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MEMORANDUM

TO:	Kathryn Serra, P.E., C.T. Male	DATE:	October 14, 2014
FROM:	Lauren Caputo, P.E., ESS Group Roger Hill, Senior Designer, ESS Group	ESS PROJECT NO.:	N461-001
SUBJECT:	National Grid Mohican Battenkill Project – Qp and Qf Analysis for Vegetated Swales		
COPY TO:	Frank Sciortino, National Grid Steve Wood, ESS Group		
ATTACHMENTS:	N461-001_VegSwaleAnalysis _EX_HSGA N461-001_VegSwaleAnalysis _EX_HSGA N461-001_VegSwaleAnalysis _PR_HSGA N461-001_VegSwaleAnalysis _PR_HSGA		

INTRODUCTION

National Grid is committed to constructing the Mohican Battenkill Project in accordance with the *New York State Stormwater Management Design Manual* (herein known as the Manual). Stormwater BMPs were chosen and designed for the project to meet all NYSDEC quantity control sizing criteria, specifically channel protection volume (Cpv), overbank flood (Qp), and extreme storm (Qf) requirements. The project covers a distance of approximately 14.2 miles and there is over 13.4 miles of proposed access roads proposed for the project, of which 6.6 miles is composed of gravel and considered impervious for purposes of complying with the Manual. As shown on the plans, vegetated swales are proposed along gravel access roads in areas that drain to stream crossings and wetlands and are designed to provide necessary detention to meet the Cpv, Qp, and Qf requirements. Due to the linear nature of the project, an analysis at each discharge point where runoff entered a stream crossing or wetland was not an ideal methodology to show compliance with the requirements, especially since the vegetated swales are designed consistently throughout the project. Instead, a representative 50-foot length of gravel access road was chosen to be analyzed to quantify the mitigation that the vegetated swales provide. Because the gravel access road is 15 feet in width, stormwater impacts can be considered localized in nature and will have negligent impacts on larger downstream bodies of water. This analysis can effectively be considered the "downstream analysis" of the Qp and Qf requirements for the NYSDEC Notice of Intent.

HYDROCAD MODEL

HydroCAD® software was used to create an existing and proposed conditions model of a 50-foot length of gravel access road draining to a vegetated swale. HydroCAD® is a computer aided design system for modeling the hydrology and hydraulics of stormwater runoff. The software calculates runoff based on rainfall and watershed characteristics and produces a runoff hydrograph (a runoff rate versus time curve). Hydrographs were generated based on watershed area, cover characteristics, hydrologic soil group (HSG), curve number (CN) values, time of concentration (Tc), and rainfall amount.

The analysis utilized 24-hour rainfall amounts from the Manual and the Northeast Regional Climate Center (NRCC) web tool "*Extreme Precipitation in New York and New England*". The following rainfall amounts were used for the analyses.

- **Channel Protection Volume (Cpv)**: Cpv is equal to the 24-hour, 1-year storm which is 2.2 inches in the Saratoga and Washington County area based on Figure 4.2 in the Manual.
- **Overbank Flood (Qp)**: Qp is equal to the 24-hour, 10-year storm which is 3.9 inches in the Saratoga and Washington County area based on Figure 4.3 in the Manual.
- **Extreme Flood (Qf)**: Qf is equal to the 24-hour, 100-year storm which is 6.5 inches based on NRCC data for the Saratoga and Washington County area. NRCC data was used instead of Figure 4.4 in the Manual because it is a larger, more conservative value. Additionally, culvert sizing at stream crossings was based on the NRCC data for the 100-year storm, so we wanted to remain consistent in our analyses.

Soils at the proposed gravel access road have properties that range from Hydrologic Soil Group (HSG) A through HSG D; therefore, HSG A soils and D soils were used in the modeling to provide a range of results for peak flows and runoff volumes under existing and proposed conditions.

The watershed under existing conditions is composed of a 50-foot long section of land that is 13.5 feet wide. Landuse is assumed to be grass in good conditions and time of concentration assumed to be 6 minutes.

The watershed under proposed conditions is composed of a 50-foot long section of gravel access road 7.5 feet in width plus a 6-foot wide swale vegetated with grass in good condition. Each vegetated swale is designed with a 2-foot bottom width, 2:1 side slopes, 1-foot depth and 8-inch berm at the end of each swale to provide detention. Time of concentration is assumed to be 6 minutes.

MODEL RESULTS

Two HydroCAD models were created to simulate existing conditions, one model using HSG A soils and one using HSG D soils to provide a range of values for peak flow rates and runoff volumes. The same methodology was performed for proposed conditions.

Estimated peak flow rates under existing and proposed conditions is summarized in Table 1 below.

Table 1. Estimated Peak Flows under Existing and Proposed Conditions

Requirement	Rainfall Amount (inches)	Existing (cfs)	Proposed (cfs)
Assuming HSG A			
Cpv	2.2	0.00	0.00
Qp	3.9	0.00	0.00
Qf	6.5	0.01	0.00
Assuming HSG D			
Cpv	2.2	0.02	0.00
Qp	3.9	0.05	0.00
Qf	6.5	0.11	0.11

Table 1 shows that peak flows under proposed conditions are maintained to peak flows under existing conditions under all rainfall events assuming both HSG A and D soils. The Qf event assuming D soils is the only simulation that produces a peak flow from the proposed swale that is larger than 0.00 cfs.

Estimated runoff volumes under existing and proposed conditions is summarized in Table 2 below.

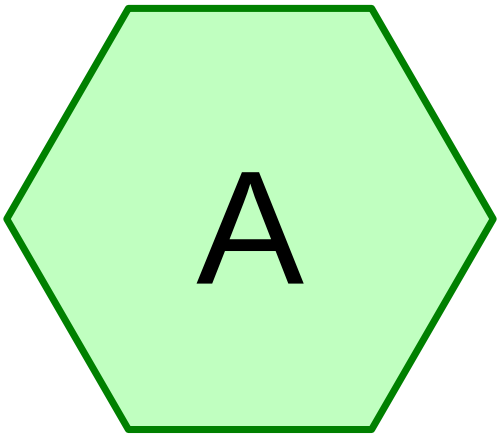
Table 2. Estimated Runoff Volumes under Existing and Proposed Conditions

Requirement	Rainfall Amount (inches)	Existing (ac-ft)	Proposed (ac-ft)
Assuming HSG A			
Cpv	2.2	0.000	0.000
Qp	3.9	0.000	0.000
Qf	6.5	0.001	0.001
Assuming HSG D			
Cpv	2.2	0.001	0.000
Qp	3.9	0.003	0.001
Qf	6.5	0.006	0.004

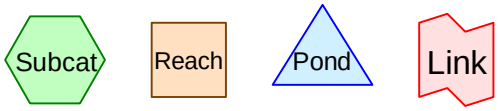
Table 2 shows that runoff volumes under proposed conditions are maintained to runoff volumes under existing conditions under all rainfall events assuming both HSG A and D soils. We converted runoff volumes to a volume per linear foot based on the 50-foot length of the road in order to get provide another aspect to the modeling results. Under the Qf event assuming HSG A soils, both existing grass and the proposed gravel access road to vegetated swale generates 0.871 cubic feet (cf) of runoff per linear foot (converted from 0.001 ac-ft). Note that both existing and proposed conditions reflect the same value of 0.001 ac-ft because HydoCAD capabilities can only report runoff volumes to the thousandth place. Under the Qf event assuming HSG D soils, existing grass generates 5.227 cf runoff/ ft and the proposed gravel access road to vegetated swale generates 3.485 cf runoff/ ft.

CONCLUSIONS

Modeling results show that the vegetated swales meet the NYSDEC quantity control sizing criteria including Cpv, Qp, and Qf requirements. Due to the linear nature of the project, this memo documenting the modeling results should serve as the “downstream analysis” for the Qp and Qf requirements for the NYSDEC Notice of Intent.



Existing Conditions Watershed



Routing Diagram for N461-001_VegSwaleAnalysis_EX_HSGA
Prepared by ESS Group, Printed 10/7/2014
HydroCAD® 10.00 s/n 01446 © 2012 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.016	39	>75% Grass cover, Good, HSG A (A)
0.016	**39**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.016	HSG A	A
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.016		**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
0.016	0.000	0.000	0.000	0.000	0.016	>75% Grass cover, Good	A
0.016	**0.000**	**0.000**	**0.000**	**0.000**	**0.016**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

[45] Hint: Runoff=Zero

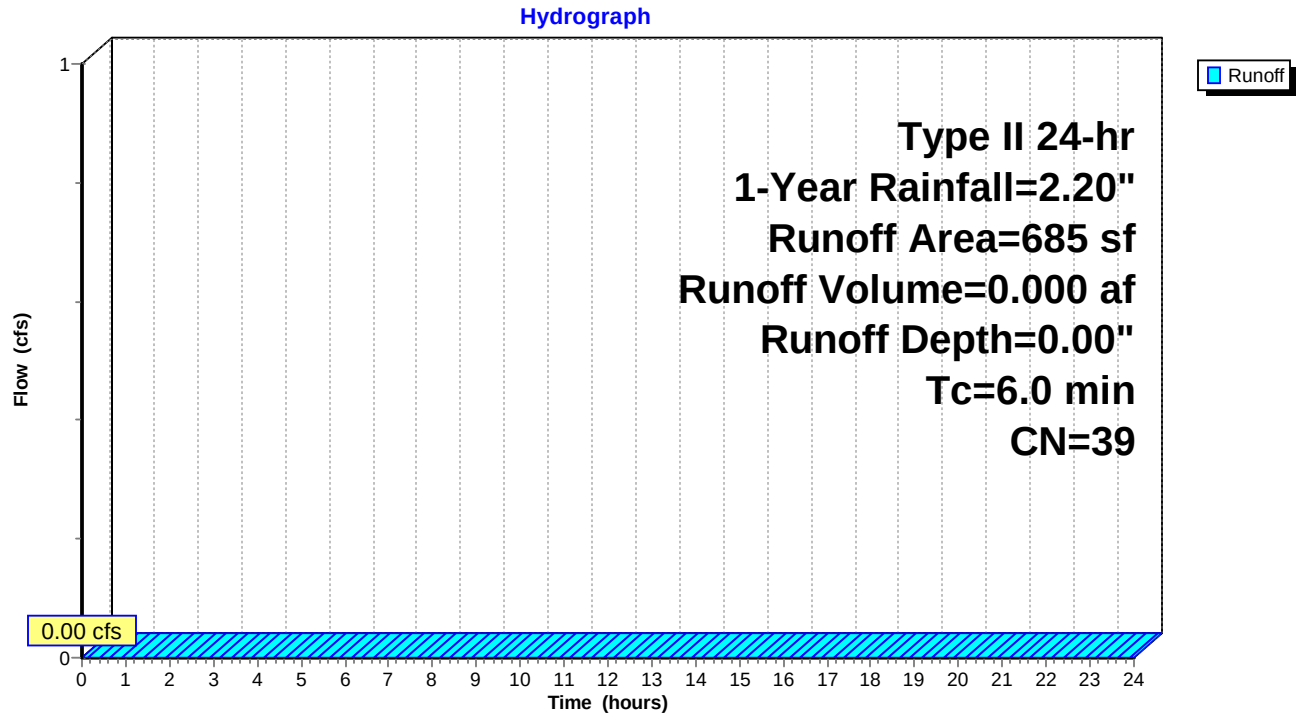
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.20"

Area (sf)	CN	Description
685	39	>75% Grass cover, Good, HSG A
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.04"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.04"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

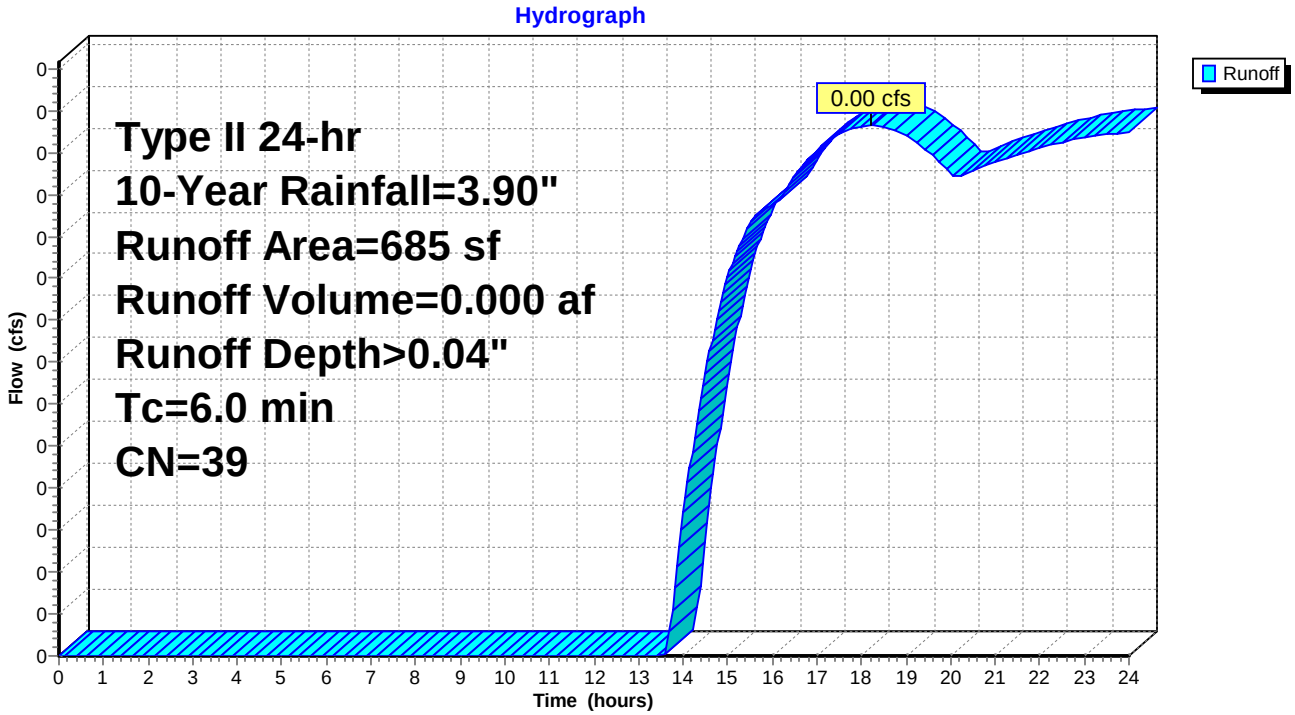
Runoff = 0.00 cfs @ 18.19 hrs, Volume= 0.000 af, Depth> 0.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.90"

Area (sf)	CN	Description
685	39	>75% Grass cover, Good, HSG A
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

[45] Hint: Runoff=Zero

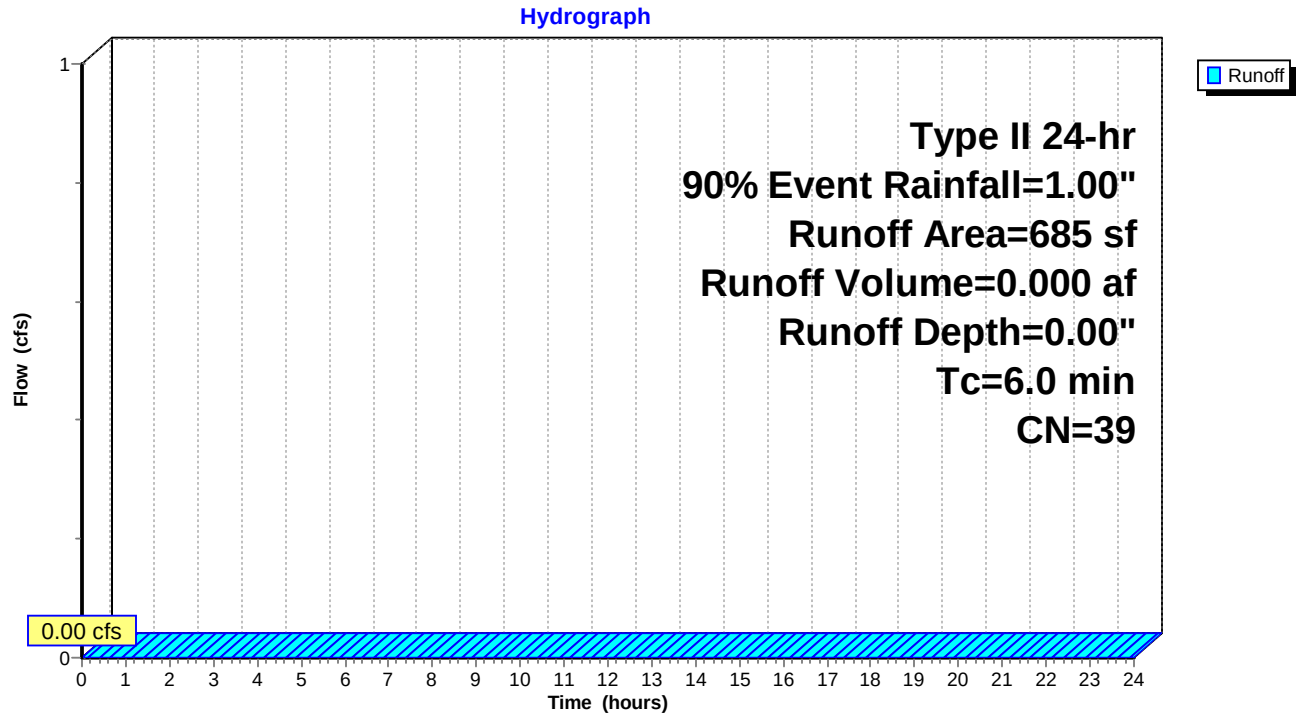
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 90% Event Rainfall=1.00"

Area (sf)	CN	Description
685	39	>75% Grass cover, Good, HSG A
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.60"
Tc=6.0 min CN=39 Runoff=0.01 cfs 0.001 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.60"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

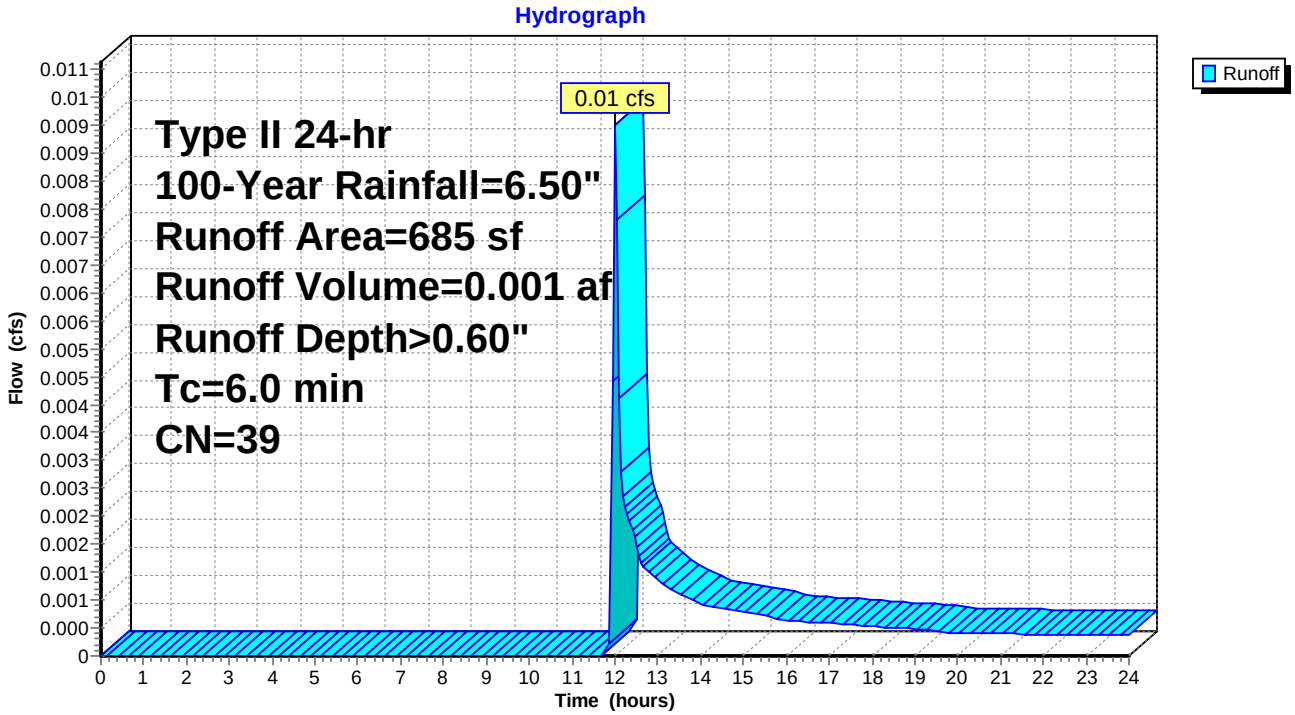
Runoff = 0.01 cfs @ 12.01 hrs, Volume= 0.001 af, Depth> 0.60"

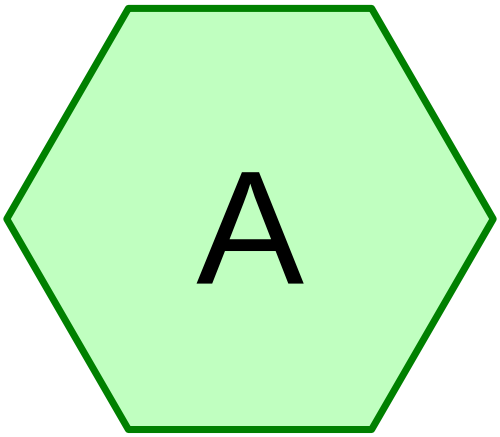
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
685	39	>75% Grass cover, Good, HSG A
685		100.00% Pervious Area

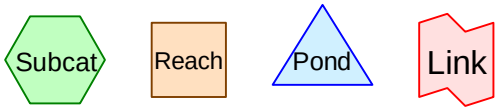
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Sheet Flow**

Subcatchment A: Existing Conditions Watershed





Existing Conditions Watershed



Routing Diagram for N461-001_VegSwaleAnalysis_EX_HSGD
Prepared by ESS Group, Printed 10/7/2014

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.016	80	>75% Grass cover, Good, HSG D (A)
0.016	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.016	HSG D	A
0.000	Other	
0.016		**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
0.000	0.000	0.000	0.016	0.000	0.016	>75% Grass cover, Good	A
0.000	**0.000**	**0.000**	**0.016**	**0.000**	**0.016**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.69"
Tc=6.0 min CN=80 Runoff=0.02 cfs 0.001 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.69"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

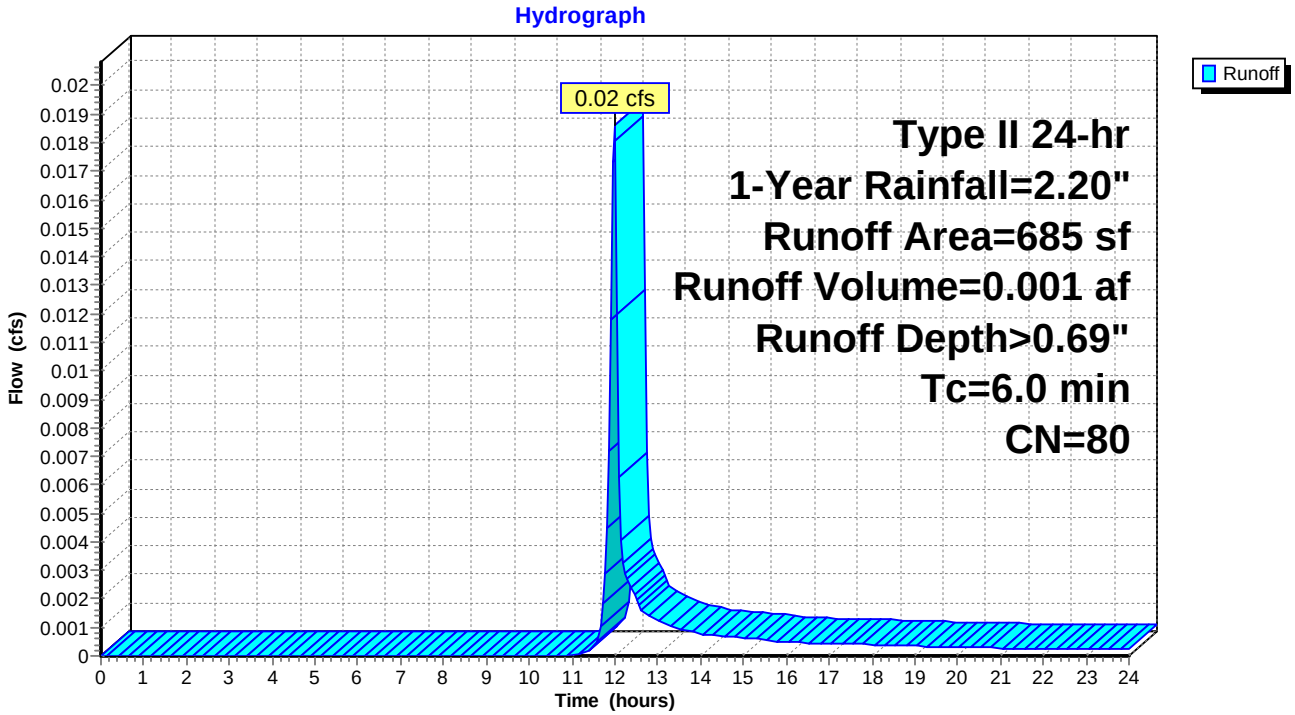
Runoff = 0.02 cfs @ 11.98 hrs, Volume= 0.001 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.20"

Area (sf)	CN	Description
685	80	>75% Grass cover, Good, HSG D
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>1.96"
Tc=6.0 min CN=80 Runoff=0.05 cfs 0.003 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.003 af Average Runoff Depth = 1.96"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

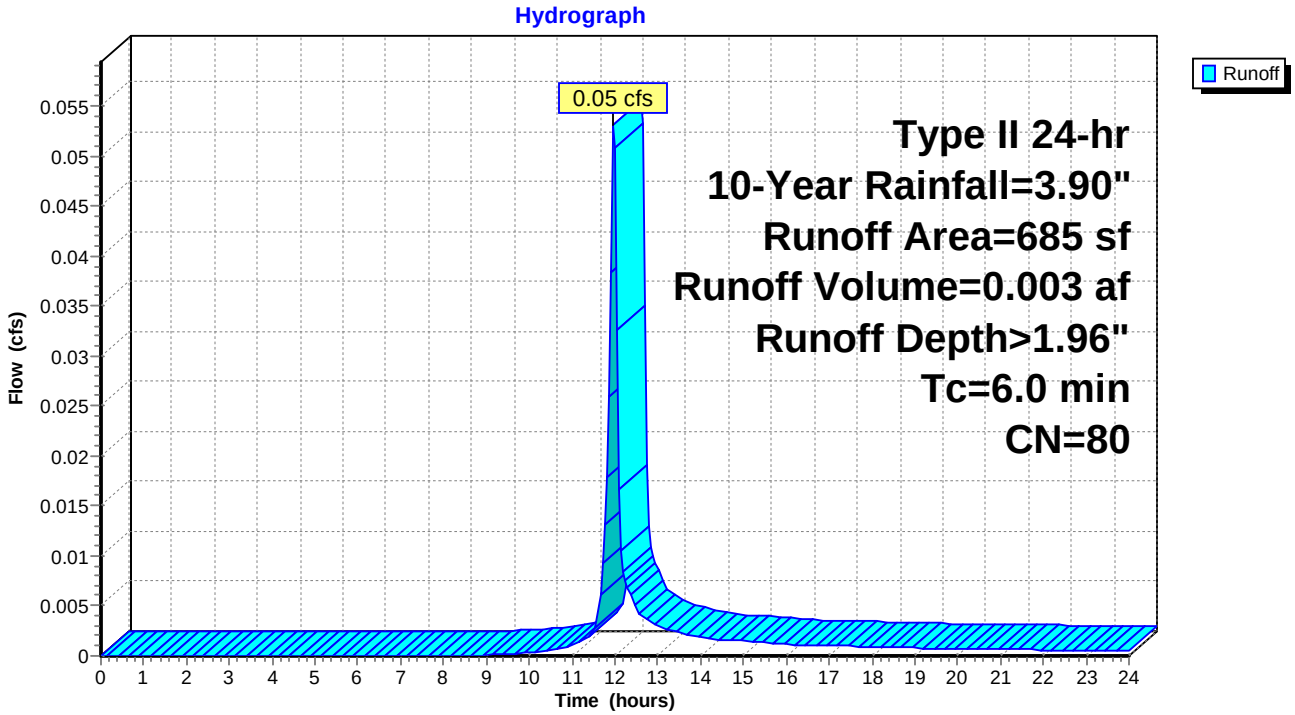
Runoff = 0.05 cfs @ 11.97 hrs, Volume= 0.003 af, Depth> 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.90"

Area (sf)	CN	Description
685	80	>75% Grass cover, Good, HSG D
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.08"
Tc=6.0 min CN=80 Runoff=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.08"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

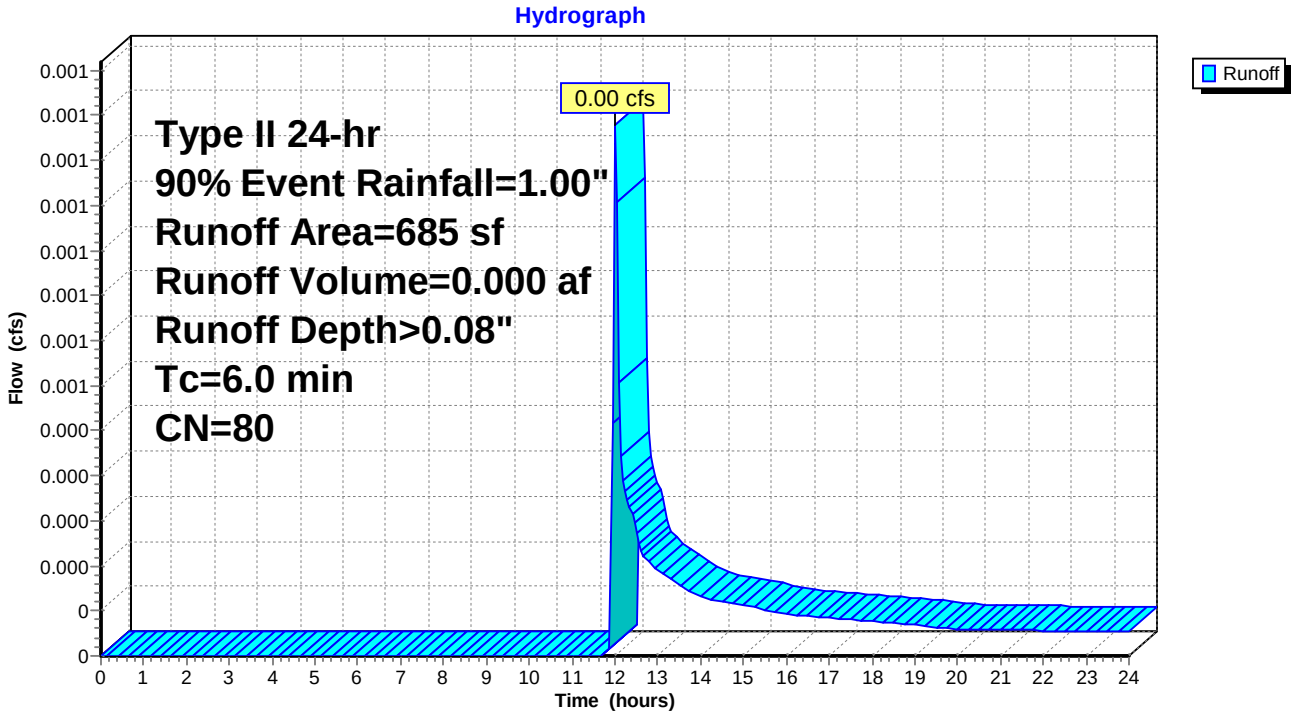
Runoff = 0.00 cfs @ 12.02 hrs, Volume= 0.000 af, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 90% Event Rainfall=1.00"

Area (sf)	CN	Description
685	80	>75% Grass cover, Good, HSG D
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Existing Conditions Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>4.23"
Tc=6.0 min CN=80 Runoff=0.11 cfs 0.006 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.006 af Average Runoff Depth = 4.23"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Existing Conditions Watershed

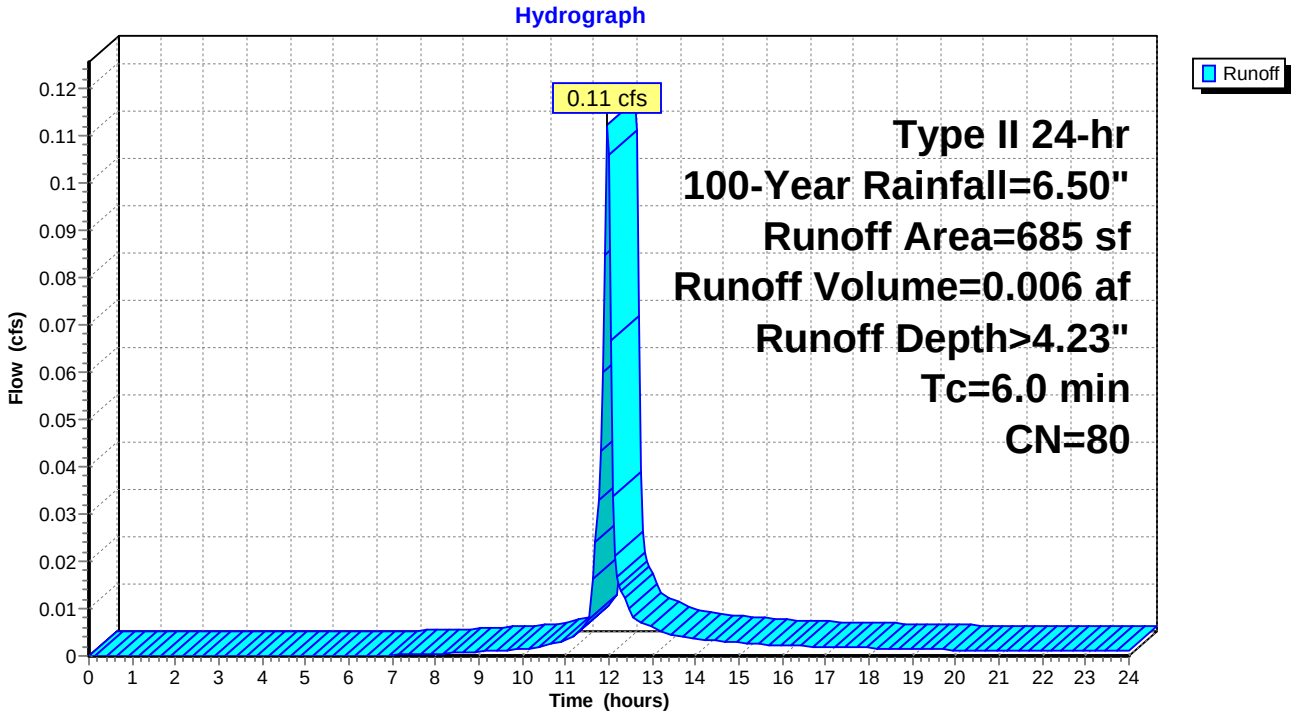
Runoff = 0.11 cfs @ 11.97 hrs, Volume= 0.006 af, Depth> 4.23"

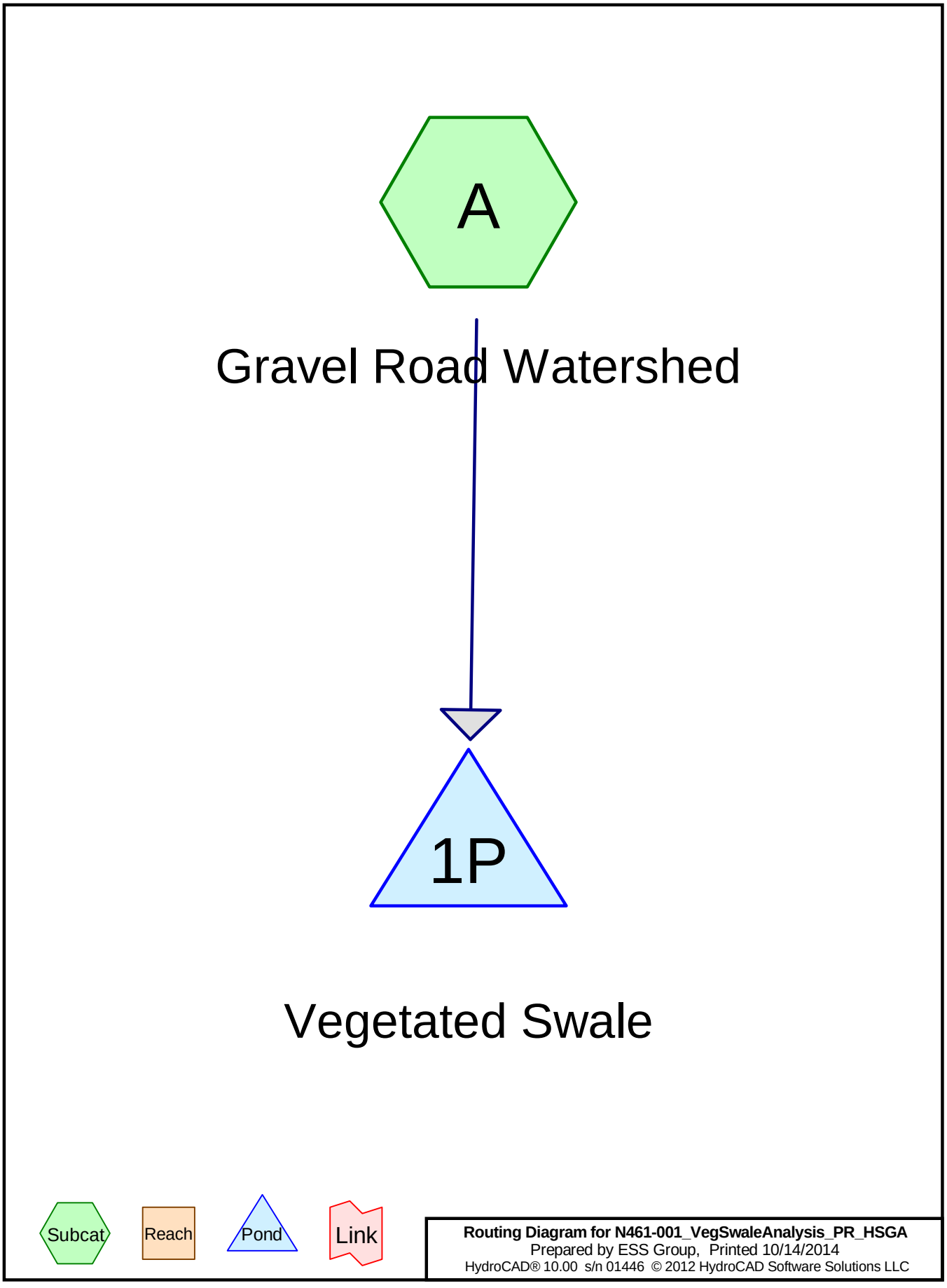
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
685	80	>75% Grass cover, Good, HSG D
685		100.00% Pervious Area

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

Subcatchment A: Existing Conditions Watershed





Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	39	>75% Grass cover, Good, HSG A (A)
0.009	76	Gravel roads, HSG A (A)
0.016	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.016	HSG A	A
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.016		**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
0.007	0.000	0.000	0.000	0.000	0.007	>75% Grass cover, Good	A
0.009	0.000	0.000	0.000	0.000	0.009	Gravel roads	A
0.016	**0.000**	**0.000**	**0.000**	**0.000**	**0.016**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.08"
Tc=6.0 min CN=59 Runoff=0.00 cfs 0.000 af

Pond 1P: Vegetated Swale Peak Elev=281.05' Storage=5 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.08"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

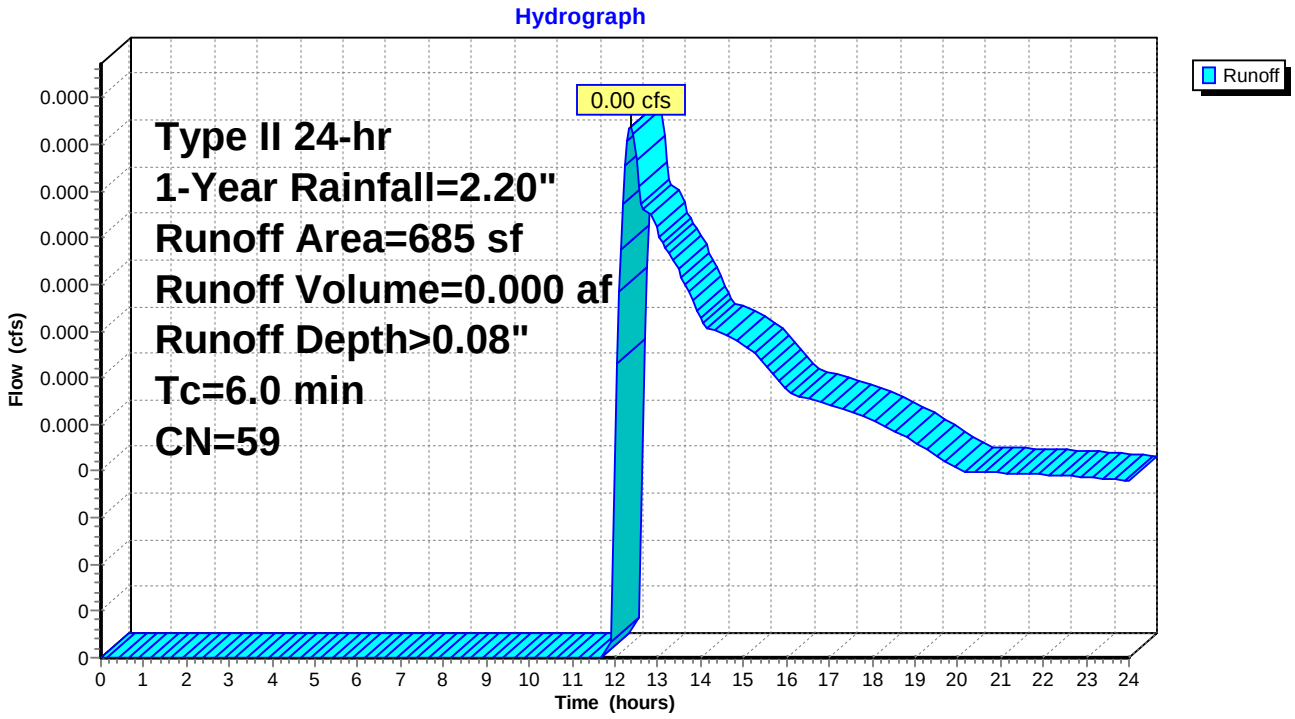
Runoff = 0.00 cfs @ 12.38 hrs, Volume= 0.000 af, Depth> 0.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.20"

Area (sf)	CN	Description
379	76	Gravel roads, HSG A
306	39	>75% Grass cover, Good, HSG A
685	59	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 0.08" for 1-Year event
Inflow = 0.00 cfs @ 12.38 hrs, Volume= 0.000 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

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.05' @ 24.00 hrs Surf.Area= 109 sf Storage= 5 cf

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

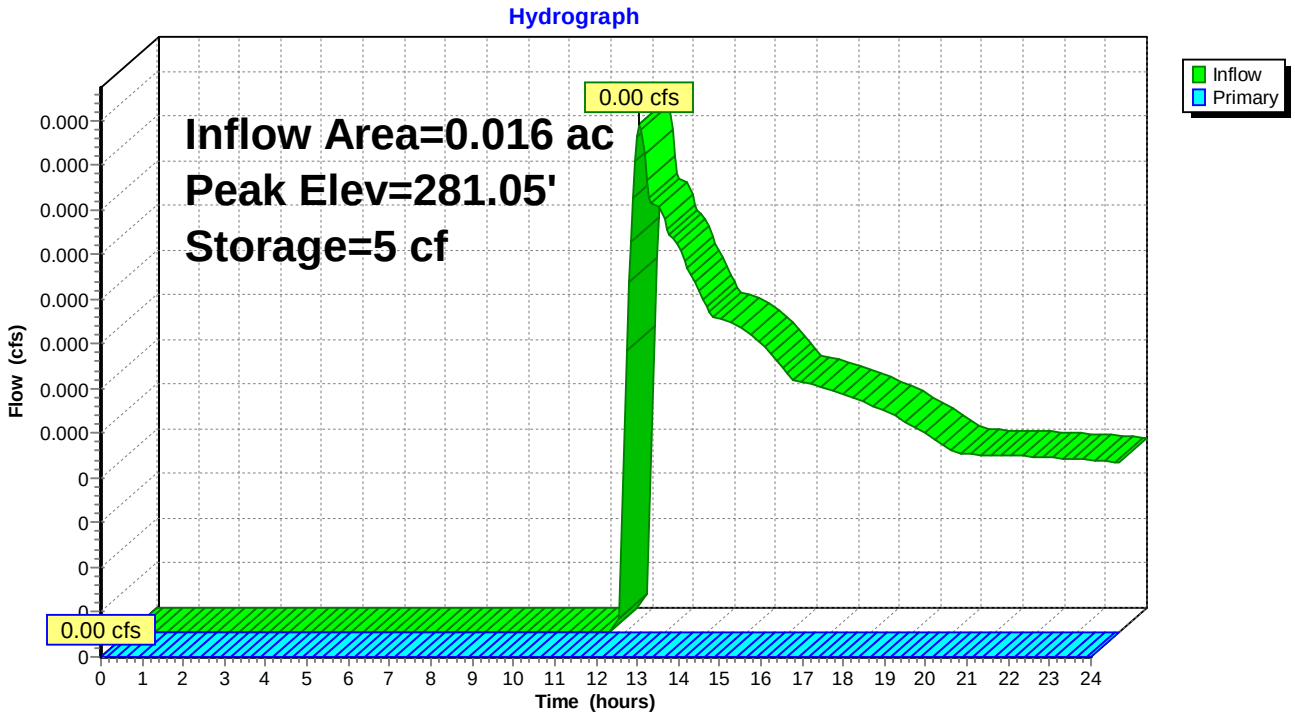
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=281.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.66"
Tc=6.0 min CN=59 Runoff=0.02 cfs 0.001 af

Pond 1P: Vegetated Swale Peak Elev=281.30' Storage=38 cf Inflow=0.02 cfs 0.001 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.66"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

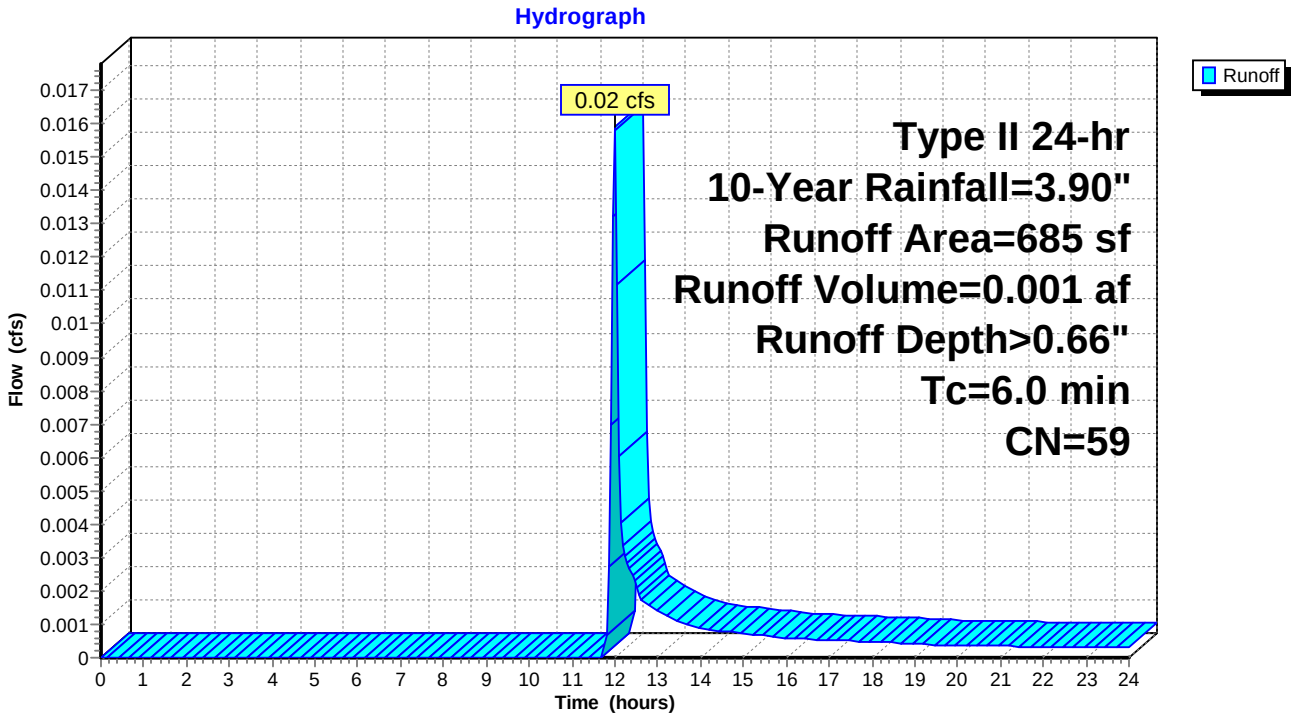
Runoff = 0.02 cfs @ 11.99 hrs, Volume= 0.001 af, Depth> 0.66"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.90"

Area (sf)	CN	Description
379	76	Gravel roads, HSG A
306	39	>75% Grass cover, Good, HSG A
685	59	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 0.66" for 10-Year event
Inflow = 0.02 cfs @ 11.99 hrs, Volume= 0.001 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

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.30' @ 24.00 hrs Surf.Area= 155 sf Storage= 38 cf

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

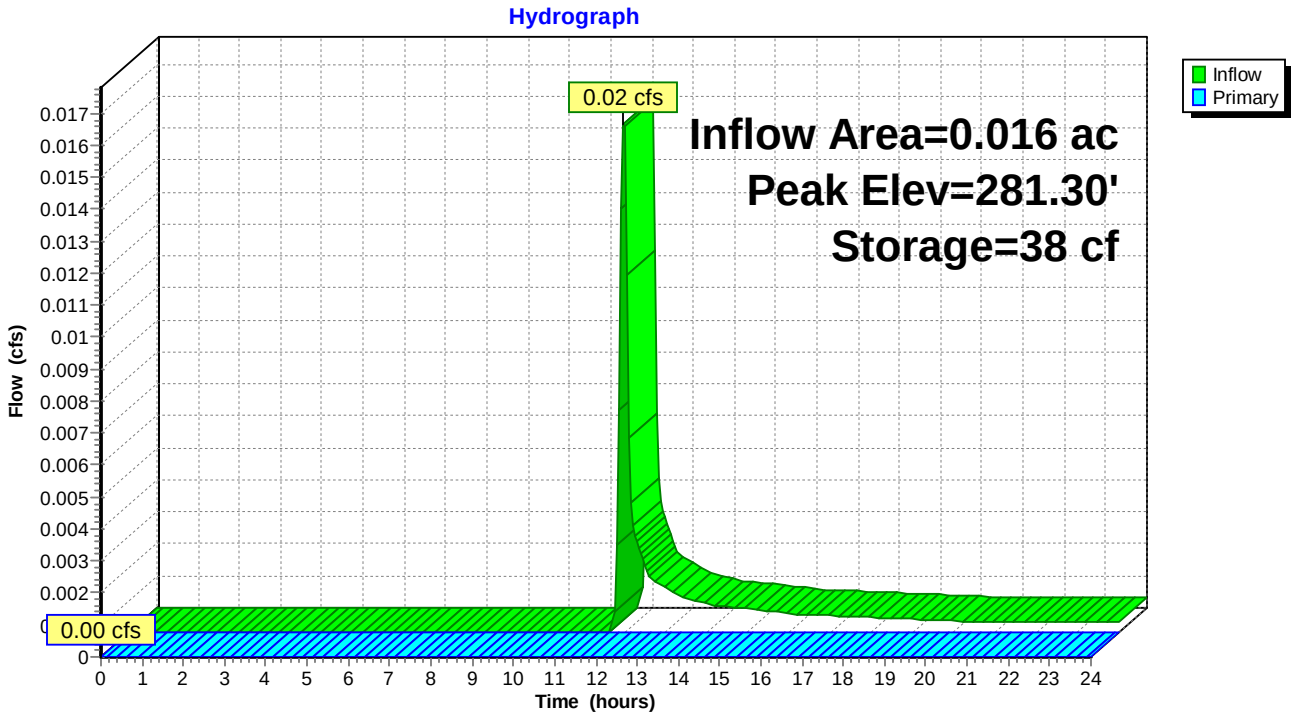
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=281.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=59 Runoff=0.00 cfs 0.000 af

Pond 1P: Vegetated Swale Peak Elev=281.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.00"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

[45] Hint: Runoff=Zero

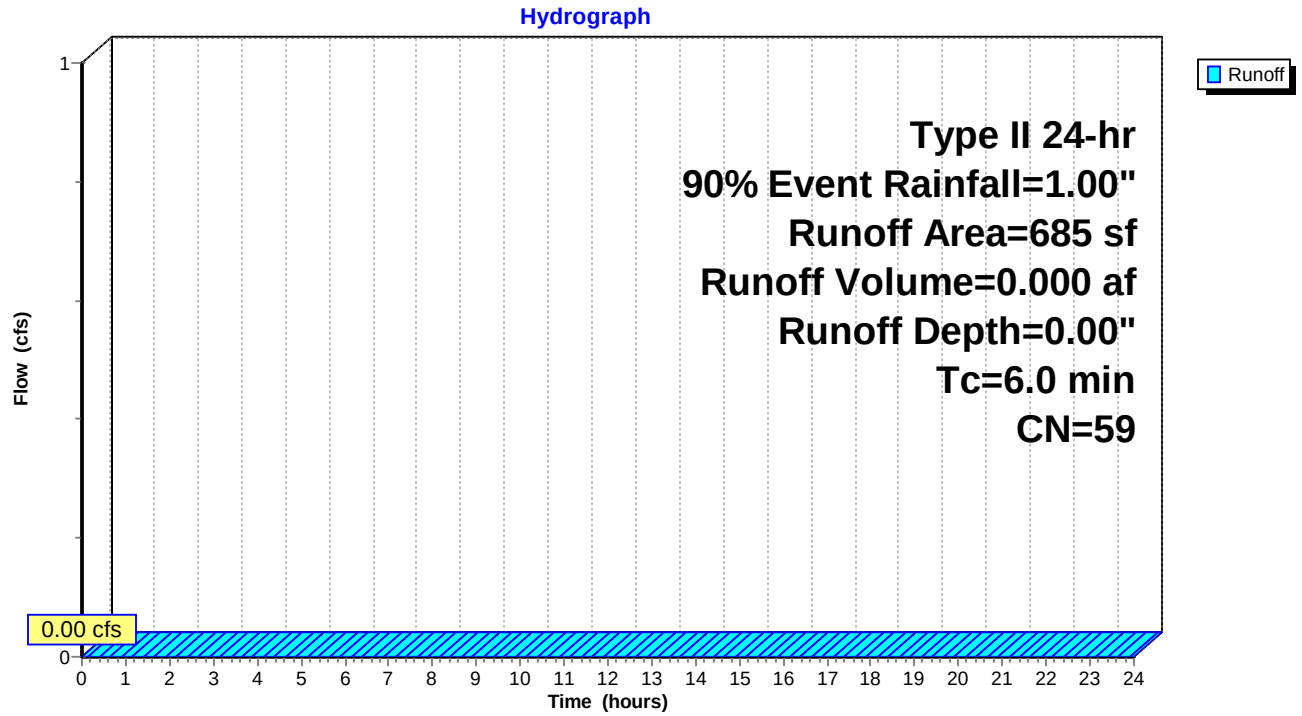
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 90% Event Rainfall=1.00"

Area (sf)	CN	Description
379	76	Gravel roads, HSG A
306	39	>75% Grass cover, Good, HSG A
685	59	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth = 0.00" for 90% Event 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
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.00' @ 0.00 hrs Surf.Area= 102 sf Storage= 0 cf

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

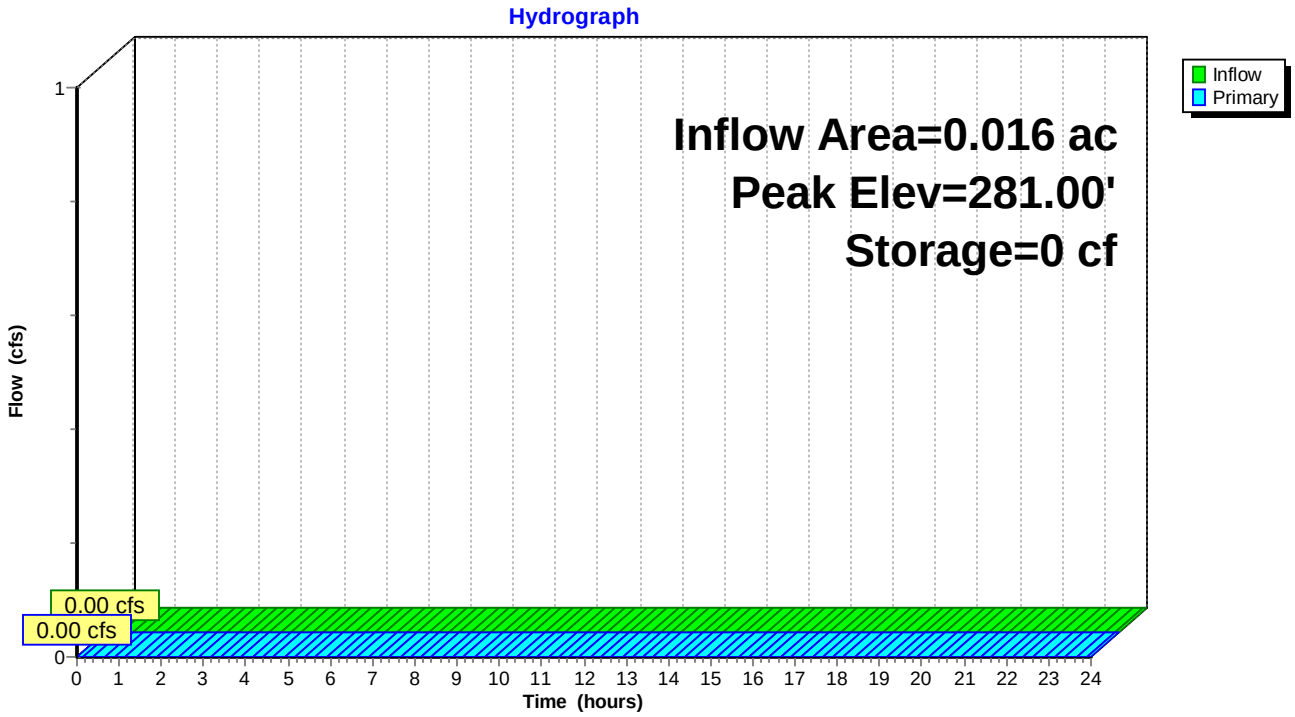
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=281.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>2.16"
Tc=6.0 min CN=59 Runoff=0.06 cfs 0.003 af

Pond 1P: Vegetated Swale Peak Elev=281.67' Storage=111 cf Inflow=0.06 cfs 0.003 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.003 af Average Runoff Depth = 2.16"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

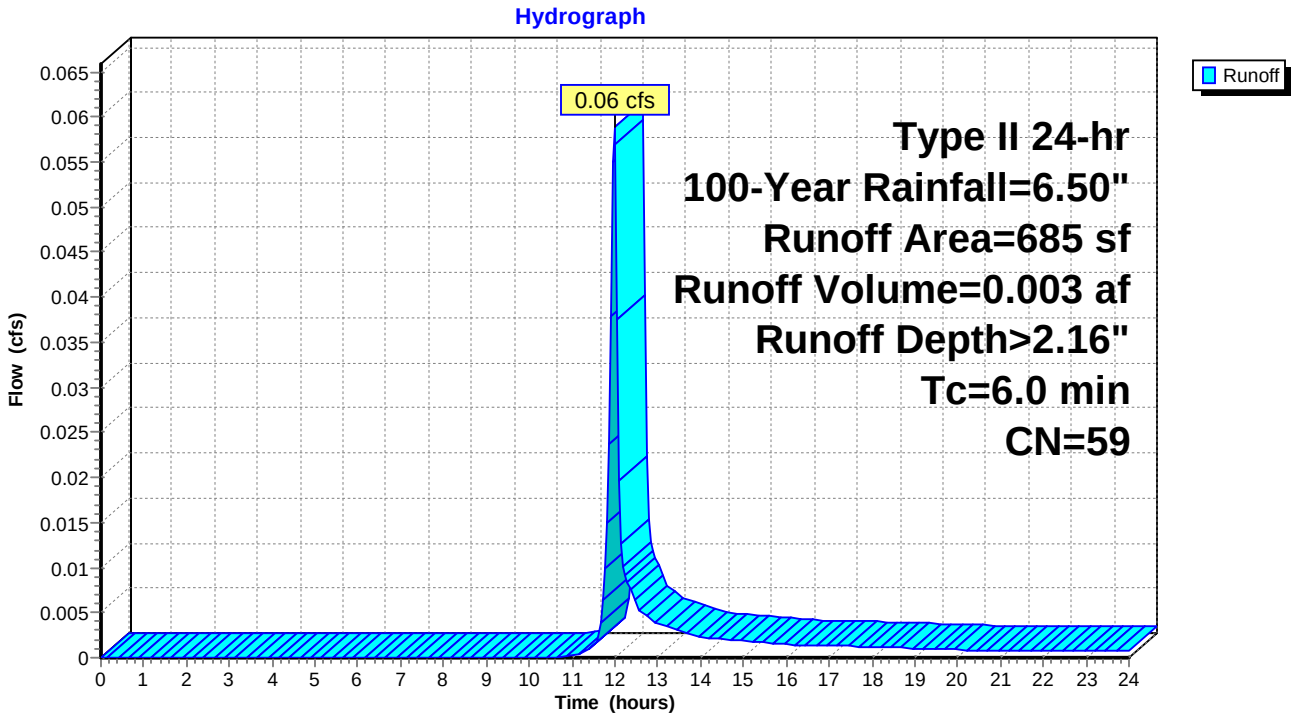
Runoff = 0.06 cfs @ 11.98 hrs, Volume= 0.003 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
379	76	Gravel roads, HSG A
306	39	>75% Grass cover, Good, HSG A
685	59	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 2.16" for 100-Year event
Inflow = 0.06 cfs @ 11.98 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 20.11 hrs, Volume= 0.000 af, Atten= 99%, Lag= 487.8 min
Primary = 0.00 cfs @ 20.11 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.67' @ 20.11 hrs Surf.Area= 238 sf Storage= 111 cf

Plug-Flow detention time= 607.6 min calculated for 0.000 af (10% of inflow)
Center-of-Mass det. time= 455.9 min (1,312.1 - 856.2)

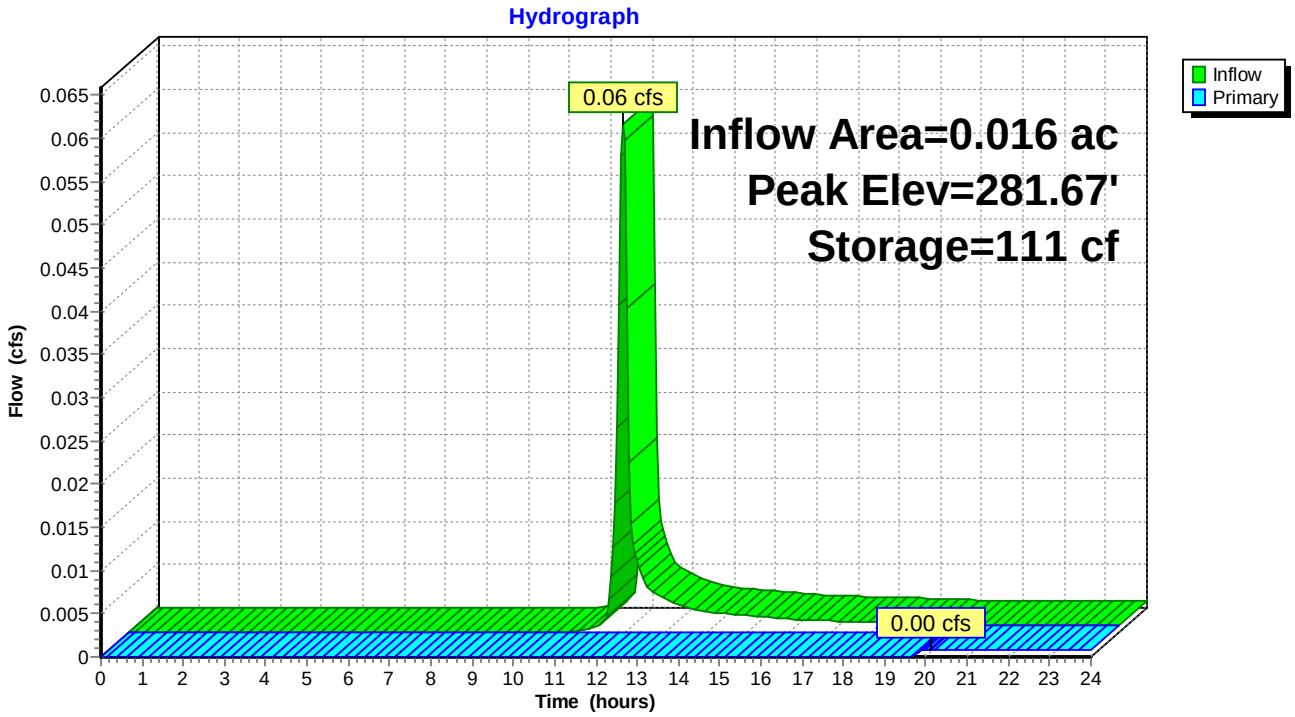
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

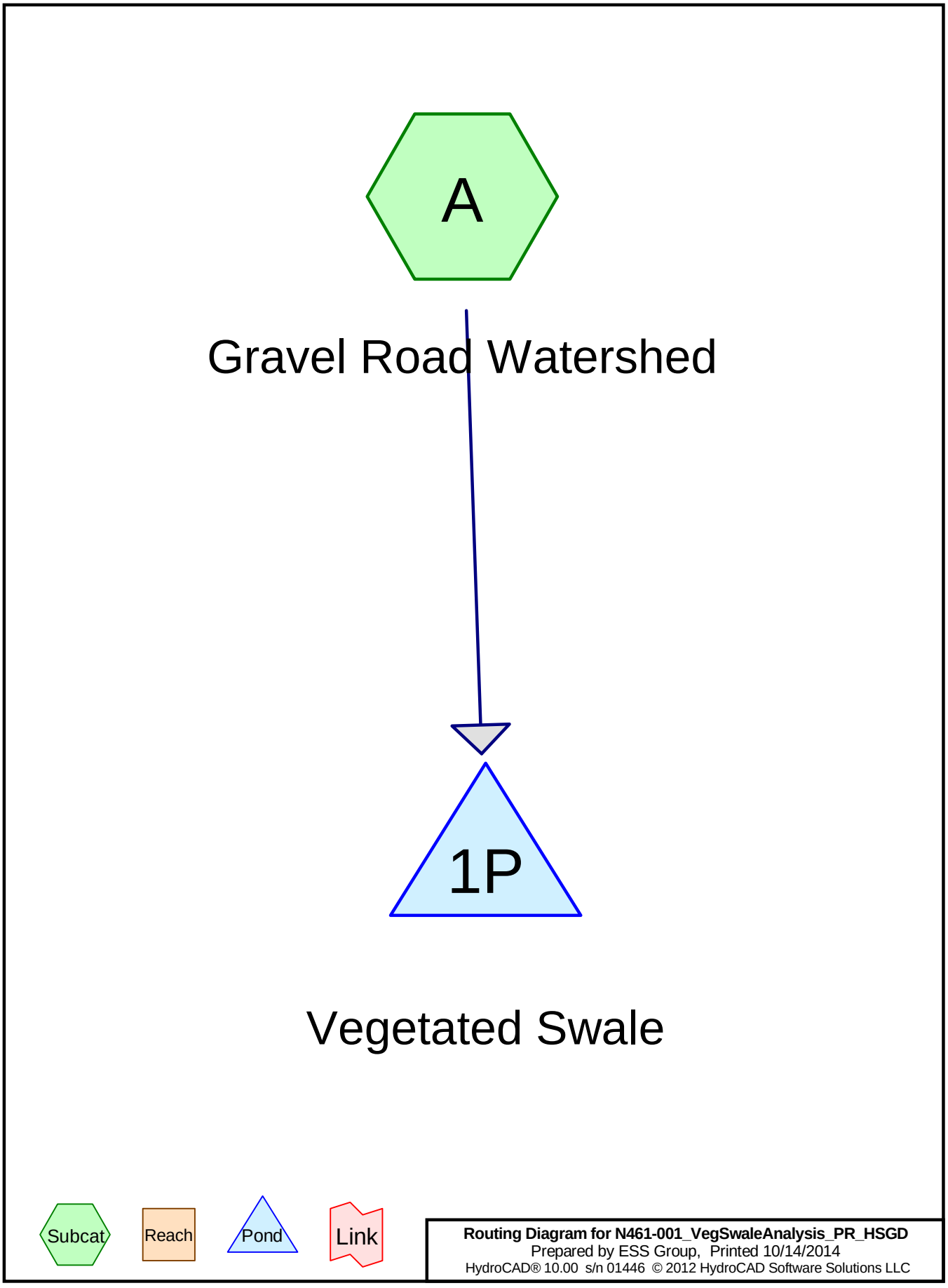
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 20.11 hrs HW=281.67' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.00 cfs @ 0.09 fps)

Pond 1P: Vegetated Swale





Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	80	>75% Grass cover, Good, HSG D (A)
0.009	91	Gravel roads, HSG D (A)
0.016	**86**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.016	HSG D	A
0.000	Other	
0.016		**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
0.000	0.000	0.000	0.007	0.000	0.007	>75% Grass cover, Good	A
0.000	0.000	0.000	0.009	0.000	0.009	Gravel roads	A
0.000	**0.000**	**0.000**	**0.016**	**0.000**	**0.016**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>1.00"
Tc=6.0 min CN=86 Runoff=0.03 cfs 0.001 af

Pond 1P: Vegetated Swale Peak Elev=281.41' Storage=57 cf Inflow=0.03 cfs 0.001 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.001 af Average Runoff Depth = 1.00"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

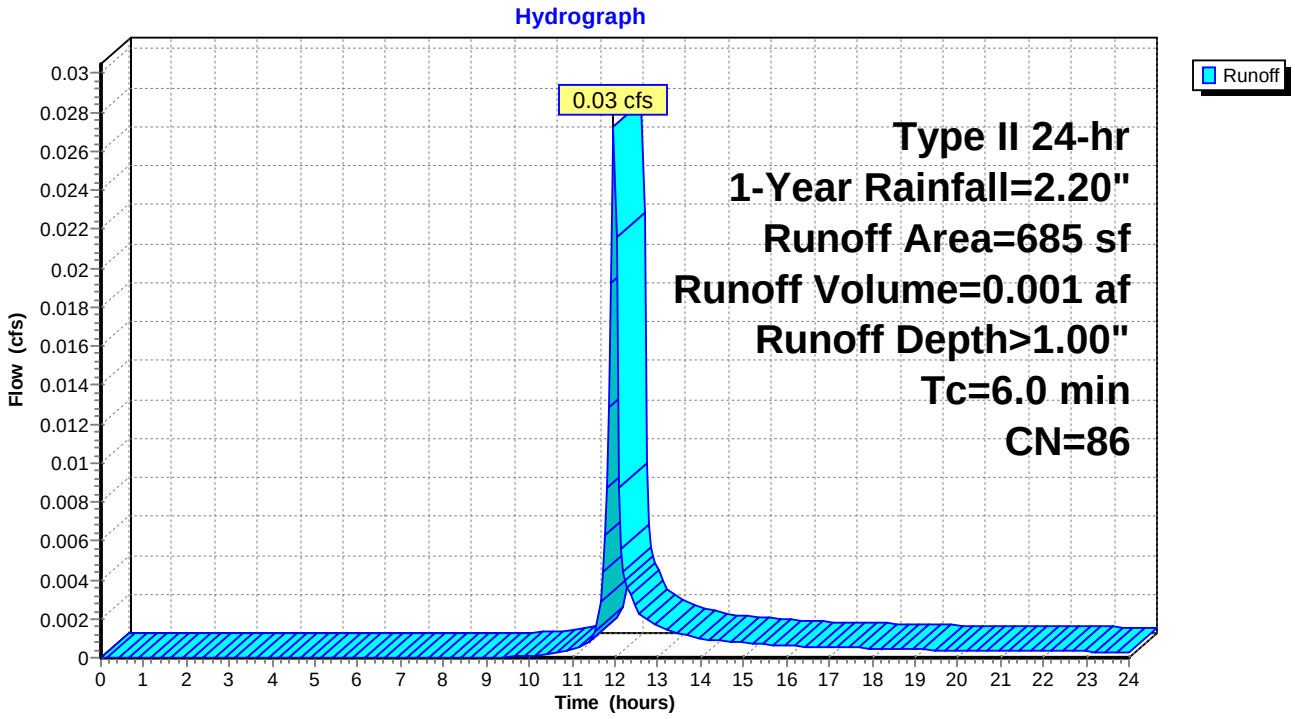
Runoff = 0.03 cfs @ 11.97 hrs, Volume= 0.001 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=2.20"

Area (sf)	CN	Description
379	91	Gravel roads, HSG D
306	80	>75% Grass cover, Good, HSG D
685	86	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 1.00" for 1-Year event
Inflow = 0.03 cfs @ 11.97 hrs, Volume= 0.001 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

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.41' @ 24.00 hrs Surf.Area= 179 sf Storage= 57 cf

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

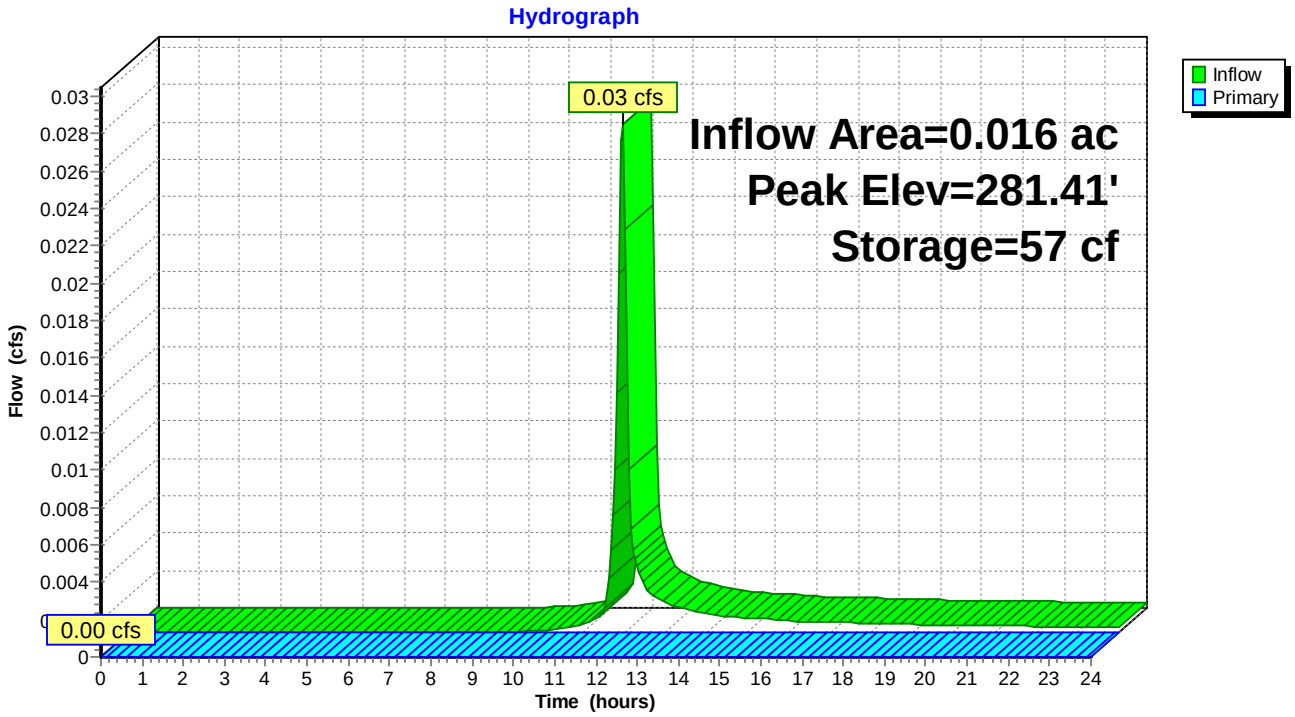
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=281.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>2.45"
Tc=6.0 min CN=86 Runoff=0.07 cfs 0.003 af

Pond 1P: Vegetated Swale Peak Elev=281.67' Storage=111 cf Inflow=0.07 cfs 0.003 af
Outflow=0.00 cfs 0.001 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.003 af Average Runoff Depth = 2.45"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

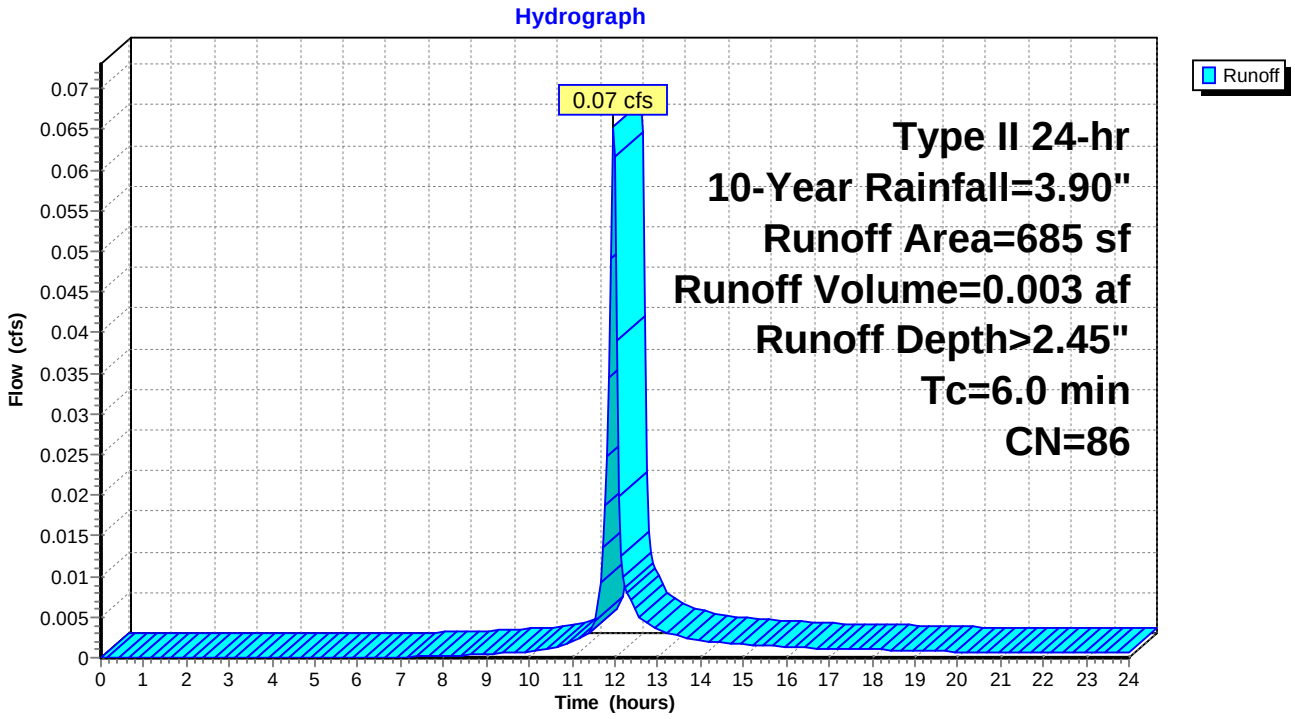
Runoff = 0.07 cfs @ 11.97 hrs, Volume= 0.003 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.90"

Area (sf)	CN	Description
379	91	Gravel roads, HSG D
306	80	>75% Grass cover, Good, HSG D
685	86	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 2.45" for 10-Year event
Inflow = 0.07 cfs @ 11.97 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 15.35 hrs, Volume= 0.001 af, Atten= 98%, Lag= 203.0 min
Primary = 0.00 cfs @ 15.35 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.67' @ 15.35 hrs Surf.Area= 238 sf Storage= 111 cf

Plug-Flow detention time= 461.8 min calculated for 0.001 af (21% of inflow)
Center-of-Mass det. time= 319.1 min (1,129.5 - 810.5)

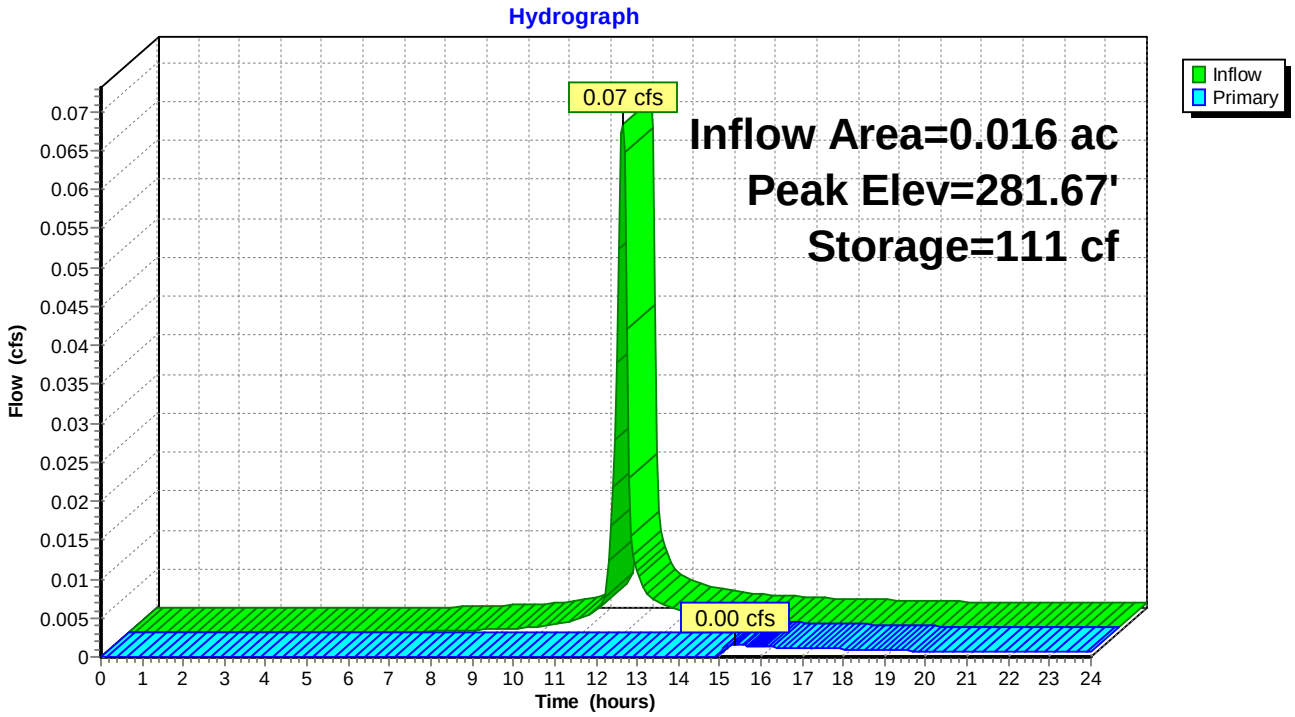
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 15.35 hrs HW=281.67' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.00 cfs @ 0.12 fps)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>0.20"
Tc=6.0 min CN=86 Runoff=0.00 cfs 0.000 af

Pond 1P: Vegetated Swale Peak Elev=281.10' Storage=11 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.000 af Average Runoff Depth = 0.20"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

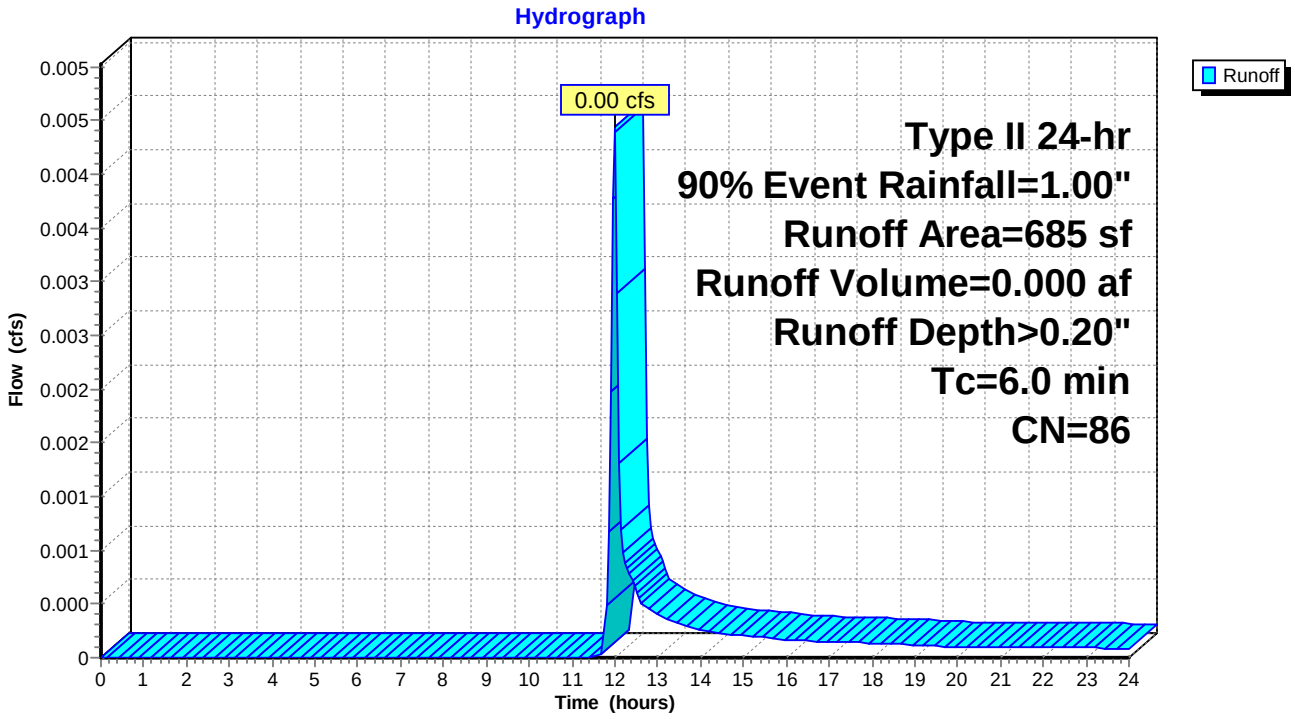
Runoff = 0.00 cfs @ 11.99 hrs, Volume= 0.000 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 90% Event Rainfall=1.00"

Area (sf)	CN	Description
379	91	Gravel roads, HSG D
306	80	>75% Grass cover, Good, HSG D
685	86	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 0.20" for 90% Event event
Inflow = 0.00 cfs @ 11.99 hrs, Volume= 0.000 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

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.10' @ 24.00 hrs Surf.Area= 119 sf Storage= 11 cf

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

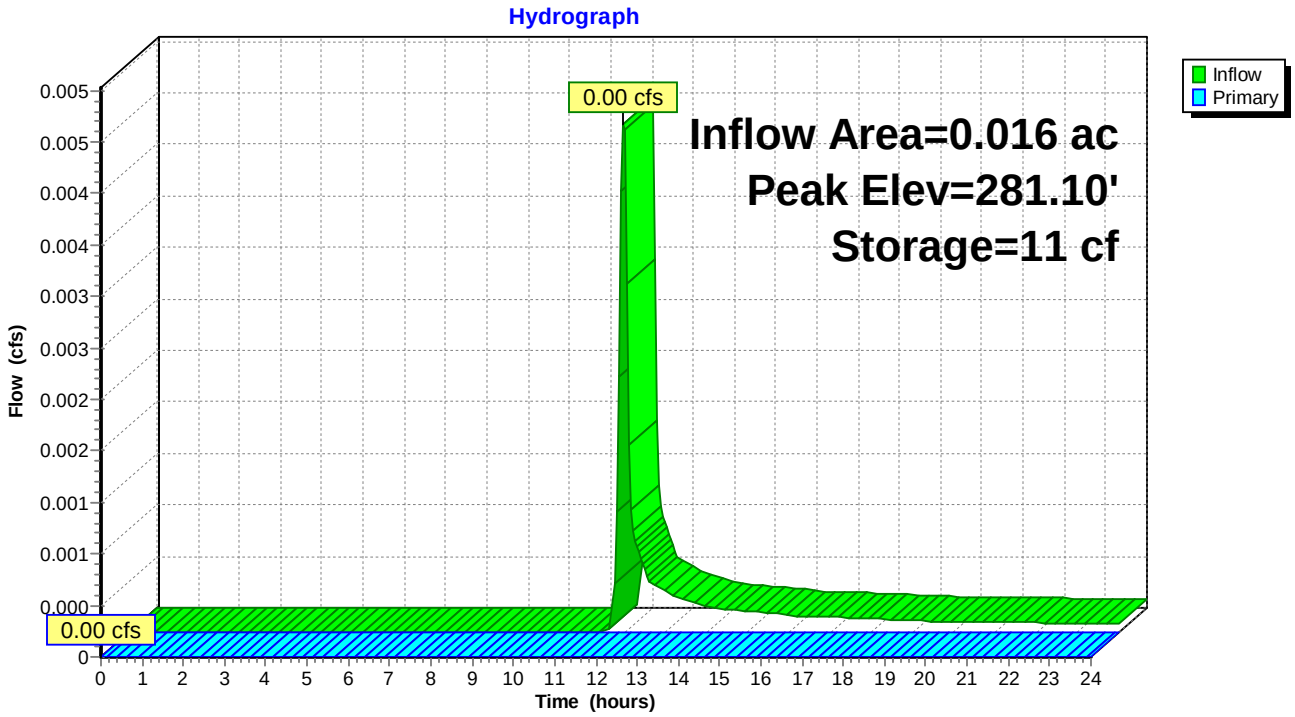
Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=281.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: Vegetated Swale



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Gravel Road Watershed Runoff Area=685 sf 0.00% Impervious Runoff Depth>4.88"
Tc=6.0 min CN=86 Runoff=0.13 cfs 0.006 af

Pond 1P: Vegetated Swale Peak Elev=281.73' Storage=125 cf Inflow=0.13 cfs 0.006 af
Outflow=0.11 cfs 0.004 af

Total Runoff Area = 0.016 ac Runoff Volume = 0.006 af Average Runoff Depth = 4.88"
100.00% Pervious = 0.016 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment A: Gravel Road Watershed

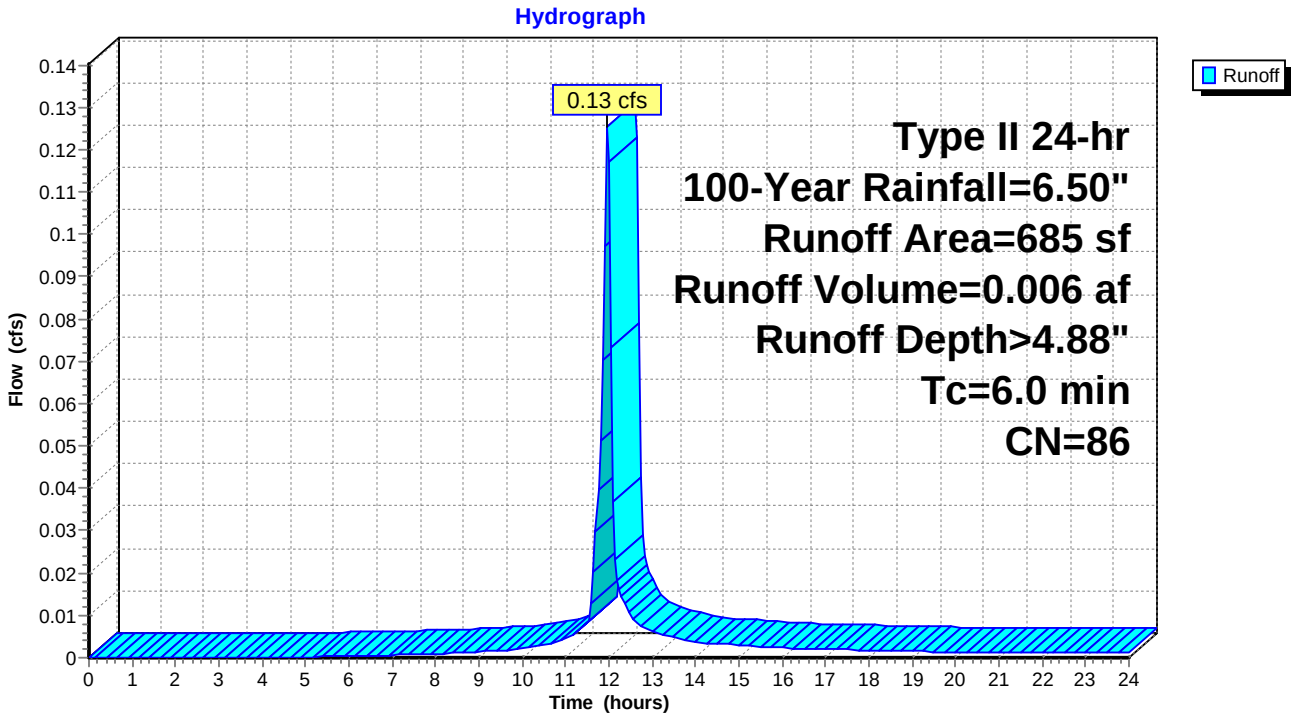
Runoff = 0.13 cfs @ 11.96 hrs, Volume= 0.006 af, Depth> 4.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
379	91	Gravel roads, HSG D
306	80	>75% Grass cover, Good, HSG D
685	86	Weighted Average
685		100.00% Pervious Area

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

Subcatchment A: Gravel Road Watershed



Summary for Pond 1P: Vegetated Swale

Inflow Area = 0.016 ac, 0.00% Impervious, Inflow Depth > 4.88" for 100-Year event
Inflow = 0.13 cfs @ 11.96 hrs, Volume= 0.006 af
Outflow = 0.11 cfs @ 12.02 hrs, Volume= 0.004 af, Atten= 14%, Lag= 3.6 min
Primary = 0.11 cfs @ 12.02 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 281.73' @ 12.02 hrs Surf.Area= 249 sf Storage= 125 cf

Plug-Flow detention time= 187.3 min calculated for 0.004 af (60% of inflow)
Center-of-Mass det. time= 84.1 min (875.1 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	281.00'	200 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
281.00	102	106.0	0	0	102
281.67	238	110.0	111	111	202
282.00	306	114.0	90	200	282

Device	Routing	Invert	Outlet Devices
#1	Primary	281.67'	**3.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.10 cfs @ 12.02 hrs HW=281.72' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.10 cfs @ 0.61 fps)

Pond 1P: Vegetated Swale