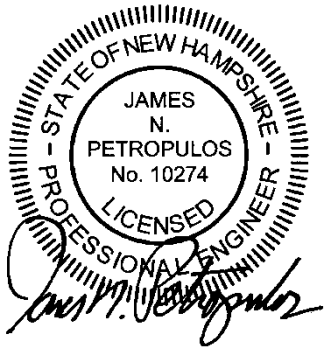
STORMWATER COMPUTATIONS

PROPOSED SITE IMPROVEMENTS
Tax Map 204, Lot 1
121 Technology Drive
Durham, New Hampshire

August, 2023



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I. INTRODUCTION

A. Abstract

The following letter report is an analysis of three existing basin areas on the southerly side of the existing industrial building located at 121 Technology Drive in Durham, New Hampshire. It is proposed to modify these three basins by excavating down 2.75 feet below the inverts of the outlet structures, and placing back 1.75 feet of specified rain garden soil filter bed materials. The purpose of the analysis is to determine the qualitative and quantitative stormwater benefits of these field modifications to mitigate the proposed site improvements. Reference is made to the drainage area maps included as exhibits to this analysis.

B. Existing Conditions

The project area under consideration for this study is located at 121 Technology Drive in Durham, NH. The 148-acre site is zoned ORLI; Office and Retail & Light Industrial and is identified as Tax Map 204, Lot 2. The project site is located approximately ½-mile north of Main Street (NH Route 155A) in the northwest part of Durham. Technology Drive dead-ends at the frontage of the project site. In addition to the project site, there is a residential condominium, and a cemetery on the westerly side of Technology Drive; and agricultural lands on the easterly side.

The site is currently partially developed with a 500,000+/- partial 2-story, multi-tenant industrial building. There are 1,465+/- car parking spaces and 18 loading spaces on the currently built site; along with stormwater management areas, municipal sanitary sewer, municipal water, propane gas, power, and communications facilities serving the site. West of this developed portion of the site, where the project is proposed, is predominantly wooded.

According to the Site-Specific Soil Mapping, the site contains predominantly WfB – Windsor loamy fine sandy loam, clay subsoil variant, 0 to 8 percent slopes (Hydrologic Group A); ScA and ScB – Scantic silt loam, 0 to 3 and 3 to 8 percent slopes, respectively (Hydrologic Group C/D); and PbB and PbC – Paxton fine sandy loam, 3 to 8 and 8 to 15 percent slopes, respectively (Hyrdologic Group C).

Approximately 30% of the existing site is developed, with 16.5% being impervious area. The existing drainage system generally drains in a southerly direction via closed drainage segments, swales, and culverts; which all discharge to the existing fire pond/detention basin on the westerly side of the Technology Drive/ring road intersection. This basin in-turn discharges to the adjacent wetland system to the south which, after travelling over 1,000 feet, eventually drains to the Oyster River. Wetlands on the property were flagged by Certified Wetland Scientist Brendan Quigley of Gove Environmental Services, Inc., and located by Hayner/Swanson, Inc. This information is shown on the accompanying Site Plans.

C. Proposed Development

It is being proposed to construct various loading, parking, sidewalk, utility, stormwater management, and landscaping improvements as part of building renovations being done for new building tenants. Other site improvements include bike racks, and EV charging facilities.

The proposed site improvements have been designed to avoid wetland buffer impacts and environmental issues. The site development associated with the overall construction of this project disturbs approximately 76,000 square feet of cumulative disturbed area, and therefore a NHDES Alteration of Terrain Permit (AoT) is not required. The disturbed area calculation includes the areas where pavement is being removed and replaced by grass, and the excavation work in the three existing basins to convert them to rain gardens (bioretention areas).

II. STORMWATER ANALYSIS

A. Intent

With regard to stormwater management, it is the intent of these design enhancements to the existing stormwater management system to address both qualitative and quantitative aspects of the runoff produced in and near the areas of the proposed site improvements with the addition of pretreatment (deep sumps and oil/debris stops) and treatment practices (rain gardens). These enhancements include the conversion of three existing small stormwater basins to rain gardens as described above, replacing impermeable pavement with permeable pavers in the proposed south building entrance plaza, the addition of deep sump drainage structures fitted with oil & debris stops to service new loading dock areas, retrofitting a specified number of existing catch basins with oil & debris stops, and removing a net 7,000 SF of existing paved area and replacing with loam and seed. Furthermore, the design shall address the Town of Durham regulations to the extent practicable for a small site renovation project on such a large site. The overall goal of the design is to maintain existing drainage patterns, provide permanent methods for improving water quality and reducing impacts to downstream drainage systems.

B. Methodology

In accordance with the Town of Durham the 1-inch, 2-year, 10-year, 25-year, and 100-year 24-hour storm frequencies were evaluated as part of the analysis of the three proposed rain gardens; utilizing current Northeast Regional Climate Center rainfall data. Evaluation of the quantitative runoff impacts of these three drainage subareas were determined by comparing the peak flows leaving these practices for both the pre-development and post-development conditions.

Total drainage area calculations for pre-development and post-development conditions were evaluated and designed using the HydroCAD® version 10.0 stormwater modeling program for the Soil Conservation Service (SCS) type III storm distribution.

C. Pre-Development Drainage Conditions

As can be seen on the Pre-Development Drainage Area Map (Figure 1), the three drainage subareas analyzed are designated DA 1, DA 2, and DA 3. The corresponding stormwater basins are designated as SMA 1, SMA 2, and SMA 3. The corresponding points-of-analysis are designated POA A, POA B, and POA C, respectively.

The pre-development drainage calculations estimating peak rates and volumes of runoff to the points-of-analysis (POAs) are shown in Appendix A of this analysis and summarized in Table 1 below.

TABLE 1: SUMMARY OF PRE-DEVELOPMENT PEAK FLOWS

Location	Storm Frequency	Pre-Development Peak Outflow Rates (cfs) and Volumes (cf)
Point of Analysis 'A'	1-inch	0.00 cfs / 0.00 cf
	2-year	0.02 cfs / 392 cf
	10-year	0.30 cfs / 1,786 cf
	25-year	0.77 cfs / 3,398
	100-year	1.97 cfs / 7,623 cf
Point of Analysis 'B'	1-inch	0.03 cfs / 261 cf
	2-year	1.37 cfs / 4,922 cf
	10-year	2.77 cfs / 980 cf
	25-year	3.85 cfs / 14, 026 cf
	100-year	5.58 cfs / 23, 174
Point of Analysis 'C'	1-inch	0.00 cfs / 0.00 cf
	2-year	0.05 cfs / 566 cf
	10-year	0.45 cfs / 2,396 cf
	25-year	1.02 cfs / 4,400 cf
	100-year	2.40 cfs / 9,583 cf

D. Post-Development Drainage Conditions

As can be seen on the Post-Development Drainage Area Map (Figure 2), the three drainage subareas analyzed are designated DA 1, DA 2, and DA 3. The corresponding stormwater rain gardens are designated as SMA 1, SMA 2, and SMA 3. The corresponding points-of-analysis are designated POA A, POA B, and POA C, respectively.

The post-development drainage calculations estimating peak rates and volumes of runoff to the point of analysis (POA) is shown in Appendix B of this analysis and summarized in Table 1 below.

TABLE 2: SUMMARY OF POST-DEVELOPMENT STORMWATER MANAGEMENT AREA CHARACTERISTICS

Location	Storm Frequency	Peak Inflow Rate(cfs) and Volumes (cf)	Peak Outflow Rates (cfs) and Volumes (cf)	Max. Water Elev.
SMA 1	1-inch	0.00 cfs / 0.00 cf	0.00 cfs / 0.00 cf	90.18
	2-year	0.02 cfs / 392 cf	0.00 cfs / 0.00 cf	90.19
	10-year	0.30 cfs / 1,786 cf	0.00 cfs / 0.00 cf	91.00
	25-year	0.77 cfs / 3,398 cf	0.00 cfs / 0.00 cf	92.19
	100-year	2.04 cfs / 7,623 cf	0.77 cfs / 653 cf	92.98
SMA 2	1-inch	0.03 cfs / 261 cf	0.00 cfs / 0.00 cf	90.96
	2-year	1.37 cfs / 4,922 cf	1.22 cfs / 1,873 cf	92.74
	10-year	2.81 cfs / 9,801 cf	2.44 cfs / 5,314 cf	92.93
	25-year	4.01 cfs / 14,026 cf	3.38 cfs / 8,581 cf	93.17
	100-year	6.53 cfs / 23,130 cf	4.96 cfs / 16,161 cf	93.74
SMA 3	1-inch	0.00 cfs / 0.00 cf	0.00 cfs / 0.00 cf	87.00
	2-year	0.11 cfs / 915 cf	0.00 cfs / 0.00 cf	87.29
	10-year	0.71 cfs / 3,093 cf	0.02 cfs / 0.00 cf	89.81
	25-year	1.40 cfs / 5,401 cf	0.69 cfs / 1,045 cf	90.16
	100-year	3.09 cfs / 11,064 cf	2.29 cfs / 4,443 cf	90.61

TABLE 3: COMPARISON OF PRE-DEVELOPMENT AND POST-DEVELOPMENT PEAK FLOWS TO THE POINTS OF ANALYSES

Location	Storm Frequency	Pre-Development Peak Flow Rates (cfs) and Volumes (cf)	Post-Development Peak Flow Rates (cfs) and Volumes (cf)
Point of Analysis 'A'	1-inch	0.00 cfs / 0.00 cf	0.00 cfs / 0.00 cf
	2-year	0.02 cfs / 392	0.00 cfs / 0.00 cf
	10-year	0.30 cfs / 1,786	0.00 cfs / 0.00 cf
	25-year	0.77 cfs / 3,398 cf	0.00 cfs / 0.00 cf
	100-year	1.97 cfs / 7,623	0.77 cfs / 653 cf

Point of Analysis 'B'	1-inch	0.03 cfs / 261 cf	0.00 cfs / 0.00 cf
	2-year	1.37 cfs / 4,922 cf	1.22 cfs / 1,873 cf
	10-year	2.77 cfs / 9,801 cf	2.44 cfs / 5,314 cf
	25-year	3.85 cfs / 14,026 cf	3.38 cfs / 8,581 cf
	100-year	5.58 cfs / 23,174 cf	4.96 cfs / 16,161 cf
Point of Analysis 'C'	1-inch	0.00 cfs / 0.00 cf	0.00 cfs / 0.00 cf
	2-year	0.05 cfs / 566 cf	0.00 cfs / 0.00 cf
	10-year	0.45 cfs / 2,396 cf	0.02 cfs / 0.00 cf
	25-year	1.02 cfs / 4,400 cf	0.69 cfs / 1,045 cf
	100-year	2.40 cfs / 9,583 cf	2.29 cfs / 4,443 cf

E. Results

1. The three rain garden areas analyzed provide stormwater detention, filtration treatment, and infiltration to groundwater for all design storms for a total area of 2.73 acres of the site; including 0.64 acres of impervious surface. There is greater than a foot of freeboard in each of these practices for the 100-yer design storm.
2. The additional proposed drainage system enhancements; which include deep sump DMHs fitted with oil and debris stops, as well as retrofitting a number of existing CBs with oil and debris stops, further enhances the quality of stormwater runoff leaving the site.
3. The proposed work yields a net decrease of approximately 7,000 of impervious surface as compared to the existing site condition.
4. SMA 1 and SMA 3 provide more than the recommended water quality volume below the outlet structure. SMA 2 provides less than the recommended water quality volume below the outlet structure due to the restrictions on expanding the base areas due to existing trees along the northerly slope.

In summary, it is our opinion that the stormwater management design associated with the proposed project substantially complies with the intent of the stormwater regulations set forth by the Town of Durham.

III. EROSION AND SEDIMENT CONTROL PROVISIONS

Erosion control measures are proposed throughout the project, to ensure that the wetlands and adjacent off-site areas are protected from erosion/siltation and debris during construction of this project.

A. Temporary Erosion Control Measures

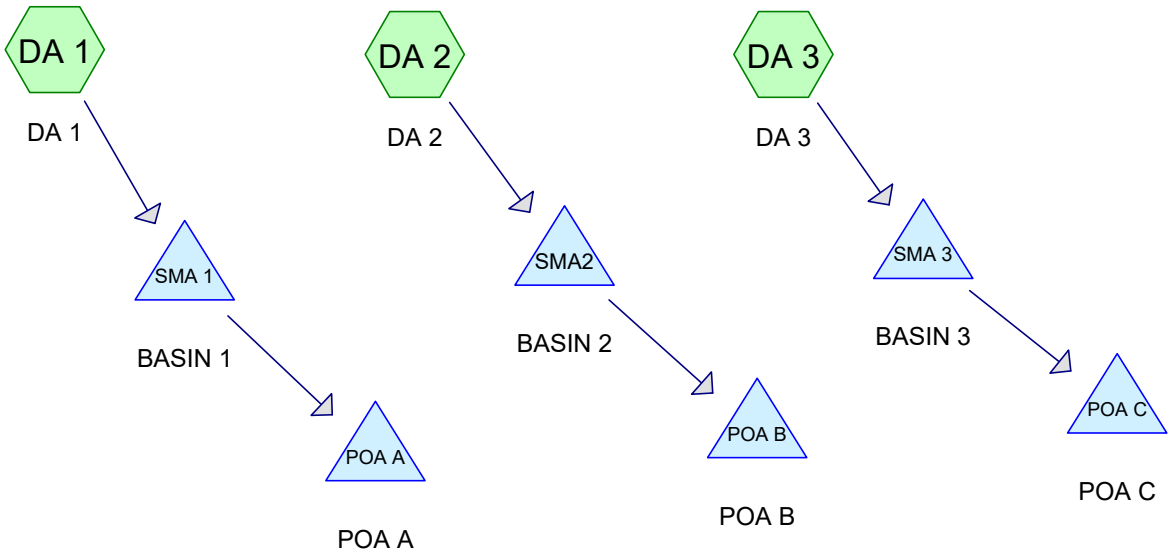
During the construction phase of the project, specific erosion and sedimentation controls have been developed into the design of the project and details of these items are included in the project plans. Reference to the New Hampshire Stormwater Management Manual, Vol. 3, Construction Phase Erosion and Sediment Controls was made for the temporary erosion and sedimentation control devices such as silt sock barriers, stone check dams, and seeding. The erosion control notes were developed to limit soil loss due to erosion and are therefore directed at minimizing the degradation of water quality on and off the site.

B. Permanent Erosion Control Measures

Permanent erosion control measures have been included in the design of the project to limit long-term erosion conditions. Loam and seed requirements have been specified to establish conditions that minimize erodible conditions. This is complemented by the minimization of stormwater flow lengths to keep runoff quantities and velocities as low as possible. These permanent measures, when completed and in-place, provide treatment methods that will maintain long-term water quality in downstream waterways.

APPENDIX A

PRE-DEVELOPMENT DRAINAGE CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for Pre-Development

Prepared by {enter your company name here}, Printed 8/11/2023

Project Notes

Rainfall events imported from "PRE-DEVELOPMENT.hcp"

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.304	39	>75% Grass cover, Good, HSG A (DA 1, DA 3)
0.850	74	>75% Grass cover, Good, HSG C (DA 2)
0.370	98	Impervious, HSG A (DA 1, DA 3)
0.208	98	Impervious, HSG C (DA 2)
2.732	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.674	HSG A	DA 1, DA 3
0.000	HSG B	
1.058	HSG C	DA 2
0.000	HSG D	
0.000	Other	
2.732		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.304	0.000	0.850	0.000	0.000	2.154	>75% Grass cover, Good	DA 1, DA 2, DA 3
0.370	0.000	0.208	0.000	0.000	0.578	Impervious	DA 1, DA 2, DA 3
1.674	**0.000**	**1.058**	**0.000**	**0.000**	**2.732**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	SMA 3	89.74	89.39	25.0	0.0140	0.012	0.0	12.0	0.0

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.63"
Tc=8.0 min CN=51 Runoff=0.30 cfs 0.041 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.66% Impervious Runoff Depth=2.55"
Tc=8.0 min CN=79 Runoff=2.81 cfs 0.225 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 23.50% Impervious Runoff Depth=0.73"
Tc=8.0 min CN=53 Runoff=0.45 cfs 0.055 af

Pond POA A: POA A Inflow=0.30 cfs 0.041 af
Primary=0.30 cfs 0.041 af

Pond POA B: POA B Inflow=2.77 cfs 0.225 af
Primary=2.77 cfs 0.225 af

Pond POA C: POA C Inflow=0.45 cfs 0.055 af
Primary=0.45 cfs 0.055 af

Pond SMA 1: BASIN 1 Peak Elev=92.95' Storage=0 cf Inflow=0.30 cfs 0.041 af
Outflow=0.30 cfs 0.041 af

Pond SMA 3: BASIN 3 Peak Elev=90.07' Storage=5 cf Inflow=0.45 cfs 0.055 af
12.0" Round Culvert n=0.012 L=25.0' S=0.0140 '/' Outflow=0.45 cfs 0.055 af

Pond SMA2: BASIN 2 Peak Elev=93.01' Storage=10 cf Inflow=2.81 cfs 0.225 af
Outflow=2.77 cfs 0.225 af

Total Runoff Area = 2.732 ac Runoff Volume = 0.320 af Average Runoff Depth = 1.41"
78.84% Pervious = 2.154 ac 21.16% Impervious = 0.578 ac

Summary for Subcatchment DA 1: DA 1

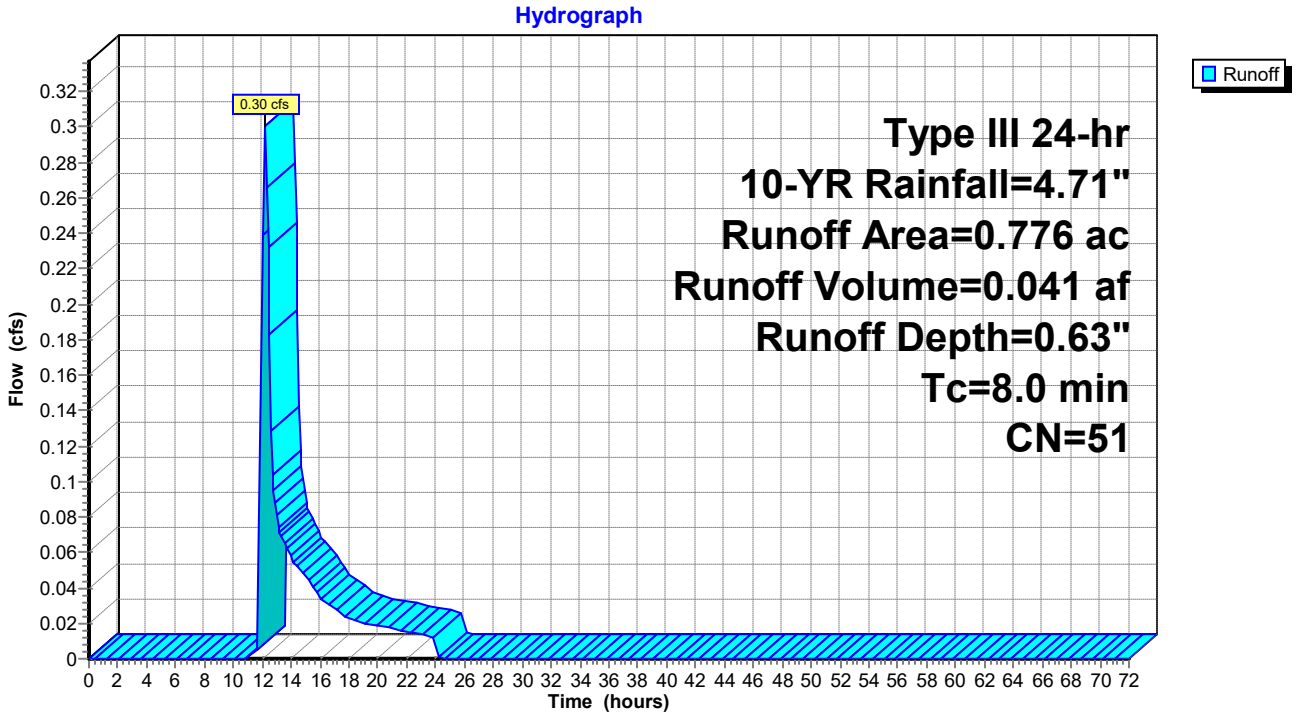
Runoff = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
*	0.159	98	Impervious, HSG A
	0.617	39	>75% Grass cover, Good, HSG A
	0.776	51	Weighted Average
	0.617		79.51% Pervious Area
	0.159		20.49% Impervious Area

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

Subcatchment DA 1: DA 1



Summary for Subcatchment DA 2: DA 2

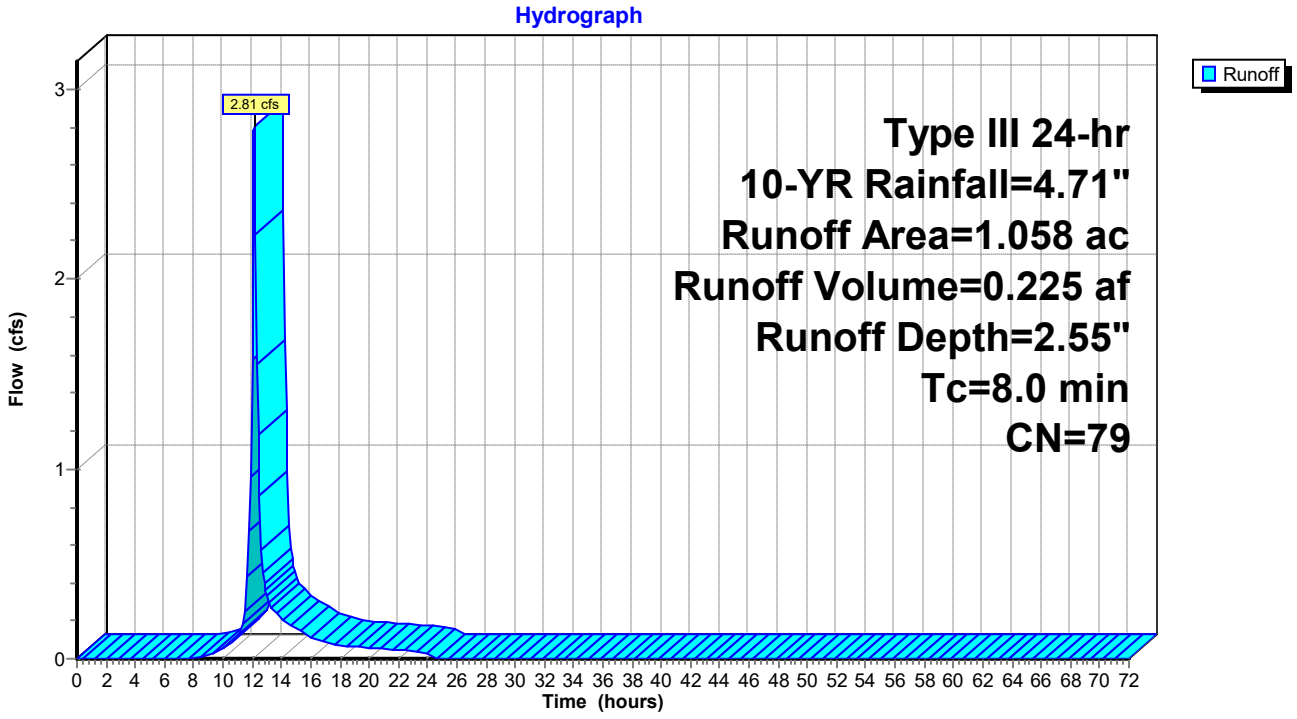
Runoff = 2.81 cfs @ 12.12 hrs, Volume= 0.225 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
	0.850	74	>75% Grass cover, Good, HSG C
*	0.208	98	Impervious, HSG C
	1.058	79	Weighted Average
	0.850		80.34% Pervious Area
	0.208		19.66% Impervious Area

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

Subcatchment DA 2: DA 2



Summary for Subcatchment DA 3: DA 3

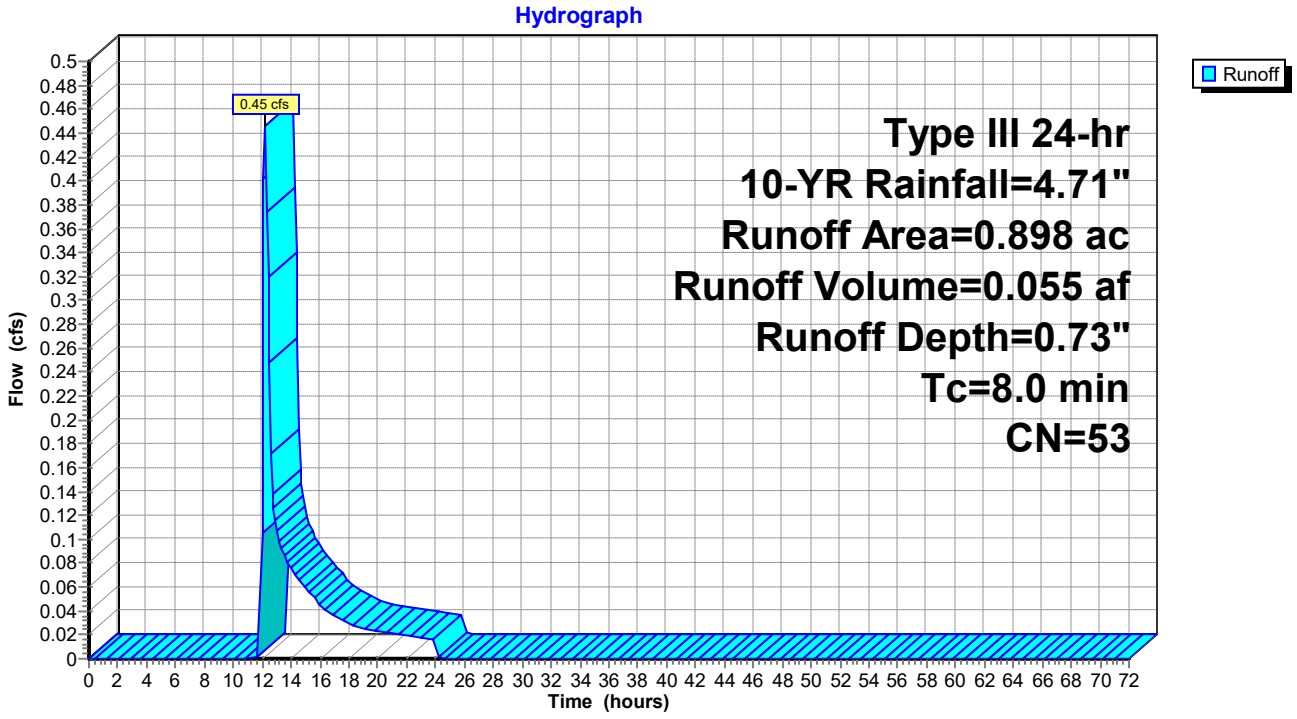
Runoff = 0.45 cfs @ 12.19 hrs, Volume= 0.055 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
	0.687	39	>75% Grass cover, Good, HSG A
*	0.211	98	Impervious, HSG A
	0.898	53	Weighted Average
	0.687		76.50% Pervious Area
	0.211		23.50% Impervious Area

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

Subcatchment DA 3: DA 3

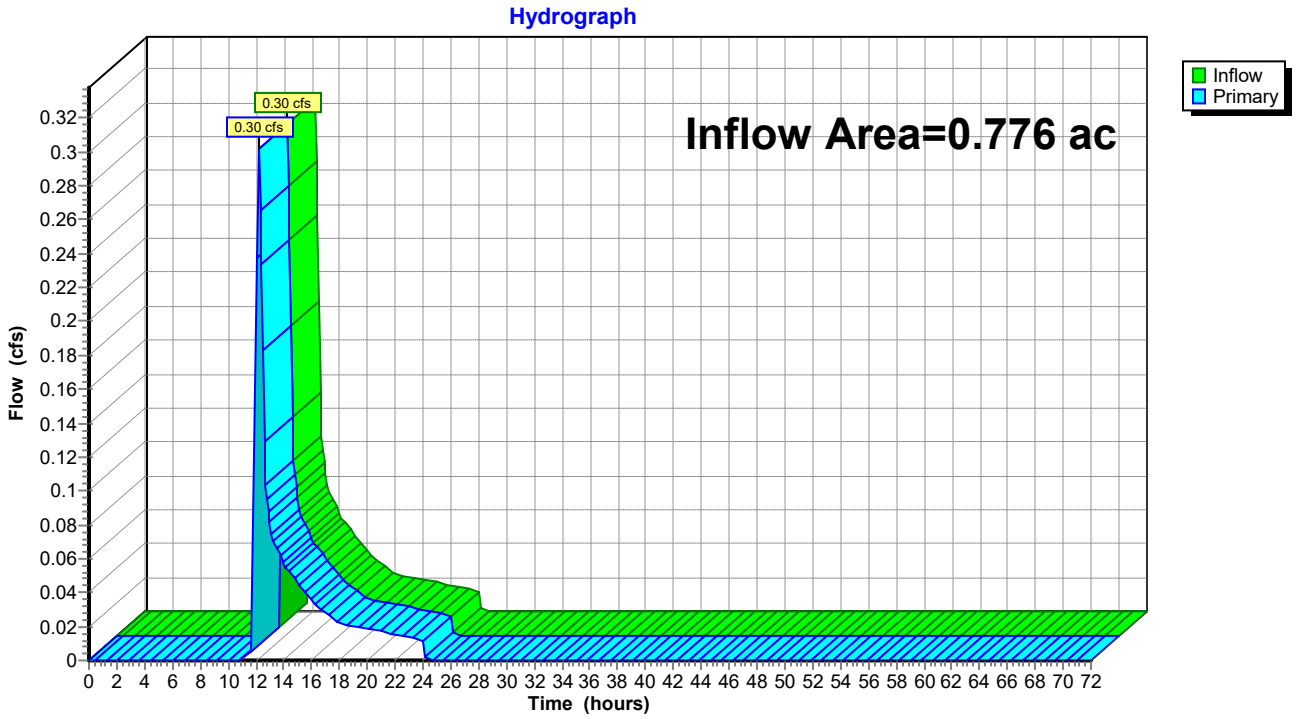


Summary for Pond POA A: POA A

Inflow Area = 0.776 ac, 20.49% Impervious, Inflow Depth = 0.63" for 10-YR event
Inflow = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af
Primary = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA A: POA A

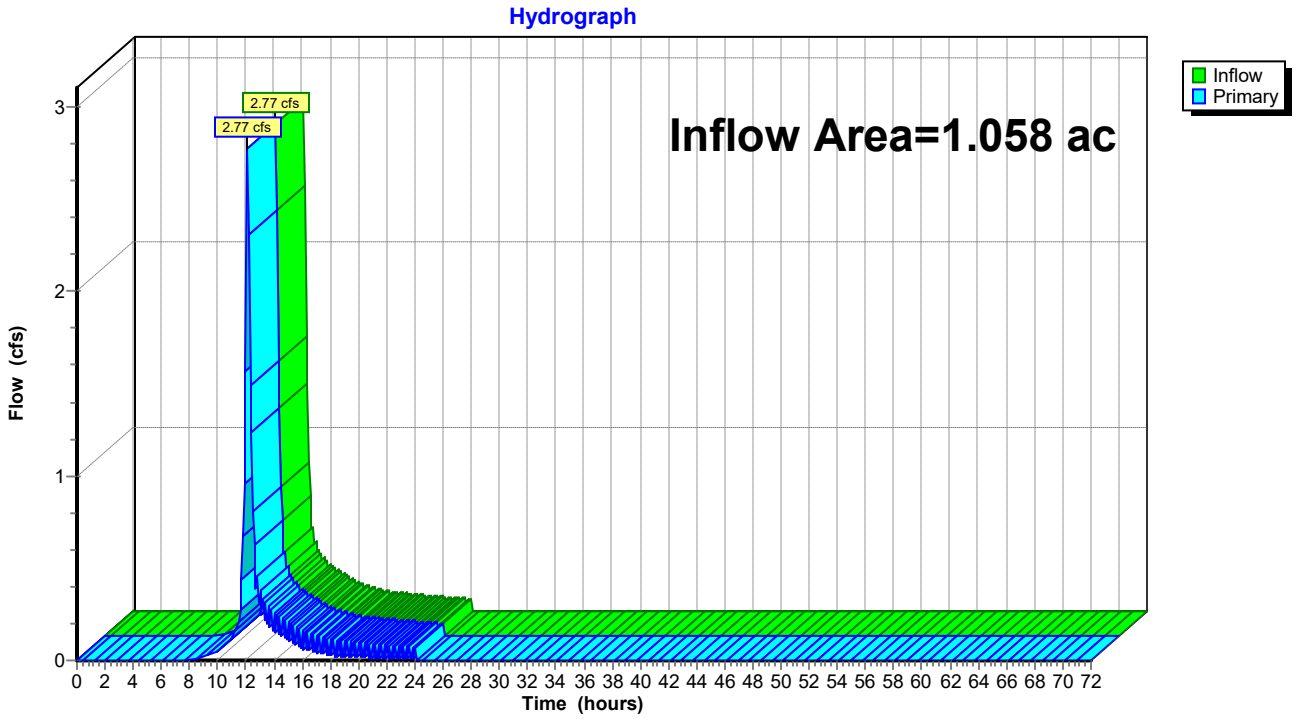


Summary for Pond POA B: POA B

Inflow Area = 1.058 ac, 19.66% Impervious, Inflow Depth = 2.56" for 10-YR event
Inflow = 2.77 cfs @ 12.12 hrs, Volume= 0.225 af
Primary = 2.77 cfs @ 12.12 hrs, Volume= 0.225 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA B: POA B

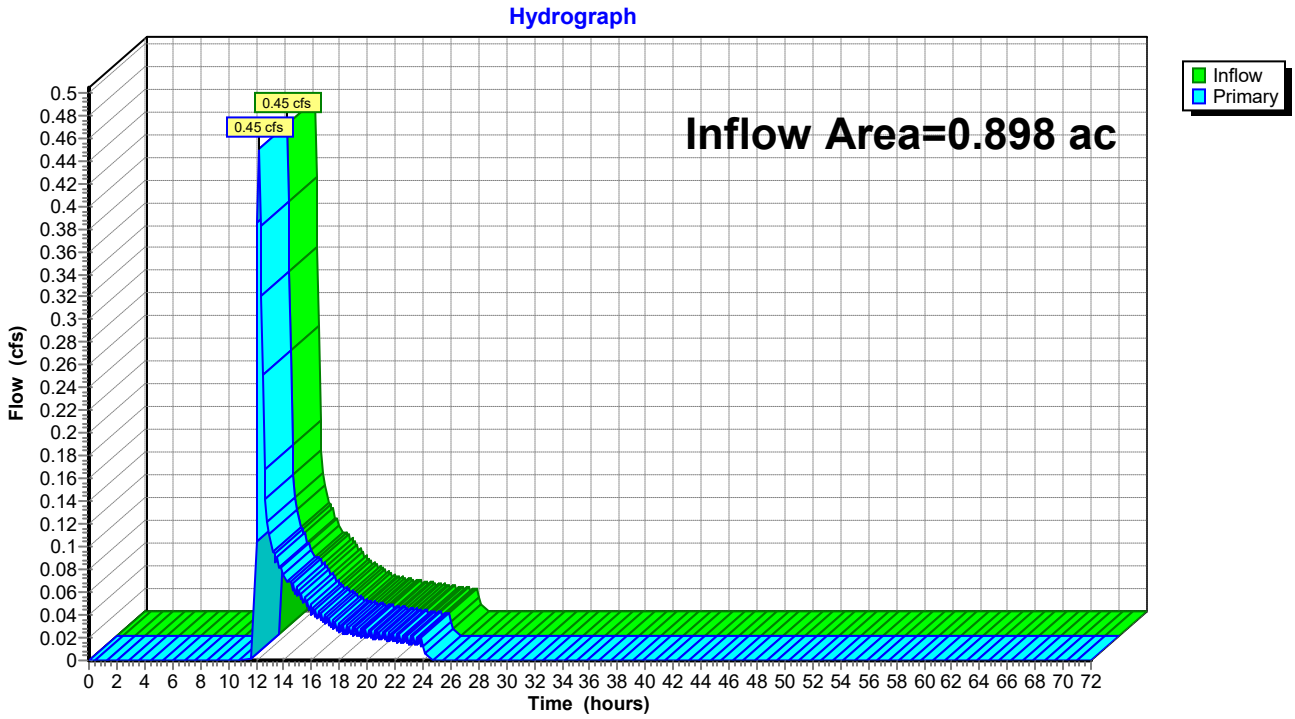


Summary for Pond POA C: POA C

Inflow Area = 0.898 ac, 23.50% Impervious, Inflow Depth = 0.73" for 10-YR event
Inflow = 0.45 cfs @ 12.20 hrs, Volume= 0.055 af
Primary = 0.45 cfs @ 12.20 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA C: POA C



Summary for Pond SMA 1: BASIN 1

Inflow Area = 0.776 ac, 20.49% Impervious, Inflow Depth = 0.63" for 10-YR event
Inflow = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af
Outflow = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 92.95' @ 12.21 hrs Surf.Area= 43 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (919.4 - 919.4)

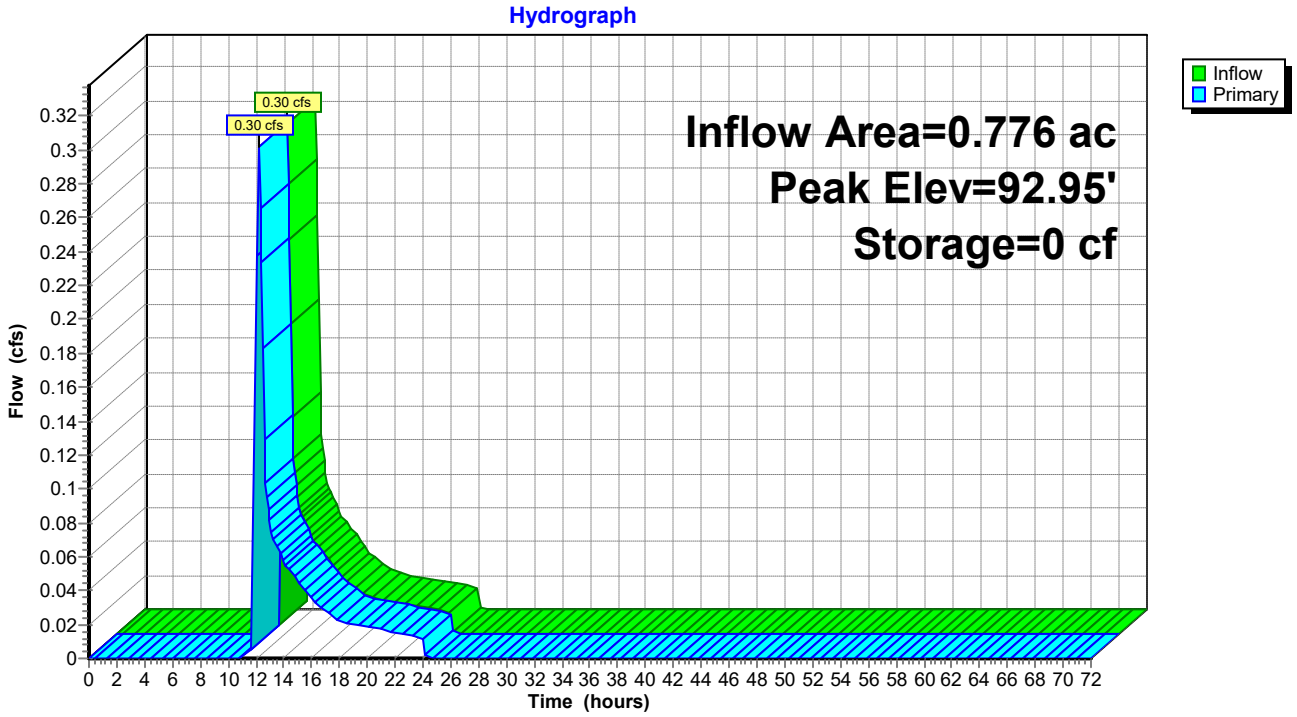
Volume	Invert	Avail.Storage	Storage Description
#1	92.93'	3,387 cf	**Surface (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.93	4	0	0	4
93.00	227	6	6	227
94.00	1,601	810	816	1,604
95.00	3,682	2,570	3,387	3,693

Device	Routing	Invert	Outlet Devices
#1	Primary	92.93'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.30 cfs @ 12.21 hrs HW=92.95' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Weir Controls 0.30 cfs @ 0.51 fps)

Pond SMA 1: BASIN 1



Stage-Discharge for Pond SMA 1: BASIN 1

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
92.93	0.00	93.45	3.47	93.97	4.91	94.49	6.01
92.94	0.08	93.46	3.51	93.98	4.93	94.50	6.03
92.95	0.22	93.47	3.54	93.99	4.96	94.51	6.05
92.96	0.41	93.48	3.57	94.00	4.98	94.52	6.07
92.97	0.63	93.49	3.60	94.01	5.00	94.53	6.09
92.98	0.88	93.50	3.64	94.02	5.03	94.54	6.11
92.99	1.15	93.51	3.67	94.03	5.05	94.55	6.13
93.00	1.27	93.52	3.70	94.04	5.07	94.56	6.15
93.01	1.36	93.53	3.73	94.05	5.10	94.57	6.17
93.02	1.44	93.54	3.76	94.06	5.12	94.58	6.18
93.03	1.52	93.55	3.79	94.07	5.14	94.59	6.20
93.04	1.60	93.56	3.82	94.08	5.16	94.60	6.22
93.05	1.67	93.57	3.85	94.09	5.19	94.61	6.24
93.06	1.74	93.58	3.88	94.10	5.21	94.62	6.26
93.07	1.80	93.59	3.91	94.11	5.23	94.63	6.28
93.08	1.86	93.60	3.94	94.12	5.25	94.64	6.30
93.09	1.93	93.61	3.97	94.13	5.27	94.65	6.31
93.10	1.99	93.62	4.00	94.14	5.30	94.66	6.33
93.11	2.04	93.63	4.03	94.15	5.32	94.67	6.35
93.12	2.10	93.64	4.06	94.16	5.34	94.68	6.37
93.13	2.15	93.65	4.09	94.17	5.36	94.69	6.39
93.14	2.21	93.66	4.11	94.18	5.38	94.70	6.41
93.15	2.26	93.67	4.14	94.19	5.40	94.71	6.42
93.16	2.31	93.68	4.17	94.20	5.43	94.72	6.44
93.17	2.36	93.69	4.20	94.21	5.45	94.73	6.46
93.18	2.41	93.70	4.23	94.22	5.47	94.74	6.48
93.19	2.46	93.71	4.25	94.23	5.49	94.75	6.50
93.20	2.50	93.72	4.28	94.24	5.51	94.76	6.51
93.21	2.55	93.73	4.31	94.25	5.53	94.77	6.53
93.22	2.59	93.74	4.33	94.26	5.55	94.78	6.55
93.23	2.64	93.75	4.36	94.27	5.57	94.79	6.57
93.24	2.68	93.76	4.39	94.28	5.59	94.80	6.58
93.25	2.72	93.77	4.41	94.29	5.62	94.81	6.60
93.26	2.77	93.78	4.44	94.30	5.64	94.82	6.62
93.27	2.81	93.79	4.47	94.31	5.66	94.83	6.64
93.28	2.85	93.80	4.49	94.32	5.68	94.84	6.65
93.29	2.89	93.81	4.52	94.33	5.70	94.85	6.67
93.30	2.93	93.82	4.54	94.34	5.72	94.86	6.69
93.31	2.97	93.83	4.57	94.35	5.74	94.87	6.71
93.32	3.01	93.84	4.59	94.36	5.76	94.88	6.72
93.33	3.05	93.85	4.62	94.37	5.78	94.89	6.74
93.34	3.08	93.86	4.64	94.38	5.80	94.90	6.76
93.35	3.12	93.87	4.67	94.39	5.82	94.91	6.78
93.36	3.16	93.88	4.69	94.40	5.84	94.92	6.79
93.37	3.19	93.89	4.72	94.41	5.86	94.93	6.81
93.38	3.23	93.90	4.74	94.42	5.88	94.94	6.83
93.39	3.27	93.91	4.77	94.43	5.90	94.95	6.84
93.40	3.30	93.92	4.79	94.44	5.92	94.96	6.86
93.41	3.34	93.93	4.81	94.45	5.94	94.97	6.88
93.42	3.37	93.94	4.84	94.46	5.96	94.98	6.89
93.43	3.40	93.95	4.86	94.47	5.98	94.99	6.91
93.44	3.44	93.96	4.89	94.48	5.99	95.00	**6.93**

Summary for Pond SMA 3: BASIN 3

Inflow Area = 0.898 ac, 23.50% Impervious, Inflow Depth = 0.73" for 10-YR event
Inflow = 0.45 cfs @ 12.19 hrs, Volume= 0.055 af
Outflow = 0.45 cfs @ 12.20 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.6 min
Primary = 0.45 cfs @ 12.20 hrs, Volume= 0.055 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 90.07' @ 12.20 hrs Surf.Area= 83 sf Storage= 5 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (909.5 - 909.3)

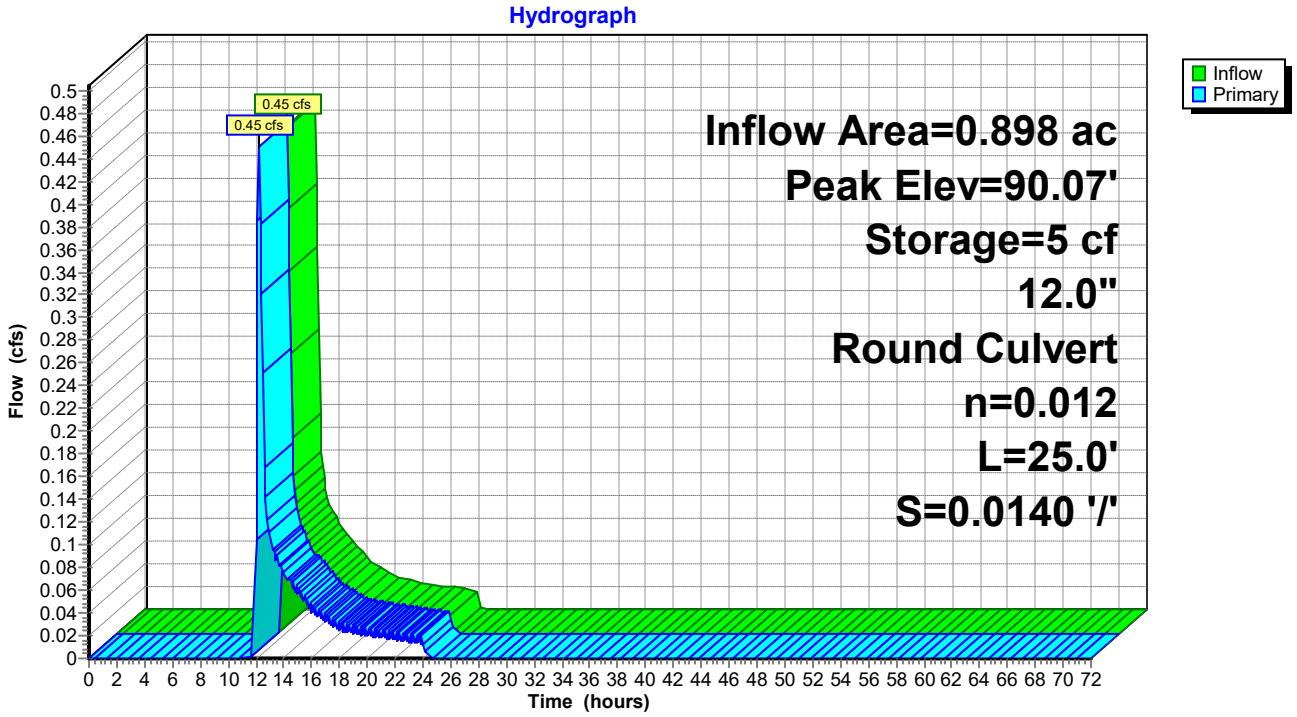
Volume	Invert	Avail.Storage	Storage Description
#1	90.00'	14,409 cf	**Surface (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.00	50	0	0	50
91.00	1,212	503	503	1,214
92.00	2,280	1,718	2,221	2,292
93.00	3,403	2,823	5,044	3,431
94.00	4,609	3,991	9,034	4,658
95.00	6,178	5,374	14,409	6,248

Device	Routing	Invert	Outlet Devices
#1	Primary	89.74'	**12.0" Round Culvert** L= 25.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 89.74' / 89.39' S= 0.0140 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.20 hrs HW=90.07' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.45 cfs @ 1.96 fps)

Pond SMA 3: BASIN 3



Stage-Discharge for Pond SMA 3: BASIN 3

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
90.00	0.00	92.60	5.81
90.05	0.39	92.65	5.87
90.10	0.52	92.70	5.93
90.15	0.66	92.75	5.99
90.20	0.81	92.80	6.05
90.25	0.98	92.85	6.11
90.30	1.15	92.90	6.17
90.35	1.33	92.95	6.23
90.40	1.51	93.00	6.28
90.45	1.70	93.05	6.34
90.50	1.88	93.10	6.40
90.55	2.07	93.15	6.45
90.60	2.25	93.20	6.51
90.65	2.44	93.25	6.56
90.70	2.58	93.30	6.62
90.75	2.70	93.35	6.67
90.80	2.83	93.40	6.72
90.85	2.95	93.45	6.78
90.90	3.07	93.50	6.83
90.95	3.19	93.55	6.88
91.00	3.30	93.60	6.93
91.05	3.40	93.65	6.98
91.10	3.51	93.70	7.03
91.15	3.61	93.75	7.08
91.20	3.71	93.80	7.14
91.25	3.80	93.85	7.19
91.30	3.89	93.90	7.23
91.35	3.98	93.95	7.28
91.40	4.07	94.00	7.33
91.45	4.16	94.05	7.38
91.50	4.24	94.10	7.43
91.55	4.33	94.15	7.48
91.60	4.41	94.20	7.53
91.65	4.49	94.25	7.57
91.70	4.57	94.30	7.62
91.75	4.65	94.35	7.67
91.80	4.72	94.40	7.71
91.85	4.80	94.45	7.76
91.90	4.87	94.50	7.81
91.95	4.95	94.55	7.85
92.00	5.02	94.60	7.90
92.05	5.09	94.65	7.94
92.10	5.16	94.70	7.99
92.15	5.23	94.75	8.03
92.20	5.29	94.80	8.08
92.25	5.36	94.85	8.12
92.30	5.43	94.90	8.16
92.35	5.49	94.95	8.21
92.40	5.56	95.00	**8.25**
92.45	5.62		
92.50	5.69		
92.55	5.75		

Summary for Pond SMA2: BASIN 2

Inflow Area = 1.058 ac, 19.66% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 2.81 cfs @ 12.12 hrs, Volume= 0.225 af
Outflow = 2.77 cfs @ 12.12 hrs, Volume= 0.225 af, Atten= 1%, Lag= 0.3 min
Primary = 2.77 cfs @ 12.12 hrs, Volume= 0.225 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 93.01' @ 12.12 hrs Surf.Area= 73 sf Storage= 10 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min (829.4 - 829.0)

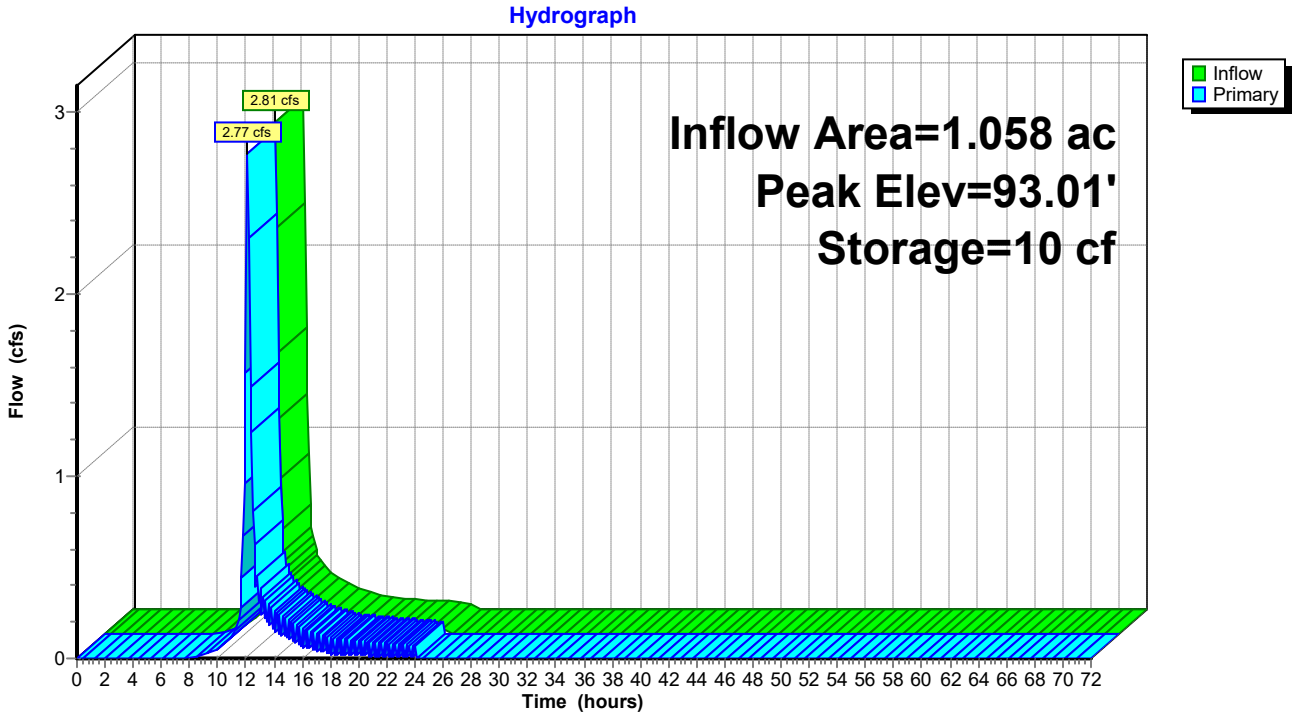
Volume	Invert	Avail.Storage	Storage Description
#1	92.68'	7,555 cf	**Surface (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
92.68	4	0	0	4
93.00	70	10	10	70
94.00	973	435	444	976
95.00	3,285	2,015	2,460	3,293
96.00	7,154	5,096	7,555	7,170

Device	Routing	Invert	Outlet Devices
#1	Primary	92.68'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.64 cfs @ 12.12 hrs HW=92.98' TW=0.00' (Dynamic Tailwater)
↑—**1=Orifice/Grate** (Orifice Controls 2.64 cfs @ 2.64 fps)

Pond SMA2: BASIN 2



Stage-Discharge for Pond SMA2: BASIN 2

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
92.68	0.00	93.72	4.91	94.76	6.94	95.80	8.50
92.70	0.22	93.74	4.96	94.78	6.98	95.82	8.53
92.72	0.63	93.76	5.00	94.80	7.01	95.84	8.56
92.74	1.15	93.78	5.05	94.82	7.04	95.86	8.59
92.76	1.36	93.80	5.10	94.84	7.08	95.88	8.61
92.78	1.52	93.82	5.14	94.86	7.11	95.90	8.64
92.80	1.67	93.84	5.19	94.88	7.14	95.92	8.67
92.82	1.80	93.86	5.23	94.90	7.17	95.94	8.69
92.84	1.93	93.88	5.27	94.92	7.21	95.96	8.72
92.86	2.04	93.90	5.32	94.94	7.24	95.98	8.75
92.88	2.15	93.92	5.36	94.96	7.27	96.00	**8.77**
92.90	2.26	93.94	5.40	94.98	7.30		
92.92	2.36	93.96	5.45	95.00	7.33		
92.94	2.46	93.98	5.49	95.02	7.37		
92.96	2.55	94.00	5.53	95.04	7.40		
92.98	2.64	94.02	5.57	95.06	7.43		
93.00	2.72	94.04	5.62	95.08	7.46		
93.02	2.81	94.06	5.66	95.10	7.49		
93.04	2.89	94.08	5.70	95.12	7.52		
93.06	2.97	94.10	5.74	95.14	7.55		
93.08	3.05	94.12	5.78	95.16	7.58		
93.10	3.12	94.14	5.82	95.18	7.61		
93.12	3.19	94.16	5.86	95.20	7.64		
93.14	3.27	94.18	5.90	95.22	7.67		
93.16	3.34	94.20	5.94	95.24	7.70		
93.18	3.40	94.22	5.98	95.26	7.73		
93.20	3.47	94.24	6.01	95.28	7.76		
93.22	3.54	94.26	6.05	95.30	7.79		
93.24	3.60	94.28	6.09	95.32	7.82		
93.26	3.67	94.30	6.13	95.34	7.85		
93.28	3.73	94.32	6.17	95.36	7.88		
93.30	3.79	94.34	6.20	95.38	7.91		
93.32	3.85	94.36	6.24	95.40	7.94		
93.34	3.91	94.38	6.28	95.42	7.97		
93.36	3.97	94.40	6.31	95.44	8.00		
93.38	4.03	94.42	6.35	95.46	8.03		
93.40	4.09	94.44	6.39	95.48	8.06		
93.42	4.14	94.46	6.42	95.50	8.09		
93.44	4.20	94.48	6.46	95.52	8.11		
93.46	4.25	94.50	6.50	95.54	8.14		
93.48	4.31	94.52	6.53	95.56	8.17		
93.50	4.36	94.54	6.57	95.58	8.20		
93.52	4.41	94.56	6.60	95.60	8.23		
93.54	4.47	94.58	6.64	95.62	8.26		
93.56	4.52	94.60	6.67	95.64	8.28		
93.58	4.57	94.62	6.71	95.66	8.31		
93.60	4.62	94.64	6.74	95.68	8.34		
93.62	4.67	94.66	6.78	95.70	8.37		
93.64	4.72	94.68	6.81	95.72	8.40		
93.66	4.77	94.70	6.84	95.74	8.42		
93.68	4.81	94.72	6.88	95.76	8.45		
93.70	4.86	94.74	6.91	95.78	8.48		

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.00"
Tc=8.0 min CN=51 Runoff=0.00 cfs 0.000 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.66% Impervious Runoff Depth=0.07"
Tc=8.0 min CN=79 Runoff=0.03 cfs 0.006 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 23.50% Impervious Runoff Depth=0.00"
Tc=8.0 min CN=53 Runoff=0.00 cfs 0.000 af

Pond POA A: POA A Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA B: POA B Inflow=0.03 cfs 0.006 af
Primary=0.03 cfs 0.006 af

Pond POA C: POA C Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SMA 1: BASIN 1 Peak Elev=92.93' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond SMA 3: BASIN 3 Peak Elev=90.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
12.0" Round Culvert n=0.012 L=25.0' S=0.0140 '/' Outflow=0.00 cfs 0.000 af

Pond SMA2: BASIN 2 Peak Elev=92.68' Storage=0 cf Inflow=0.03 cfs 0.006 af
Outflow=0.03 cfs 0.006 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.13"
Tc=8.0 min CN=51 Runoff=0.02 cfs 0.009 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.66% Impervious Runoff Depth=1.28"
Tc=8.0 min CN=79 Runoff=1.37 cfs 0.113 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 23.50% Impervious Runoff Depth=0.18"
Tc=8.0 min CN=53 Runoff=0.05 cfs 0.013 af

Pond POA A: POA A Inflow=0.02 cfs 0.009 af
Primary=0.02 cfs 0.009 af

Pond POA B: POA B Inflow=1.37 cfs 0.113 af
Primary=1.37 cfs 0.113 af

Pond POA C: POA C Inflow=0.05 cfs 0.013 af
Primary=0.05 cfs 0.013 af

Pond SMA 1: BASIN 1 Peak Elev=92.93' Storage=0 cf Inflow=0.02 cfs 0.009 af
Outflow=0.02 cfs 0.009 af

Pond SMA 3: BASIN 3 Peak Elev=90.00' Storage=0 cf Inflow=0.05 cfs 0.013 af
12.0" Round Culvert n=0.012 L=25.0' S=0.0140 '/' Outflow=0.05 cfs 0.013 af

Pond SMA2: BASIN 2 Peak Elev=92.76' Storage=1 cf Inflow=1.37 cfs 0.113 af
Outflow=1.37 cfs 0.113 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=1.20"
Tc=8.0 min CN=51 Runoff=0.77 cfs 0.078 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.66% Impervious Runoff Depth=3.65"
Tc=8.0 min CN=79 Runoff=4.01 cfs 0.322 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 23.50% Impervious Runoff Depth=1.35"
Tc=8.0 min CN=53 Runoff=1.06 cfs 0.101 af

Pond POA A: POA A Inflow=0.77 cfs 0.078 af
Primary=0.77 cfs 0.078 af

Pond POA B: POA B Inflow=3.85 cfs 0.322 af
Primary=3.85 cfs 0.322 af

Pond POA C: POA C Inflow=1.02 cfs 0.101 af
Primary=1.02 cfs 0.101 af

Pond SMA 1: BASIN 1 Peak Elev=92.98' Storage=2 cf Inflow=0.77 cfs 0.078 af
Outflow=0.77 cfs 0.078 af

Pond SMA 3: BASIN 3 Peak Elev=90.26' Storage=31 cf Inflow=1.06 cfs 0.101 af
12.0" Round Culvert n=0.012 L=25.0' S=0.0140 '/' Outflow=1.02 cfs 0.101 af

Pond SMA2: BASIN 2 Peak Elev=93.31' Storage=54 cf Inflow=4.01 cfs 0.322 af
Outflow=3.85 cfs 0.322 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=2.71"
Tc=8.0 min CN=51 Runoff=2.04 cfs 0.175 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.66% Impervious Runoff Depth=6.02"
Tc=8.0 min CN=79 Runoff=6.53 cfs 0.531 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 23.50% Impervious Runoff Depth=2.94"
Tc=8.0 min CN=53 Runoff=2.61 cfs 0.220 af

Pond POA A: POA A Inflow=1.97 cfs 0.175 af
Primary=1.97 cfs 0.175 af

Pond POA B: POA B Inflow=5.58 cfs 0.532 af
Primary=5.58 cfs 0.532 af

Pond POA C: POA C Inflow=2.40 cfs 0.220 af
Primary=2.40 cfs 0.220 af

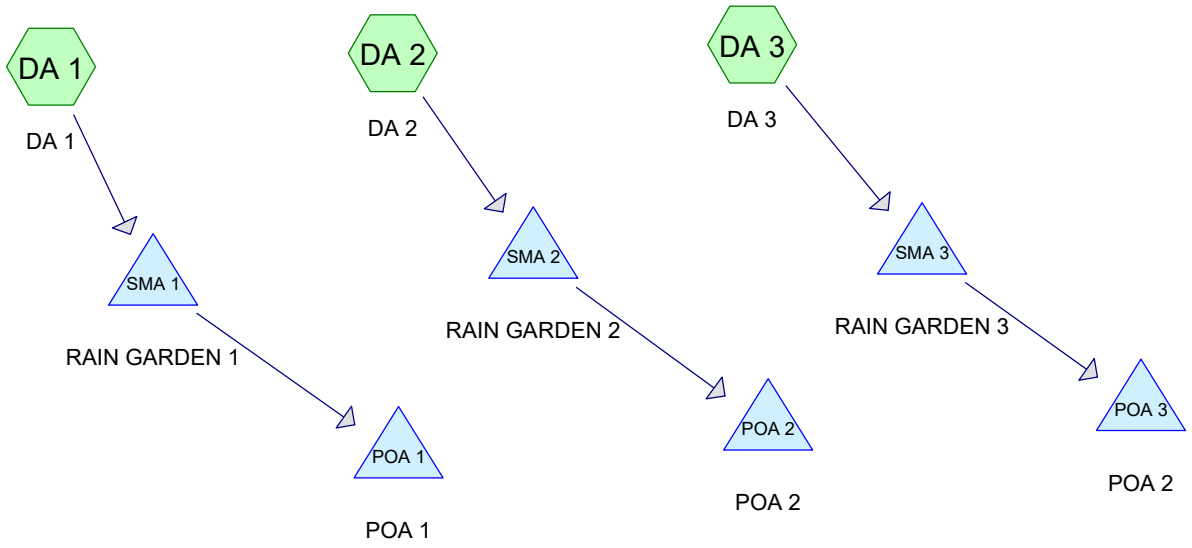
Pond SMA 1: BASIN 1 Peak Elev=93.09' Storage=30 cf Inflow=2.04 cfs 0.175 af
Outflow=1.97 cfs 0.175 af

Pond SMA 3: BASIN 3 Peak Elev=90.64' Storage=179 cf Inflow=2.61 cfs 0.220 af
12.0" Round Culvert n=0.012 L=25.0' S=0.0140 '/' Outflow=2.40 cfs 0.220 af

Pond SMA2: BASIN 2 Peak Elev=94.02' Storage=466 cf Inflow=6.53 cfs 0.531 af
Outflow=5.58 cfs 0.532 af

APPENDIX B

POST-DEVELOPMENT DRAINAGE CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for Post-Development

Prepared by {enter your company name here}, Printed 8/11/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	10-YR	Type III 24-hr		Default	24.00	1	4.71	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.235	39	>75% Grass cover, Good, HSG A (DA 1, DA 3)
0.855	74	>75% Grass cover, Good, HSG C (DA 2)
0.439	98	Impervious, HSG A (DA 1, DA 3)
0.203	98	Impervious, HSG C (DA 2)
2.732	**64**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.674	HSG A	DA 1, DA 3
0.000	HSG B	
1.058	HSG C	DA 2
0.000	HSG D	
0.000	Other	
2.732		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.235	0.000	0.855	0.000	0.000	2.090	>75% Grass cover, Good	DA 1, DA 2, DA 3
0.439	0.000	0.203	0.000	0.000	0.642	Impervious	DA 1, DA 2, DA 3
1.674	**0.000**	**1.058**	**0.000**	**0.000**	**2.732**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	SMA 3	89.74	89.39	25.0	0.0140	0.012	0.0	12.0	0.0

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.63"
Tc=8.0 min CN=51 Runoff=0.30 cfs 0.041 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.19% Impervious Runoff Depth=2.55"
Tc=8.0 min CN=79 Runoff=2.81 cfs 0.225 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 31.18% Impervious Runoff Depth=0.95"
Tc=8.0 min CN=57 Runoff=0.71 cfs 0.071 af

Pond POA 1: POA 1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA 2: POA 2 Inflow=2.44 cfs 0.122 af
Primary=2.44 cfs 0.122 af

Pond POA 3: POA 2 Inflow=0.02 cfs 0.000 af
Primary=0.02 cfs 0.000 af

Pond SMA 1: RAIN GARDEN 1 Peak Elev=91.00' Storage=106 cf Inflow=0.30 cfs 0.041 af
Discarded=0.19 cfs 0.041 af Primary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.041 af

Pond SMA 2: RAIN GARDEN 2 Peak Elev=92.93' Storage=319 cf Inflow=2.81 cfs 0.225 af
Discarded=0.15 cfs 0.103 af Primary=2.44 cfs 0.122 af Outflow=2.59 cfs 0.225 af

Pond SMA 3: RAIN GARDEN 3 Peak Elev=89.81' Storage=634 cf Inflow=0.71 cfs 0.071 af
Discarded=0.22 cfs 0.071 af Primary=0.02 cfs 0.000 af Outflow=0.24 cfs 0.071 af

Total Runoff Area = 2.732 ac Runoff Volume = 0.337 af Average Runoff Depth = 1.48"
76.50% Pervious = 2.090 ac 23.50% Impervious = 0.642 ac

Summary for Subcatchment DA 1: DA 1

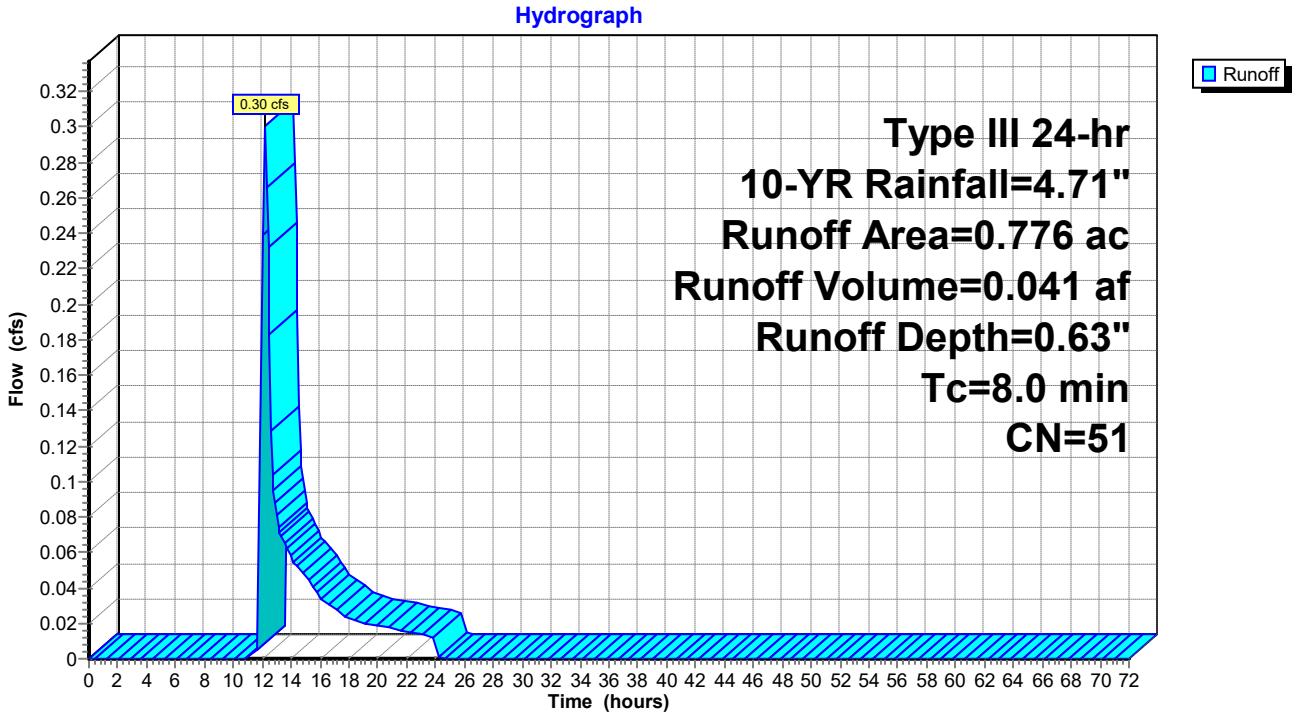
Runoff = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
*	0.159	98	Impervious, HSG A
	0.617	39	>75% Grass cover, Good, HSG A
	0.776	51	Weighted Average
	0.617		79.51% Pervious Area
	0.159		20.49% Impervious Area

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

Subcatchment DA 1: DA 1



Summary for Subcatchment DA 2: DA 2

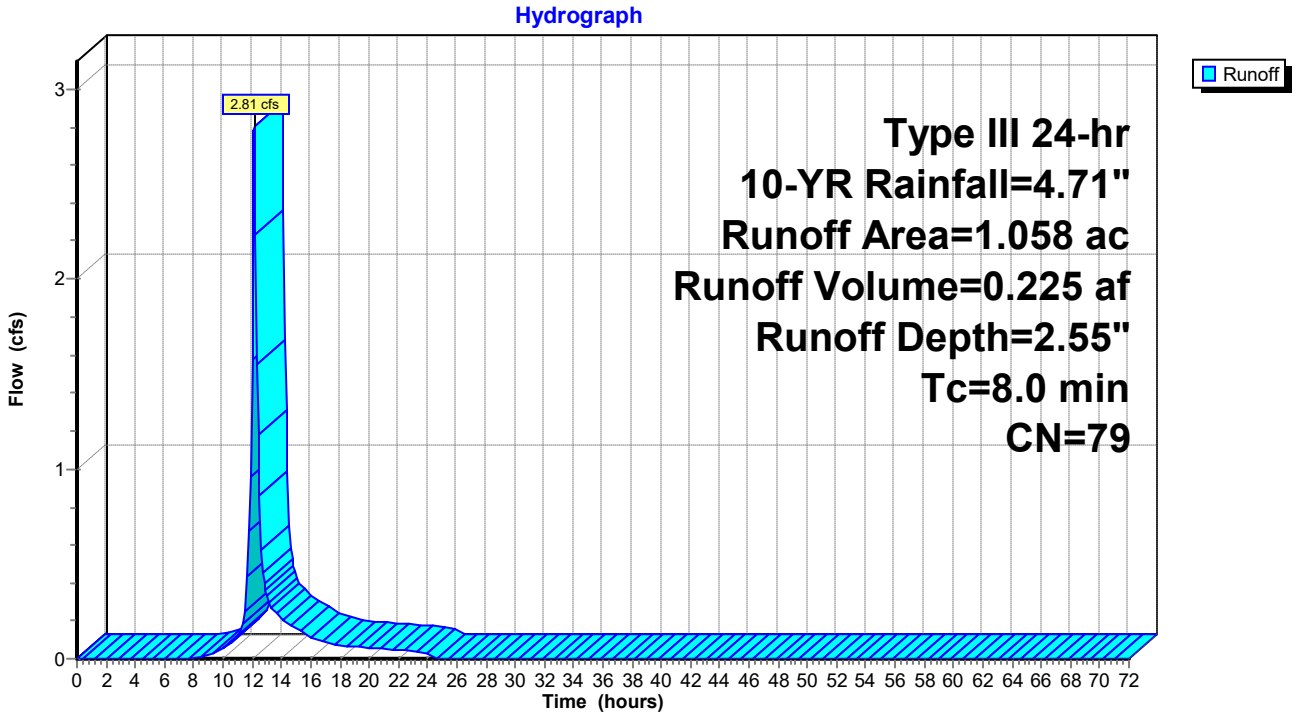
Runoff = 2.81 cfs @ 12.12 hrs, Volume= 0.225 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
	0.855	74	>75% Grass cover, Good, HSG C
*	0.203	98	Impervious, HSG C
	1.058	79	Weighted Average
	0.855		80.81% Pervious Area
	0.203		19.19% Impervious Area

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

Subcatchment DA 2: DA 2



Summary for Subcatchment DA 3: DA 3

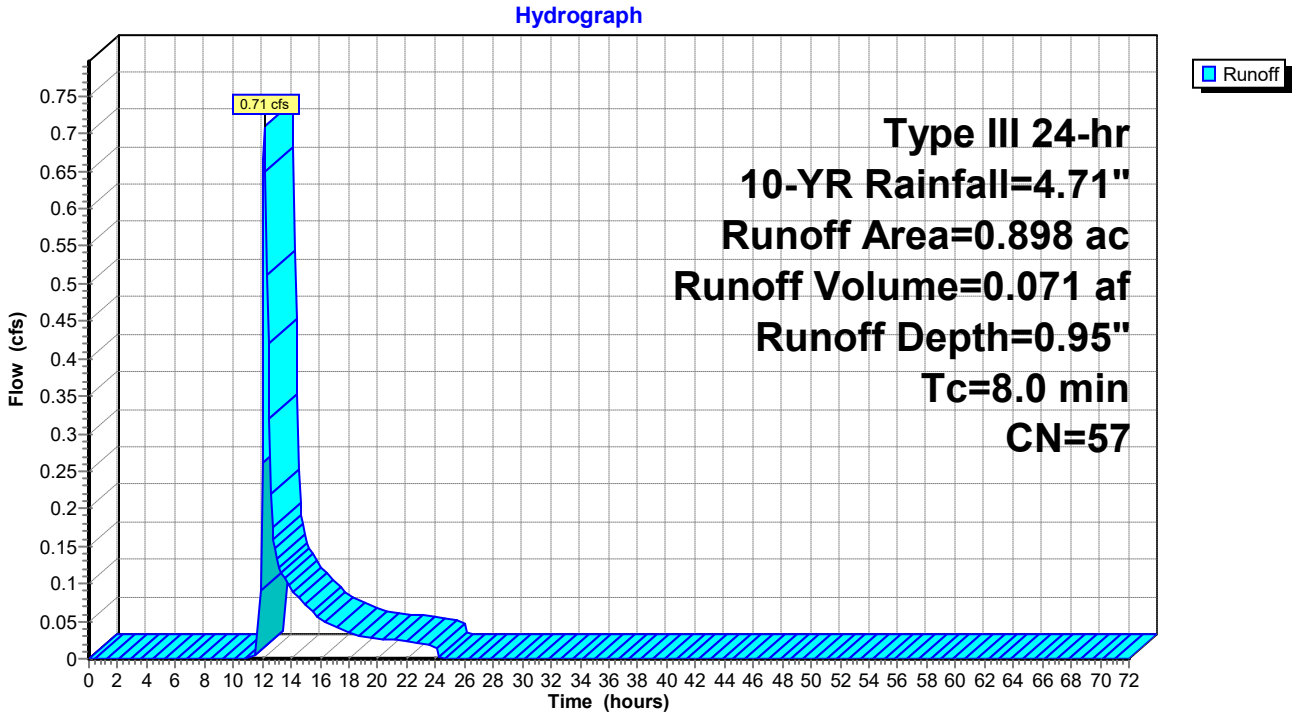
Runoff = 0.71 cfs @ 12.15 hrs, Volume= 0.071 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Type III 24-hr 10-YR Rainfall=4.71"

	Area (ac)	CN	Description
	0.618	39	>75% Grass cover, Good, HSG A
*	0.280	98	Impervious, HSG A
	0.898	57	Weighted Average
	0.618		68.82% Pervious Area
	0.280		31.18% Impervious Area

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

Subcatchment DA 3: DA 3

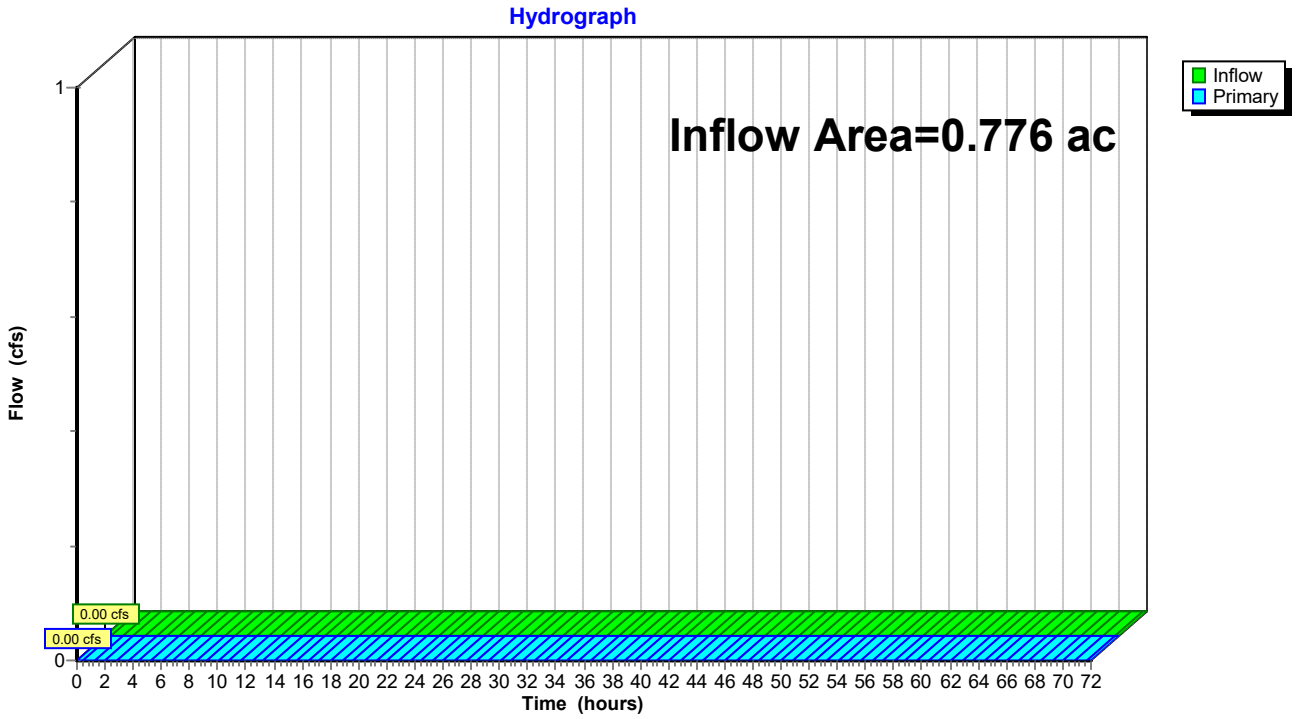


Summary for Pond POA 1: POA 1

Inflow Area = 0.776 ac, 20.49% Impervious, Inflow Depth = 0.00" for 10-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA 1: POA 1

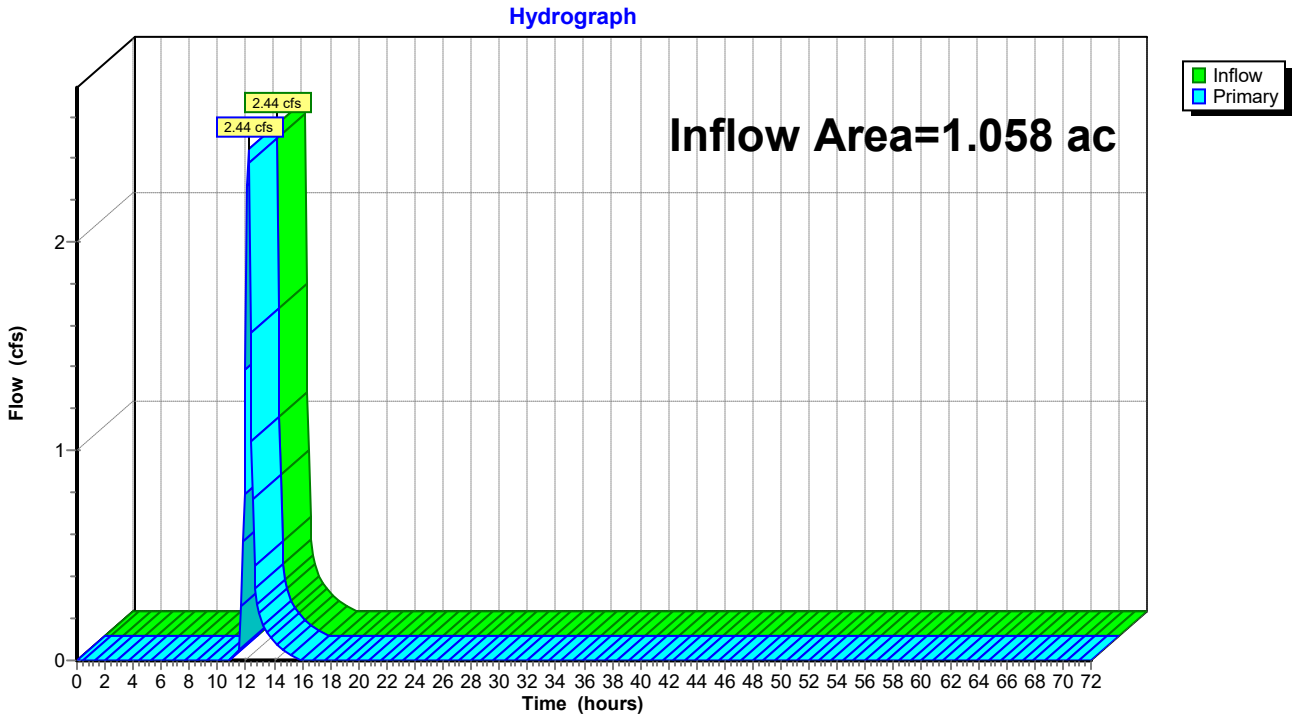


Summary for Pond POA 2: POA 2

Inflow Area = 1.058 ac, 19.19% Impervious, Inflow Depth = 1.38" for 10-YR event
Inflow = 2.44 cfs @ 12.16 hrs, Volume= 0.122 af
Primary = 2.44 cfs @ 12.16 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA 2: POA 2

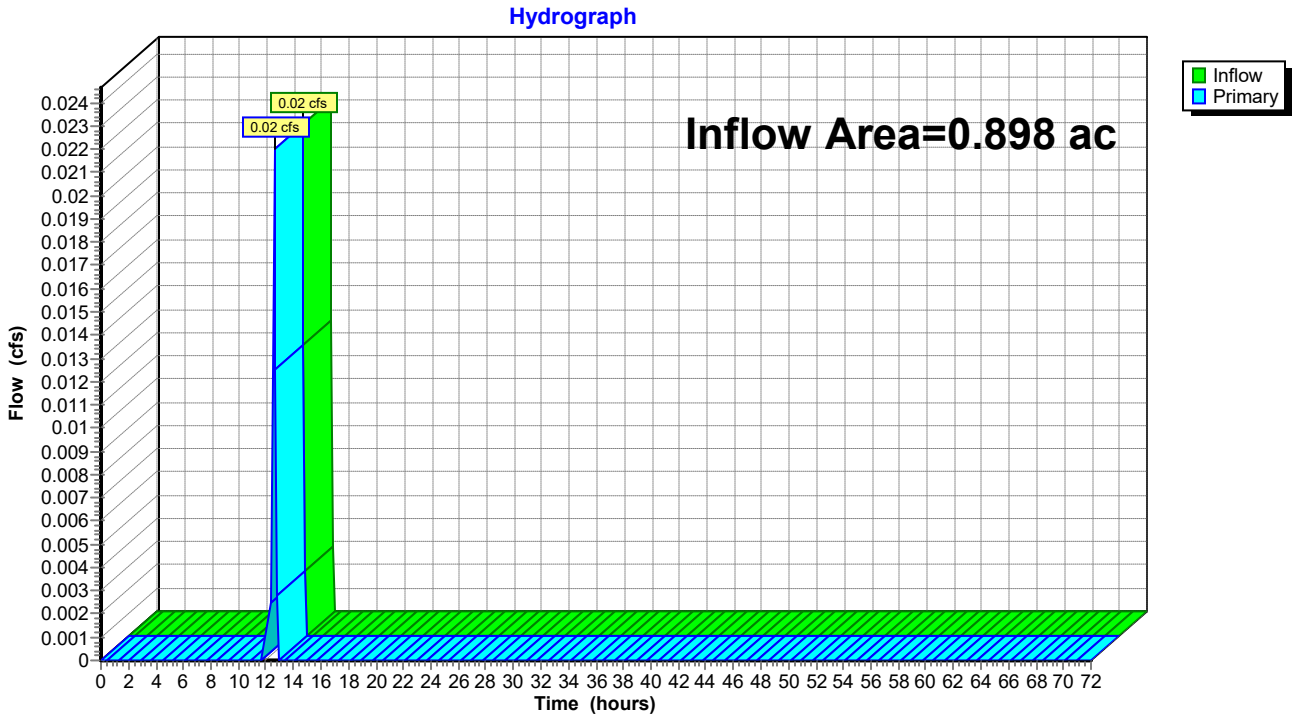


Summary for Pond POA 3: POA 2

Inflow Area = 0.898 ac, 31.18% Impervious, Inflow Depth = 0.01" for 10-YR event
Inflow = 0.02 cfs @ 12.60 hrs, Volume= 0.000 af
Primary = 0.02 cfs @ 12.60 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs

Pond POA 3: POA 2



Summary for Pond SMA 1: RAIN GARDEN 1

Inflow Area = 0.776 ac, 20.49% Impervious, Inflow Depth = 0.63" for 10-YR event
Inflow = 0.30 cfs @ 12.21 hrs, Volume= 0.041 af
Outflow = 0.19 cfs @ 12.48 hrs, Volume= 0.041 af, Atten= 36%, Lag= 15.9 min
Discarded = 0.19 cfs @ 12.48 hrs, Volume= 0.041 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 91.00' @ 12.48 hrs Surf.Area= 1,285 sf Storage= 106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.2 min (921.6 - 919.4)

Volume	Invert	Avail.Storage	Storage Description
#1	91.93'	6,428 cf	**Surface (Conic)** Listed below (Recalc)
#2	90.18'	225 cf	**Filter Media (Conic)** Listed below (Recalc) 2,249 cf Overall x 10.0% Voids
		6,653 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.93	885	0	0	885
92.00	927	63	63	928
93.00	1,639	1,266	1,330	1,651
94.00	2,472	2,041	3,371	2,499
95.00	3,682	3,057	6,428	3,725

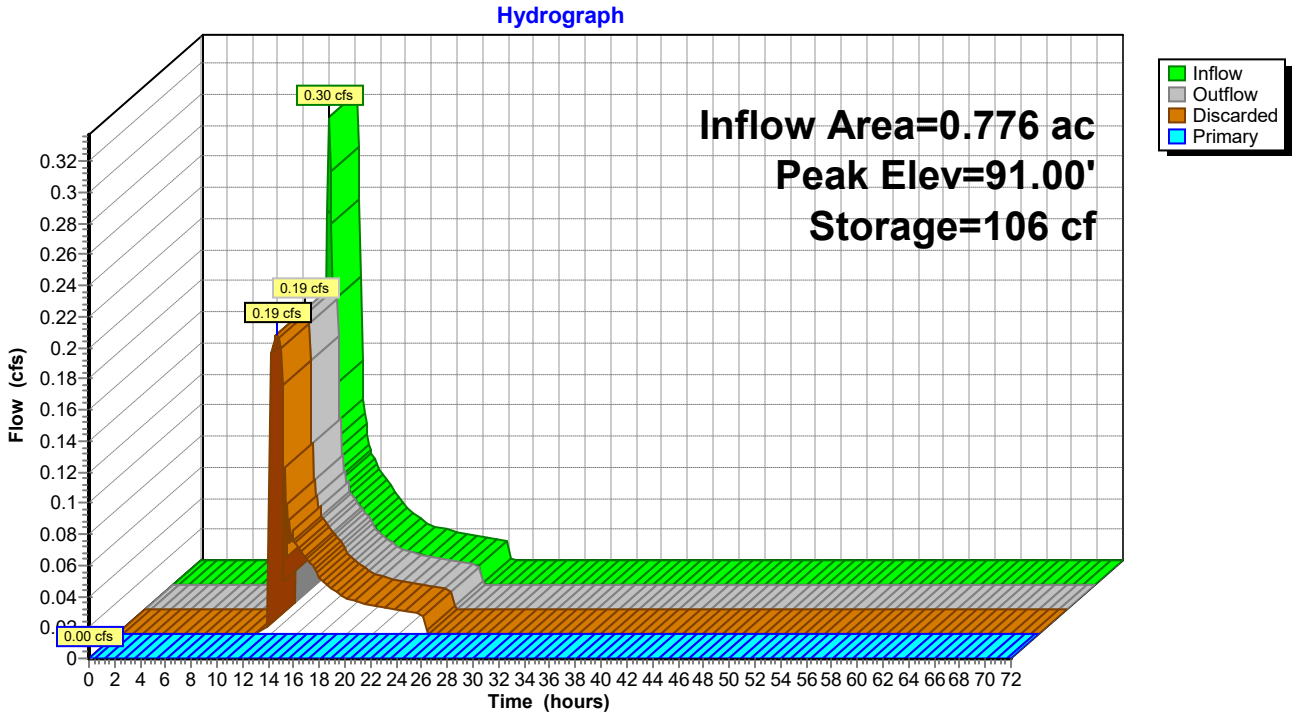
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.18	1,285	0	0	1,285
91.00	1,285	1,054	1,054	1,389
91.93	1,285	1,195	2,249	1,507

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.18'	**6.000 in/hr Exfiltration over Wetted area** Phase-In= 0.05'
#2	Primary	92.93'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.19 cfs @ 12.48 hrs HW=90.99' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=90.18' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond SMA 1: RAIN GARDEN 1



Stage-Discharge for Pond SMA 1: RAIN GARDEN 1

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
90.18	0.00	0.00	0.00
90.23	0.18	0.18	0.00
90.28	0.18	0.18	0.00
90.33	0.18	0.18	0.00
90.38	0.18	0.18	0.00
90.43	0.18	0.18	0.00
90.48	0.18	0.18	0.00
90.53	0.18	0.18	0.00
90.58	0.19	0.19	0.00
90.63	0.19	0.19	0.00
90.68	0.19	0.19	0.00
90.73	0.19	0.19	0.00
90.78	0.19	0.19	0.00
90.83	0.19	0.19	0.00
90.88	0.19	0.19	0.00
90.93	0.19	0.19	0.00
90.98	0.19	0.19	0.00
91.03	0.19	0.19	0.00
91.08	0.19	0.19	0.00
91.13	0.20	0.20	0.00
91.18	0.20	0.20	0.00
91.23	0.20	0.20	0.00
91.28	0.20	0.20	0.00
91.33	0.20	0.20	0.00
91.38	0.20	0.20	0.00
91.43	0.20	0.20	0.00
91.48	0.20	0.20	0.00
91.53	0.20	0.20	0.00
91.58	0.20	0.20	0.00
91.63	0.20	0.20	0.00
91.68	0.20	0.20	0.00
91.73	0.21	0.21	0.00
91.78	0.21	0.21	0.00
91.83	0.21	0.21	0.00
91.88	0.21	0.21	0.00
91.93	0.33	0.33	0.00
91.98	0.34	0.34	0.00
92.03	0.34	0.34	0.00
92.08	0.35	0.35	0.00
92.13	0.35	0.35	0.00
92.18	0.35	0.35	0.00
92.23	0.36	0.36	0.00
92.28	0.36	0.36	0.00
92.33	0.37	0.37	0.00
92.38	0.37	0.37	0.00
92.43	0.38	0.38	0.00
92.48	0.38	0.38	0.00
92.53	0.39	0.39	0.00
92.58	0.39	0.39	0.00
92.63	0.40	0.40	0.00
92.68	0.40	0.40	0.00
92.73	0.41	0.41	0.00
92.78	0.41	0.41	0.00
92.83	0.42	0.42	0.00
92.88	0.43	0.43	0.00
92.93	0.43	0.43	0.00
92.98	1.31	0.44	0.88
93.03	1.96	0.44	1.52
93.08	2.31	0.45	1.86
93.13	2.61	0.45	2.15
93.18	2.87	0.46	2.41
93.23	3.10	0.46	2.64
93.28	3.32	0.47	2.85
93.33	3.52	0.47	3.05
93.38	3.71	0.48	3.23
93.43	3.89	0.49	3.40
93.48	4.06	0.49	3.57
93.53	4.23	0.50	3.73
93.58	4.39	0.50	3.88
93.63	4.54	0.51	4.03
93.68	4.69	0.52	4.17
93.73	4.83	0.52	4.31
93.78	4.97	0.53	4.44
93.83	5.10	0.53	4.57
93.88	5.23	0.54	4.69
93.93	5.36	0.55	4.81
93.98	5.49	0.55	4.93
94.03	5.61	0.56	5.05
94.08	5.73	0.57	5.16
94.13	5.85	0.58	5.27
94.18	5.97	0.58	5.38
94.23	6.08	0.59	5.49
94.28	6.20	0.60	5.59
94.33	6.31	0.61	5.70
94.38	6.42	0.62	5.80
94.43	6.52	0.63	5.90
94.48	6.63	0.63	5.99
94.53	6.73	0.64	6.09
94.58	6.84	0.65	6.18
94.63	6.94	0.66	6.28
94.68	7.04	0.67	6.37
94.73	7.14	0.68	6.46
94.78	7.24	0.69	6.55
94.83	7.33	0.70	6.64
94.88	7.43	0.70	6.72
94.93	7.52	0.71	6.81
94.98	**7.62**	**0.72**	**6.89**

Summary for Pond SMA 2: RAIN GARDEN 2

Inflow Area = 1.058 ac, 19.19% Impervious, Inflow Depth = 2.55" for 10-YR event
Inflow = 2.81 cfs @ 12.12 hrs, Volume= 0.225 af
Outflow = 2.59 cfs @ 12.16 hrs, Volume= 0.225 af, Atten= 8%, Lag= 2.6 min
Discarded = 0.15 cfs @ 12.16 hrs, Volume= 0.103 af
Primary = 2.44 cfs @ 12.16 hrs, Volume= 0.122 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 92.93' @ 12.16 hrs Surf.Area= 1,033 sf Storage= 319 cf

Plug-Flow detention time= 8.3 min calculated for 0.225 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (837.2 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	91.68'	9,191 cf	**Surface (Conic)** Listed below (Recalc)
#2	90.93'	29 cf	**Filter Media (Conic)** Listed below (Recalc) 289 cf Overall x 10.0% Voids
		9,219 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
91.68	30	0	0	30
92.00	55	13	13	56
93.00	715	323	336	719
94.00	1,837	1,233	1,569	1,848
95.00	3,285	2,526	4,095	3,306
96.00	7,154	5,096	9,191	7,184

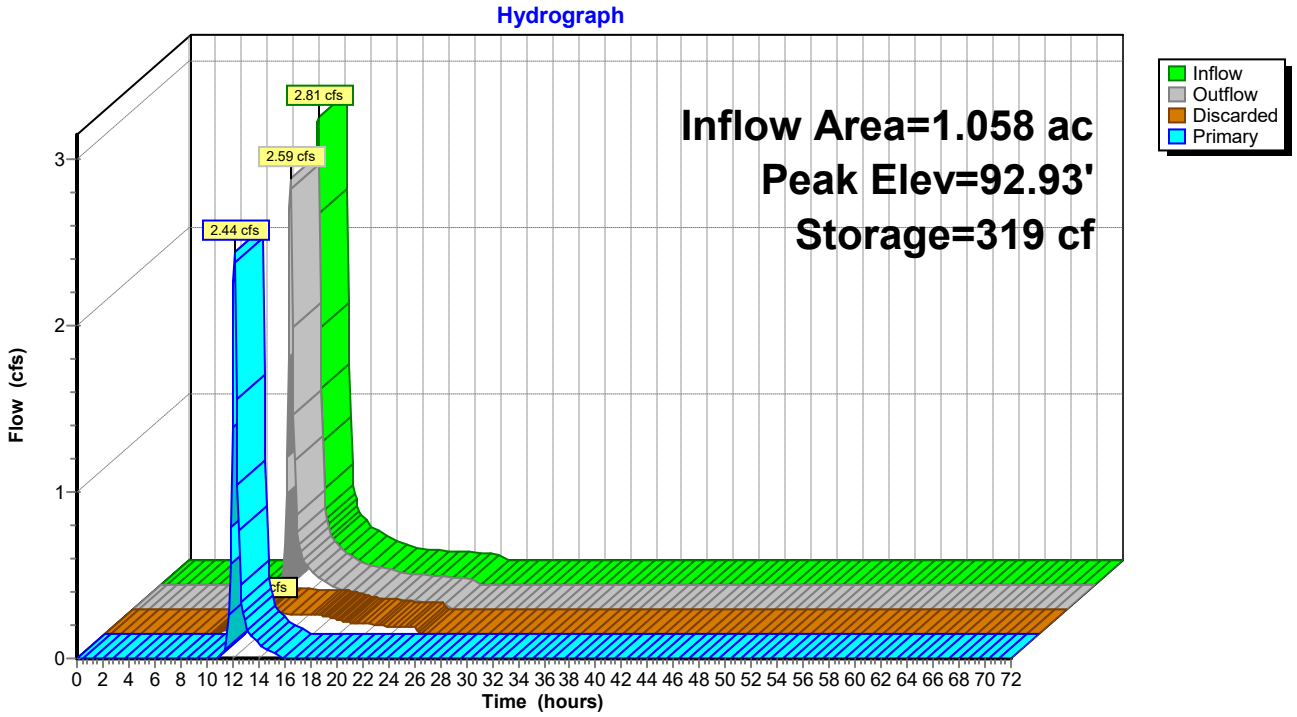
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
90.93	385	0	0	385
91.00	385	27	27	390
91.68	385	262	289	437

Device	Routing	Invert	Outlet Devices
#1	Discarded	90.93'	**6.000 in/hr Exfiltration over Wetted area** Phase-In= 0.05'
#2	Primary	92.68'	**2.0" x 2.0" Horiz. Orifice/Grate X 6.00 columns** X 6 rows C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 12.16 hrs HW=92.91' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=2.33 cfs @ 12.16 hrs HW=92.91' TW=0.00' (Dynamic Tailwater)
↑**2=Orifice/Grate** (Orifice Controls 2.33 cfs @ 2.33 fps)

Pond SMA 2: RAIN GARDEN 2



Stage-Discharge for Pond SMA 2: RAIN GARDEN 2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
90.93	0.00	0.00	0.00
90.98	0.05	0.05	0.00
91.03	0.05	0.05	0.00
91.08	0.05	0.05	0.00
91.13	0.06	0.06	0.00
91.18	0.06	0.06	0.00
91.23	0.06	0.06	0.00
91.28	0.06	0.06	0.00
91.33	0.06	0.06	0.00
91.38	0.06	0.06	0.00
91.43	0.06	0.06	0.00
91.48	0.06	0.06	0.00
91.53	0.06	0.06	0.00
91.58	0.06	0.06	0.00
91.63	0.06	0.06	0.00
91.68	0.06	0.06	0.00
91.73	0.07	0.07	0.00
91.78	0.07	0.07	0.00
91.83	0.07	0.07	0.00
91.88	0.07	0.07	0.00
91.93	0.07	0.07	0.00
91.98	0.07	0.07	0.00
92.03	0.07	0.07	0.00
92.08	0.07	0.07	0.00
92.13	0.07	0.07	0.00
92.18	0.08	0.08	0.00
92.23	0.08	0.08	0.00
92.28	0.08	0.08	0.00
92.33	0.09	0.09	0.00
92.38	0.09	0.09	0.00
92.43	0.10	0.10	0.00
92.48	0.10	0.10	0.00
92.53	0.10	0.10	0.00
92.58	0.11	0.11	0.00
92.63	0.11	0.11	0.00
92.68	0.12	0.12	0.00
92.73	1.00	0.13	0.88
92.78	1.65	0.13	1.52
92.83	2.00	0.14	1.86
92.88	2.30	0.14	2.15
92.93	2.56	0.15	2.41
92.98	2.79	0.16	2.64
93.03	3.01	0.16	2.85
93.08	3.22	0.17	3.05
93.13	3.41	0.18	3.23
93.18	3.59	0.18	3.40
93.23	3.76	0.19	3.57
93.28	3.93	0.20	3.73
93.33	4.09	0.20	3.88
93.38	4.24	0.21	4.03
93.43	4.39	0.22	4.17
93.48	4.53	0.23	4.31
93.53	4.67	0.23	4.44
93.58	4.81	0.24	4.57
93.63	4.94	0.25	4.69
93.68	5.07	0.26	4.81
93.73	5.20	0.27	4.93
93.78	5.33	0.28	5.05
93.83	5.45	0.29	5.16
93.88	5.57	0.29	5.27
93.93	5.69	0.30	5.38
93.98	5.80	0.31	5.49
94.03	5.92	0.32	5.59
94.08	6.03	0.33	5.70
94.13	6.14	0.34	5.80
94.18	6.25	0.35	5.90
94.23	6.35	0.36	5.99
94.28	6.46	0.37	6.09
94.33	6.56	0.38	6.18
94.38	6.67	0.39	6.28
94.43	6.77	0.40	6.37
94.48	6.87	0.41	6.46
94.53	6.97	0.42	6.55
94.58	7.06	0.43	6.64
94.63	7.16	0.44	6.72
94.68	7.26	0.45	6.81
94.73	7.35	0.46	6.89
94.78	7.45	0.47	6.98
94.83	7.54	0.48	7.06
94.88	7.63	0.49	7.14
94.93	7.73	0.50	7.22
94.98	7.82	0.52	7.30
95.03	7.91	0.53	7.38
95.08	8.01	0.56	7.46
95.13	8.11	0.58	7.54
95.18	8.21	0.60	7.61
95.23	8.31	0.63	7.69
95.28	8.41	0.65	7.76
95.33	8.51	0.67	7.84
95.38	8.61	0.70	7.91
95.43	8.71	0.73	7.98
95.48	8.81	0.75	8.06
95.53	8.91	0.78	8.13
95.58	9.01	0.81	8.20
95.63	9.11	0.84	8.27
95.68	9.20	0.86	8.34
95.73	9.30	0.89	8.41
95.78	9.40	0.92	8.48
95.83	9.50	0.95	8.55
95.88	9.60	0.98	8.61
95.93	9.69	1.01	8.68
95.98	**9.79**	**1.05**	**8.75**

Summary for Pond SMA 3: RAIN GARDEN 3

Inflow Area = 0.898 ac, 31.18% Impervious, Inflow Depth = 0.95" for 10-YR event
Inflow = 0.71 cfs @ 12.15 hrs, Volume= 0.071 af
Outflow = 0.24 cfs @ 12.60 hrs, Volume= 0.071 af, Atten= 66%, Lag= 27.3 min
Discarded = 0.22 cfs @ 12.60 hrs, Volume= 0.071 af
Primary = 0.02 cfs @ 12.60 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.10 hrs
Peak Elev= 89.81' @ 12.60 hrs Surf.Area= 1,398 sf Storage= 634 cf

Plug-Flow detention time= 20.4 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 20.4 min (912.9 - 892.5)

Volume	Invert	Avail.Storage	Storage Description
#1	88.74'	15,906 cf	**Surface (Conic)** Listed below (Recalc)
#2	87.00'	114 cf	**Filter Media (Conic)** Listed below (Recalc) 1,138 cf Overall x 10.0% Voids
		16,020 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
88.74	270	0	0	270
89.00	358	81	81	359
90.00	860	591	672	869
91.00	1,504	1,167	1,839	1,524
92.00	2,280	1,879	3,718	2,315
93.00	3,403	2,823	6,541	3,454
94.00	4,609	3,991	10,532	4,680
95.00	6,178	5,374	15,906	6,271

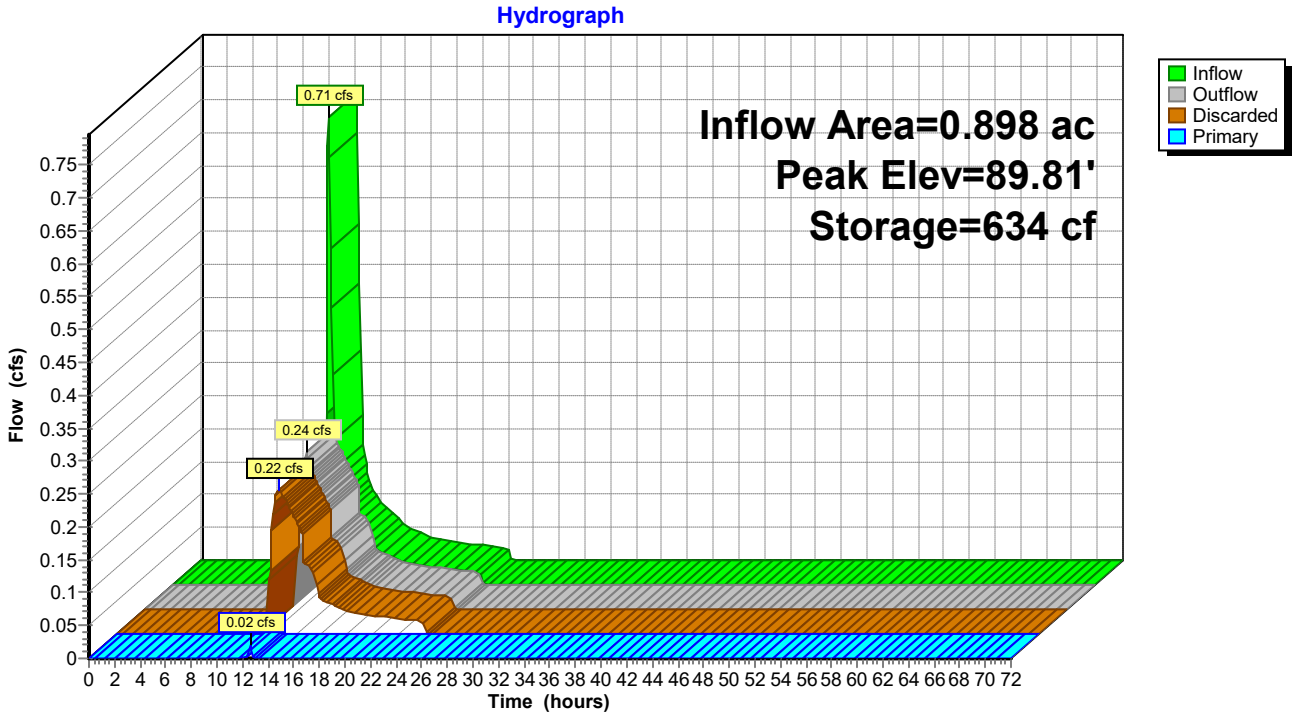
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
87.00	650	0	0	650
88.00	650	650	650	740
88.75	650	488	1,138	808

Device	Routing	Invert	Outlet Devices
#1	Discarded	87.00'	**6.000 in/hr Exfiltration over Wetted area** Phase-In= 0.05'
#2	Primary	89.74'	**12.0" Round Culvert** L= 25.0' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 89.74' / 89.39' S= 0.0140 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Discarded OutFlow Max=0.22 cfs @ 12.60 hrs HW=89.81' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.02 cfs @ 12.60 hrs HW=89.81' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Inlet Controls 0.02 cfs @ 0.90 fps)

Pond SMA 3: RAIN GARDEN 3



Stage-Discharge for Pond SMA 3: RAIN GARDEN 3

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
87.00	0.00	0.00	0.00
87.10	0.09	0.09	0.00
87.20	0.09	0.09	0.00
87.30	0.09	0.09	0.00
87.40	0.10	0.10	0.00
87.50	0.10	0.10	0.00
87.60	0.10	0.10	0.00
87.70	0.10	0.10	0.00
87.80	0.10	0.10	0.00
87.90	0.10	0.10	0.00
88.00	0.10	0.10	0.00
88.10	0.10	0.10	0.00
88.20	0.11	0.11	0.00
88.30	0.11	0.11	0.00
88.40	0.11	0.11	0.00
88.50	0.11	0.11	0.00
88.60	0.11	0.11	0.00
88.70	0.11	0.11	0.00
88.80	0.15	0.15	0.00
88.90	0.16	0.16	0.00
89.00	0.16	0.16	0.00
89.10	0.17	0.17	0.00
89.20	0.17	0.17	0.00
89.30	0.18	0.18	0.00
89.40	0.19	0.19	0.00
89.50	0.19	0.19	0.00
89.60	0.20	0.20	0.00
89.70	0.21	0.21	0.00
89.80	0.23	0.22	0.02
89.90	0.33	0.22	0.11
90.00	0.51	0.23	0.28
90.10	0.76	0.24	0.52
90.20	1.06	0.25	0.81
90.30	1.41	0.26	1.15
90.40	1.78	0.27	1.51
90.50	2.16	0.28	1.88
90.60	2.54	0.28	2.25
90.70	2.88	0.29	2.58
90.80	3.13	0.30	2.83
90.90	3.39	0.31	3.07
91.00	3.62	0.32	3.30
91.10	3.84	0.33	3.51
91.20	4.05	0.34	3.71
91.30	4.25	0.35	3.89
91.40	4.44	0.37	4.07
91.50	4.62	0.38	4.24
91.60	4.80	0.39	4.41
91.70	4.97	0.40	4.57
91.80	5.13	0.41	4.72
91.90	5.29	0.42	4.87
92.00	5.45	0.43	5.02
92.10	5.61	0.45	5.16
92.20	5.76	0.46	5.29
92.30	5.91	0.48	5.43
92.40	6.05	0.49	5.56
92.50	6.19	0.51	5.69
92.60	6.33	0.52	5.81
92.70	6.47	0.54	5.93
92.80	6.61	0.56	6.05
92.90	6.74	0.57	6.17
93.00	6.87	0.59	6.28
93.10	7.00	0.61	6.40
93.20	7.13	0.62	6.51
93.30	7.26	0.64	6.62
93.40	7.38	0.66	6.72
93.50	7.50	0.67	6.83
93.60	7.62	0.69	6.93
93.70	7.74	0.71	7.03
93.80	7.86	0.73	7.14
93.90	7.98	0.74	7.23
94.00	8.10	0.76	7.33
94.10	8.21	0.78	7.43
94.20	8.33	0.80	7.53
94.30	8.45	0.83	7.62
94.40	8.56	0.85	7.71
94.50	8.67	0.87	7.81
94.60	8.79	0.89	7.90
94.70	8.90	0.91	7.99
94.80	9.01	0.94	8.08
94.90	9.12	0.96	8.16
95.00	**9.23**	**0.98**	**8.25**

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.00"
Tc=8.0 min CN=51 Runoff=0.00 cfs 0.000 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.19% Impervious Runoff Depth=0.07"
Tc=8.0 min CN=79 Runoff=0.03 cfs 0.006 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 31.18% Impervious Runoff Depth=0.00"
Tc=8.0 min CN=57 Runoff=0.00 cfs 0.000 af

Pond POA 1: POA 1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA 2: POA 2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA 3: POA 2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SMA 1: RAIN GARDEN 1 Peak Elev=90.18' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SMA 2: RAIN GARDEN 2 Peak Elev=90.96' Storage=1 cf Inflow=0.03 cfs 0.006 af
Discarded=0.03 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.006 af

Pond SMA 3: RAIN GARDEN 3 Peak Elev=87.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=0.13"
Tc=8.0 min CN=51 Runoff=0.02 cfs 0.009 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.19% Impervious Runoff Depth=1.28"
Tc=8.0 min CN=79 Runoff=1.37 cfs 0.113 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 31.18% Impervious Runoff Depth=0.28"
Tc=8.0 min CN=57 Runoff=0.11 cfs 0.021 af

Pond POA 1: POA 1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA 2: POA 2 Inflow=1.22 cfs 0.043 af
Primary=1.22 cfs 0.043 af

Pond POA 3: POA 2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SMA 1: RAIN GARDEN 1 Peak Elev=90.19' Storage=1 cf Inflow=0.02 cfs 0.009 af
Discarded=0.02 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.009 af

Pond SMA 2: RAIN GARDEN 2 Peak Elev=92.74' Storage=213 cf Inflow=1.37 cfs 0.113 af
Discarded=0.13 cfs 0.070 af Primary=1.22 cfs 0.043 af Outflow=1.35 cfs 0.113 af

Pond SMA 3: RAIN GARDEN 3 Peak Elev=87.29' Storage=19 cf Inflow=0.11 cfs 0.021 af
Discarded=0.09 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.021 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=1.20"
Tc=8.0 min CN=51 Runoff=0.77 cfs 0.078 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.19% Impervious Runoff Depth=3.65"
Tc=8.0 min CN=79 Runoff=4.01 cfs 0.322 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 31.18% Impervious Runoff Depth=1.66"
Tc=8.0 min CN=57 Runoff=1.40 cfs 0.124 af

Pond POA 1: POA 1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond POA 2: POA 2 Inflow=3.38 cfs 0.197 af
Primary=3.38 cfs 0.197 af

Pond POA 3: POA 2 Inflow=0.69 cfs 0.024 af
Primary=0.69 cfs 0.024 af

Pond SMA 1: RAIN GARDEN 1 Peak Elev=92.19' Storage=472 cf Inflow=0.77 cfs 0.078 af
Discarded=0.35 cfs 0.078 af Primary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.078 af

Pond SMA 2: RAIN GARDEN 2 Peak Elev=93.17' Storage=501 cf Inflow=4.01 cfs 0.322 af
Discarded=0.18 cfs 0.125 af Primary=3.38 cfs 0.197 af Outflow=3.57 cfs 0.322 af

Pond SMA 3: RAIN GARDEN 3 Peak Elev=90.16' Storage=931 cf Inflow=1.40 cfs 0.124 af
Discarded=0.25 cfs 0.101 af Primary=0.69 cfs 0.024 af Outflow=0.93 cfs 0.124 af

Time span=0.00-72.00 hrs, dt=0.10 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA 1: DA 1 Runoff Area=0.776 ac 20.49% Impervious Runoff Depth=2.71"
Tc=8.0 min CN=51 Runoff=2.04 cfs 0.175 af

Subcatchment DA 2: DA 2 Runoff Area=1.058 ac 19.19% Impervious Runoff Depth=6.02"
Tc=8.0 min CN=79 Runoff=6.53 cfs 0.531 af

Subcatchment DA 3: DA 3 Runoff Area=0.898 ac 31.18% Impervious Runoff Depth=3.40"
Tc=8.0 min CN=57 Runoff=3.09 cfs 0.254 af

Pond POA 1: POA 1 Inflow=0.77 cfs 0.015 af
Primary=0.77 cfs 0.015 af

Pond POA 2: POA 2 Inflow=4.96 cfs 0.371 af
Primary=4.96 cfs 0.371 af

Pond POA 3: POA 2 Inflow=2.29 cfs 0.102 af
Primary=2.29 cfs 0.102 af

Pond SMA 1: RAIN GARDEN 1 Peak Elev=92.98' Storage=1,515 cf Inflow=2.04 cfs 0.175 af
Discarded=0.44 cfs 0.160 af Primary=0.77 cfs 0.015 af Outflow=1.20 cfs 0.175 af

Pond SMA 2: RAIN GARDEN 2 Peak Elev=93.74' Storage=1,166 cf Inflow=6.53 cfs 0.531 af
Discarded=0.27 cfs 0.160 af Primary=4.96 cfs 0.371 af Outflow=5.23 cfs 0.531 af

Pond SMA 3: RAIN GARDEN 3 Peak Elev=90.61' Storage=1,419 cf Inflow=3.09 cfs 0.254 af
Discarded=0.29 cfs 0.153 af Primary=2.29 cfs 0.102 af Outflow=2.57 cfs 0.254 af

APPENDIX C

STORMWATER DESIGN SUPPORT DATA

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point	
Smoothing	Yes
State	
Location	
Latitude	43.154 degrees North
Longitude	70.952 degrees West
Elevation	40 feet
Date/Time	Fri Aug 11 2023 07:43:38 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2da
1yr	0.26	0.40	0.50	0.65	0.81	1.03	**1yr**	0.70	0.98	1.20	1.54	1.99	2.59	2.83	**1yr**	2.29	2.7
2yr	0.32	0.49	0.61	0.81	1.01	1.28	**2yr**	0.87	1.17	1.49	1.90	2.43	3.12	3.45	**2yr**	2.76	3.3
5yr	0.37	0.57	0.72	0.96	1.23	1.58	**5yr**	1.06	1.44	1.85	2.37	3.06	3.94	4.43	**5yr**	3.49	4.2
10yr	0.40	0.63	0.80	1.09	1.41	1.84	**10yr**	1.22	1.69	2.17	2.81	3.64	4.71	5.34	**10yr**	4.17	5.1
25yr	0.46	0.74	0.94	1.29	1.72	2.26	**25yr**	1.48	2.09	2.69	3.51	4.58	5.97	6.85	**25yr**	5.28	6.5
50yr	0.51	0.83	1.06	1.48	1.99	2.66	**50yr**	1.72	2.45	3.17	4.17	5.47	7.14	8.28	**50yr**	6.32	7.9
100yr	0.58	0.93	1.20	1.70	2.31	3.11	**100yr**	2.00	2.88	3.73	4.94	6.51	8.55	10.01	**100yr**	7.56	9.6
200yr	0.64	1.04	1.35	1.94	2.69	3.66	**200yr**	2.32	3.39	4.41	5.87	7.77	10.23	12.10	**200yr**	9.06	11.(
500yr	0.75	1.24	1.61	2.34	3.28	4.52	**500yr**	2.83	4.21	5.47	7.35	9.80	12.99	15.55	**500yr**	11.50	14.9

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2da
1yr	0.24	0.37	0.45	0.60	0.74	0.90	**1yr**	0.64	0.88	0.91	1.24	1.53	1.94	2.51	**1yr**	1.72	2.4

General Calculations - WQV and WQF (optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided (i.e. for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

0.78	ac	A = Area draining to the practice
0.16	ac	A_I = Impervious area draining to the practice
0.20	decimal	I = percent impervious area draining to the practice, in decimal form
0.23	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
0.18	ac-in	WQV= 1" x Rv x A
660	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")

Water Quality Flow (WQF)

1	inches	P = amount of rainfall. For WQF in NH, P = 1".
0.23	inches	Q = water quality depth. Q = WQV/A
87	unitless	CN = unit peak discharge curve number. $CN = 1000/(10+5P+10Q-10*[Q^2 + 1.25*Q*P]^{0.5})$
1.4	inches	S = potential maximum retention. S = (1000/CN) - 10
0.289	inches	Ia = initial abstraction. Ia = 0.2S
8.0	minutes	T_c = Time of Concentration
85.0	cfs/mi^2/in	qu is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III
0.024	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac

Designer's Notes: SMA 1

General Calculations - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided (i.e. for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

1.06	ac	A = Area draining to the practice
0.20	ac	A_I = Impervious area draining to the practice
0.19	decimal	I = percent impervious area draining to the practice, in decimal form
0.22	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
0.24	ac-in	WQV= 1" x Rv x A
855	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")

Water Quality Flow (WQF)

1	inches	P = amount of rainfall. For WQF in NH, P = 1".
0.22	inches	Q = water quality depth. Q = WQV/A
87	unitless	CN = unit peak discharge curve number. $CN = 1000/(10+5P+10Q-10*[Q^2 + 1.25*Q*P]^{0.5})$
1.5	inches	S = potential maximum retention. S = (1000/CN) - 10
0.300	inches	Ia = initial abstraction. Ia = 0.2S
8.0	minutes	T_c = Time of Concentration
85.0	cfs/mi^2/in	qu is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III
0.031	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac

Designer's Notes: SMA 2

General Calculations - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided (i.e. for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

0.90	ac	A = Area draining to the practice
0.28	ac	A_I = Impervious area draining to the practice
0.31	decimal	I = percent impervious area draining to the practice, in decimal form
0.33	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
0.30	ac-in	WQV= 1" x Rv x A
1,078	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")

Water Quality Flow (WQF)

1	inches	P = amount of rainfall. For WQF in NH, P = 1".
0.33	inches	Q = water quality depth. Q = WQV/A
90	unitless	CN = unit peak discharge curve number. $CN = 1000/(10+5P+10Q-10*[Q^2 + 1.25*Q*P]^{0.5})$
1.1	inches	S = potential maximum retention. S = (1000/CN) - 10
0.215	inches	Ia = initial abstraction. Ia = 0.2S
8.0	minutes	T_c = Time of Concentration
85.0	cfs/mi^2/in	qu is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III
0.039	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac

Designer's Notes: SMA 3

APPENDIX D

DRAINAGE AREA MAPS

N

N.A.D. 1983

NH STATE PLANE

EXISTING BUILDING
FOOTPRINT=358,560 SF

LEGEND

- tc — TIME OF CONCENTRATION LINE
- SUBCATCHMENT BOUNDARY
- 11 — SUBCATCHMENT IDENTIFIER
- POA — POINT OF ANALYSIS
- WETLAND FLAGGING LIMIT

DA 1
0.776 AC

DA 2
1.058 AC

DA 3
0.898 AC

POA A

POA B

POA C

tc

LIMIT OF WETLANDS AS FLAGGED BY GOVE ENVIRONMENTAL SERVICES, INC. AND SURVEYED BY HAYNER/SWANSON, INC. OCTOBER 2021 AND JANUARY 2022 (TYP)

DENSE TREES

PUMP

OVERHEAD DOOR (TYP)

18" RCP WITH SLEEVE

-2-

NO.	DATE	REVISION	BY
40			

0 40 80 120 160 FEET

PREPARED FOR:
R.J. KELLY COMPANY, INC.
55 CAMBRIDGE STREET BURLINGTON, MASSACHUSETTS 01803 (781) 365-2416

RECORD OWNER:
121 TECH OWNER, L.L.C.
55 CAMBRIDGE STREET BURLINGTON, MASSACHUSETTS 01803 (781) 365-2416

PRE-DEVELOPMENT DRAINAGE AREA MAP
(MAP 204, LOTS 1 & 2)

SITE IMPROVEMENTS PLAN

121 TECHNOLOGY DRIVE
DURHAM, NEW HAMPSHIRE

HSI Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors
3 Congress Street
Nashua, NH 03062
(603) 883-2057
13 Middlesex Turnpike
Burlington, MA 01803
(781) 365-2416
www.haynerswanson.com

FIELD BOOK: 1266, 1289 | DWG: LOC-J:\5000\5832\DWG\5832 EB1
DWG: 5832EB1-DA41 | Scale 1" = 40'
FIG. 1 | 5832-EB1 | Date 10 AUGUST 2023
Sheet | File Number

N

N.A.D. 1983

NH STATE PLANE

EXISTING BUILDING
FOOTPRINT=358,560 SF

LEGEND

- tc — TIME OF CONCENTRATION LINE
- SUBCATCHMENT BOUNDARY
- 11 — SUBCATCHMENT IDENTIFIER
- POA — POINT OF ANALYSIS
- WETLAND FLAGGING LIMIT

DA 1
0.776 AC

DA 2
1.058 AC

DA 3
0.898 AC

POA A

POA B

POA C

SMA 1

SMA 2

SMA 3

LIMIT OF WETLANDS AS FLAGGED BY GOVE ENVIRONMENTAL SERVICES, INC. AND SURVEYED BY HAYNER/SWANSON, INC. OCTOBER 2021 AND JANUARY 2022 (TYP)

NO.	DATE	REVISION	BY
40			

PREPARED FOR:
R.J. KELLY COMPANY, INC.
55 CAMBRIDGE STREET BURLINGTON, MASSACHUSETTS 01803 (781) 365-2416

RECORD OWNER:
121 TECH OWNER, L.L.C.
55 CAMBRIDGE STREET BURLINGTON, MASSACHUSETTS 01803 (781) 365-2416

POST-DEVELOPMENT DRAINAGE AREA MAP
(MAP 204, LOTS 1 & 2)

SITE IMPROVEMENTS PLAN

121 TECHNOLOGY DRIVE
DURHAM, NEW HAMPSHIRE

HSI Hayner/Swanson, Inc.
Civil Engineers/Land Surveyors
131 Middlesex Turnpike
Burlington, MA 01803
(781) 202-2501
3 Congress Street
Nashua, NH 03062
(603) 883-2057
www.haynerswanson.com

FIELD BOOK: 1286, 1289	DWG. LOC.: J:\5800\5832\DWG\5832 EB1	Scale	1" = 40'
DWG.: 5832EB1-DA41		Date	10 AUGUST 2023
Sheet: FIG. 2	File Number: 5832-EB1		