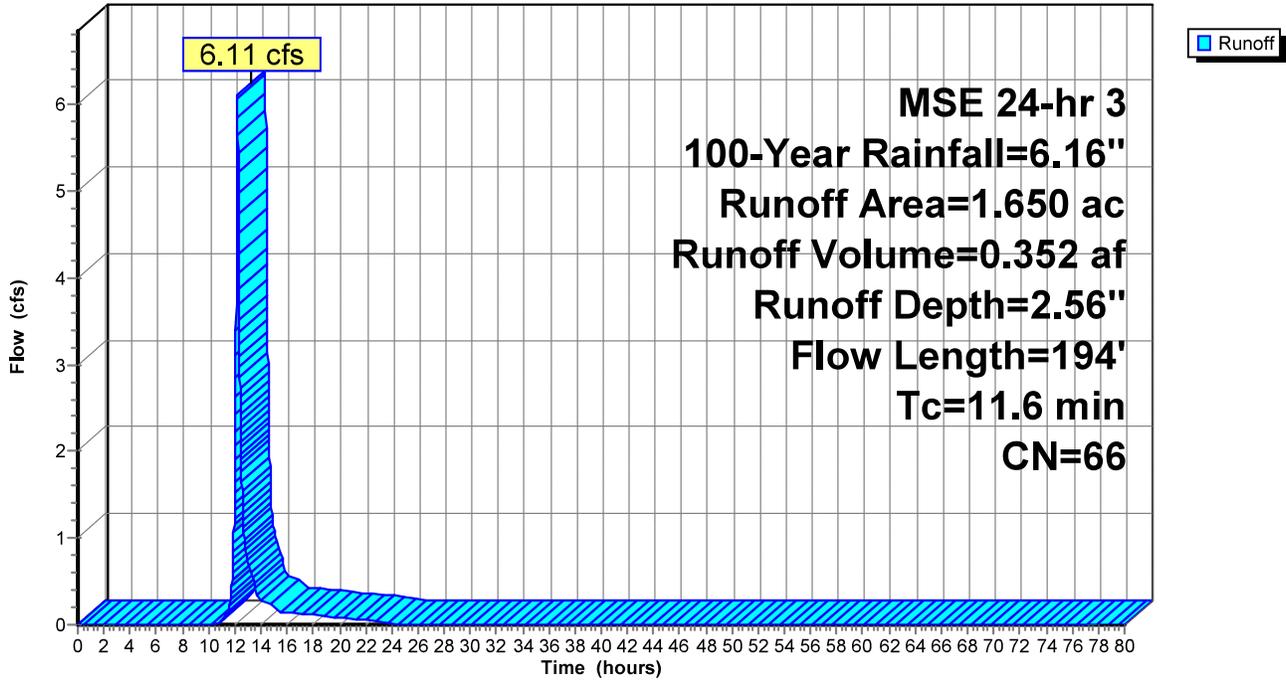
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	94	0.0200	0.16		Sheet Flow, Pretreated Flow to Basin Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
1.7	100	0.0100	0.98		Sheet Flow, Badger Dr Smooth surfaces n= 0.011 P2= 2.84"
11.6	194	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.430	Open Space	147.68	1.18
0.220	Roadway	34.08	0.27
1.650	Total	181.76	1.45

Subcatchment P-1: Badger Drive & North Lots

Hydrograph



Summary for Subcatchment P-5: Eagle Pass & North Lots

Runoff = 5.97 cfs @ 12.20 hrs, Volume= 0.348 af, Depth= 2.56"
 Routed to Pond IN1 : Biofilter Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 100-Year Rainfall=6.16"

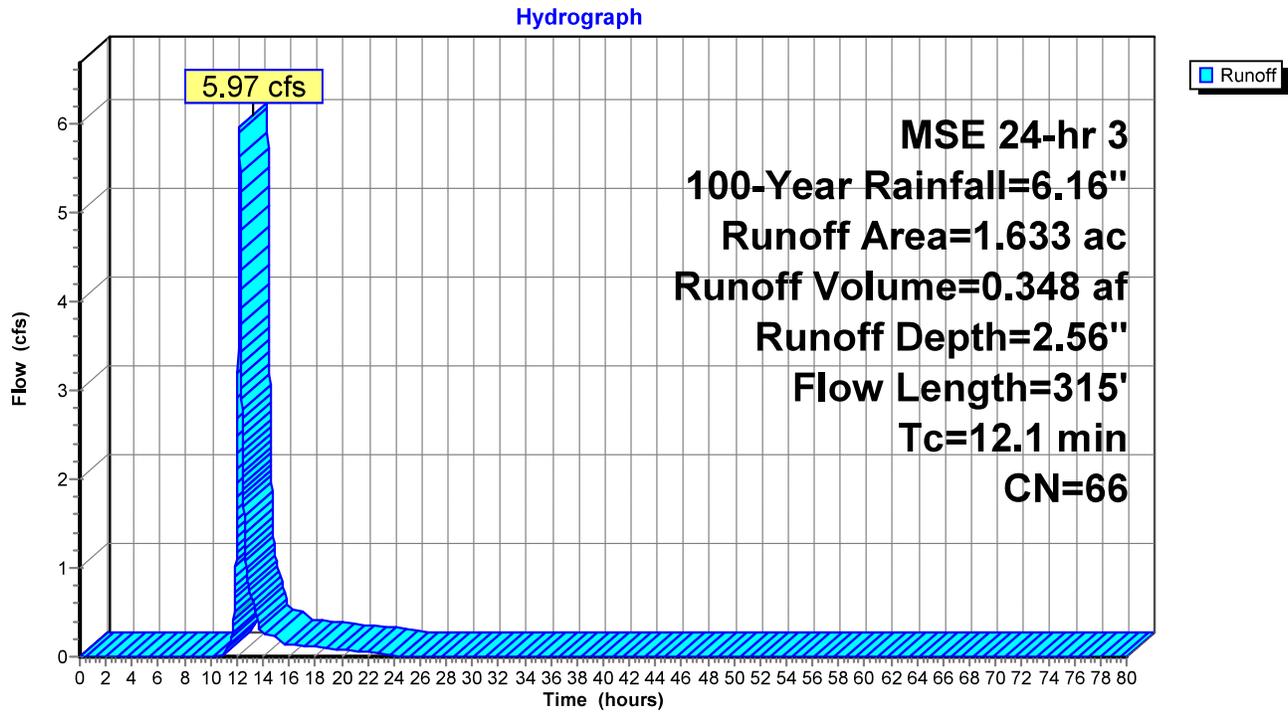
Area (ac)	CN	Description	Land Use
0.233	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.400	61	>75% Grass cover, Good, HSG B	Open Space
1.633	66	Weighted Average	
1.400		85.73% Pervious Area	
0.233		14.27% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	200	0.0200	1.49		Sheet Flow, Roads/Sewers/Roofs Smooth surfaces n= 0.011 P2= 2.84"
9.9	115	0.0300	0.19		Sheet Flow, Eagle Lots Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
12.1	315	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.400	Open Space	144.58	1.16
0.233	Roadway	36.09	0.29
1.633	Total	180.68	1.45

Subcatchment P-5: Eagle Pass & North Lots

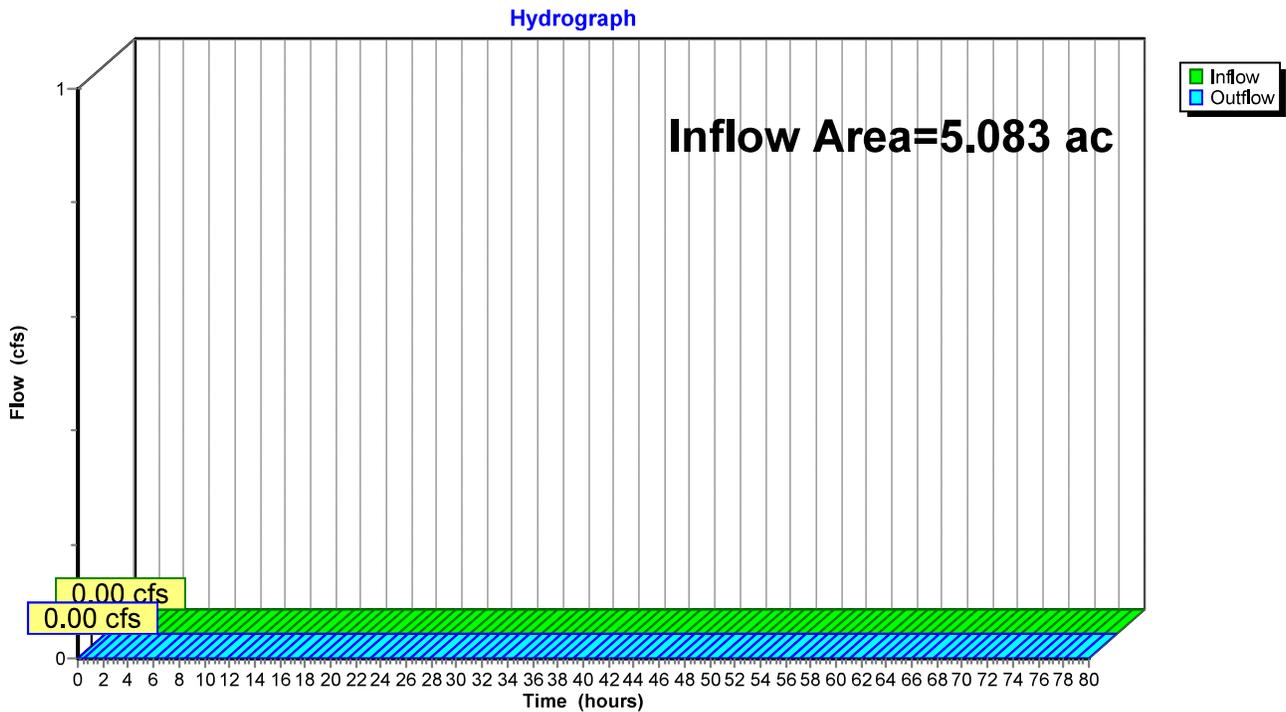


Summary for Reach 1R: Existing Eagle Storm Sewer

Inflow Area = 5.083 ac, 8.91% Impervious, Inflow Depth = 0.00" for 100-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 1R: Existing Eagle Storm Sewer



Summary for Reach 2R: swale

Inflow Area = 3.450 ac, 6.38% Impervious, Inflow Depth = 2.33" for 100-Year event
 Inflow = 11.90 cfs @ 12.19 hrs, Volume= 0.669 af
 Outflow = 10.04 cfs @ 12.34 hrs, Volume= 0.669 af, Atten= 16%, Lag= 9.3 min
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.83 fps, Min. Travel Time= 5.6 min
 Avg. Velocity = 0.18 fps, Avg. Travel Time= 25.6 min

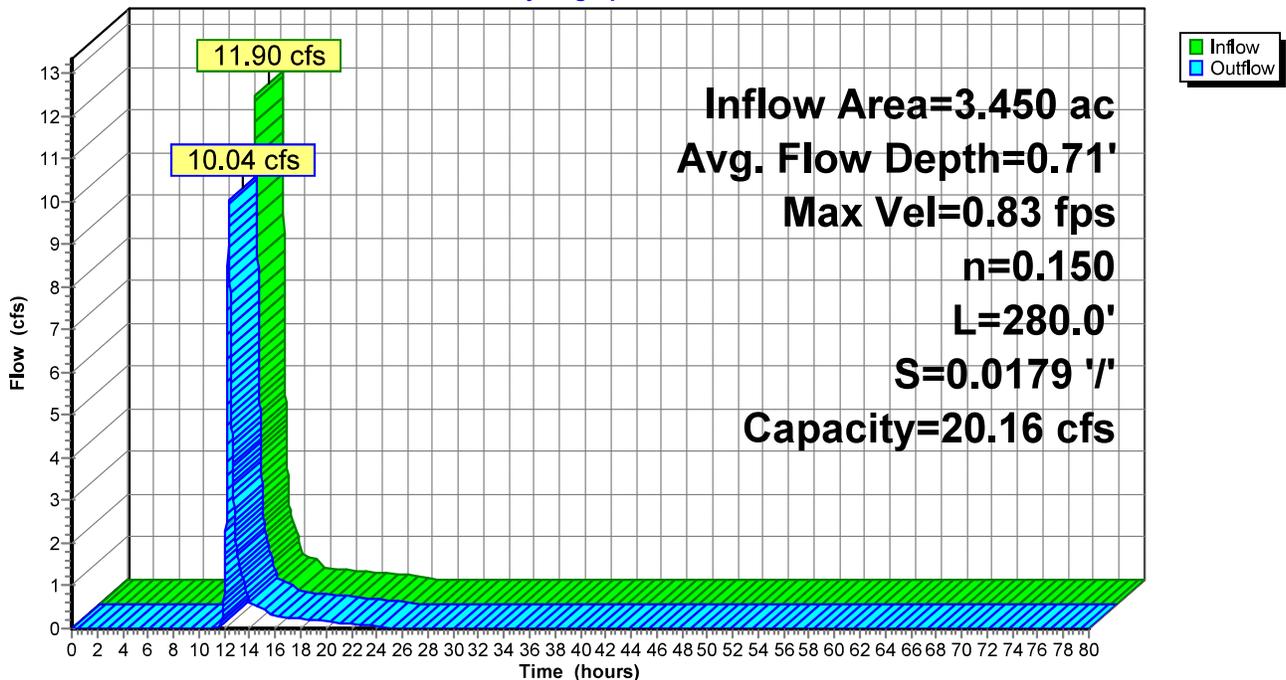
Peak Storage= 3,379 cf @ 12.25 hrs
 Average Depth at Peak Storage= 0.71' , Surface Width= 24.14'
 Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 20.16 cfs

10.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
 Side Slope Z-value= 10.0 ' / ' Top Width= 30.00'
 Length= 280.0' Slope= 0.0179 ' / '
 Inlet Invert= 959.00', Outlet Invert= 954.00'



Reach 2R: swale

Hydrograph



Stage-Discharge for Reach 2R: swale

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
959.00	0.00	0.00	959.52	0.70	5.55
959.01	0.06	0.01	959.53	0.71	5.76
959.02	0.10	0.02	959.54	0.72	5.96
959.03	0.13	0.04	959.55	0.72	6.18
959.04	0.15	0.06	959.56	0.73	6.39
959.05	0.17	0.09	959.57	0.74	6.61
959.06	0.20	0.12	959.58	0.75	6.84
959.07	0.22	0.16	959.59	0.75	7.07
959.08	0.23	0.20	959.60	0.76	7.30
959.09	0.25	0.25	959.61	0.77	7.53
959.10	0.27	0.30	959.62	0.77	7.78
959.11	0.29	0.35	959.63	0.78	8.02
959.12	0.30	0.40	959.64	0.79	8.27
959.13	0.32	0.46	959.65	0.79	8.52
959.14	0.33	0.53	959.66	0.80	8.78
959.15	0.34	0.59	959.67	0.81	9.04
959.16	0.36	0.66	959.68	0.81	9.31
959.17	0.37	0.74	959.69	0.82	9.58
959.18	0.38	0.81	959.70	0.83	9.85
959.19	0.40	0.90	959.71	0.83	10.13
959.20	0.41	0.98	959.72	0.84	10.41
959.21	0.42	1.07	959.73	0.85	10.70
959.22	0.43	1.16	959.74	0.85	10.99
959.23	0.44	1.25	959.75	0.86	11.29
959.24	0.45	1.35	959.76	0.87	11.59
959.25	0.46	1.45	959.77	0.87	11.89
959.26	0.48	1.56	959.78	0.88	12.20
959.27	0.49	1.67	959.79	0.88	12.51
959.28	0.50	1.78	959.80	0.89	12.83
959.29	0.51	1.89	959.81	0.90	13.15
959.30	0.52	2.01	959.82	0.90	13.48
959.31	0.53	2.13	959.83	0.91	13.81
959.32	0.54	2.26	959.84	0.92	14.15
959.33	0.54	2.39	959.85	0.92	14.49
959.34	0.55	2.52	959.86	0.93	14.83
959.35	0.56	2.66	959.87	0.93	15.18
959.36	0.57	2.80	959.88	0.94	15.54
959.37	0.58	2.94	959.89	0.95	15.90
959.38	0.59	3.09	959.90	0.95	16.26
959.39	0.60	3.24	959.91	0.96	16.63
959.40	0.61	3.40	959.92	0.96	17.00
959.41	0.62	3.56	959.93	0.97	17.38
959.42	0.62	3.72	959.94	0.97	17.76
959.43	0.63	3.89	959.95	0.98	18.15
959.44	0.64	4.06	959.96	0.99	18.54
959.45	0.65	4.23	959.97	0.99	18.94
959.46	0.66	4.41	959.98	1.00	19.34
959.47	0.66	4.59	959.99	1.00	19.75
959.48	0.67	4.77	960.00	1.01	20.16
959.49	0.68	4.96			
959.50	0.69	5.15			
959.51	0.69	5.35			

Stage-Area-Storage for Reach 2R: swale

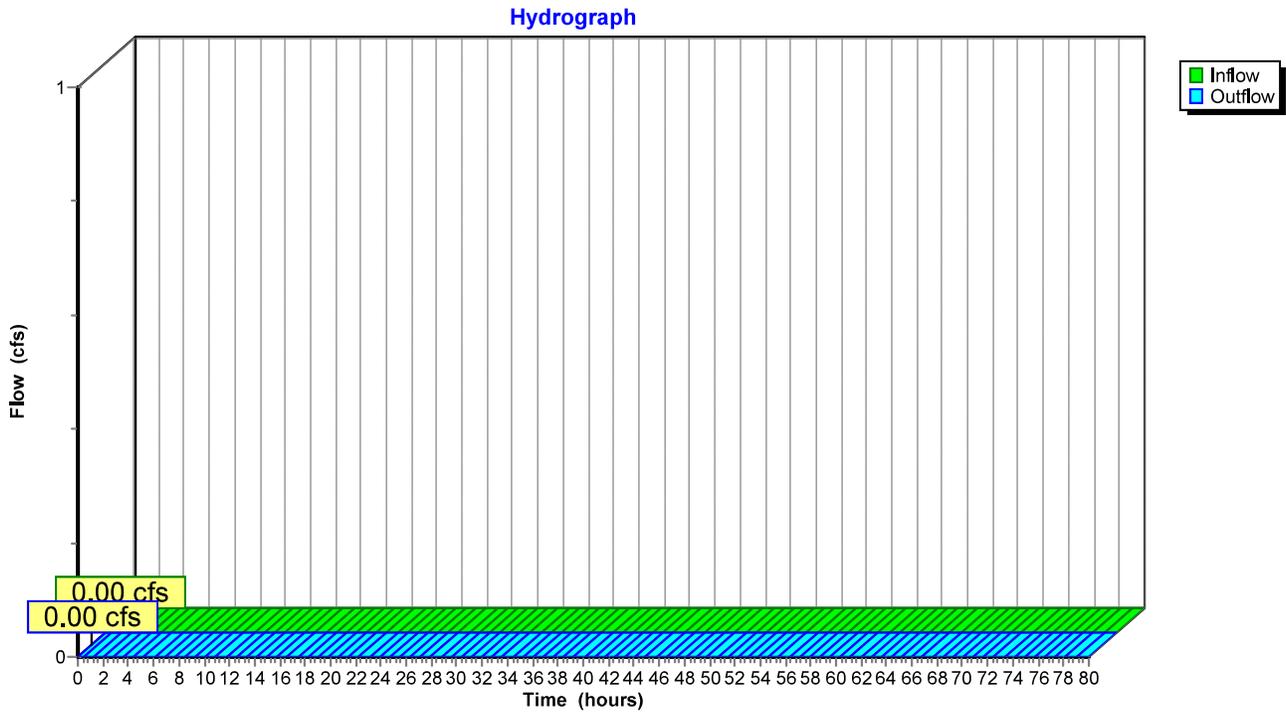
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
959.00	0.0	0	959.52	7.9	2,213
959.01	0.1	28	959.53	8.1	2,271
959.02	0.2	57	959.54	8.3	2,328
959.03	0.3	87	959.55	8.5	2,387
959.04	0.4	116	959.56	8.7	2,446
959.05	0.5	147	959.57	8.9	2,506
959.06	0.6	178	959.58	9.2	2,566
959.07	0.7	210	959.59	9.4	2,627
959.08	0.9	242	959.60	9.6	2,688
959.09	1.0	275	959.61	9.8	2,750
959.10	1.1	308	959.62	10.0	2,812
959.11	1.2	342	959.63	10.3	2,875
959.12	1.3	376	959.64	10.5	2,939
959.13	1.5	411	959.65	10.7	3,003
959.14	1.6	447	959.66	11.0	3,068
959.15	1.7	483	959.67	11.2	3,133
959.16	1.9	520	959.68	11.4	3,199
959.17	2.0	557	959.69	11.7	3,265
959.18	2.1	595	959.70	11.9	3,332
959.19	2.3	633	959.71	12.1	3,399
959.20	2.4	672	959.72	12.4	3,468
959.21	2.5	711	959.73	12.6	3,536
959.22	2.7	752	959.74	12.9	3,605
959.23	2.8	792	959.75	13.1	3,675
959.24	3.0	833	959.76	13.4	3,745
959.25	3.1	875	959.77	13.6	3,816
959.26	3.3	917	959.78	13.9	3,888
959.27	3.4	960	959.79	14.1	3,959
959.28	3.6	1,004	959.80	14.4	4,032
959.29	3.7	1,047	959.81	14.7	4,105
959.30	3.9	1,092	959.82	14.9	4,179
959.31	4.1	1,137	959.83	15.2	4,253
959.32	4.2	1,183	959.84	15.5	4,328
959.33	4.4	1,229	959.85	15.7	4,403
959.34	4.6	1,276	959.86	16.0	4,479
959.35	4.7	1,323	959.87	16.3	4,555
959.36	4.9	1,371	959.88	16.5	4,632
959.37	5.1	1,419	959.89	16.8	4,710
959.38	5.2	1,468	959.90	17.1	4,788
959.39	5.4	1,518	959.91	17.4	4,867
959.40	5.6	1,568	959.92	17.7	4,946
959.41	5.8	1,619	959.93	17.9	5,026
959.42	6.0	1,670	959.94	18.2	5,106
959.43	6.1	1,722	959.95	18.5	5,187
959.44	6.3	1,774	959.96	18.8	5,268
959.45	6.5	1,827	959.97	19.1	5,351
959.46	6.7	1,880	959.98	19.4	5,433
959.47	6.9	1,935	959.99	19.7	5,516
959.48	7.1	1,989	960.00	20.0	5,600
959.49	7.3	2,044			
959.50	7.5	2,100			
959.51	7.7	2,156			

Summary for Reach 6R: Site Discharge

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 6R: Site Discharge



Summary for Pond 5P: Infiltration Basin

Inflow Area = 5.083 ac, 8.91% Impervious, Inflow Depth = 1.99" for 100-Year event
 Inflow = 10.04 cfs @ 12.34 hrs, Volume= 0.843 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 1R : Existing Eagle Storm Sewer
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Site Discharge

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 946.25' @ 57.25 hrs Surf.Area= 13,458 sf Storage= 36,707 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	943.00'	70,609 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
943.00	9,227	0	0
944.00	10,462	9,845	9,845
945.00	11,755	11,109	20,953
946.00	13,106	12,431	33,384
947.00	14,512	13,809	47,193
947.50	15,237	7,437	54,630
948.00	15,976	7,803	62,433
948.50	16,729	8,176	70,609

Device	Routing	Invert	Outlet Devices
#1	Secondary	947.50'	26.0' 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
#2	Discarded	943.00'	1.630 in/hr Exfiltration - Primary X 0.00 over Surface area
#3	Primary	946.40'	12.0" Round Secondary Culvert to Street L= 54.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.40' / 945.50' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

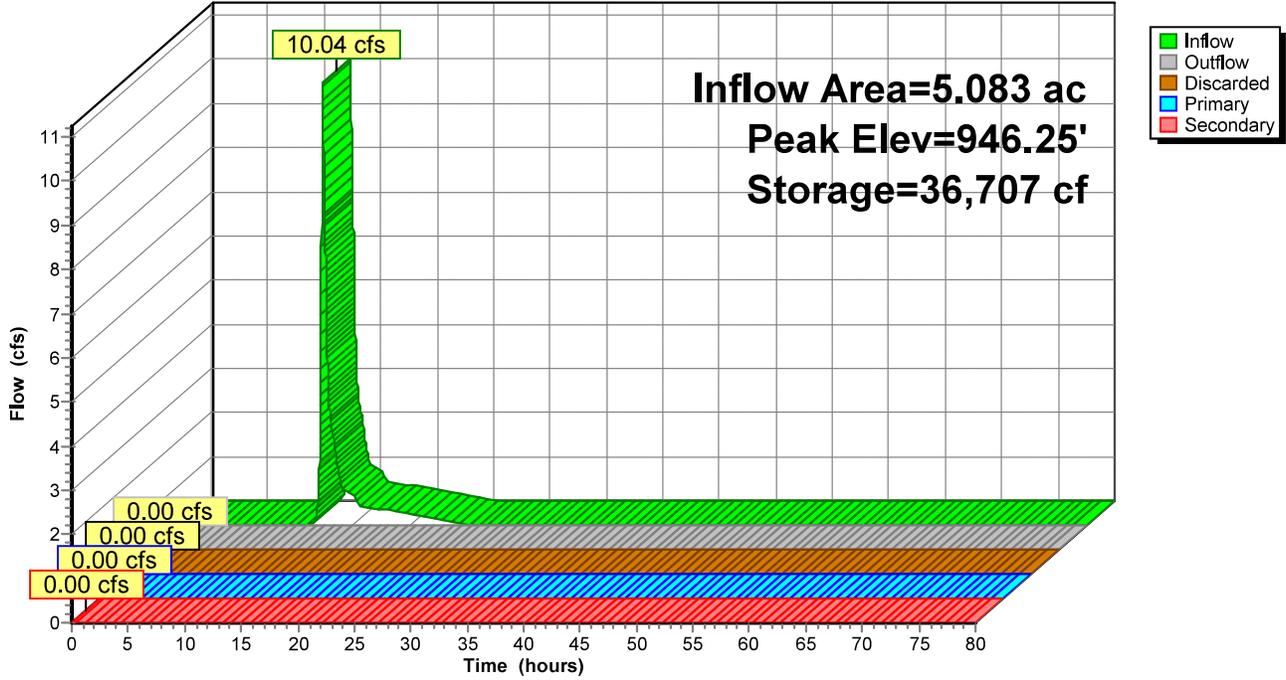
Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑2=Exfiltration - Primary (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑3=Secondary Culvert to Street (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: Infiltration Basin

Hydrograph



Stage-Discharge for Pond 5P: Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
943.00	0.00	0.00	0.00	0.00
943.20	0.00	0.00	0.00	0.00
943.40	0.00	0.00	0.00	0.00
943.60	0.00	0.00	0.00	0.00
943.80	0.00	0.00	0.00	0.00
944.00	0.00	0.00	0.00	0.00
944.20	0.00	0.00	0.00	0.00
944.40	0.00	0.00	0.00	0.00
944.60	0.00	0.00	0.00	0.00
944.80	0.00	0.00	0.00	0.00
945.00	0.00	0.00	0.00	0.00
945.20	0.00	0.00	0.00	0.00
945.40	0.00	0.00	0.00	0.00
945.60	0.00	0.00	0.00	0.00
945.80	0.00	0.00	0.00	0.00
946.00	0.00	0.00	0.00	0.00
946.20	0.00	0.00	0.00	0.00
946.40	0.00	0.00	0.00	0.00
946.60	0.15	0.00	0.15	0.00
946.80	0.56	0.00	0.56	0.00
947.00	1.14	0.00	1.14	0.00
947.20	1.81	0.00	1.81	0.00
947.40	2.36	0.00	2.36	0.00
947.60	4.84	0.00	2.79	2.05
947.80	13.95	0.00	3.17	10.79
948.00	27.68	0.00	3.50	24.18
948.20	44.84	0.00	3.80	41.04
948.40	63.69	0.00	4.09	59.60

Stage-Area-Storage for Pond 5P: Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
943.00	9,227	0	948.20	16,277	65,658
943.10	9,351	929	948.30	16,428	67,294
943.20	9,474	1,870	948.40	16,578	68,944
943.30	9,597	2,824	948.50	16,729	70,609
943.40	9,721	3,790			
943.50	9,845	4,768			
943.60	9,968	5,759			
943.70	10,092	6,761			
943.80	10,215	7,777			
943.90	10,338	8,804			
944.00	10,462	9,845			
944.10	10,591	10,897			
944.20	10,721	11,963			
944.30	10,850	13,041			
944.40	10,979	14,133			
944.50	11,109	15,237			
944.60	11,238	16,354			
944.70	11,367	17,485			
944.80	11,496	18,628			
944.90	11,626	19,784			
945.00	11,755	20,953			
945.10	11,890	22,135			
945.20	12,025	23,331			
945.30	12,160	24,540			
945.40	12,295	25,763			
945.50	12,431	26,999			
945.60	12,566	28,249			
945.70	12,701	29,512			
945.80	12,836	30,789			
945.90	12,971	32,080			
946.00	13,106	33,384			
946.10	13,247	34,701			
946.20	13,387	36,033			
946.30	13,528	37,379			
946.40	13,668	38,738			
946.50	13,809	40,112			
946.60	13,950	41,500			
946.70	14,090	42,902			
946.80	14,231	44,318			
946.90	14,371	45,748			
947.00	14,512	47,193			
947.10	14,657	48,651			
947.20	14,802	50,124			
947.30	14,947	51,611			
947.40	15,092	53,113			
947.50	15,237	54,630			
947.60	15,385	56,161			
947.70	15,533	57,707			
947.80	15,680	59,267			
947.90	15,828	60,843			
948.00	15,976	62,433			
948.10	16,127	64,038			

Summary for Pond IN1: Biofilter Forebay

Inflow Area = 1.633 ac, 14.27% Impervious, Inflow Depth = 2.56" for 100-Year event
 Inflow = 5.97 cfs @ 12.20 hrs, Volume= 0.348 af
 Outflow = 1.37 cfs @ 12.61 hrs, Volume= 0.174 af, Atten= 77%, Lag= 24.5 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 5P : Infiltration Basin
 Secondary = 1.37 cfs @ 12.61 hrs, Volume= 0.174 af
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 949.08' @ 12.61 hrs Surf.Area= 4,328 sf Storage= 7,965 cf

Plug-Flow detention time= 191.4 min calculated for 0.174 af (50% of inflow)
 Center-of-Mass det. time= 99.2 min (921.7 - 822.5)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	14,802 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	3,348	0	0
948.00	3,795	3,572	3,572
949.00	4,266	4,031	7,602
949.50	4,636	2,226	9,828
950.00	5,020	2,414	12,242
950.50	5,220	2,560	14,802

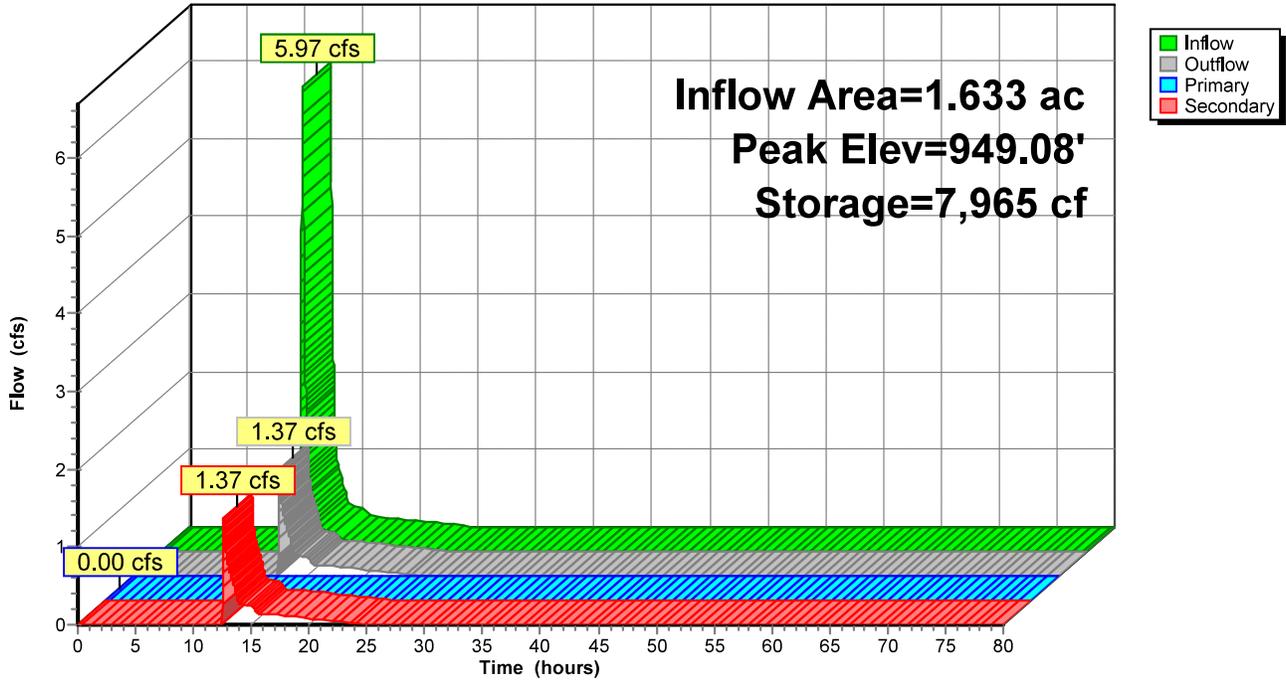
Device	Routing	Invert	Outlet Devices
#1	Secondary	949.00'	23.0' long x 6.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.81
#2	Primary	947.00'	1.630 in/hr Exfiltration X 0.00 over Surface area

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=947.00' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Secondary OutFlow Max=1.34 cfs @ 12.61 hrs HW=949.08' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 1.34 cfs @ 0.69 fps)

Pond IN1: Biofilter Forebay

Hydrograph



Stage-Discharge for Pond IN1: Biofilter Forebay

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
947.00	0.00	0.00	0.00	949.60	28.86	0.00	28.86
947.05	0.00	0.00	0.00	949.65	32.48	0.00	32.48
947.10	0.00	0.00	0.00	949.70	36.23	0.00	36.23
947.15	0.00	0.00	0.00	949.75	40.11	0.00	40.11
947.20	0.00	0.00	0.00	949.80	44.11	0.00	44.11
947.25	0.00	0.00	0.00	949.85	48.30	0.00	48.30
947.30	0.00	0.00	0.00	949.90	52.63	0.00	52.63
947.35	0.00	0.00	0.00	949.95	57.08	0.00	57.08
947.40	0.00	0.00	0.00	950.00	61.64	0.00	61.64
947.45	0.00	0.00	0.00	950.05	66.26	0.00	66.26
947.50	0.00	0.00	0.00	950.10	70.98	0.00	70.98
947.55	0.00	0.00	0.00	950.15	75.80	0.00	75.80
947.60	0.00	0.00	0.00	950.20	80.73	0.00	80.73
947.65	0.00	0.00	0.00	950.25	85.74	0.00	85.74
947.70	0.00	0.00	0.00	950.30	90.85	0.00	90.85
947.75	0.00	0.00	0.00	950.35	96.05	0.00	96.05
947.80	0.00	0.00	0.00	950.40	101.34	0.00	101.34
947.85	0.00	0.00	0.00	950.45	106.72	0.00	106.72
947.90	0.00	0.00	0.00	950.50	112.18	0.00	112.18
947.95	0.00	0.00	0.00				
948.00	0.00	0.00	0.00				
948.05	0.00	0.00	0.00				
948.10	0.00	0.00	0.00				
948.15	0.00	0.00	0.00				
948.20	0.00	0.00	0.00				
948.25	0.00	0.00	0.00				
948.30	0.00	0.00	0.00				
948.35	0.00	0.00	0.00				
948.40	0.00	0.00	0.00				
948.45	0.00	0.00	0.00				
948.50	0.00	0.00	0.00				
948.55	0.00	0.00	0.00				
948.60	0.00	0.00	0.00				
948.65	0.00	0.00	0.00				
948.70	0.00	0.00	0.00				
948.75	0.00	0.00	0.00				
948.80	0.00	0.00	0.00				
948.85	0.00	0.00	0.00				
948.90	0.00	0.00	0.00				
948.95	0.00	0.00	0.00				
949.00	0.00	0.00	0.00				
949.05	0.61	0.00	0.61				
949.10	1.73	0.00	1.73				
949.15	3.18	0.00	3.18				
949.20	4.90	0.00	4.90				
949.25	6.94	0.00	6.94				
949.30	9.26	0.00	9.26				
949.35	11.83	0.00	11.83				
949.40	14.66	0.00	14.66				
949.45	17.81	0.00	17.81				
949.50	21.22	0.00	21.22				
949.55	24.91	0.00	24.91				

Stage-Area-Storage for Pond IN1: Biofilter Forebay

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
947.00	3,348	0	949.60	4,713	10,295
947.05	3,370	168	949.65	4,751	10,532
947.10	3,393	337	949.70	4,790	10,770
947.15	3,415	507	949.75	4,828	11,011
947.20	3,437	679	949.80	4,866	11,253
947.25	3,460	851	949.85	4,905	11,497
947.30	3,482	1,025	949.90	4,943	11,743
947.35	3,504	1,199	949.95	4,982	11,991
947.40	3,527	1,375	950.00	5,020	12,242
947.45	3,549	1,552	950.05	5,040	12,493
947.50	3,572	1,730	950.10	5,060	12,746
947.55	3,594	1,909	950.15	5,080	12,999
947.60	3,616	2,089	950.20	5,100	13,254
947.65	3,639	2,271	950.25	5,120	13,509
947.70	3,661	2,453	950.30	5,140	13,765
947.75	3,683	2,637	950.35	5,160	14,023
947.80	3,706	2,821	950.40	5,180	14,281
947.85	3,728	3,007	950.45	5,200	14,541
947.90	3,750	3,194	950.50	5,220	14,802
947.95	3,773	3,382			
948.00	3,795	3,572			
948.05	3,819	3,762			
948.10	3,842	3,953			
948.15	3,866	4,146			
948.20	3,889	4,340			
948.25	3,913	4,535			
948.30	3,936	4,731			
948.35	3,960	4,929			
948.40	3,983	5,127			
948.45	4,007	5,327			
948.50	4,031	5,528			
948.55	4,054	5,730			
948.60	4,078	5,933			
948.65	4,101	6,138			
948.70	4,125	6,343			
948.75	4,148	6,550			
948.80	4,172	6,758			
948.85	4,195	6,967			
948.90	4,219	7,178			
948.95	4,242	7,389			
949.00	4,266	7,602			
949.05	4,303	7,816			
949.10	4,340	8,032			
949.15	4,377	8,250			
949.20	4,414	8,470			
949.25	4,451	8,692			
949.30	4,488	8,915			
949.35	4,525	9,140			
949.40	4,562	9,368			
949.45	4,599	9,597			
949.50	4,636	9,828			
949.55	4,674	10,060			

Time span=0.00-80.00 hrs, dt=0.01 hrs, 8001 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 3S: Residential Areas Runoff Area=1.800 ac 0.00% Impervious Runoff Depth=0.20"
 Flow Length=115' Slope=0.0300 '/' Tc=9.9 min CN=61 Runoff=0.23 cfs 0.029 af

Subcatchment P-1: Badger Drive & North Runoff Area=1.650 ac 13.33% Impervious Runoff Depth=0.33"
 Flow Length=194' Tc=11.6 min CN=66 Runoff=0.53 cfs 0.045 af

Subcatchment P-5: Eagle Pass & North Runoff Area=1.633 ac 14.27% Impervious Runoff Depth=0.33"
 Flow Length=315' Tc=12.1 min CN=66 Runoff=0.52 cfs 0.044 af

Reach 1R: Existing Eagle Storm Sewer Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Reach 2R: swale Avg. Flow Depth=0.13' Max Vel=0.32 fps Inflow=0.76 cfs 0.074 af
 n=0.150 L=280.0' S=0.0179 '/' Capacity=20.16 cfs Outflow=0.48 cfs 0.074 af

Reach 6R: Site Discharge Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Pond 5P: Infiltration Basin Peak Elev=943.34' Storage=3,233 cf Inflow=0.48 cfs 0.074 af
 Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond IN1: Biofilter Forebay Peak Elev=947.56' Storage=1,934 cf Inflow=0.52 cfs 0.044 af
 Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 5.083 ac Runoff Volume = 0.119 af Average Runoff Depth = 0.28"
91.09% Pervious = 4.630 ac 8.91% Impervious = 0.453 ac

Summary for Subcatchment 3S: Residential Areas

Runoff = 0.23 cfs @ 12.25 hrs, Volume= 0.029 af, Depth= 0.20"
 Routed to Reach 2R : swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 Custom Rainfall=2.50"

Area (ac)	CN	Description	Land Use
1.800	61	>75% Grass cover, Good, HSG B	Open Space
1.800		100.00% Pervious Area	

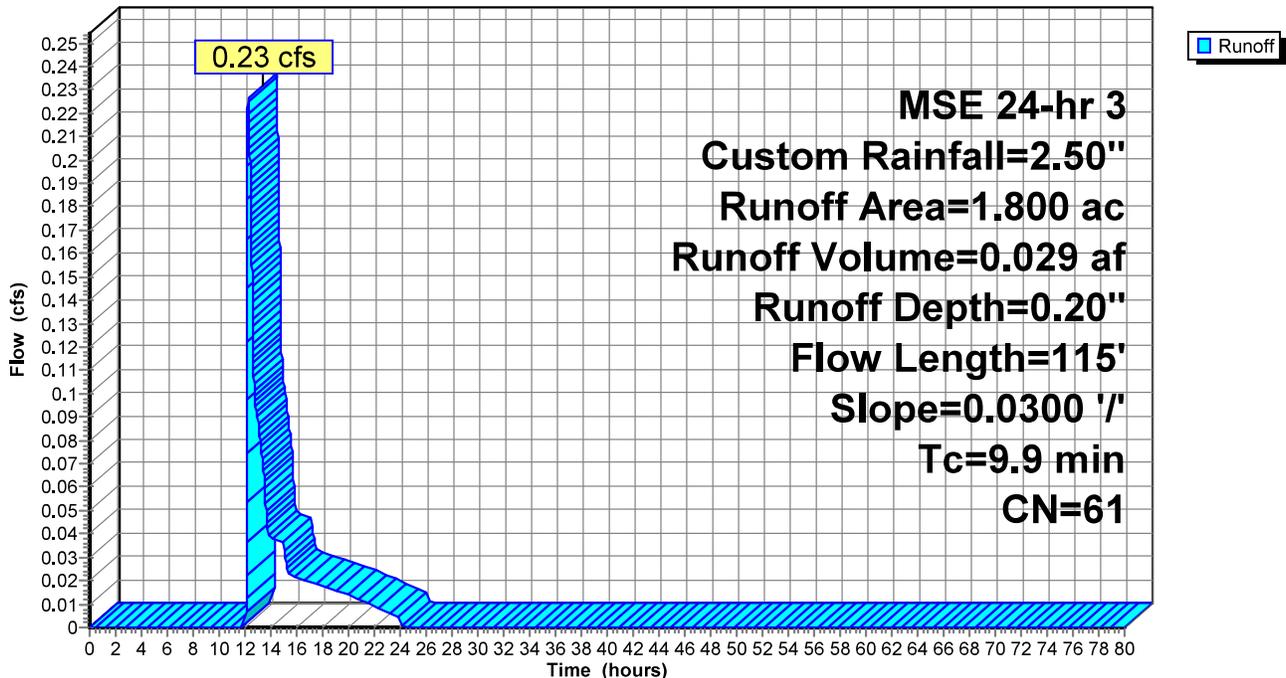
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	115	0.0300	0.19		Sheet Flow, Uncaptured By Swale Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.800	Open Space	185.89	1.49
1.800	Total	185.89	1.49

Subcatchment 3S: Residential Areas

Hydrograph



Summary for Subcatchment P-1: Badger Drive & North Lots

Runoff = 0.53 cfs @ 12.23 hrs, Volume= 0.045 af, Depth= 0.33"
 Routed to Reach 2R : swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 Custom Rainfall=2.50"

Area (ac)	CN	Description	Land Use
1.430	61	>75% Grass cover, Good, HSG B	Open Space
0.220	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.650	66	Weighted Average	
1.430		86.67% Pervious Area	
0.220		13.33% Impervious Area	

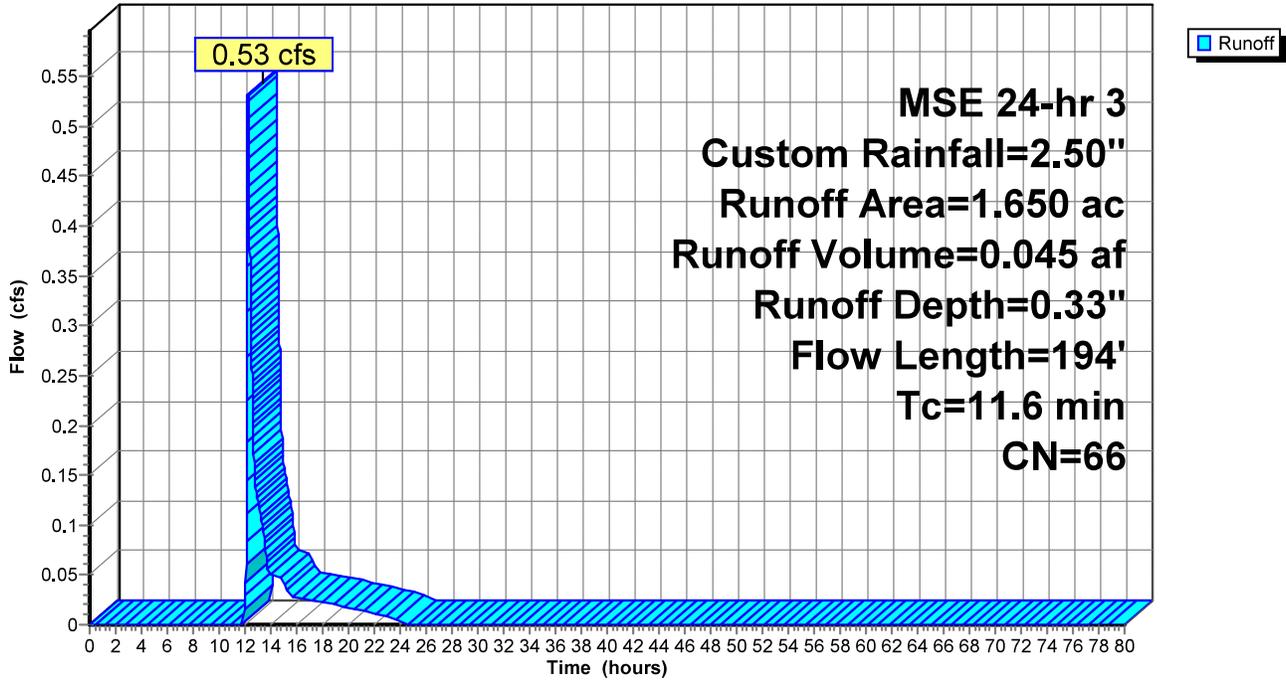
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	94	0.0200	0.16		Sheet Flow, Pretreated Flow to Basin Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
1.7	100	0.0100	0.98		Sheet Flow, Badger Dr Smooth surfaces n= 0.011 P2= 2.84"
11.6	194	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.430	Open Space	147.68	1.18
0.220	Roadway	34.08	0.27
1.650	Total	181.76	1.45

Subcatchment P-1: Badger Drive & North Lots

Hydrograph



Summary for Subcatchment P-5: Eagle Pass & North Lots

Runoff = 0.52 cfs @ 12.24 hrs, Volume= 0.044 af, Depth= 0.33"
 Routed to Pond IN1 : Biofilter Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 3 Custom Rainfall=2.50"

Area (ac)	CN	Description	Land Use
0.233	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.400	61	>75% Grass cover, Good, HSG B	Open Space
1.633	66	Weighted Average	
1.400		85.73% Pervious Area	
0.233		14.27% Impervious Area	

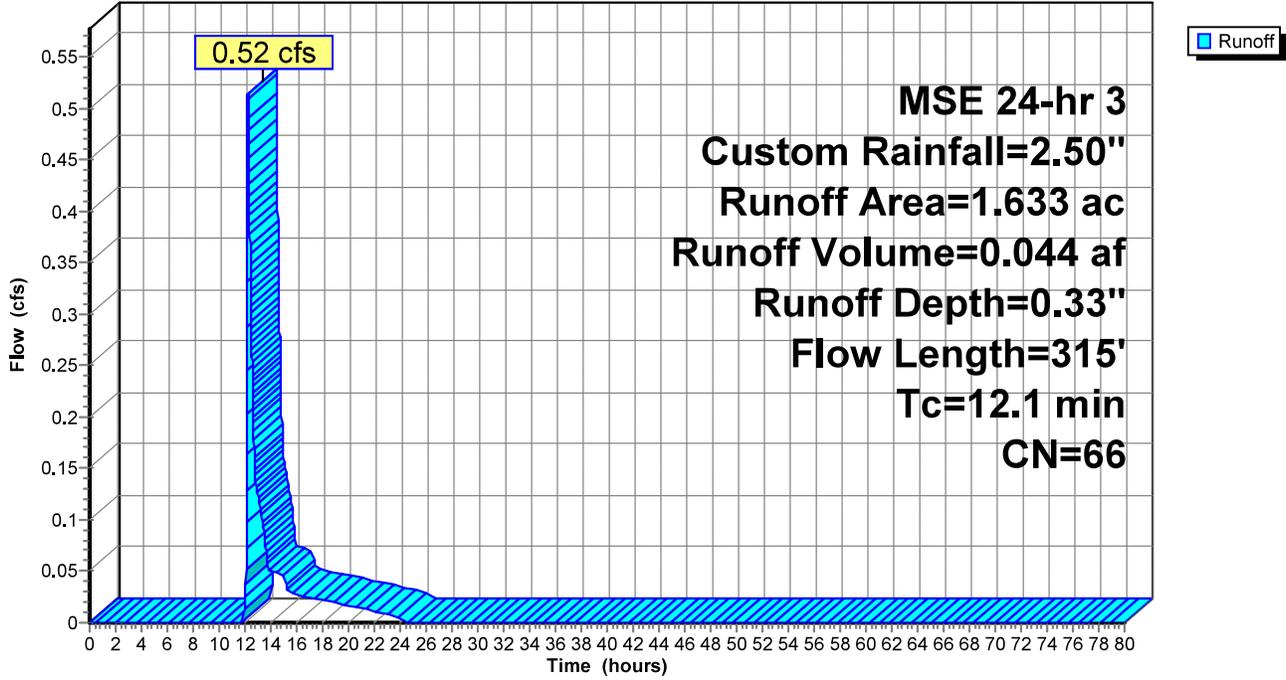
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	200	0.0200	1.49		Sheet Flow, Roads/Sewers/Roofs Smooth surfaces n= 0.011 P2= 2.84"
9.9	115	0.0300	0.19		Sheet Flow, Eagle Lots Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
12.1	315	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 8.91% Impervious, Rv= 0.130, Runoff= 4.56"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.400	Open Space	144.58	1.16
0.233	Roadway	36.09	0.29
1.633	Total	180.68	1.45

Subcatchment P-5: Eagle Pass & North Lots

Hydrograph

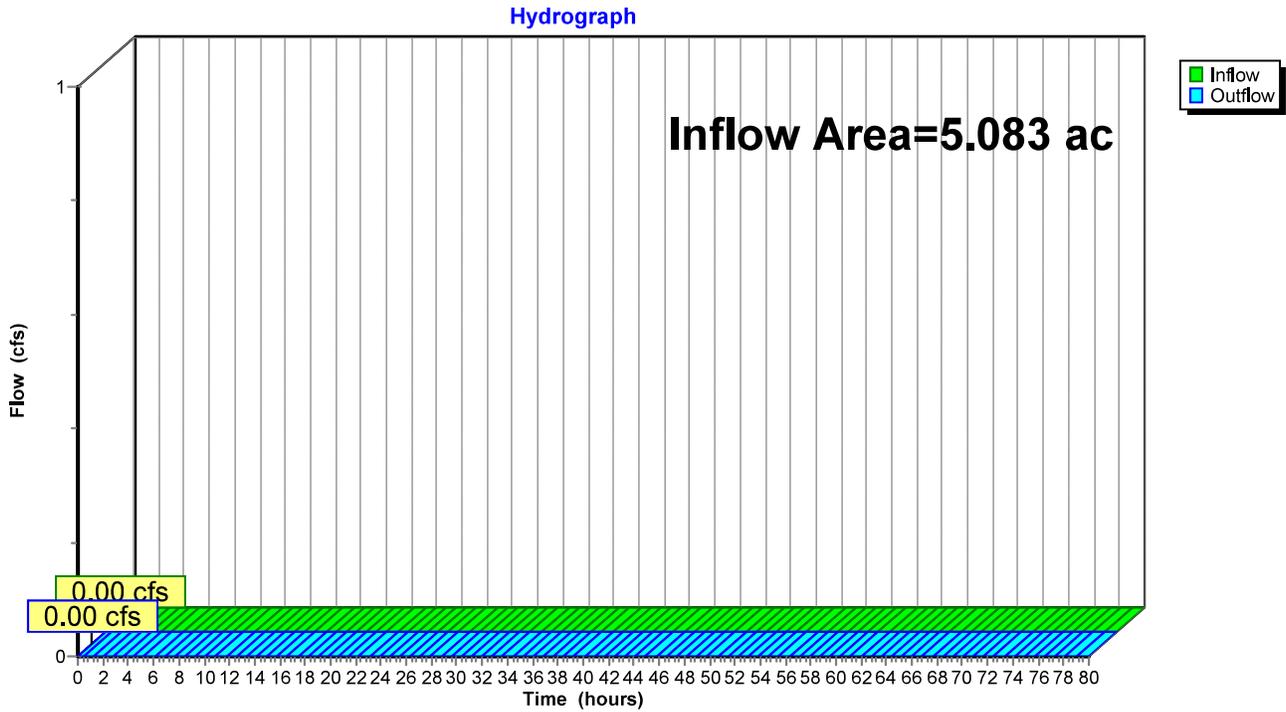


Summary for Reach 1R: Existing Eagle Storm Sewer

Inflow Area = 5.083 ac, 8.91% Impervious, Inflow Depth = 0.00" for Custom event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 1R: Existing Eagle Storm Sewer



Summary for Reach 2R: swale

Inflow Area = 3.450 ac, 6.38% Impervious, Inflow Depth = 0.26" for Custom event
 Inflow = 0.76 cfs @ 12.24 hrs, Volume= 0.074 af
 Outflow = 0.48 cfs @ 12.71 hrs, Volume= 0.074 af, Atten= 37%, Lag= 28.2 min
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.32 fps, Min. Travel Time= 14.6 min
 Avg. Velocity = 0.11 fps, Avg. Travel Time= 43.3 min

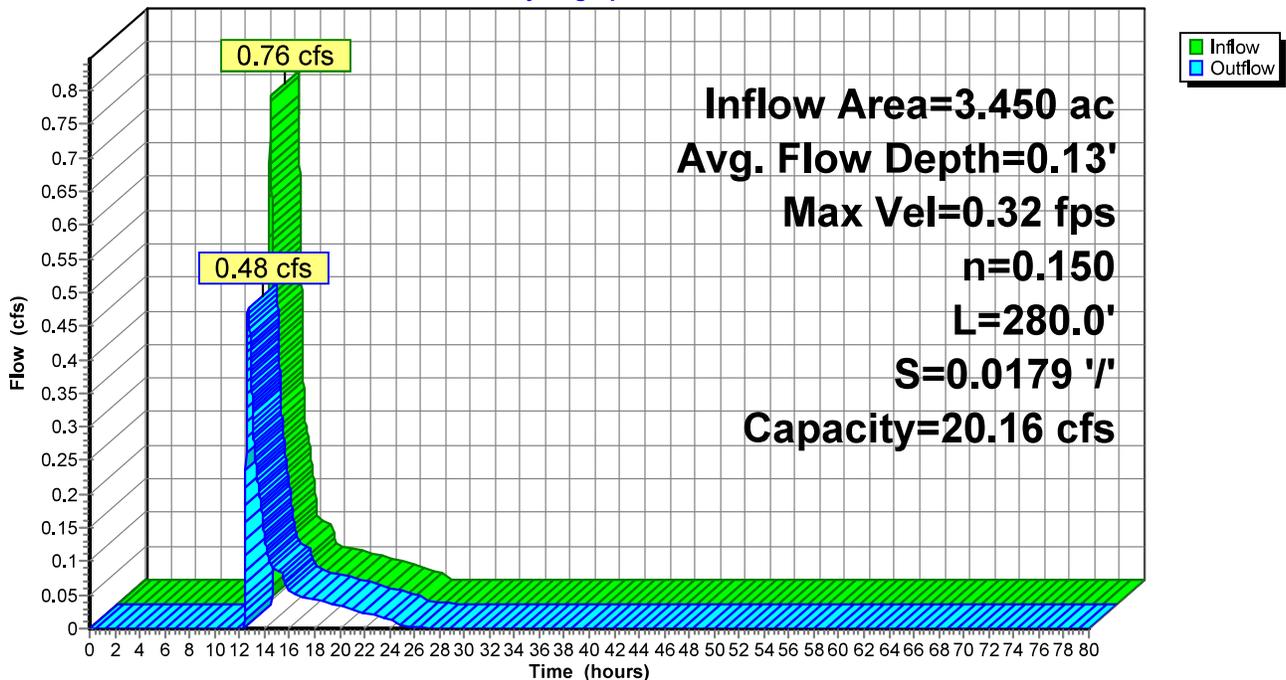
Peak Storage= 419 cf @ 12.47 hrs
 Average Depth at Peak Storage= 0.13' , Surface Width= 12.64'
 Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 20.16 cfs

10.00' x 1.00' deep channel, n= 0.150 Sheet flow over Short Grass
 Side Slope Z-value= 10.0 ' / ' Top Width= 30.00'
 Length= 280.0' Slope= 0.0179 ' / '
 Inlet Invert= 959.00', Outlet Invert= 954.00'



Reach 2R: swale

Hydrograph



Stage-Discharge for Reach 2R: swale

Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)	Elevation (feet)	Velocity (ft/sec)	Discharge (cfs)
959.00	0.00	0.00	959.52	0.70	5.55
959.01	0.06	0.01	959.53	0.71	5.76
959.02	0.10	0.02	959.54	0.72	5.96
959.03	0.13	0.04	959.55	0.72	6.18
959.04	0.15	0.06	959.56	0.73	6.39
959.05	0.17	0.09	959.57	0.74	6.61
959.06	0.20	0.12	959.58	0.75	6.84
959.07	0.22	0.16	959.59	0.75	7.07
959.08	0.23	0.20	959.60	0.76	7.30
959.09	0.25	0.25	959.61	0.77	7.53
959.10	0.27	0.30	959.62	0.77	7.78
959.11	0.29	0.35	959.63	0.78	8.02
959.12	0.30	0.40	959.64	0.79	8.27
959.13	0.32	0.46	959.65	0.79	8.52
959.14	0.33	0.53	959.66	0.80	8.78
959.15	0.34	0.59	959.67	0.81	9.04
959.16	0.36	0.66	959.68	0.81	9.31
959.17	0.37	0.74	959.69	0.82	9.58
959.18	0.38	0.81	959.70	0.83	9.85
959.19	0.40	0.90	959.71	0.83	10.13
959.20	0.41	0.98	959.72	0.84	10.41
959.21	0.42	1.07	959.73	0.85	10.70
959.22	0.43	1.16	959.74	0.85	10.99
959.23	0.44	1.25	959.75	0.86	11.29
959.24	0.45	1.35	959.76	0.87	11.59
959.25	0.46	1.45	959.77	0.87	11.89
959.26	0.48	1.56	959.78	0.88	12.20
959.27	0.49	1.67	959.79	0.88	12.51
959.28	0.50	1.78	959.80	0.89	12.83
959.29	0.51	1.89	959.81	0.90	13.15
959.30	0.52	2.01	959.82	0.90	13.48
959.31	0.53	2.13	959.83	0.91	13.81
959.32	0.54	2.26	959.84	0.92	14.15
959.33	0.54	2.39	959.85	0.92	14.49
959.34	0.55	2.52	959.86	0.93	14.83
959.35	0.56	2.66	959.87	0.93	15.18
959.36	0.57	2.80	959.88	0.94	15.54
959.37	0.58	2.94	959.89	0.95	15.90
959.38	0.59	3.09	959.90	0.95	16.26
959.39	0.60	3.24	959.91	0.96	16.63
959.40	0.61	3.40	959.92	0.96	17.00
959.41	0.62	3.56	959.93	0.97	17.38
959.42	0.62	3.72	959.94	0.97	17.76
959.43	0.63	3.89	959.95	0.98	18.15
959.44	0.64	4.06	959.96	0.99	18.54
959.45	0.65	4.23	959.97	0.99	18.94
959.46	0.66	4.41	959.98	1.00	19.34
959.47	0.66	4.59	959.99	1.00	19.75
959.48	0.67	4.77	960.00	1.01	20.16
959.49	0.68	4.96			
959.50	0.69	5.15			
959.51	0.69	5.35			

Stage-Area-Storage for Reach 2R: swale

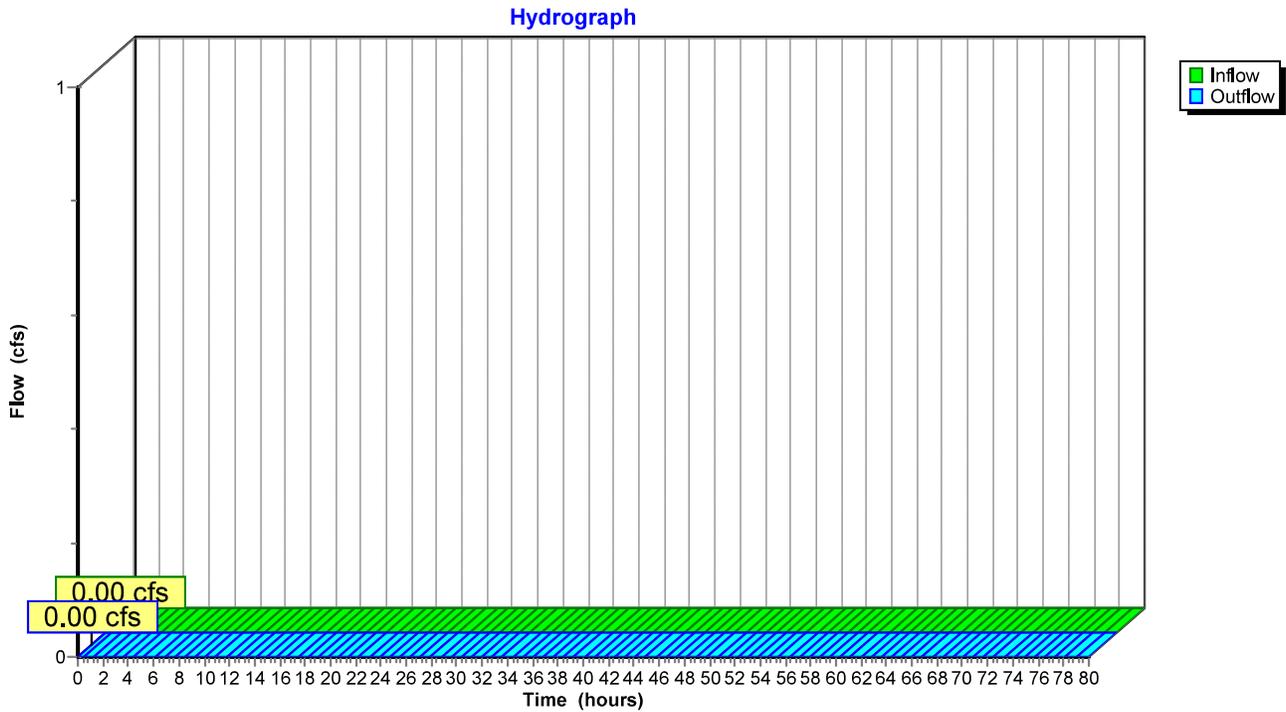
Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
959.00	0.0	0	959.52	7.9	2,213
959.01	0.1	28	959.53	8.1	2,271
959.02	0.2	57	959.54	8.3	2,328
959.03	0.3	87	959.55	8.5	2,387
959.04	0.4	116	959.56	8.7	2,446
959.05	0.5	147	959.57	8.9	2,506
959.06	0.6	178	959.58	9.2	2,566
959.07	0.7	210	959.59	9.4	2,627
959.08	0.9	242	959.60	9.6	2,688
959.09	1.0	275	959.61	9.8	2,750
959.10	1.1	308	959.62	10.0	2,812
959.11	1.2	342	959.63	10.3	2,875
959.12	1.3	376	959.64	10.5	2,939
959.13	1.5	411	959.65	10.7	3,003
959.14	1.6	447	959.66	11.0	3,068
959.15	1.7	483	959.67	11.2	3,133
959.16	1.9	520	959.68	11.4	3,199
959.17	2.0	557	959.69	11.7	3,265
959.18	2.1	595	959.70	11.9	3,332
959.19	2.3	633	959.71	12.1	3,399
959.20	2.4	672	959.72	12.4	3,468
959.21	2.5	711	959.73	12.6	3,536
959.22	2.7	752	959.74	12.9	3,605
959.23	2.8	792	959.75	13.1	3,675
959.24	3.0	833	959.76	13.4	3,745
959.25	3.1	875	959.77	13.6	3,816
959.26	3.3	917	959.78	13.9	3,888
959.27	3.4	960	959.79	14.1	3,959
959.28	3.6	1,004	959.80	14.4	4,032
959.29	3.7	1,047	959.81	14.7	4,105
959.30	3.9	1,092	959.82	14.9	4,179
959.31	4.1	1,137	959.83	15.2	4,253
959.32	4.2	1,183	959.84	15.5	4,328
959.33	4.4	1,229	959.85	15.7	4,403
959.34	4.6	1,276	959.86	16.0	4,479
959.35	4.7	1,323	959.87	16.3	4,555
959.36	4.9	1,371	959.88	16.5	4,632
959.37	5.1	1,419	959.89	16.8	4,710
959.38	5.2	1,468	959.90	17.1	4,788
959.39	5.4	1,518	959.91	17.4	4,867
959.40	5.6	1,568	959.92	17.7	4,946
959.41	5.8	1,619	959.93	17.9	5,026
959.42	6.0	1,670	959.94	18.2	5,106
959.43	6.1	1,722	959.95	18.5	5,187
959.44	6.3	1,774	959.96	18.8	5,268
959.45	6.5	1,827	959.97	19.1	5,351
959.46	6.7	1,880	959.98	19.4	5,433
959.47	6.9	1,935	959.99	19.7	5,516
959.48	7.1	1,989	960.00	20.0	5,600
959.49	7.3	2,044			
959.50	7.5	2,100			
959.51	7.7	2,156			

Summary for Reach 6R: Site Discharge

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 6R: Site Discharge



Summary for Pond 5P: Infiltration Basin

Inflow Area = 5.083 ac, 8.91% Impervious, Inflow Depth = 0.18" for Custom event
 Inflow = 0.48 cfs @ 12.71 hrs, Volume= 0.074 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 1R : Existing Eagle Storm Sewer
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Site Discharge

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 943.34' @ 56.62 hrs Surf.Area= 9,650 sf Storage= 3,233 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	943.00'	70,609 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
943.00	9,227	0	0
944.00	10,462	9,845	9,845
945.00	11,755	11,109	20,953
946.00	13,106	12,431	33,384
947.00	14,512	13,809	47,193
947.50	15,237	7,437	54,630
948.00	15,976	7,803	62,433
948.50	16,729	8,176	70,609

Device	Routing	Invert	Outlet Devices
#1	Secondary	947.50'	26.0' 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
#2	Discarded	943.00'	1.630 in/hr Exfiltration - Primary X 0.00 over Surface area
#3	Primary	946.40'	12.0" Round Secondary Culvert to Street L= 54.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.40' / 945.50' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

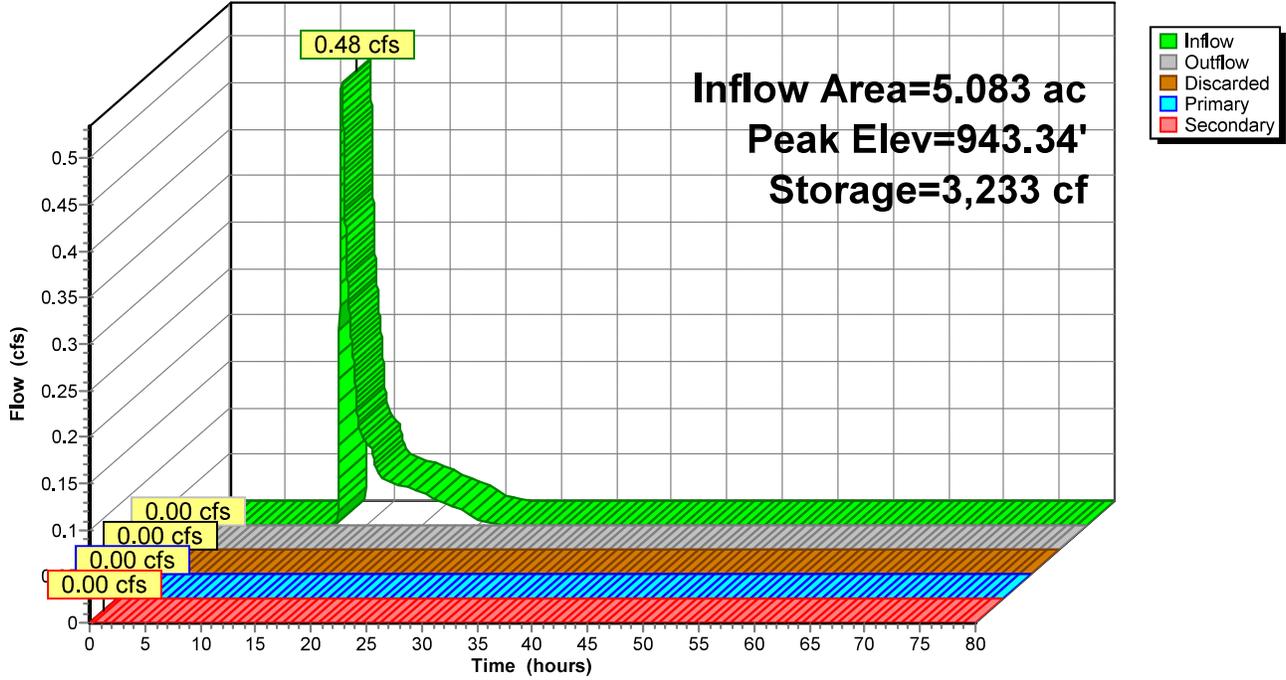
Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑2=Exfiltration - Primary (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑3=Secondary Culvert to Street (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=943.00' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: Infiltration Basin

Hydrograph



Stage-Discharge for Pond 5P: Infiltration Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
943.00	0.00	0.00	0.00	0.00
943.20	0.00	0.00	0.00	0.00
943.40	0.00	0.00	0.00	0.00
943.60	0.00	0.00	0.00	0.00
943.80	0.00	0.00	0.00	0.00
944.00	0.00	0.00	0.00	0.00
944.20	0.00	0.00	0.00	0.00
944.40	0.00	0.00	0.00	0.00
944.60	0.00	0.00	0.00	0.00
944.80	0.00	0.00	0.00	0.00
945.00	0.00	0.00	0.00	0.00
945.20	0.00	0.00	0.00	0.00
945.40	0.00	0.00	0.00	0.00
945.60	0.00	0.00	0.00	0.00
945.80	0.00	0.00	0.00	0.00
946.00	0.00	0.00	0.00	0.00
946.20	0.00	0.00	0.00	0.00
946.40	0.00	0.00	0.00	0.00
946.60	0.15	0.00	0.15	0.00
946.80	0.56	0.00	0.56	0.00
947.00	1.14	0.00	1.14	0.00
947.20	1.81	0.00	1.81	0.00
947.40	2.36	0.00	2.36	0.00
947.60	4.84	0.00	2.79	2.05
947.80	13.95	0.00	3.17	10.79
948.00	27.68	0.00	3.50	24.18
948.20	44.84	0.00	3.80	41.04
948.40	63.69	0.00	4.09	59.60

Stage-Area-Storage for Pond 5P: Infiltration Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
943.00	9,227	0	948.20	16,277	65,658
943.10	9,351	929	948.30	16,428	67,294
943.20	9,474	1,870	948.40	16,578	68,944
943.30	9,597	2,824	948.50	16,729	70,609
943.40	9,721	3,790			
943.50	9,845	4,768			
943.60	9,968	5,759			
943.70	10,092	6,761			
943.80	10,215	7,777			
943.90	10,338	8,804			
944.00	10,462	9,845			
944.10	10,591	10,897			
944.20	10,721	11,963			
944.30	10,850	13,041			
944.40	10,979	14,133			
944.50	11,109	15,237			
944.60	11,238	16,354			
944.70	11,367	17,485			
944.80	11,496	18,628			
944.90	11,626	19,784			
945.00	11,755	20,953			
945.10	11,890	22,135			
945.20	12,025	23,331			
945.30	12,160	24,540			
945.40	12,295	25,763			
945.50	12,431	26,999			
945.60	12,566	28,249			
945.70	12,701	29,512			
945.80	12,836	30,789			
945.90	12,971	32,080			
946.00	13,106	33,384			
946.10	13,247	34,701			
946.20	13,387	36,033			
946.30	13,528	37,379			
946.40	13,668	38,738			
946.50	13,809	40,112			
946.60	13,950	41,500			
946.70	14,090	42,902			
946.80	14,231	44,318			
946.90	14,371	45,748			
947.00	14,512	47,193			
947.10	14,657	48,651			
947.20	14,802	50,124			
947.30	14,947	51,611			
947.40	15,092	53,113			
947.50	15,237	54,630			
947.60	15,385	56,161			
947.70	15,533	57,707			
947.80	15,680	59,267			
947.90	15,828	60,843			
948.00	15,976	62,433			
948.10	16,127	64,038			

Summary for Pond IN1: Biofilter Forebay

Inflow Area = 1.633 ac, 14.27% Impervious, Inflow Depth = 0.33" for Custom event
 Inflow = 0.52 cfs @ 12.24 hrs, Volume= 0.044 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 5P : Infiltration Basin
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 947.56' @ 24.69 hrs Surf.Area= 3,597 sf Storage= 1,934 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	947.00'	14,802 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
947.00	3,348	0	0
948.00	3,795	3,572	3,572
949.00	4,266	4,031	7,602
949.50	4,636	2,226	9,828
950.00	5,020	2,414	12,242
950.50	5,220	2,560	14,802

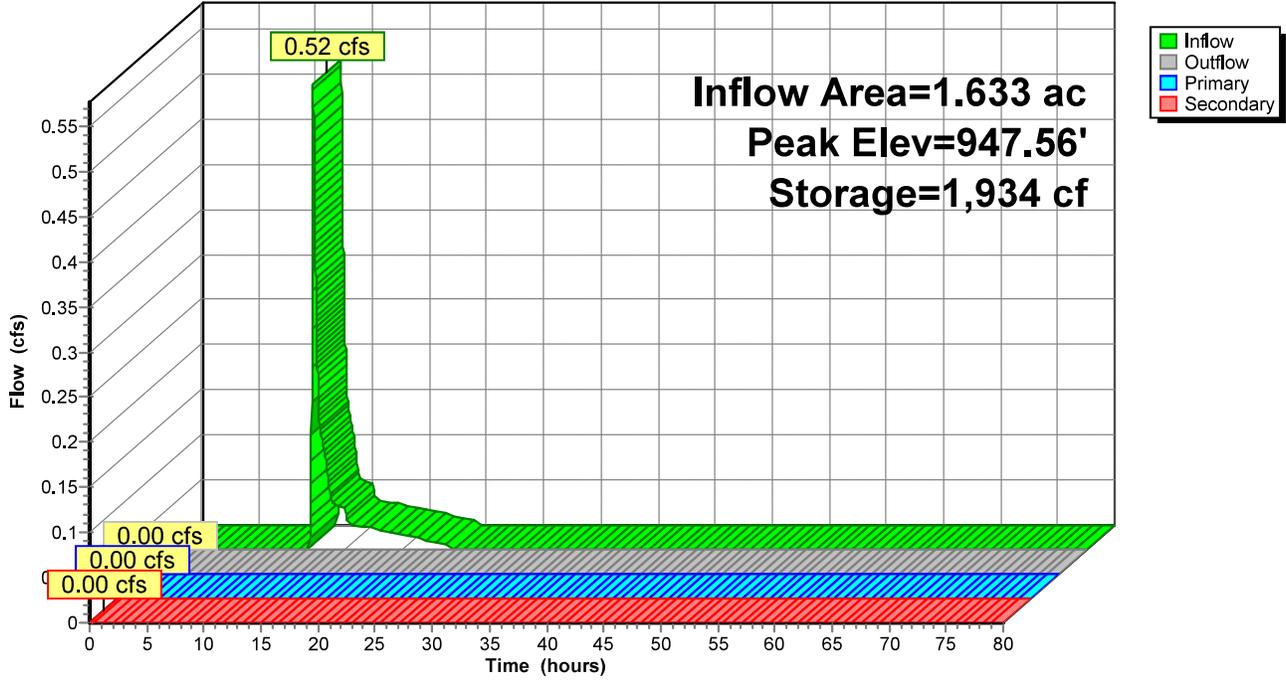
Device	Routing	Invert	Outlet Devices
#1	Secondary	949.00'	23.0' long x 6.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.81
#2	Primary	947.00'	1.630 in/hr Exfiltration X 0.00 over Surface area

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=947.00' (Free Discharge)
 ↑2=Exfiltration (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=947.00' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond IN1: Biofilter Forebay

Hydrograph

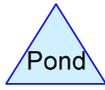
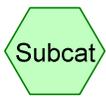
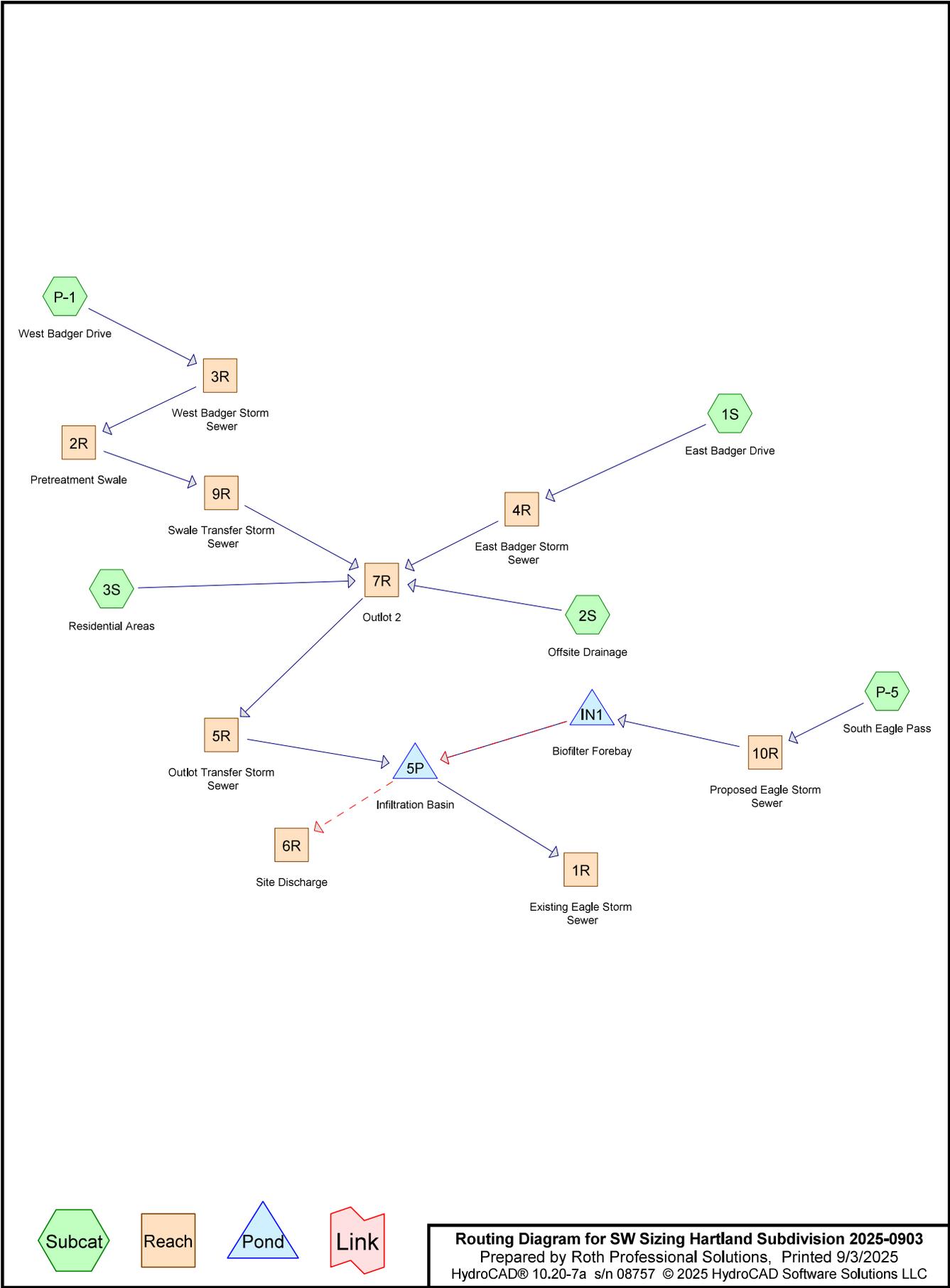


Stage-Discharge for Pond IN1: Biofilter Forebay

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
947.00	0.00	0.00	0.00	949.60	28.86	0.00	28.86
947.05	0.00	0.00	0.00	949.65	32.48	0.00	32.48
947.10	0.00	0.00	0.00	949.70	36.23	0.00	36.23
947.15	0.00	0.00	0.00	949.75	40.11	0.00	40.11
947.20	0.00	0.00	0.00	949.80	44.11	0.00	44.11
947.25	0.00	0.00	0.00	949.85	48.30	0.00	48.30
947.30	0.00	0.00	0.00	949.90	52.63	0.00	52.63
947.35	0.00	0.00	0.00	949.95	57.08	0.00	57.08
947.40	0.00	0.00	0.00	950.00	61.64	0.00	61.64
947.45	0.00	0.00	0.00	950.05	66.26	0.00	66.26
947.50	0.00	0.00	0.00	950.10	70.98	0.00	70.98
947.55	0.00	0.00	0.00	950.15	75.80	0.00	75.80
947.60	0.00	0.00	0.00	950.20	80.73	0.00	80.73
947.65	0.00	0.00	0.00	950.25	85.74	0.00	85.74
947.70	0.00	0.00	0.00	950.30	90.85	0.00	90.85
947.75	0.00	0.00	0.00	950.35	96.05	0.00	96.05
947.80	0.00	0.00	0.00	950.40	101.34	0.00	101.34
947.85	0.00	0.00	0.00	950.45	106.72	0.00	106.72
947.90	0.00	0.00	0.00	950.50	112.18	0.00	112.18
947.95	0.00	0.00	0.00				
948.00	0.00	0.00	0.00				
948.05	0.00	0.00	0.00				
948.10	0.00	0.00	0.00				
948.15	0.00	0.00	0.00				
948.20	0.00	0.00	0.00				
948.25	0.00	0.00	0.00				
948.30	0.00	0.00	0.00				
948.35	0.00	0.00	0.00				
948.40	0.00	0.00	0.00				
948.45	0.00	0.00	0.00				
948.50	0.00	0.00	0.00				
948.55	0.00	0.00	0.00				
948.60	0.00	0.00	0.00				
948.65	0.00	0.00	0.00				
948.70	0.00	0.00	0.00				
948.75	0.00	0.00	0.00				
948.80	0.00	0.00	0.00				
948.85	0.00	0.00	0.00				
948.90	0.00	0.00	0.00				
948.95	0.00	0.00	0.00				
949.00	0.00	0.00	0.00				
949.05	0.61	0.00	0.61				
949.10	1.73	0.00	1.73				
949.15	3.18	0.00	3.18				
949.20	4.90	0.00	4.90				
949.25	6.94	0.00	6.94				
949.30	9.26	0.00	9.26				
949.35	11.83	0.00	11.83				
949.40	14.66	0.00	14.66				
949.45	17.81	0.00	17.81				
949.50	21.22	0.00	21.22				
949.55	24.91	0.00	24.91				

Stage-Area-Storage for Pond IN1: Biofilter Forebay

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
947.00	3,348	0	949.60	4,713	10,295
947.05	3,370	168	949.65	4,751	10,532
947.10	3,393	337	949.70	4,790	10,770
947.15	3,415	507	949.75	4,828	11,011
947.20	3,437	679	949.80	4,866	11,253
947.25	3,460	851	949.85	4,905	11,497
947.30	3,482	1,025	949.90	4,943	11,743
947.35	3,504	1,199	949.95	4,982	11,991
947.40	3,527	1,375	950.00	5,020	12,242
947.45	3,549	1,552	950.05	5,040	12,493
947.50	3,572	1,730	950.10	5,060	12,746
947.55	3,594	1,909	950.15	5,080	12,999
947.60	3,616	2,089	950.20	5,100	13,254
947.65	3,639	2,271	950.25	5,120	13,509
947.70	3,661	2,453	950.30	5,140	13,765
947.75	3,683	2,637	950.35	5,160	14,023
947.80	3,706	2,821	950.40	5,180	14,281
947.85	3,728	3,007	950.45	5,200	14,541
947.90	3,750	3,194	950.50	5,220	14,802
947.95	3,773	3,382			
948.00	3,795	3,572			
948.05	3,819	3,762			
948.10	3,842	3,953			
948.15	3,866	4,146			
948.20	3,889	4,340			
948.25	3,913	4,535			
948.30	3,936	4,731			
948.35	3,960	4,929			
948.40	3,983	5,127			
948.45	4,007	5,327			
948.50	4,031	5,528			
948.55	4,054	5,730			
948.60	4,078	5,933			
948.65	4,101	6,138			
948.70	4,125	6,343			
948.75	4,148	6,550			
948.80	4,172	6,758			
948.85	4,195	6,967			
948.90	4,219	7,178			
948.95	4,242	7,389			
949.00	4,266	7,602			
949.05	4,303	7,816			
949.10	4,340	8,032			
949.15	4,377	8,250			
949.20	4,414	8,470			
949.25	4,451	8,692			
949.30	4,488	8,915			
949.35	4,525	9,140			
949.40	4,562	9,368			
949.45	4,599	9,597			
949.50	4,636	9,828			
949.55	4,674	10,060			



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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-Year	MSE 24-hr	4	Default	24.00	1	5.01	2

SW Sizing Hartland Subdivision 2025-0903

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.000	70	1/2 acre lots, 25% imp, HSG B (2S)
4.510	61	>75% Grass cover, Good, HSG B (3S, P-1, P-5)
0.125	98	East Badger Drive (1S)
0.125	61	East Badger Lots (1S)
0.333	98	Paved roads w/curbs & sewers, HSG B (P-1, P-5)
7.093	66	TOTAL AREA

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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)	Node Name
1	3R	957.50	957.00	58.0	0.0086	0.013	0.0	15.0	0.0	
2	4R	951.50	948.50	220.0	0.0136	0.013	0.0	15.0	0.0	
3	5R	946.50	944.00	190.0	0.0132	0.013	0.0	18.0	0.0	
4	9R	952.00	947.50	75.0	0.0600	0.013	0.0	15.0	0.0	
5	10R	948.00	947.50	40.0	0.0125	0.013	0.0	15.0	0.0	
6	5P	946.40	945.50	54.0	0.0167	0.012	0.0	12.0	0.0	

SW Sizing Hartland Subdivision 2025-0903

MSE 24-hr 4 25-Year Rainfall=5.01"

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Time span=0.00-80.00 hrs, dt=0.01 hrs, 8001 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: East Badger Drive Runoff Area=0.250 ac 50.00% Impervious Runoff Depth=2.90"
 Flow Length=167' Slope=0.0100 '/' Tc=11.7 min CN=80 Runoff=0.93 cfs 0.060 af

Subcatchment 2S: Offsite Drainage Runoff Area=2.000 ac 25.00% Impervious Runoff Depth=2.04"
 Flow Length=200' Slope=0.0200 '/' Tc=8.3 min CN=70 Runoff=6.01 cfs 0.341 af

Subcatchment 3S: Residential Areas Runoff Area=1.800 ac 0.00% Impervious Runoff Depth=1.38"
 Flow Length=115' Slope=0.0300 '/' Tc=9.9 min CN=61 Runoff=3.22 cfs 0.206 af

Subcatchment P-1: West Badger Drive Runoff Area=1.410 ac 7.09% Impervious Runoff Depth=1.59"
 Flow Length=167' Slope=0.0100 '/' Tc=11.7 min CN=64 Runoff=2.75 cfs 0.186 af

Subcatchment P-5: South Eagle Pass Runoff Area=1.633 ac 14.27% Impervious Runoff Depth=1.73"
 Flow Length=294' Tc=12.6 min CN=66 Runoff=3.42 cfs 0.236 af

Reach 1R: Existing Eagle Storm Sewer Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Reach 2R: Pretreatment Swale Avg. Flow Depth=0.15' Max Vel=1.59 fps Inflow=2.75 cfs 0.186 af
 n=0.030 L=375.0' S=0.0133 '/' Capacity=511.87 cfs Outflow=2.54 cfs 0.186 af

Reach 3R: West Badger Storm Sewer Avg. Flow Depth=0.59' Max Vel=4.78 fps Inflow=2.75 cfs 0.186 af
 15.0" Round Pipe n=0.013 L=58.0' S=0.0086 '/' Capacity=6.00 cfs Outflow=2.75 cfs 0.186 af

Reach 4R: East Badger Storm Sewer Avg. Flow Depth=0.29' Max Vel=4.16 fps Inflow=0.93 cfs 0.060 af
 15.0" Round Pipe n=0.013 L=220.0' S=0.0136 '/' Capacity=7.54 cfs Outflow=0.92 cfs 0.060 af

Reach 5R: Outlot Transfer Storm Sewer Avg. Flow Depth=1.10' Max Vel=7.70 fps Inflow=10.73 cfs 0.794 af
 18.0" Round Pipe n=0.013 L=190.0' S=0.0132 '/' Capacity=12.05 cfs Outflow=10.70 cfs 0.794 af

Reach 6R: Site Discharge Inflow=0.00 cfs 0.000 af
 Outflow=0.00 cfs 0.000 af

Reach 7R: Outlot 2 Avg. Flow Depth=0.43' Max Vel=2.72 fps Inflow=10.89 cfs 0.794 af
 n=0.030 L=220.0' S=0.0114 '/' Capacity=757.75 cfs Outflow=10.73 cfs 0.794 af

Reach 9R: Swale Transfer Storm Sewer Avg. Flow Depth=0.34' Max Vel=9.46 fps Inflow=2.54 cfs 0.186 af
 15.0" Round Pipe n=0.013 L=75.0' S=0.0600 '/' Capacity=15.82 cfs Outflow=2.54 cfs 0.186 af

Reach 10R: Proposed Eagle Storm Avg. Flow Depth=0.61' Max Vel=5.80 fps Inflow=3.42 cfs 0.236 af
 15.0" Round Pipe n=0.013 L=40.0' S=0.0125 '/' Capacity=7.22 cfs Outflow=3.42 cfs 0.236 af

Pond 5P: Infiltration Basin Peak Elev=946.15' Storage=36,870 cf Inflow=10.70 cfs 0.846 af
 Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond IN1: Biofilter Forebay Peak Elev=949.51' Storage=8,030 cf Inflow=3.42 cfs 0.236 af
 Outflow=0.11 cfs 0.053 af

SW Sizing Hartland Subdivision 2025-0903

MSE 24-hr 4 25-Year Rainfall=5.01"

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Total Runoff Area = 7.093 ac Runoff Volume = 1.030 af Average Runoff Depth = 1.74"
86.49% Pervious = 6.135 ac 13.51% Impervious = 0.958 ac

Summary for Subcatchment 1S: East Badger Drive

Runoff = 0.93 cfs @ 12.19 hrs, Volume= 0.060 af, Depth= 2.90"
 Routed to Reach 4R : East Badger Storm Sewer

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 4 25-Year Rainfall=5.01"

Area (ac)	CN	Description	Land Use
* 0.125	98	East Badger Drive	
* 0.125	61	East Badger Lots	
0.250	80	Weighted Average	
0.125		50.00% Pervious Area	
0.125		50.00% Impervious Area	

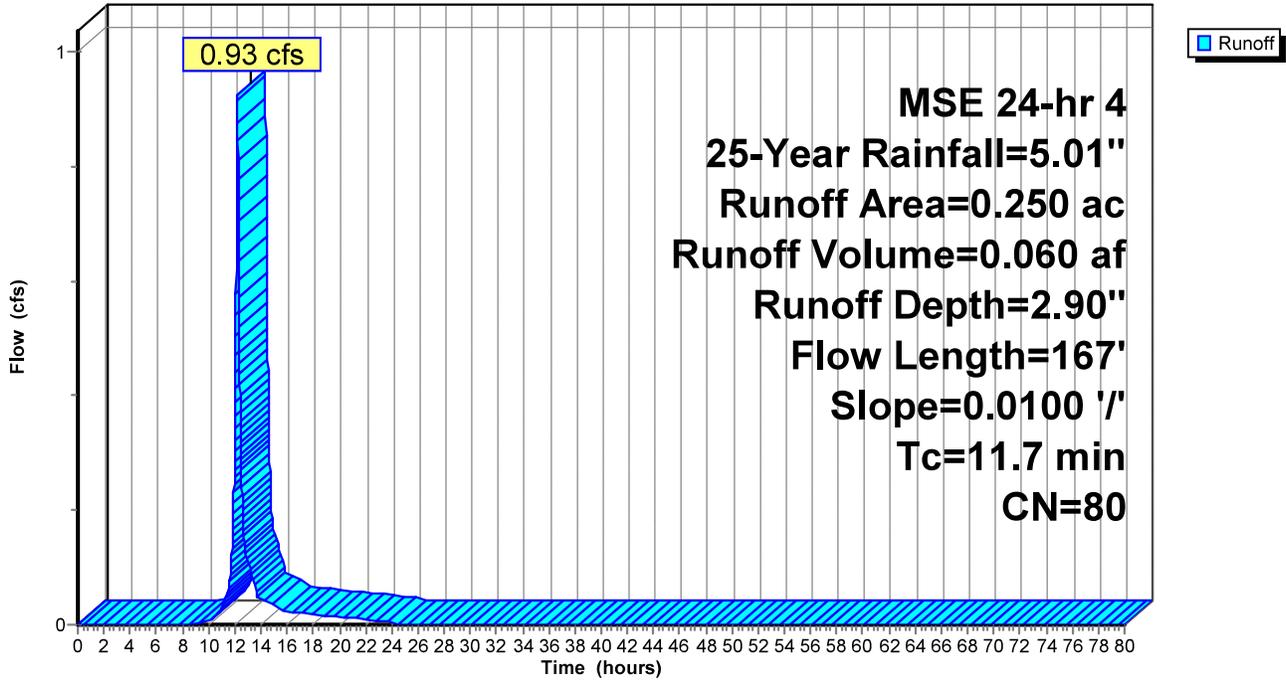
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	100	0.0100	0.98		Sheet Flow, East Badger Drive Smooth surfaces n= 0.011 P2= 2.84"
10.0	67	0.0100	0.11		Sheet Flow, East Badger Lots Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
11.7	167	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 13.51% Impervious, Rv= 0.172, Runoff= 6.00"

Area (acres)	Land Use	tss (pounds)	p (pounds)
0.250	(undefined)	0.00	0.00
0.250	Total	0.00	0.00

Subcatchment 1S: East Badger Drive

Hydrograph



Summary for Subcatchment 2S: Offsite Drainage

Runoff = 6.01 cfs @ 12.16 hrs, Volume= 0.341 af, Depth= 2.04"
 Routed to Reach 7R : Outlot 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 4 25-Year Rainfall=5.01"

Area (ac)	CN	Description	Land Use
2.000	70	1/2 acre lots, 25% imp, HSG B	Residential
1.500		75.00% Pervious Area	
0.500		25.00% Impervious Area	

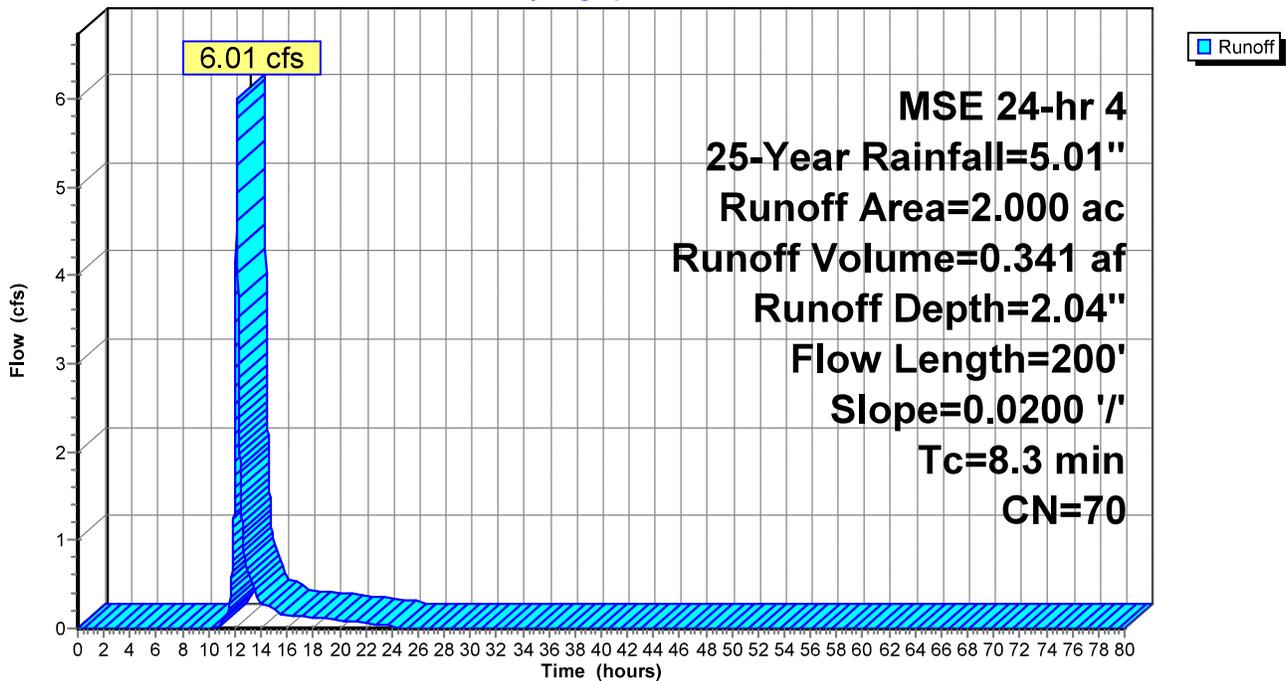
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	200	0.0200	0.40		Lag/CN Method, East Properties

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 13.51% Impervious, Rv= 0.172, Runoff= 6.00"

Area (acres)	Land Use	tss (pounds)	p (pounds)
2.000	Residential	272.14	2.18
2.000	Total	272.14	2.18

Subcatchment 2S: Offsite Drainage

Hydrograph



Summary for Subcatchment 3S: Residential Areas

Runoff = 3.22 cfs @ 12.18 hrs, Volume= 0.206 af, Depth= 1.38"
 Routed to Reach 7R : Outlot 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 4 25-Year Rainfall=5.01"

Area (ac)	CN	Description	Land Use
1.800	61	>75% Grass cover, Good, HSG B	Open Space
1.800		100.00% Pervious Area	

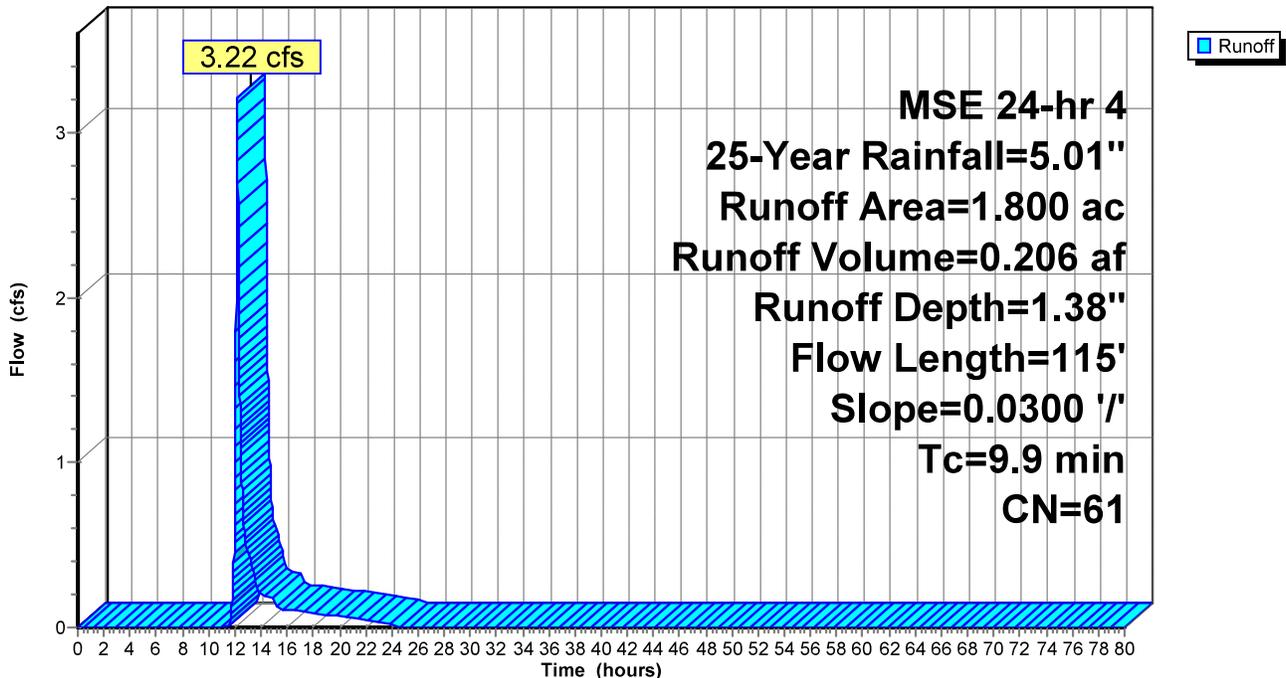
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	115	0.0300	0.19		Sheet Flow, Uncaptured By Swale Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 13.51% Impervious, Rv= 0.172, Runoff= 6.00"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.800	Open Space	244.93	1.96
1.800	Total	244.93	1.96

Subcatchment 3S: Residential Areas

Hydrograph



Summary for Subcatchment P-1: West Badger Drive

Runoff = 2.75 cfs @ 12.20 hrs, Volume= 0.186 af, Depth= 1.59"
 Routed to Reach 3R : West Badger Storm Sewer

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 4 25-Year Rainfall=5.01"

Area (ac)	CN	Description	Land Use
1.310	61	>75% Grass cover, Good, HSG B	Open Space
0.100	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.410	64	Weighted Average	
1.310		92.91% Pervious Area	
0.100		7.09% Impervious Area	

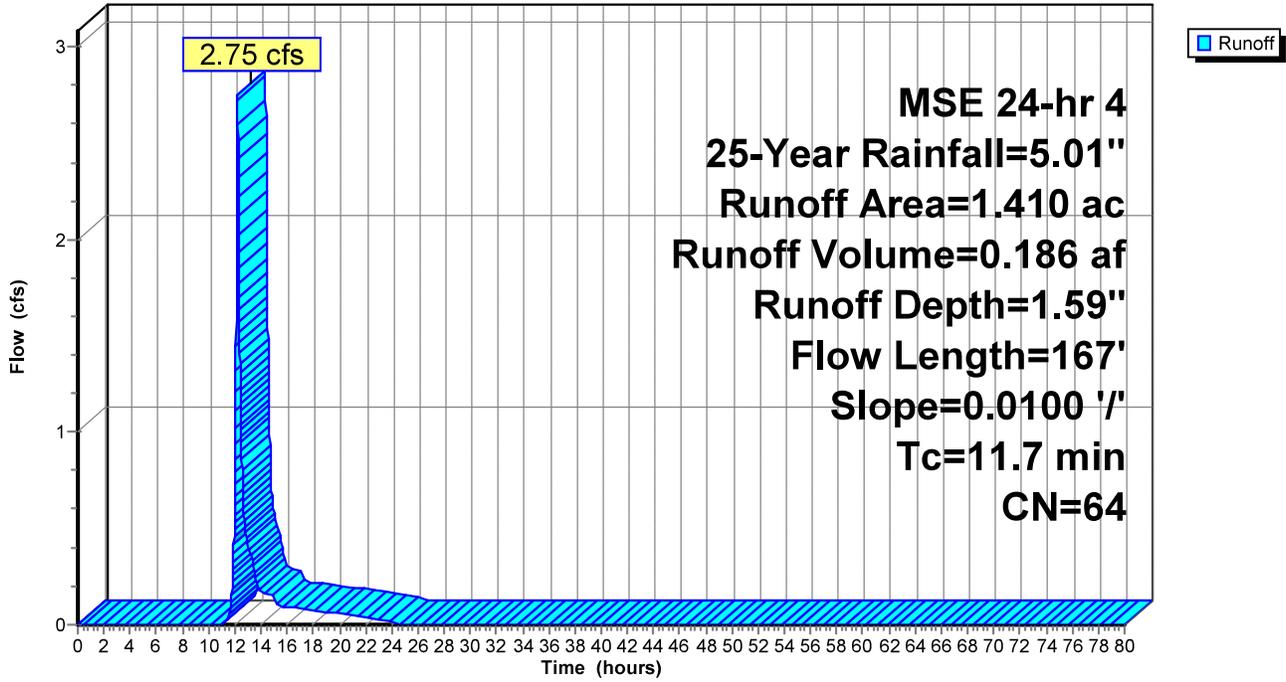
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	67	0.0100	0.11		Sheet Flow, West Badger Lots Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
1.7	100	0.0100	0.98		Sheet Flow, West Badger Drive Smooth surfaces n= 0.011 P2= 2.84"
11.7	167	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 13.51% Impervious, Rv= 0.172, Runoff= 6.00"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.310	Open Space	178.25	1.43
0.100	Roadway	20.41	0.16
1.410	Total	198.66	1.59

Subcatchment P-1: West Badger Drive

Hydrograph



Summary for Subcatchment P-5: South Eagle Pass

Runoff = 3.42 cfs @ 12.21 hrs, Volume= 0.236 af, Depth= 1.73"

Routed to Reach 10R : Proposed Eagle Storm Sewer

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 MSE 24-hr 4 25-Year Rainfall=5.01"

Area (ac)	CN	Description	Land Use
0.233	98	Paved roads w/curbs & sewers, HSG B	Roadway
1.400	61	>75% Grass cover, Good, HSG B	Open Space
1.633	66	Weighted Average	
1.400		85.73% Pervious Area	
0.233		14.27% Impervious Area	

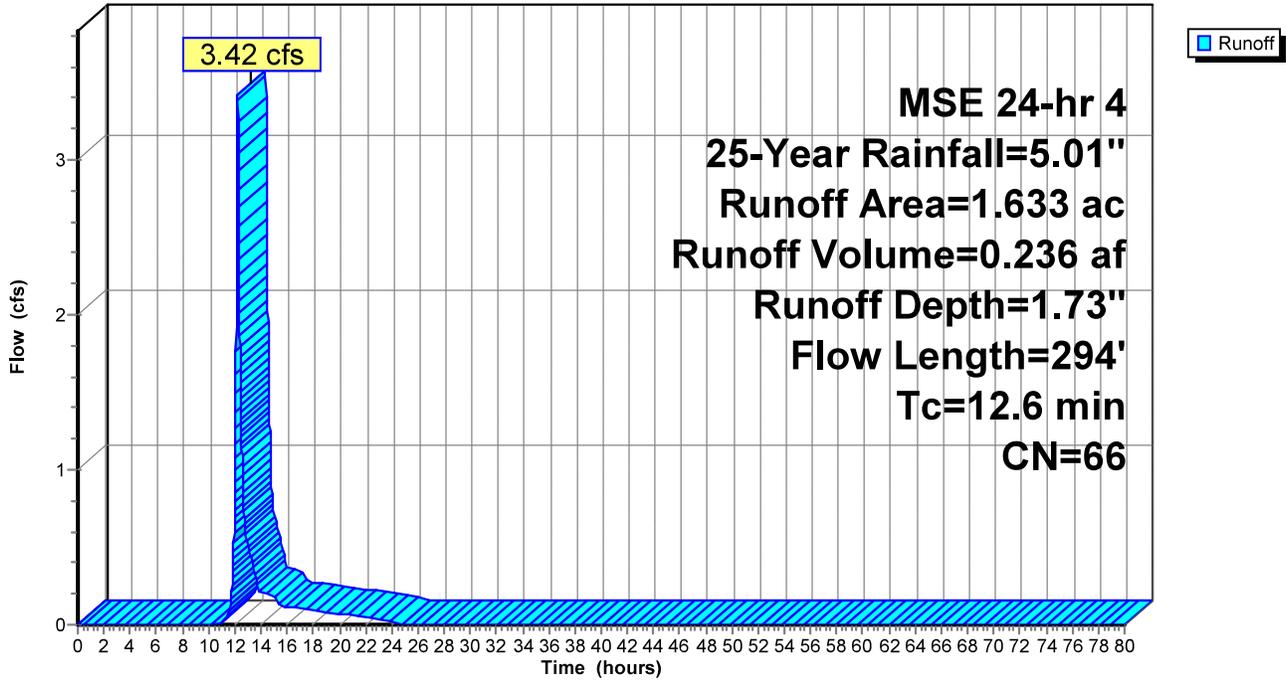
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	200	0.0130	1.25		Sheet Flow, Eagle Pass Smooth surfaces n= 0.011 P2= 2.84"
9.9	94	0.0200	0.16		Sheet Flow, Southern Lots Grass: Short n= 0.150 P2= 2.84" Using McCuen-Spiess flow length
12.6	294	Total			

Pollutant Loading for 35.00" Rainfall, Pj=1.000
 Project 13.51% Impervious, Rv= 0.172, Runoff= 6.00"

Area (acres)	Land Use	tss (pounds)	p (pounds)
1.400	Open Space	190.50	1.52
0.233	Roadway	47.56	0.38
1.633	Total	238.05	1.90

Subcatchment P-5: South Eagle Pass

Hydrograph



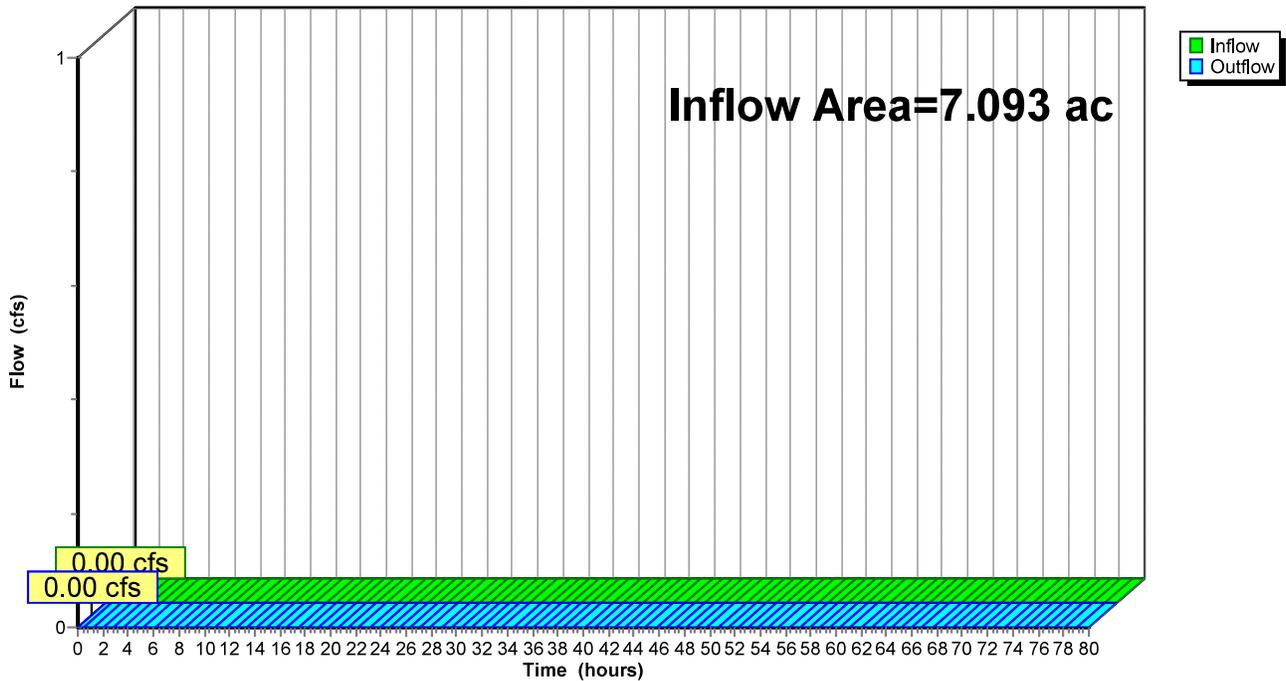
Summary for Reach 1R: Existing Eagle Storm Sewer

Inflow Area = 7.093 ac, 13.51% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 1R: Existing Eagle Storm Sewer

Hydrograph



Summary for Reach 2R: Pretreatment Swale

Inflow Area = 1.410 ac, 7.09% Impervious, Inflow Depth = 1.59" for 25-Year event
 Inflow = 2.75 cfs @ 12.21 hrs, Volume= 0.186 af
 Outflow = 2.54 cfs @ 12.32 hrs, Volume= 0.186 af, Atten= 7%, Lag= 6.5 min
 Routed to Reach 9R : Swale Transfer Storm Sewer

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 1.59 fps, Min. Travel Time= 3.9 min
 Avg. Velocity = 0.60 fps, Avg. Travel Time= 10.4 min

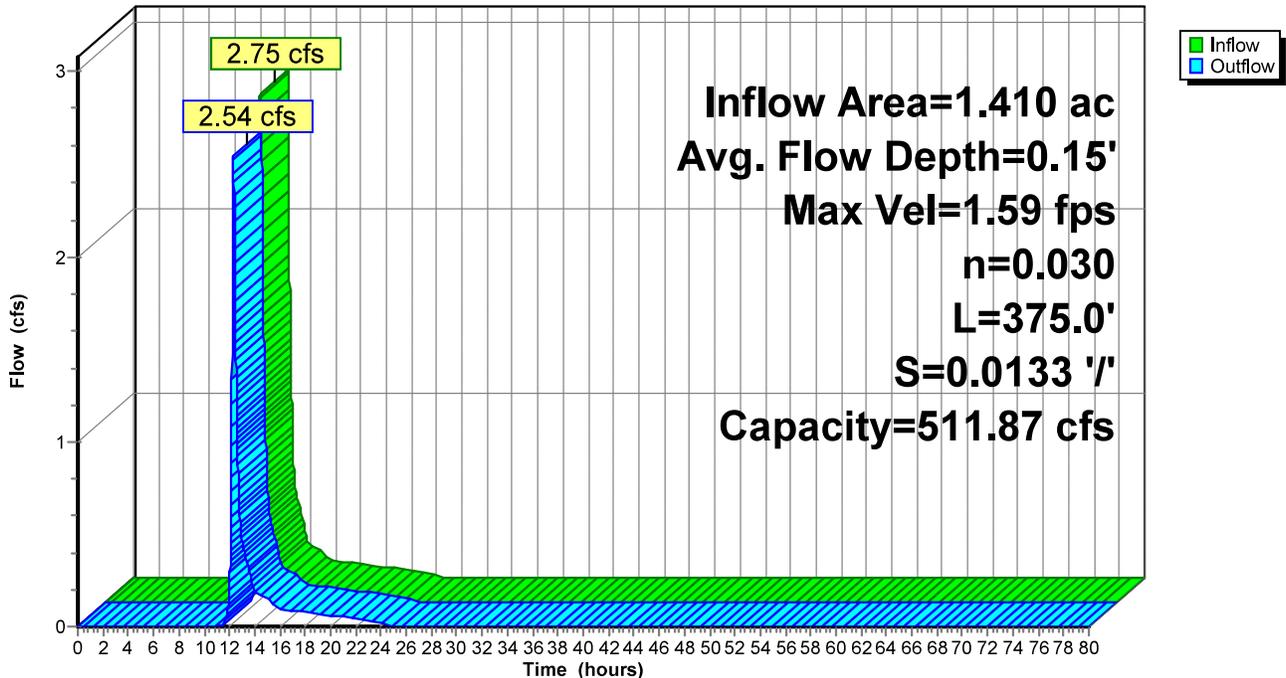
Peak Storage= 601 cf @ 12.25 hrs
 Average Depth at Peak Storage= 0.15' , Surface Width= 10.92'
 Bank-Full Depth= 3.00' Flow Area= 57.0 sf, Capacity= 511.87 cfs

10.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
 Side Slope Z-value= 3.0 ' / ' Top Width= 28.00'
 Length= 375.0' Slope= 0.0133 ' / '
 Inlet Invert= 957.00', Outlet Invert= 952.00'



Reach 2R: Pretreatment Swale

Hydrograph



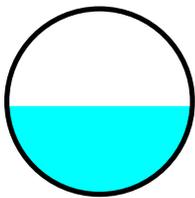
Summary for Reach 3R: West Badger Storm Sewer

Inflow Area = 1.410 ac, 7.09% Impervious, Inflow Depth = 1.59" for 25-Year event
 Inflow = 2.75 cfs @ 12.20 hrs, Volume= 0.186 af
 Outflow = 2.75 cfs @ 12.21 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.3 min
 Routed to Reach 2R : Pretreatment Swale

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 4.78 fps, Min. Travel Time= 0.2 min
 Avg. Velocity = 1.79 fps, Avg. Travel Time= 0.5 min

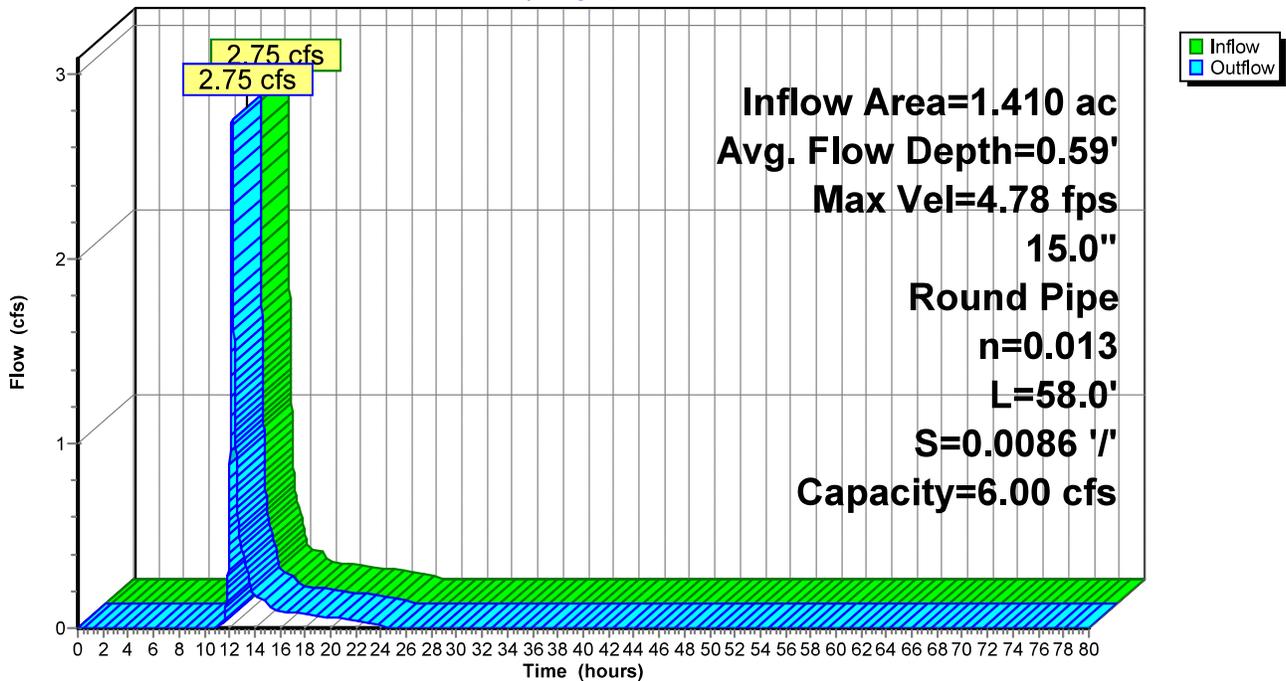
Peak Storage= 33 cf @ 12.21 hrs
 Average Depth at Peak Storage= 0.59' , Surface Width= 1.25'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 6.00 cfs

15.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 58.0' Slope= 0.0086 '/'
 Inlet Invert= 957.50', Outlet Invert= 957.00'



Reach 3R: West Badger Storm Sewer

Hydrograph



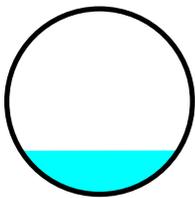
Summary for Reach 4R: East Badger Storm Sewer

Inflow Area = 0.250 ac, 50.00% Impervious, Inflow Depth = 2.90" for 25-Year event
Inflow = 0.93 cfs @ 12.19 hrs, Volume= 0.060 af
Outflow = 0.92 cfs @ 12.22 hrs, Volume= 0.060 af, Atten= 1%, Lag= 1.5 min
Routed to Reach 7R : Outlet 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.16 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 2.7 min

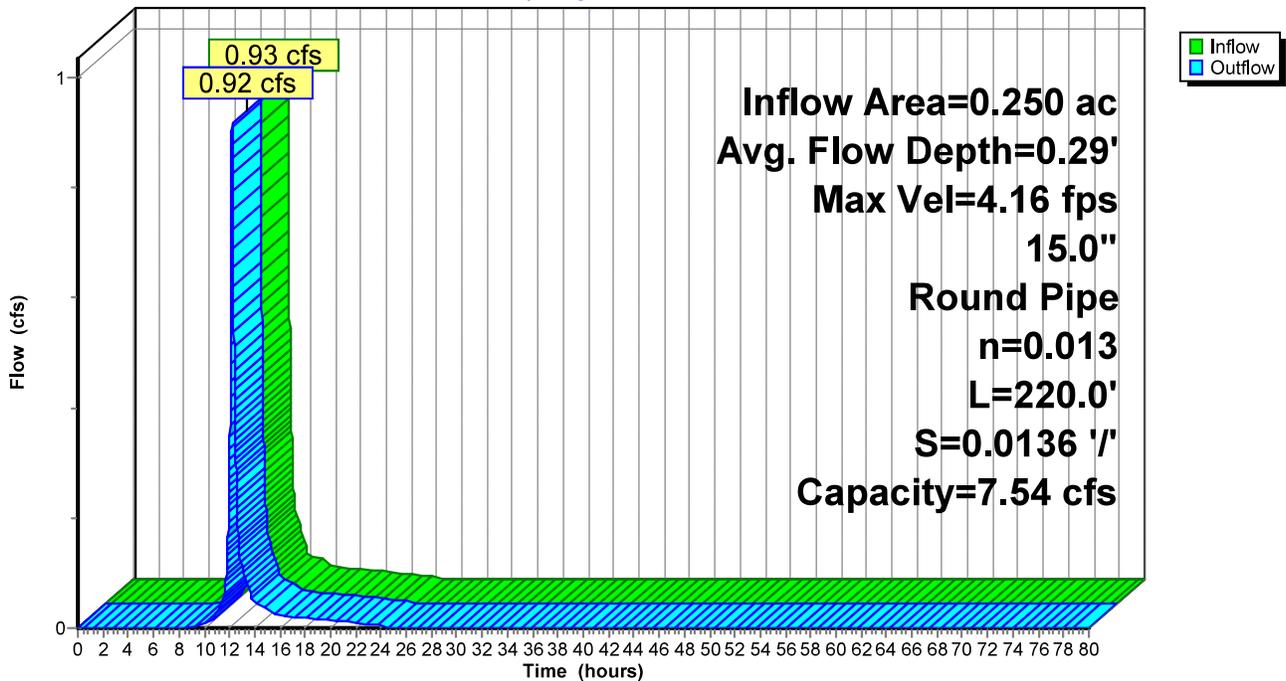
Peak Storage= 49 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 1.06'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.54 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 220.0' Slope= 0.0136 '/'
Inlet Invert= 951.50', Outlet Invert= 948.50'



Reach 4R: East Badger Storm Sewer

Hydrograph



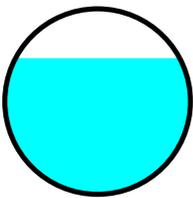
Summary for Reach 5R: Outlot Transfer Storm Sewer

Inflow Area = 5.460 ac, 13.28% Impervious, Inflow Depth = 1.74" for 25-Year event
 Inflow = 10.73 cfs @ 12.21 hrs, Volume= 0.794 af
 Outflow = 10.70 cfs @ 12.23 hrs, Volume= 0.794 af, Atten= 0%, Lag= 0.8 min
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 7.70 fps, Min. Travel Time= 0.4 min
 Avg. Velocity = 2.64 fps, Avg. Travel Time= 1.2 min

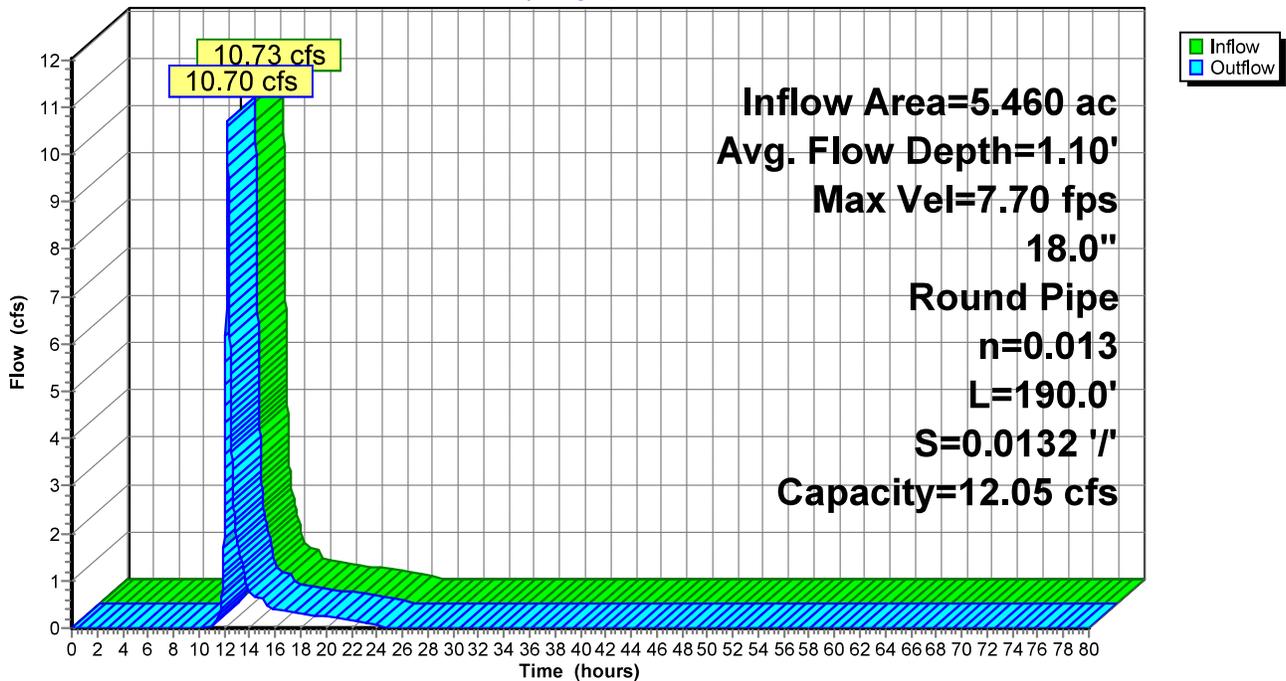
Peak Storage= 264 cf @ 12.22 hrs
 Average Depth at Peak Storage= 1.10' , Surface Width= 1.33'
 Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 12.05 cfs

18.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 190.0' Slope= 0.0132 '/'
 Inlet Invert= 946.50', Outlet Invert= 944.00'



Reach 5R: Outlot Transfer Storm Sewer

Hydrograph

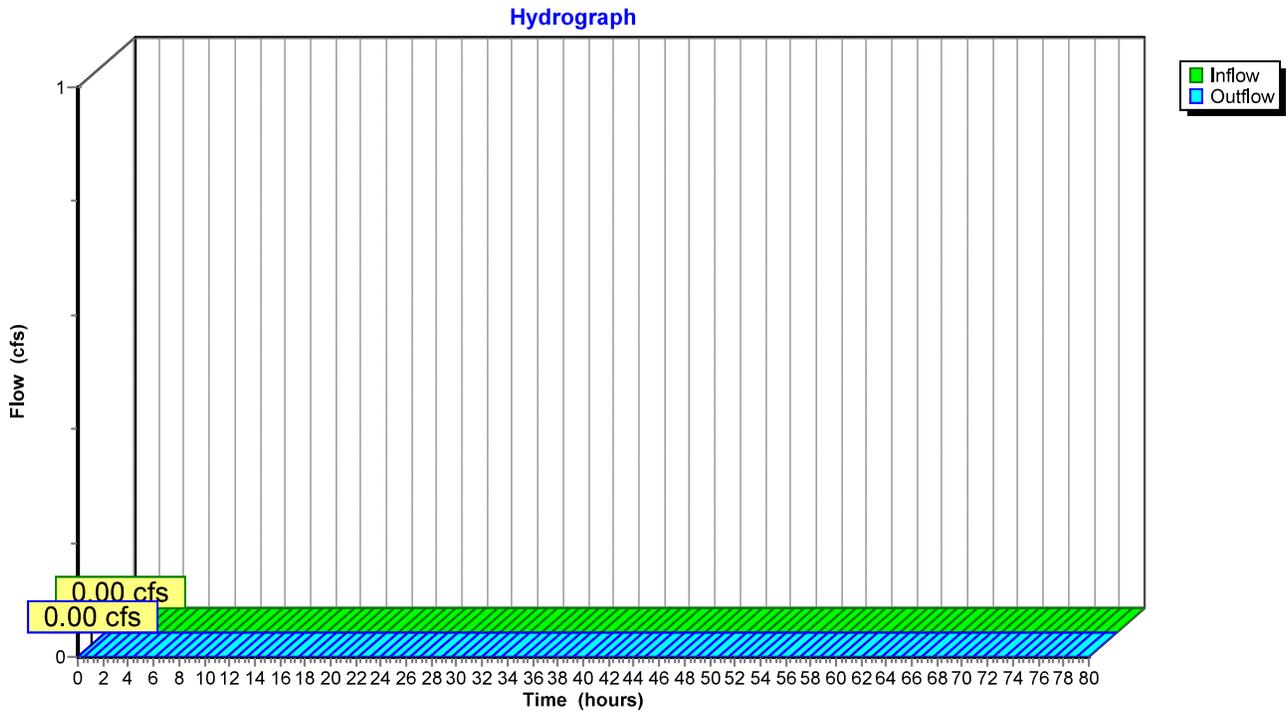


Summary for Reach 6R: Site Discharge

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs

Reach 6R: Site Discharge



Summary for Reach 7R: Outlot 2

Inflow Area = 5.460 ac, 13.28% Impervious, Inflow Depth = 1.74" for 25-Year event
 Inflow = 10.89 cfs @ 12.18 hrs, Volume= 0.794 af
 Outflow = 10.73 cfs @ 12.21 hrs, Volume= 0.794 af, Atten= 1%, Lag= 2.3 min
 Routed to Reach 5R : Outlot Transfer Storm Sewer

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.72 fps, Min. Travel Time= 1.3 min
 Avg. Velocity = 0.81 fps, Avg. Travel Time= 4.5 min

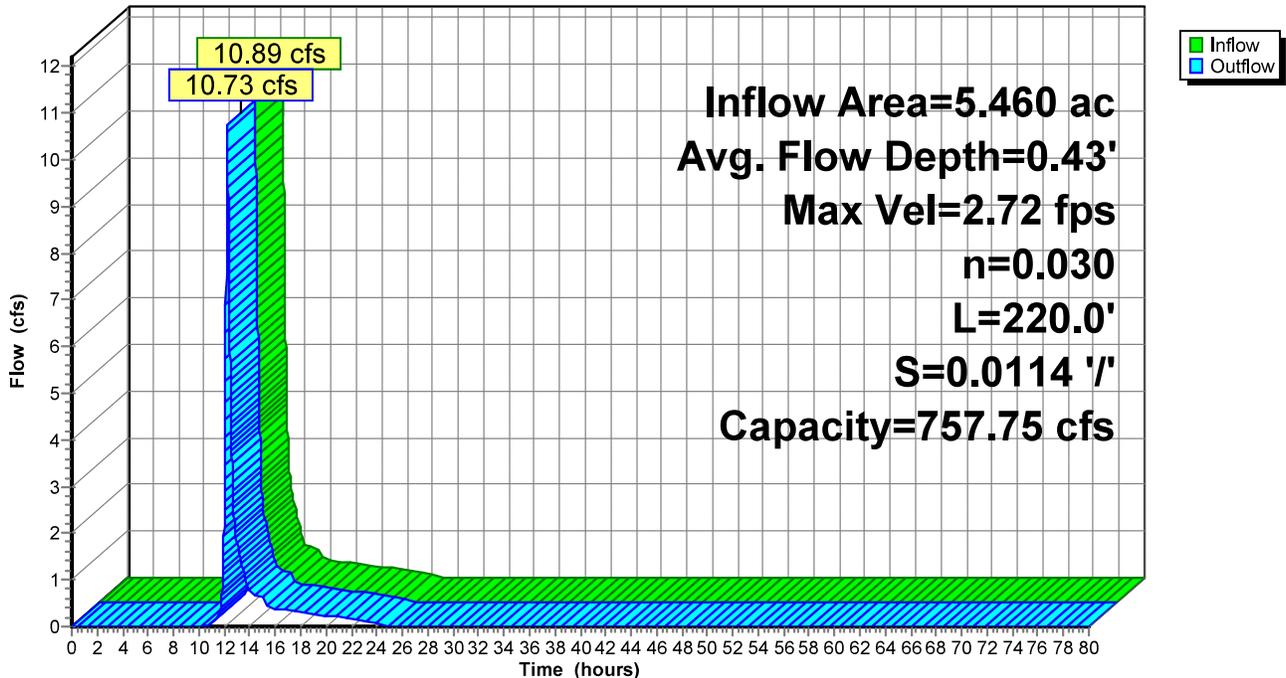
Peak Storage= 869 cf @ 12.19 hrs
 Average Depth at Peak Storage= 0.43' , Surface Width= 10.55'
 Bank-Full Depth= 4.00' Flow Area= 80.0 sf, Capacity= 757.75 cfs

8.00' x 4.00' deep channel, n= 0.030 Earth, grassed & winding
 Side Slope Z-value= 3.0 '/' Top Width= 32.00'
 Length= 220.0' Slope= 0.0114 '/'
 Inlet Invert= 949.00', Outlet Invert= 946.50'



Reach 7R: Outlot 2

Hydrograph



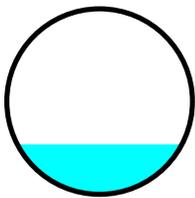
Summary for Reach 9R: Swale Transfer Storm Sewer

Inflow Area = 1.410 ac, 7.09% Impervious, Inflow Depth = 1.59" for 25-Year event
 Inflow = 2.54 cfs @ 12.32 hrs, Volume= 0.186 af
 Outflow = 2.54 cfs @ 12.32 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.2 min
 Routed to Reach 7R : Outlot 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Max. Velocity= 9.46 fps, Min. Travel Time= 0.1 min
 Avg. Velocity = 3.46 fps, Avg. Travel Time= 0.4 min

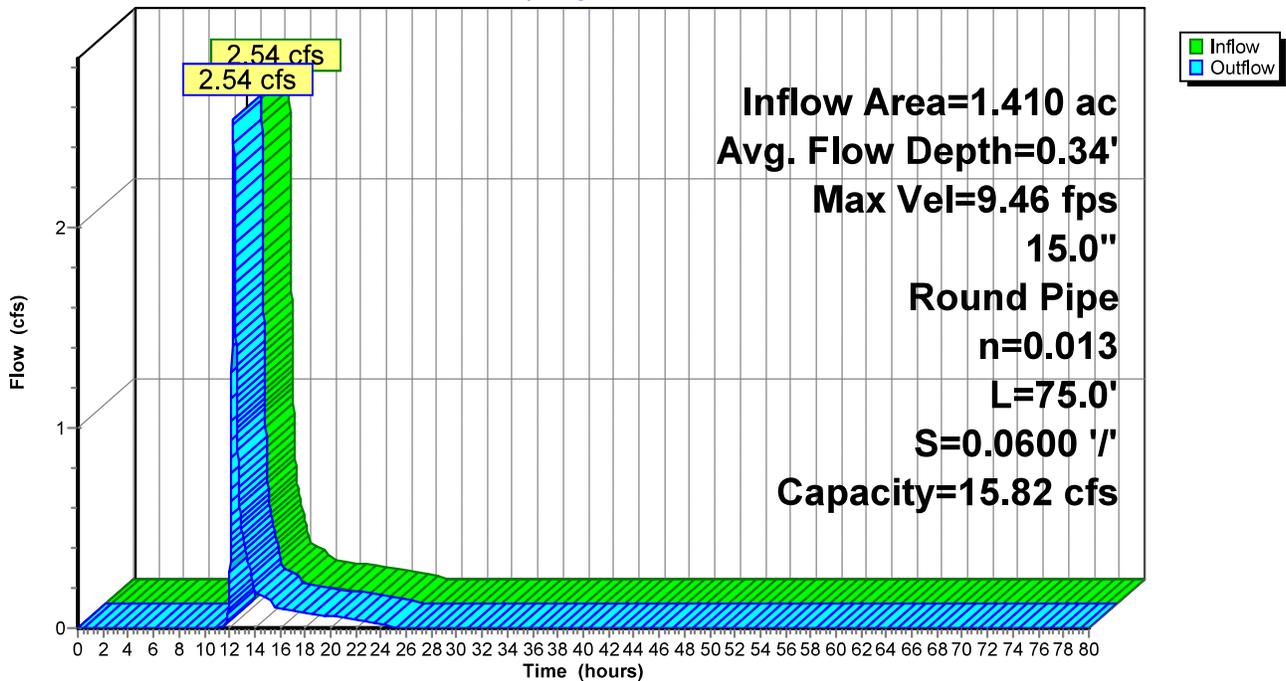
Peak Storage= 20 cf @ 12.32 hrs
 Average Depth at Peak Storage= 0.34' , Surface Width= 1.11'
 Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 15.82 cfs

15.0" Round Pipe
 n= 0.013 Corrugated PE, smooth interior
 Length= 75.0' Slope= 0.0600 '/'
 Inlet Invert= 952.00', Outlet Invert= 947.50'



Reach 9R: Swale Transfer Storm Sewer

Hydrograph



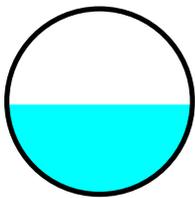
Summary for Reach 10R: Proposed Eagle Storm Sewer

Inflow Area = 1.633 ac, 14.27% Impervious, Inflow Depth = 1.73" for 25-Year event
Inflow = 3.42 cfs @ 12.21 hrs, Volume= 0.236 af
Outflow = 3.42 cfs @ 12.22 hrs, Volume= 0.236 af, Atten= 0%, Lag= 0.2 min
Routed to Pond IN1 : Biofilter Forebay

Routing by Stor-Ind+Trans method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.80 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.16 fps, Avg. Travel Time= 0.3 min

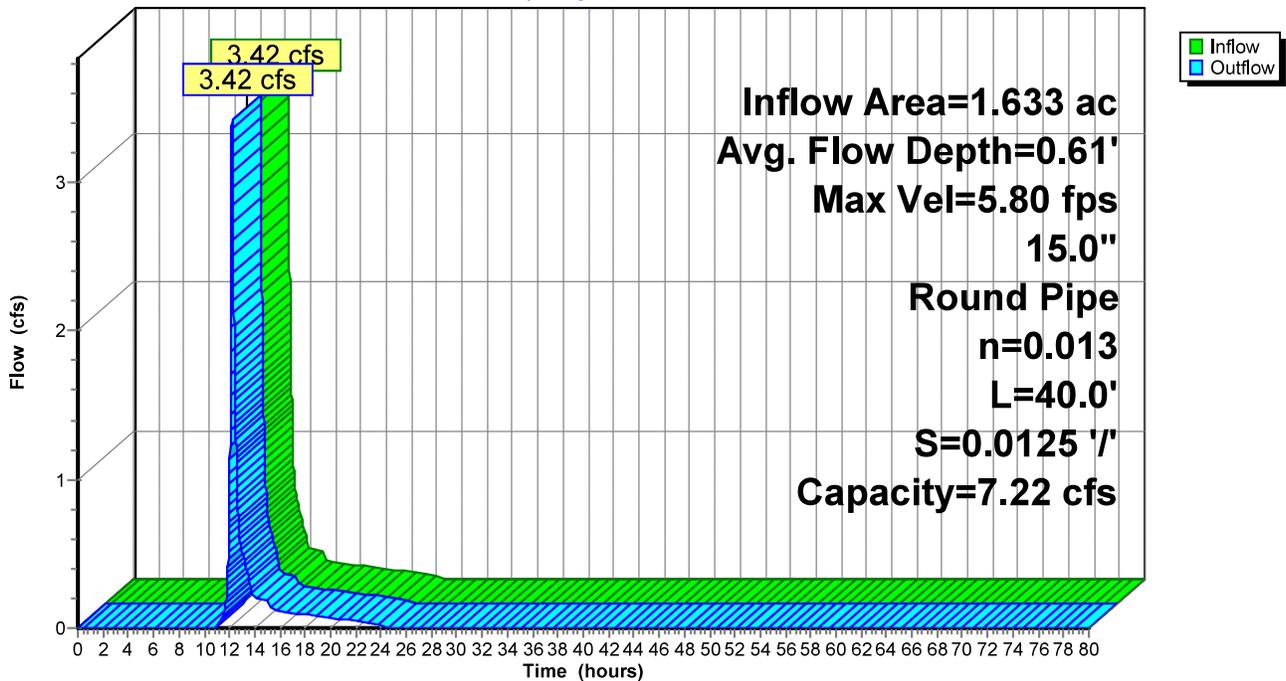
Peak Storage= 24 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 1.25'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 7.22 cfs

15.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0125 '/'
Inlet Invert= 948.00', Outlet Invert= 947.50'



Reach 10R: Proposed Eagle Storm Sewer

Hydrograph



Summary for Pond 5P: Infiltration Basin

Inflow Area = 7.093 ac, 13.51% Impervious, Inflow Depth = 1.43" for 25-Year event
 Inflow = 10.70 cfs @ 12.23 hrs, Volume= 0.846 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 1R : Existing Eagle Storm Sewer
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach 6R : Site Discharge

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 946.15' @ 29.10 hrs Surf.Area= 12,335 sf Storage= 36,870 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	942.10'	70,411 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
942.10	6,150	0	0
943.00	7,375	6,086	6,086
944.00	8,850	8,113	14,199
945.00	10,400	9,625	23,824
946.00	12,100	11,250	35,074
947.00	13,700	12,900	47,974
947.50	14,650	7,088	55,061
948.00	15,350	7,500	62,561
948.50	16,050	7,850	70,411

Device	Routing	Invert	Outlet Devices
#1	Secondary	947.50'	25.0' 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
#2	Discarded	942.10'	1.630 in/hr Exfiltration - Primary X 0.00 over Surface area
#3	Primary	946.40'	12.0" Round Secondary Culvert to Street L= 54.0' RCP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 946.40' / 945.50' S= 0.0167 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

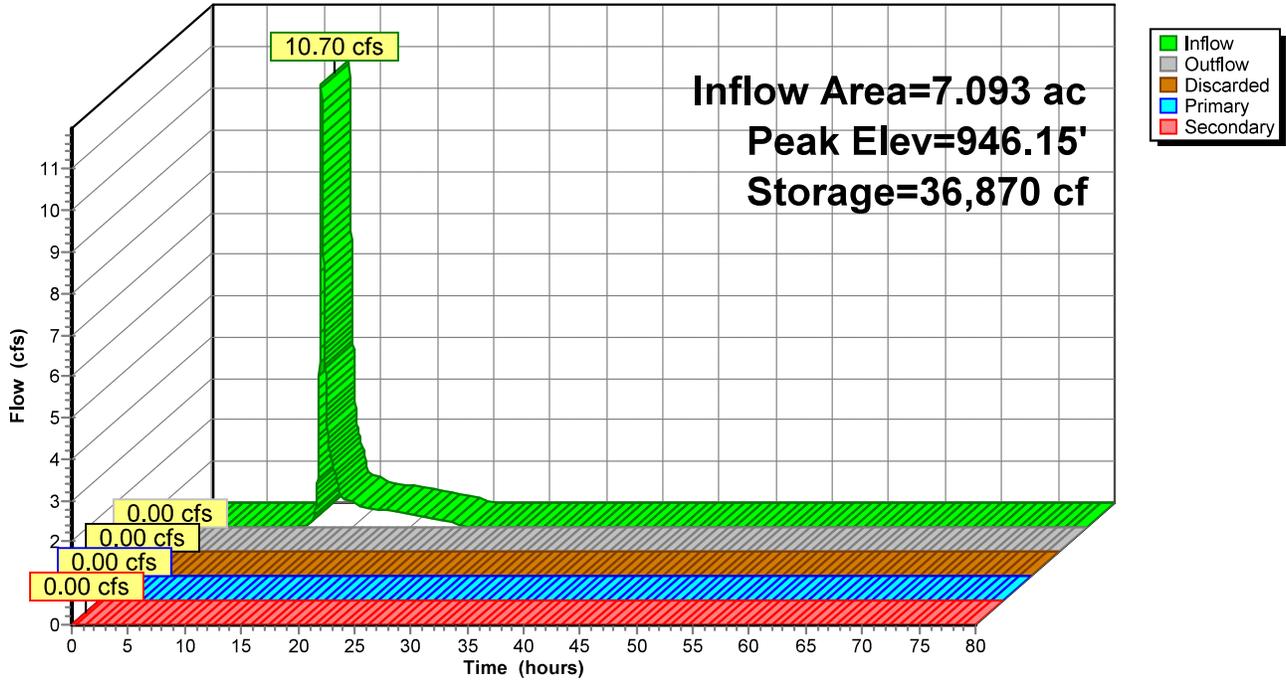
Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=942.10' (Free Discharge)
 ↑2=Exfiltration - Primary (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=942.10' (Free Discharge)
 ↑3=Secondary Culvert to Street (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=942.10' (Free Discharge)
 ↑1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: Infiltration Basin

Hydrograph



Summary for Pond IN1: Biofilter Forebay

Inflow Area = 1.633 ac, 14.27% Impervious, Inflow Depth = 1.73" for 25-Year event
 Inflow = 3.42 cfs @ 12.22 hrs, Volume= 0.236 af
 Outflow = 0.11 cfs @ 15.85 hrs, Volume= 0.053 af, Atten= 97%, Lag= 217.9 min
 Secondary = 0.11 cfs @ 15.85 hrs, Volume= 0.053 af
 Routed to Pond 5P : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-80.00 hrs, dt= 0.01 hrs
 Peak Elev= 949.51' @ 15.85 hrs Surf.Area= 3,892 sf Storage= 8,030 cf

Plug-Flow detention time= 410.2 min calculated for 0.053 af (22% of inflow)
 Center-of-Mass det. time= 287.4 min (1,133.5 - 846.1)

Volume	Invert	Avail.Storage	Storage Description
#1	946.10'	12,621 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

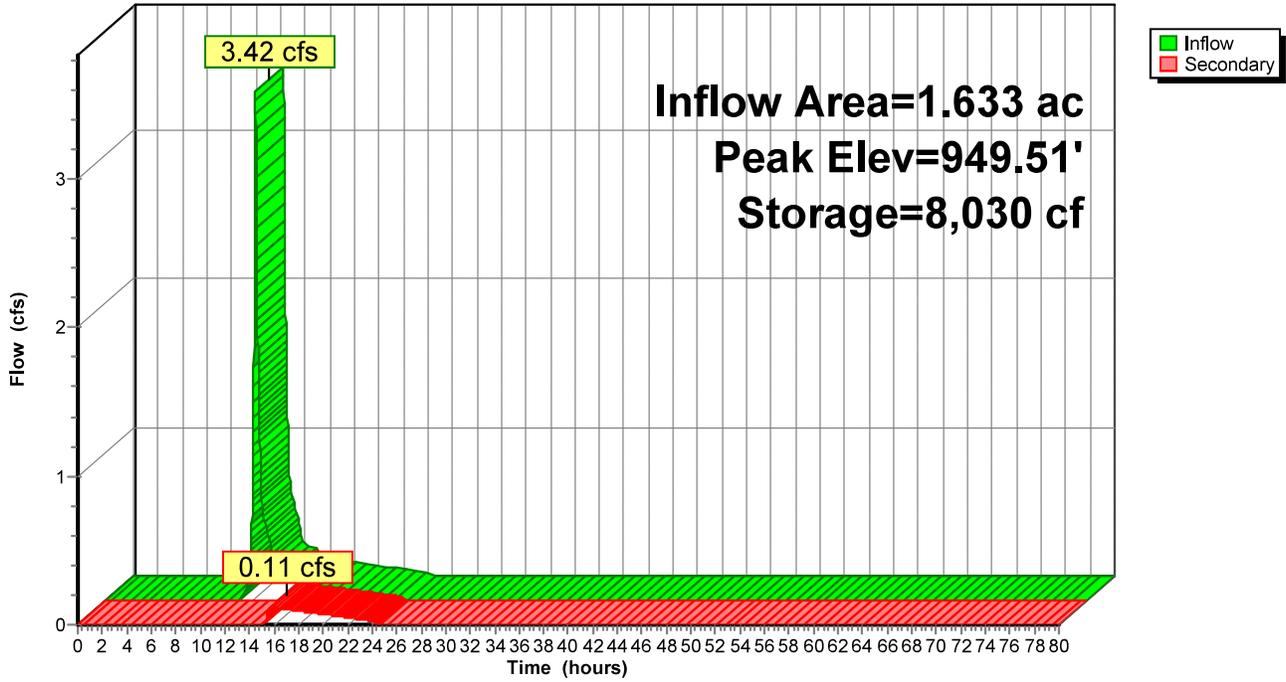
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
946.10	1,125	0	0
947.00	1,575	1,215	1,215
948.00	2,450	2,013	3,227
949.00	3,425	2,938	6,165
949.50	3,875	1,825	7,990
950.00	4,710	2,146	10,136
950.50	5,230	2,485	12,621

Device	Routing	Invert	Outlet Devices
#1	Secondary	949.50'	25.0' 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

Secondary OutFlow Max=0.06 cfs @ 15.85 hrs HW=949.51' (Free Discharge)
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.06 cfs @ 0.25 fps)

Pond IN1: Biofilter Forebay

Hydrograph



APPENDIX D – P8 MODELING RESULTS & INFILTRATION CALCULATIONS

P8 Urban Catchment Model, Version 3.5

Case	P8 Water Quality Model.p8c	FirstDate	01/01/95	Precip(in)	30.2
Title	Startup Case	LastDate	12/31/95	Rain(in)	26.51
PrecFile	MKE6095.PCP	Events	86	Snow(in)	3.70
PartFile	nurp50.p8p	TotalHrs	8520	TotalYrs	0.97

Devices Listed in Downstream Order

Device:	Swale	Type:	SWALE
	Discharges normal outlet to		Infiltration Basin
	Discharges spillway to		Infiltration Basin
	Runoff from watershed		Badger Drive & North Lots
	Runoff from watershed		Residential Areas
Device:	Eagle Catch Basin	Type:	PIPE
	Discharges normal outlet to		Biofiltered Forebay
	Runoff from watershed		Eagle Pass & North Lots
Device:	Biofiltered Forebay	Type:	INF_BASIN
	Discharges infiltration to		Infiltration Basin
	Discharges spillway to		Infiltration Basin
Device:	Infiltration Basin	Type:	INF_BASIN
	Discharges spillway to		Site Discharge

P8 Urban Catchment Model, Version 3.5

Case	P8 Water Quality Model.p8c	FirstDate	01/01/95	Precip(in)	30.2
Title	Startup Case	LastDate	12/31/95	Rain(in)	26.51
PrecFile	MKE6095.PCP	Events	86	Snow(in)	3.70
PartFile	nurp50.p8p	TotalHrs	8520	TotalYrs	0.97

Mass Balances by Device

Device: OVERALL	Type:	NONE						
	Flow	Loads(lbs)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP
01 watershed inflows	1.39	3.79	68.61	68.61	68.44	136.22	341.88	1.17
03 infiltrate	1.39	2.32	21.44	5.49	1.19	0.23	28.35	0.34
04 exfiltrate	1.39	0.23	0.00	0.00	0.00	0.00	0.00	0.02
05 filtered	0.00	3.56	40.08	11.01	2.58	0.53	54.20	0.56
08 sedimen + decay	0.00	0.00	27.66	57.51	65.83	135.68	286.69	0.58
09 total inflow	1.39	3.79	68.61	68.61	68.44	136.22	341.88	1.17
11 groundw outflow	1.39	0.23	0.00	0.00	0.00	0.00	0.00	0.02
12 total outflow	1.39	0.23	0.00	0.00	0.00	0.00	0.00	0.02
13 total trapped	0.00	3.56	67.75	68.51	68.42	136.21	340.89	1.14
14 storage increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 mass balance check	0.00	0.00	0.86	0.10	0.02	0.00	0.99	0.00
Load Reduction (%)	0.00	93.87	98.74	99.86	99.97	100.00	99.71	97.71

Device: Swale	Type:	SWALE						
	Flow	Loads(lbs)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP
01 watershed inflows	0.58	1.58	30.74	30.74	30.66	61.00	153.14	0.51
03 infiltrate	0.40	1.08	9.17	2.34	0.60	0.13	12.24	0.15
04 exfiltrate	0.40	0.11	0.00	0.00	0.00	0.00	0.00	0.01
05 filtered	0.00	0.97	9.17	2.34	0.60	0.13	12.24	0.14
06 normal outlet	0.18	0.50	10.33	5.12	1.85	0.46	17.76	0.12

08 sedimen + decay	0.00	0.00	10.93	23.26	28.21	60.40	122.80	0.24
09 total inflow	0.58	1.58	30.74	30.74	30.66	61.00	153.14	0.51
10 surface outflow	0.18	0.50	10.33	5.12	1.85	0.46	17.76	0.12
11 groundw outflow	0.40	0.11	0.00	0.00	0.00	0.00	0.00	0.01
12 total outflow	0.58	0.61	10.33	5.12	1.85	0.46	17.76	0.13
13 total trapped	0.00	0.97	20.10	25.60	28.81	60.53	135.04	0.38
14 storage increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 mass balance check	0.00	0.00	0.31	0.02	0.00	0.00	0.34	0.00
Load Reduction (%)	0.00	61.62	65.38	83.28	93.96	99.24	88.18	74.98

Device: Eagle Catch Basin	Type:	PIPE						
	Flow	Loads(lbs)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP
01 watershed inflows	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
06 normal outlet	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
09 total inflow	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
10 surface outflow	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
12 total outflow	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
15 mass balance check	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Load Reduction (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Device: Biofiltered Forebay	Type:	INF_BASIN						
	Flow	Loads(lbs)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP
02 upstream device	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
03 infiltrate	0.60	1.63	18.64	5.52	1.40	0.30	25.86	0.26
04 exfiltrate	0.60	0.16	0.00	0.00	0.00	0.00	0.00	0.02
05 filtered	0.00	1.47	18.64	5.52	1.40	0.30	25.86	0.24
08 sedimen + decay	0.00	0.00	13.05	26.61	30.70	63.58	133.94	0.27
09 total inflow	0.60	1.63	32.20	32.20	32.11	63.88	160.39	0.53
10 surface outflow	0.60	0.16	0.00	0.00	0.00	0.00	0.00	0.02
12 total outflow	0.60	0.16	0.00	0.00	0.00	0.00	0.00	0.02
13 total trapped	0.00	1.47	31.70	32.12	32.09	63.88	159.79	0.51

14 storage increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 mass balance check	0.00	0.00	0.50	0.07	0.02	0.00	0.59	0.00
Load Reduction (%)	0.00	90.00	98.45	99.77	99.95	99.99	99.63	96.54

Device: Infiltration Basin	Type:	INF_BASIN						
	Flow	Loads(lbs)						
Mass Balance Term	acre-ft	P0%	P10%	P30%	P50%	P80%	TSS	TP
01 watershed inflows	0.21	0.58	5.67	5.67	5.67	11.34	28.35	0.12
02 upstream device	0.78	0.66	10.33	5.12	1.85	0.46	17.76	0.13
03 infiltrate	1.00	1.24	12.27	3.15	0.59	0.10	16.10	0.18
04 exfiltrate	1.00	0.12	0.00	0.00	0.00	0.00	0.00	0.01
05 filtered	0.00	1.12	12.27	3.15	0.59	0.10	16.10	0.17
08 sedimen + decay	0.00	0.00	3.68	7.64	6.93	11.70	29.95	0.07
09 total inflow	1.00	1.24	16.00	10.79	7.52	11.80	46.11	0.25
11 groundw outflow	1.00	0.12	0.00	0.00	0.00	0.00	0.00	0.01
12 total outflow	1.00	0.12	0.00	0.00	0.00	0.00	0.00	0.01
13 total trapped	0.00	1.12	15.95	10.79	7.52	11.80	46.05	0.24
14 storage increase	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 mass balance check	0.00	0.00	0.05	0.00	0.00	0.00	0.05	0.00
Load Reduction (%)	0.00	89.99	99.68	100.00	100.00	100.00	99.89	95.10

APPENDIX E – SOIL LOSS & SEDIMENT DISCHARGE CALCULATIONS



Soil Loss & Sediment Discharge Calculation Tool

for use on Construction Sites in the State of Wisconsin

WDNR Version 2.1 (12-05-2024)



YEAR 1

Developer: _____

Project: _____

Date: 06/19/25

County: Waukesha

Version 2.1

Activity (1)	Begin Date (2)	End Date (3)	Period % R (4)	Annual R Factor (5)	Sub Soil Texture (6)	Soil Erodibility K Factor (7)	Slope (%) (8)	Slope Length (ft) (9)	LS Factor (10)	Land Cover C Factor (11)	Soil loss A (tons/acre) (12)	SDF (13)	Sediment Control Practice (14)	Sediment Discharge (t/ac) (15)
Bare Ground	08/01/25	08/07/25	3.9%	130	Silt Loam	0.43	4.0%	200	0.53	1.00	1.1	1.027		1.2
Directional Tracking or	08/07/25	08/20/25	7.3%	130	Silt Loam	0.43	4.0%	200	0.53	0.90	1.9	1.027		2.0
Seed with Mulch or Er	08/20/25	10/30/25	22.0%	130	Silt Loam	0.43	4.0%	200	0.53	0.10	0.6	1.027		0.7
End	10/30/25	----	----	----	-----	----	4.0%	200	0.53	-----	----	0.000		0.0
		----	----	----	-----	----	4.0%	0	----	----	----	0.000		0.0
		----	----	----	-----	----	0.0%	0	----	----	----	0.000		0.0
TOTAL											3.7		TOTAL	3.8
													% Reduction Required	NONE

Notes:

See Help Page for further descriptions of variables and items in drop-down boxes.
 The last land disturbing activity on each sheet must be 'End'. This is either 12 months from the start of construction or final stabilization.
 For periods of construction that exceed 12 months, please demonstrate that 5 tons/acre/year is not exceeded in any given 12 month period.

NOTE: THIS TOOL ONLY ADDRESSED SOIL EROSION DUE TO SHEET FLOW. MEASURES TO CONTROL CHANNEL EROSION MAY ALSO BE REQUIRED TO MEET SEDIMENT DISCHARGE REQUIREMENTS.

Recommended Permanent Seeding Dates:

4/1-5/15 and 8/7-8/29 Turf, introduced grasses and legumes
 Thaw-6/30 Native Grasses, forbs, and legumes

Designed By:	
Date	

APPENDIX F – STORMWATER MAINTENANCE AGREEMENT

DRAFT

Maintenance

Agreement
Document Title

Document Number

Ken Servi does hereby agree that all the real property described herein and each part thereof shall be held, sold, and conveyed subject to the following agreement which shall run with the land and be binding upon all parties that have title or interest in the described real property or any part thereof, their heirs, personal representatives, successors or assigns.

The storm water BMP's (Best Management Practices, e.g. stormwater management ponds, stormwater easements, storm water conveyance systems (ditches, drainage ways & swales) & the approved post development site conditions shall be maintained in accordance with the WDNR NR151 Code, the approved storm water management plan and the detailed maintenance requirements described in the attached Exhibit A. This agreement grants the Village of Hartland the authority to enter the subject property and inspect the site, stormwater conveyance systems & BMP's. This agreement also grants the Village of Hartland the right to enter the subject property and perform the required maintenance at the owner's expense if the owner fails to comply with this agreement.

Recording Area

Name and Return Address
Village of Hartland
210 Cottonwood Avenue
Hartland, WI 53029

XXXXXXXX-XXXX

Parcel Identification Number

The real estate subject to this agreement is described as:

Outlot 2 of the Plat of _____, Village of Hartland, Waukesha County, Wisconsin, including easements of record for stormwater conveyance on private lands as recorded on Lots 1-7.

The undersigned real estate owner(s) do hereby covenant that they are lawfully in possession of the above described parcel and have a lawful right to convey it or any part thereof, that it is free from encumbrances, except as hereinafter set forth.

IN WITNESS WHEREOF, the undersigned have executed this Maintenance Agreement Dated this _____ day of _____.

Grantor Authorized Person:

(print) _____ (title) _____

(sign) _____

(date) ____/____/____

State of Wisconsin
County of _____

_____ acknowledge this document before me on this ____ day of _____, 2025.

(Signature of notary above)

(Print or type name of notary above)

My Commission Expires: _____

Village of Hartland Authorized Person:

(print) _____ (title) _____

(sign) _____

(date) ____/____/____

State of Wisconsin
County of _____

_____ acknowledge this document before me on this ____ day of _____, 2025.

(Signature of notary above)

(Print or type name of notary above)

My Commission Expires: _____

- (4) Undertake corrective actions required by Village within a reasonable time frame as set by the Director of Public Works.
- (5) Maintain a record of steps taken to implement the programs referenced in (1) and (2) above. Record shall be available for inspection by Village staff at Owners business during normal business hours. The record shall catalog the action taken, who took it, when it was done, how it was done, and any problems encountered or follow-on actions recommended.

THE VILLAGE OF HARTLAND SHALL:

- (1) Provide technical assistance to Owner in support of its operation and maintenance activities conducted pursuant to its maintenance and source control programs. Said assistance shall be provided upon request, and as Village time and resources permit.
- (2) Maintain public records of the results of the site inspections, inform the party responsible for maintenance of the inspection results, and specifically indicate any corrective actions required to bring the storm water management practice into proper working condition.
- (3) Notify the Owner of maintenance problems that require correction.

REMEDIES:

- (1) If corrective actions required by the Village are not completed within the time set by the Director of Public Works, written notice will be sent to the persons who were given notice stating the Village intention to perform such maintenance and bill the owner for all incurred expenses.
- (2) If at any time the Village determines that the existing system creates any imminent threat to public health or welfare, the Director of Public Works may take immediate measures to remedy said threat. No notice to the persons listed in (1), above, shall be required under such circumstances.
- (3) The owner grants unrestricted authority to the Village for access to any and all stormwater system features for the purpose of performing maintenance or repair as may become necessary under Remedies (1) and/or (2).
- (4) The persons listed in (1), above, shall assume all responsibility for the cost of any maintenance and for repairs to the stormwater facility. Such responsibility shall include reimbursement to the Village within 30 days of the receipt of the invoice for any such work performed. Overdue payments will require payment of interest at the current legal rate for liquidated judgments. If legal action ensues, any costs or fees incurred by the Village will be borne by the parties responsible for said reimbursements.
- (5) The owner hereby grants to the Village a lien against the above-described property in an amount equal to the cost incurred by the Village to perform the maintenance or repair work described herein.

This Agreement is intended to protect the value and desirability of the real property described

APPENDIX G – CONSTRUCTION SITE INSPECTION REPORT AND NOTICE OF TERMINATION

EXHIBIT A

The project has developed a stormwater management and erosion control plan that requires long-term post-construction maintenance. This plan encourages positive drainage and completes water quality objectives away from residential homes so those homes can be granted traditional development in a residential setting with stormwater being managed off-lot. This requires grassed swales, stormwater easements, stormwater conveyance in the form of pipe discharge, and stormwater ponds as shown on the Construction Plans. The Owner will install the BMP(s) in accordance with the plans and specifications. Future lot owners within a Homeowner's Association will collectively own and operate stormwater management facilities. Said BMP(s) are private facilities with all inspection, maintenance or replacement of failed facilities being the sole responsibility of the owner. The owner is aware that periodic and continuous maintenance is required to keep the BMP(s) in good working condition & operating at peak performance, therefore maintenance and inspections shall include, but not be limited to, the following:

- Stormwater Management Ponds

Inspection: Look for accumulation of sediment and/or debris, or signs of berm nuisances (burrowing, excessive weeds, animals, etc.). Look for height of water surface standing for long periods of time – water holding durations of over 48 hours shall be logged. Look for signs of erosion at the outlets, observe the overflow weirs and pond inlet/outlets for blockages or undermining.

Maintenance: Routine maintenance includes weeding, trimming, pruning, thinning, pest management, trash and debris removal. Eliminate compost from accumulating within the management area. Continued lack of water seepage will require maintenance work which may include sediment removal and deep tilling. Erosion requires restoration and reseeding or sodding.

- Grassed Filter Swales

Goals: Uniform directional drainage from upslope to downslope areas. Grasses to be dense and may include other forms of vegetation that will allow for surface water retention to improve infiltration potential. Woody vegetation to be discouraged. Tilling or construction of improvements is to be discouraged.

Inspection: Look for signs of sediment accumulation or lack of grass establishment. Look for signs of rilling and concentrated runoff.

Maintenance: Routine maintenance of these facilities includes mowing, trash and debris removal and maintenance of positive drainage. Rilled areas shall be smoothed and re-established with designed plant life.

The aforementioned inspection and maintenance schedule shall be performed after any rainfall event exceeding one inch of rainfall, and at a minimum semi-annually in early spring and fall.

All inspections and maintenance shall be documented and the OWNER shall keep all inspection and maintenance reporting/records onsite and available upon request of the Village of Hartland and/or Wisconsin Department of Natural Resources.

APPENDIX H – NHI REVIEW



State of Wisconsin / DEPARTMENT OF NATURAL RESOURCES

Tony Evers, Governor
Karen Hyun, Ph.D., Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

101 S. Webster St.
Box 7921
Madison, WI 53707-7921

June 12, 2025

Owen Zwiefelhofer
Roth Professional Solutions
317 DeWitt Street
Portage, WI 53901

SUBJECT: Endangered Resources Review (ERR Log # 25-426)
Proposed Hartland Subdivision, Waukesha County, WI (T08N R18E S35)

Dear Owen Zwiefelhofer,

The Bureau of Natural Heritage Conservation has reviewed the proposed project described in the Endangered Resources (ER) Review Request received June 10, 2025. The complete ER Review for this proposed project is attached and follow-up actions are summarized below:

- Required Actions: 0 species
- Recommended Actions: 0 species
- No Follow-Up Actions: 7 species
- Additional Recommendations Specified: No

This ER Review may contain Natural Heritage Inventory data (<http://dnr.wi.gov/topic/NHI>), including specific locations of endangered resources, which are considered sensitive and are not subject to Wisconsin's Open Records Law. Information contained in this ER Review may be shared with individuals who need this information in order to carry out specific roles in the planning, permitting, and implementation of the proposed project. **Specific locations of endangered resources may not be released or reproduced in any publicly disseminated documents.**

The attached ER Review is for informational purposes and only addresses endangered resources issues. **This ER Review does not constitute DNR authorization of the proposed project and does not exempt the project from securing necessary permits and approvals from the DNR and/or other permitting authorities.** Please contact the ER Review Program whenever the project plans change, new details become available, or more than a year has passed to confirm if results of this ER Review are still valid.

Please contact me at 608-266-5241 or via email at angela.white@wi.gov if you have any questions about this ER Review.

Sincerely,

Angela White
Endangered Resources Review Program

cc:

Endangered Resources Review for the Proposed Hartland Subdivision, Waukesha County
(ER Log # 25-426)

Section A. Location and brief description of the proposed project

Based on information provided by the ER Review Request form and attached materials, the proposed project consists of the following:

Location	Waukesha County - T08N R18E S35
Project Description	The proposed project involves the development of a new subdivision by extending two existing roads located in Hartland to serve as access for the new residential subdivision comprising seven proposed lots. The road extensions will be designed to terminate in cul-de-sacs that provide safe entry and egress to the development. Associated with the roadway extensions, cul-de-sac terminations, and lot development, graded areas will be constructed to prepare the lots for future infrastructure and landscaping.
Project Timing	TBD
Current Habitat	100% Wooded
Impacts to Wetlands or Waterbodies	No wetlands or waterways in or adjacent to the project area, no impacts expected.
Property Type	Public, Private
Federal Nexus	No

It is best to request ER Reviews early in the project planning process. However, some important project details may not be known at that time. Details related to project location, design, and timing of disturbance are important for determining both the endangered resources that may be impacted by the project and any necessary follow-up actions. Please contact the ER Review Program whenever the project plans change, new details become available, or more than a year has passed to confirm if results of this ER Review are still valid.

Section B. Endangered resources recorded from within the project area and surrounding area

	Group	State Status	Federal Status
Black-crowned Night-Heron (<i>Nycticorax nycticorax</i>)	Bird~	SC/M	
Mesic Prairie (<i>Mesic prairie</i>)	Community	NA	
Slender Madtom (<i>Noturus exilis</i>)	Fish~	END	
Lake Chubsucker (<i>Erimyzon sucetta</i>)	Fish~	SC/N	
Blanchard's Cricket Frog (<i>Acris blanchardi</i>)	Frog~	END	
Rope Dodder (<i>Cuscuta glomerata</i>)	Plant~	SC	
Butler's Gartersnake (<i>Thamnophis butleri</i>)	Snake~	SC/H	

For additional information on the rare species, high-quality natural communities, and other endangered resources listed above, please visit our Biodiversity (<http://dnr.wi.gov/topic/EndangeredResources/biodiversity.html>) page. For further definitions of state and federal statuses (END=Endangered, THR=Threatened, SC=Special Concern), please refer to the Natural Heritage Inventory (NHI) Working List (<http://dnr.wi.gov/topic/nhi/wlist.html>).

Section C. Follow-up actions

Actions that need to be taken to comply with state and/or federal endangered species laws: None

Actions recommended to help conserve Wisconsin's Endangered Resources: None

Remember that although these actions are not required by state or federal endangered species laws, they may be required by other laws, permits, granting programs, or policies of this or another agency. Examples include the federal Migratory Bird Treaty Act, Bald and

No actions are required or recommended for the following endangered resources:

• **Black-crowned Night-Heron (*Nycticorax nycticorax*) - Bird~**

State Status: SC/M

Impact Type	No impact or no/low broad ITP/A
Reason	Lack of Suitable Habitat within Project Boundary
Justification	Suitable habitat (wetland) for the Black-crowned Night-Heron is not present within the project area.

• **Mesic Prairie - Community**

State Status: NA

Impact Type	No impact or no/low broad ITP/A
Reason	Other - Justification Required
Justification	The mapped Mesic Prairie is not within or adjacent to the project area. Therefore, no impacts are expected.

• **Slender Madtom (*Noturus exilis*) - Fish~**

State Status: END

Impact Type	No impact or no/low broad ITP/A
Reason	Lack of Suitable Habitat within Project Boundary
Justification	Suitable habitat (aquatic) for the Slender Madtom is not present within the project area.

• **Lake Chubsucker (*Erimyzon sucetta*) - Fish~**

State Status: SC/N

Impact Type	No impact or no/low broad ITP/A
Reason	Lack of Suitable Habitat within Project Boundary
Justification	Suitable habitat (aquatic) for the Lake Chubsucker is not present within the project area.

• **Blanchard's Cricket Frog (*Acris blanchardi*) - Frog~**

State Status: END

Impact Type	No impact or no/low broad ITP/A
Reason	Other - Justification Required
Justification	The Blanchard's cricket frog has been in decline over the past several decades throughout most of Wisconsin. Per the Blanchard's Cricket Frog Species Guidance Document, we do not believe cricket frogs are still present in this area, and the project does not need to be altered to avoid impacts to this species.

• **Rope Dodder (*Cuscuta glomerata*) - Plant~**

State Status: SC

Impact Type	No impact or no/low broad ITP/A
Reason	Lack of Suitable Habitat within Project Boundary
Justification	Suitable habitat (wetland) for the Rope Dodder is not present within the project area.

• **Butler's Gartersnake (*Thamnophis butleri*) - Snake~**

State Status: SC/H

Impact Type	No impact or no/low broad ITP/A
Reason	Lack of Suitable Habitat within Project Boundary
Justification	Suitable habitat (wetland) for the Butler's Gartersnake is not present within the project area.

Section D. Next Steps

1. Evaluate whether the 'Location and brief description of the proposed project' is still accurate. All recommendations in this ER Review are based on the information supplied in the ER Review Request. If the proposed project has changed or more than a year has passed and you would like your letter

renewed, please contact the ER Review Program to determine if the information in this ER Review is still valid.

2. No federally-protected species or habitats are involved.

Section E. Standard Information to help you better understand this ER Review

Endangered Resources (ER) Reviews are conducted according to the protocols in the guidance document Conducting Proposed Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff.

How endangered resources searches are conducted for the proposed project area: An endangered resources search is performed as part of all ER Reviews. A search consists of querying the Wisconsin Natural Heritage Inventory (NHI) database for endangered resources records for the proposed project area. The project area evaluated consists of both the specific project site and a buffer area surrounding the site. A 1 mile buffer is considered for terrestrial and wetland species, and a 2 mile buffer for aquatic species. Endangered resources records from the buffer area are considered because most lands and waters in the state, especially private lands, have not been surveyed. Considering records from the entire project area (also sometimes referred to as the search area) provides the best picture of species and communities that may be present on your specific site if suitable habitat for those species or communities is present.

Categories of endangered resources considered in ER Reviews and protections for each: Endangered resources records from the NHI database fall into one of the following categories:

- Federally-protected species include those federally listed as Endangered or Threatened and Designated Critical Habitats. Federally-protected animals are protected on all lands; federally-protected plants are protected only on federal lands and in the course of projects that include federal funding (see Federal Endangered Species Act of 1973 as amended).
- Animals (vertebrate and invertebrate) listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on all lands and waters of the state (s. 29.604, Wis. Stats.).
- Plants listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on public lands and on land that the person does not own or lease, except in the course of forestry, agriculture, utility, or bulk sampling actions (s. 29.604, Wis. Stats.).
- Special Concern species, high-quality examples of natural communities (sometimes called High Conservation Value areas), and natural features (e.g., caves and animal aggregation sites) are also included in the NHI database. These endangered resources are not legally protected by state or federal endangered species laws. However, other laws, policies (e.g., related to Forest Certification), or granting/permitting processes may require or strongly encourage protection of these resources. The main purpose of the Special Concern classification is to focus attention on species about which some problem of abundance or distribution is suspected before they become endangered or threatened.
- State Natural Areas (SNAs) are also included in the NHI database. SNAs protect outstanding examples of Wisconsin's native landscape of natural communities, significant geological formations, and archeological sites. Endangered species are often found within SNAs. SNAs are protected by law from any use that is inconsistent with or injurious to their natural values (s. 23.28, Wis. Stats.).

Please remember the following:

1. This ER Review is provided as information to comply with state and federal endangered species laws. By following the protocols and methodologies described above, the best information currently available about endangered resources that may be present in the proposed project area has been provided. However, the NHI database is not all inclusive; systematic surveys of most public lands have not been conducted, and the majority of private lands have not been surveyed. As a result, NHI data for the project area may be incomplete. Occurrences of endangered resources are only in the NHI database if the site has been previously surveyed for that species or group during the appropriate season, and an observation was reported to and entered into the NHI database. As such, absence of a record in the NHI database for a specific area should not be used to infer that no endangered resources are present in that area. Similarly, the presence of one species does not imply that surveys have been conducted for other species. Evaluations of the possible presence of rare species on the project site should always be based on whether suitable habitat exists on site for that species.
2. This ER Review provides an assessment of endangered resources that may be impacted by the project and measures that can be taken to avoid negatively impacting those resources based on the information that has been provided to ER Review Program at this time. Incomplete information, changes in the project, or subsequent survey results may affect our assessment and indicate the need for additional or different measures to avoid impacts to endangered resources.
3. This ER Review does not exempt the project from actions that may be required by Department permits or approvals for the project. Information contained in this ER Review may be shared with individuals who need this information in order to carry out specific roles in the planning, permitting/approvals, and implementation of the proposed project.