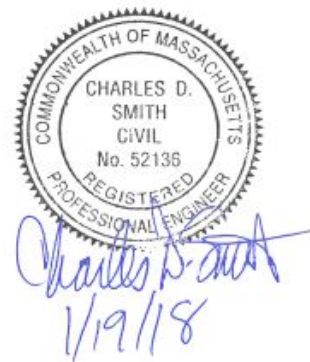

Stormwater Management Memorandum Report

1.339 MW
Solar Energy Facility
515 Henshaw Street
Rochdale, MA

Submitted By:

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851



Submitted to:

Town of Leicester
3 Washburn Square,
Leicester, Massachusetts 01524

January 19, 2017

Stormwater Memo

1.0 Introduction

The proposal is to construct a 1,339.20kW ground mount solar energy generating system on a forested portion of a Suburban Agricultural & Business Residential-1 parcel. The solar project is located within the Business Residential-1 portion of the parcel. This document presents existing and proposed construction as well as hydrologic conditions pre- and post-development.

2.0 Existing Conditions

As shown on sheet C-1.1 Existing Conditions Plan, much of the 33.63 acre parcel is forested, with wetland resource areas.

3.0 Proposed Construction

On the attached sheet C-3.1 Layout and Materials Plan the solar system is laid out at in the east portion (Business Residential-1) of the parcel. Grading associated with preparing the solar area for solar racking and the gravel road is included. The following is some information about the system characteristics.

Solar System Characteristics

Site Area:	33.63 acres (45-A8-0)
Number of Modules/String Inverters:	3,348 400-watt modules / 124
Height of Fence:	6-foot w/3 strands of barbed wire
Proposed Impervious area:	260±sf (concrete pads)
Proposed gravel roads:	0.24 acres
Total area of disturbance:	7.4± acres (includes trees cleared only)
Fenced area:	4.7 acres

4.0 Stormwater

The Massachusetts Department of Environmental Protection (MA DEP) issued stormwater standards in 2008. The following section describes how each of these standards will be achieved by incorporating Best Management Practices into the design.

Standard No. 1 No new stormwater conveyances may discharge untreated directly to or cause erosion in wetlands or waters of the Commonwealth.

There are only negligible (1,990 square feet) new impervious surfaces (concrete pads + screw anchors) associated with this project. The existing and proposed stormwater runoff from this site discharges towards the south towards wetland A and Strafford Street. There is no need for treatment and therefore Standard 1 is satisfied.

Standard No. 2 Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

In order to determine the peak rate of discharge for existing and proposed conditions, runoff hydrographs were generated for the 2-, 10- and 100-year, 24-hour storm events using the Soil

Conservation Service (SCS) Technical Release 20 Method and Type III rainfall distribution.

As shown in Table 1 below, overall post-development peak stormwater runoff rates for the project are less than or equal to the pre-development peak stormwater runoff rates in the modeled design storms. The three (3) design points are part of a larger tributary area associated with the un-named stream along the easterly edge of site. The proposed project will not increase the rate of runoff.

The comparison of peak rates of runoff is shown in Table 1 below.

Table 1 Peak Stormwater Runoff Rates

Point of Analysis	Area		2-Year			10-Year			100-Year		
	Pre	Post	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
POA-1	-	-	0.0	0.0	NC	0.0	0.0	NC	0.2	0.1	(0.1)
POA-2	-	-	0.0	0.0	NC	0.0	0.0	NC	0.1	0.1	NC
POA-3	-	-	0.0	0.0	NC	0.0	0.0	NC	0.1	0.1	NC
POA-4	-	-	0.0	0.0	NC	0.0	0.0	NC	0.7	0.6	(0.1)
POA-5	-	-	0.2	0.0	(0.2)	2.4	0.0	(2.4)	13.6	9.0	(4.6)
	13.25	13.25			(0.2)			(2.4)			(4.8)

*Summation of DP-1 through DP-3

NC=No Change

Standard No. 3 Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operations and maintenance. At a minimum, the annual recharge from pre-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

There is only a minor increase (1,990 square feet) of impervious cover proposed as part of this project. Annual recharge to groundwater will continue to occur due to the fact that the solar panels are installed on supports and are elevated above the existing ground. Any precipitation that falls on the solar panels will shed directly onto the ground not affecting annual groundwater recharge. Each solar panel rack is installed with space between each of the solar panels that allow precipitation to drip through.

Recharge Calculations:

The required recharge volume equals a depth of runoff corresponding to the soil type times the impervious areas covering that soil type at the post-development site. The soils are defined by the Soil Conservation Services (SCS) Soil Survey of Worcester County (North) as A, C and D types.

Table 3 Soils Based on the Hydrologic Soil Group

HSG	Soil Texture	Target Depth (inches)	Area (acres)
A	Sand	0.60	9.78
B	Loam	0.35	0.00
C	Silty Loam	0.25	3.47
D	Clay	0.10	0.00

Based on the different soils types on site the cumulative target depth is 0.51 inches.

Recharge Volumes Required. Based on the impervious surfaces.

- 1,730 sf @ electrical equipment area. Overall gravel area = 10,466 sf
- Screw anchors = 138 sf

The total impervious area = 260 sf (electrical concrete pad)

Table 4 Required Recharge Volume Calculations

Description of Area	Area (sf)	Target Depth (inches)	Volume Required (cubic feet)
Equipment Pads + Foundation Screws	1,868	0.51	79

Recharge Volumes Provided:

The concrete equipment pads including the gravel areas around the pads. The total area is approximately 1,990 square feet.

Table 5 Provided Recharge Volume Calculations

Description of Area	Area (sf)	Target Depth (inches)	Volume Provided (cubic feet)
Equipment Areas	1,990	0.51	85

Recharge Required = 79 cubic feet

Recharge Provided = 85 cubic feet “MEETS RECHARGE STANDARD #3”

Standard No. 4 Stormwater Management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The minimal amount of impervious cover proposed as part of this project are not for vehicular access. Therefore there are no generators (impervious surfaces) of TSS as part of the proposed project. Furthermore, all such areas are surrounded by gravel surfaces which will capture and infiltration runoff from these small areas of impervious coverage. Any access to the project will be via the existing bituminous road and the proposed 16 feet wide gravel drive. From this gravel road, stormwater runoff will be allowed to directly recharge into the ground. Such areas will also be surrounded by grassed pervious surfaces, which will encourage further infiltration. Standard 4 has been met.

Standard No. 5 For land uses with higher pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The proposed project is not classified as a “Land Use with Higher Pollutant Loads”. This standard does not apply to the project. Standard 5 has been met.

Standard No. 6 Stormwater discharges with the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

We have reviewed the Massachusetts Geographical Information System (GIS) and the site is not located within Zone II, Interim Wellhead Protection Areas, or Outstanding Resource Watersheds and therefore this standard has been met. See Figure 2.

Standard No. 7 A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5 and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

To the maximum extent practicable and where appropriate we have met the requirements of Standard 7.

Standard No. 8 A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period pollution prevention plan) shall be developed and implemented.

A Stormwater Pollution Prevention Plan (SWPPP) will be implemented to control erosion and sedimentation associated with the construction/installation of the project. Erosion and sedimentation controls will be in place prior to construction-related land disturbance on the site. A NPDES (National Pollutant Discharge Elimination System) Notice of Intent (NOI) will be filed with the US EPA a minimum of 14 days prior to the commencement of construction.

Standard No. 9 A long-term Operation and Maintenance Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

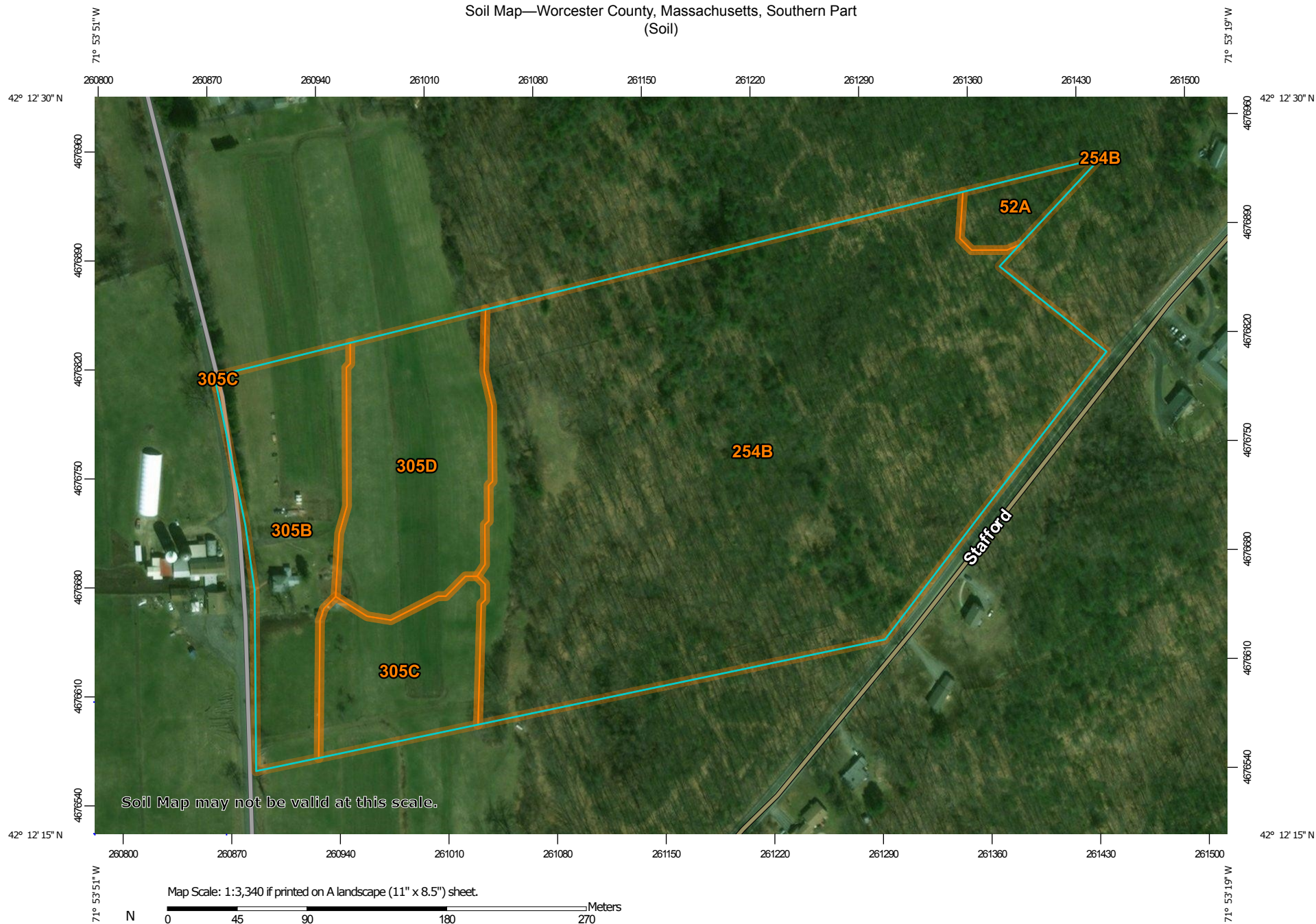
An Operations and Maintenance Plan (O & M) has been developed and is included in Appendix B – Operating and Maintenance Plan. The O & M Plan will be implemented to ensure that the site stormwater management systems function as designed. The owner of the system will be responsible for contracting with a solar system operations and maintenance company to implement the attached O & M Plan.

Standard No. 10 All illicit discharges to the stormwater management system are prohibited.

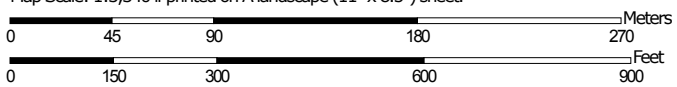
An Illicit Discharge Compliance Statement confirming that no illicit discharges exist on site is included in Appendix E – Supporting Documentation of the Notice of Intent.

Figure 1 – Soil Map

Soil Map—Worcester County, Massachusetts, Southern Part (Soil)



Map Scale: 1:3,340 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



**Natural Resources
Conservation Service**


Web Soil Survey
National Cooperative Soil Survey

1/9/2018
Page 1 of 3

Soil Map—Worcester County, Massachusetts, Southern Part (Soil)


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts, Southern Part

Survey Area Data: Version 10, Oct 6, 2017

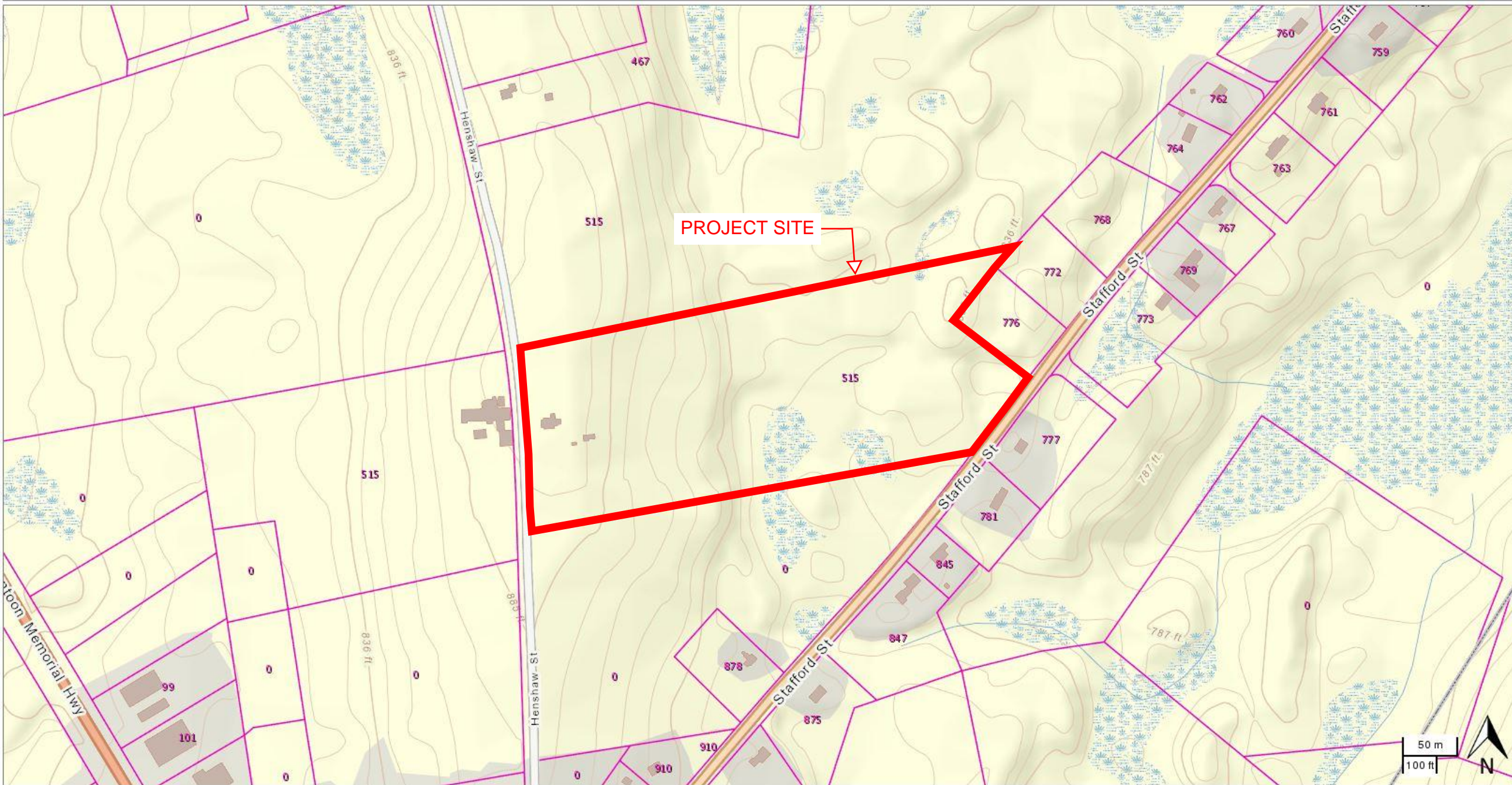
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 14, 2011—Aug 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	0.7	2.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	22.6	67.7%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	3.8	11.3%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	2.3	6.9%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	4.1	12.1%
Totals for Area of Interest		33.4	100.0%



Zone IIs

IWPAs

IWPAs Dissolved

Zone Is

Zone IIs Dissolved

Tax Parcels for Query

Detailed Features

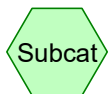
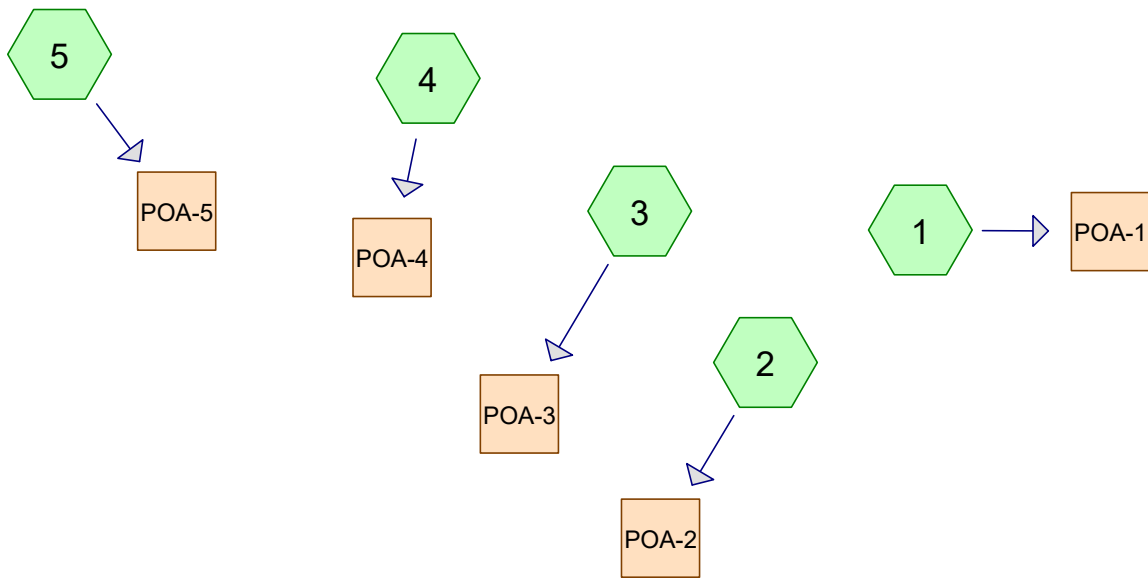
Tax Parcels

Structures

MassGIS Statewide Basemap

MassGIS Topographic Features Basemap

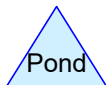




Subcat



Reach



Pond



Link

Routing Diagram for Pre-Dev

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Pre-Dev

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Printed 1/17/2018

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.020	30	Meadow, non-grazed, HSG A (5)
2.810	71	Meadow, non-grazed, HSG C (5)
0.660	74	Pasture/grassland/range, Good, HSG C (5)
8.760	30	Woods, Good, HSG A (1, 2, 3, 4, 5)
13.250	41	TOTAL AREA

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
9.780	HSG A	1, 2, 3, 4, 5
0.000	HSG B	
3.470	HSG C	5
0.000	HSG D	
0.000	Other	
13.250		TOTAL AREA

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Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.020	0.000	2.810	0.000	0.000	3.830	Meadow, non-grazed	5
0.000	0.000	0.660	0.000	0.000	0.660	Pasture/grassland/range, Good	5
8.760	0.000	0.000	0.000	0.000	8.760	Woods, Good	1, 2, 3, 4, 5
9.780	0.000	3.470	0.000	0.000	13.250	TOTAL AREA	

Pre-Dev

Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Subcatchment 1:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
1.440	30	Woods, Good, HSG A
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0400	0.05		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
1.5	145	0.1100	1.66		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
6.7	110	0.0030	0.27		Shallow Concentrated Flow, C TO D
					Woodland Kv= 5.0 fps
24.4	305	Total			

Summary for Subcatchment 2:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.670	30	Woods, Good, HSG A
0.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.9	50	0.0080	0.03		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
3.3	226	0.0530	1.15		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
34.2	276	Total			

Pre-Dev

Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Subcatchment 3:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.640	30	Woods, Good, HSG A
0.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0800	0.07		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
1.4	140	0.1140	1.69		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
13.7	190	Total			

Summary for Subcatchment 4:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
3.740	30	Woods, Good, HSG A
3.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.2000	0.10		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
0.3	40	0.2000	2.24		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
6.1	410	0.0500	1.12		Shallow Concentrated Flow, C TO D
					Woodland Kv= 5.0 fps
14.9	500	Total			

Pre-Dev

Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Subcatchment 5:

Runoff = 0.2 cfs @ 12.66 hrs, Volume= 0.087 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
2.270	30	Woods, Good, HSG A
1.020	30	Meadow, non-grazed, HSG A
2.810	71	Meadow, non-grazed, HSG C
0.660	74	Pasture/grassland/range, Good, HSG C
6.760	51	Weighted Average
6.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B
					Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C
					Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E
					Woodland Kv= 5.0 fps
5.8	330	0.0360	0.95		Shallow Concentrated Flow, E TO F
					Woodland Kv= 5.0 fps
20.9	1,598	Total			

Summary for Reach POA-1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 0.15" for 2-Year event
Inflow = 0.2 cfs @ 12.66 hrs, Volume= 0.087 af
Outflow = 0.2 cfs @ 12.66 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Pre-Dev

Type III 24-hr 10-Year Rainfall=4.83"

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Summary for Subcatchment 1:

Runoff = 0.0 cfs @ 24.05 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
1.440	30	Woods, Good, HSG A
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0400	0.05		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
1.5	145	0.1100	1.66		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
6.7	110	0.0030	0.27		Shallow Concentrated Flow, C TO D
					Woodland Kv= 5.0 fps
24.4	305	Total			

Summary for Subcatchment 2:

Runoff = 0.0 cfs @ 24.12 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.670	30	Woods, Good, HSG A
0.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.9	50	0.0080	0.03		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
3.3	226	0.0530	1.15		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
34.2	276	Total			

Summary for Subcatchment 3:

Runoff = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Pre-Dev

Type III 24-hr 10-Year Rainfall=4.83"

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Area (ac)	CN	Description
0.640	30	Woods, Good, HSG A
0.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0800	0.07		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
1.4	140	0.1140	1.69		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
13.7	190	Total			

Summary for Subcatchment 4:

Runoff = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
3.740	30	Woods, Good, HSG A
3.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.2000	0.10		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
0.3	40	0.2000	2.24		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
6.1	410	0.0500	1.12		Shallow Concentrated Flow, C TO D Woodland Kv= 5.0 fps
14.9	500	Total			

Summary for Subcatchment 5:

Runoff = 2.4 cfs @ 12.42 hrs, Volume= 0.381 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
2.270	30	Woods, Good, HSG A
1.020	30	Meadow, non-grazed, HSG A
2.810	71	Meadow, non-grazed, HSG C
0.660	74	Pasture/grassland/range, Good, HSG C
6.760	51	Weighted Average
6.760		100.00% Pervious Area

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Type III 24-hr 10-Year Rainfall=4.83"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E Woodland Kv= 5.0 fps
5.8	330	0.0360	0.95		Shallow Concentrated Flow, E TO F Woodland Kv= 5.0 fps
20.9	1,598	Total			

Summary for Reach POA-1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 24.05 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 24.05 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 24.12 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 24.12 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 24.03 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

Pre-Dev*Type III 24-hr 10-Year Rainfall=4.83"*

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Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 0.68" for 10-Year event
Inflow = 2.4 cfs @ 12.42 hrs, Volume= 0.381 af
Outflow = 2.4 cfs @ 12.42 hrs, Volume= 0.381 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Pre-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Summary for Subcatchment 1:

Runoff = 0.2 cfs @ 12.64 hrs, Volume= 0.069 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
1.440	30	Woods, Good, HSG A
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	50	0.0400	0.05		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
1.5	145	0.1100	1.66		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
6.7	110	0.0030	0.27		Shallow Concentrated Flow, C TO D
					Woodland Kv= 5.0 fps
24.4	305	Total			

Summary for Subcatchment 2:

Runoff = 0.1 cfs @ 12.80 hrs, Volume= 0.032 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.670	30	Woods, Good, HSG A
0.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.9	50	0.0080	0.03		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
3.3	226	0.0530	1.15		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
34.2	276	Total			

Summary for Subcatchment 3:

Runoff = 0.1 cfs @ 12.49 hrs, Volume= 0.031 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

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Type III 24-hr 100-Year Rainfall=8.64"

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Area (ac)	CN	Description
0.640	30	Woods, Good, HSG A
0.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0800	0.07		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
1.4	140	0.1140	1.69		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
13.7	190	Total			

Summary for Subcatchment 4:

Runoff = 0.7 cfs @ 12.50 hrs, Volume= 0.180 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
3.740	30	Woods, Good, HSG A
3.740		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.2000	0.10		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
0.3	40	0.2000	2.24		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
6.1	410	0.0500	1.12		Shallow Concentrated Flow, C TO D Woodland Kv= 5.0 fps
14.9	500	Total			

Summary for Subcatchment 5:

Runoff = 13.6 cfs @ 12.31 hrs, Volume= 1.557 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
2.270	30	Woods, Good, HSG A
1.020	30	Meadow, non-grazed, HSG A
2.810	71	Meadow, non-grazed, HSG C
0.660	74	Pasture/grassland/range, Good, HSG C
6.760	51	Weighted Average
6.760		100.00% Pervious Area

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Type III 24-hr 100-Year Rainfall=8.64"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E Woodland Kv= 5.0 fps
5.8	330	0.0360	0.95		Shallow Concentrated Flow, E TO F Woodland Kv= 5.0 fps
20.9	1,598	Total			

Summary for Reach POA-1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
 Inflow = 0.2 cfs @ 12.64 hrs, Volume= 0.069 af
 Outflow = 0.2 cfs @ 12.64 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
 Inflow = 0.1 cfs @ 12.80 hrs, Volume= 0.032 af
 Outflow = 0.1 cfs @ 12.80 hrs, Volume= 0.032 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
 Inflow = 0.1 cfs @ 12.49 hrs, Volume= 0.031 af
 Outflow = 0.1 cfs @ 12.49 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

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Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
Inflow = 0.7 cfs @ 12.50 hrs, Volume= 0.180 af
Outflow = 0.7 cfs @ 12.50 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min

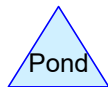
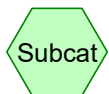
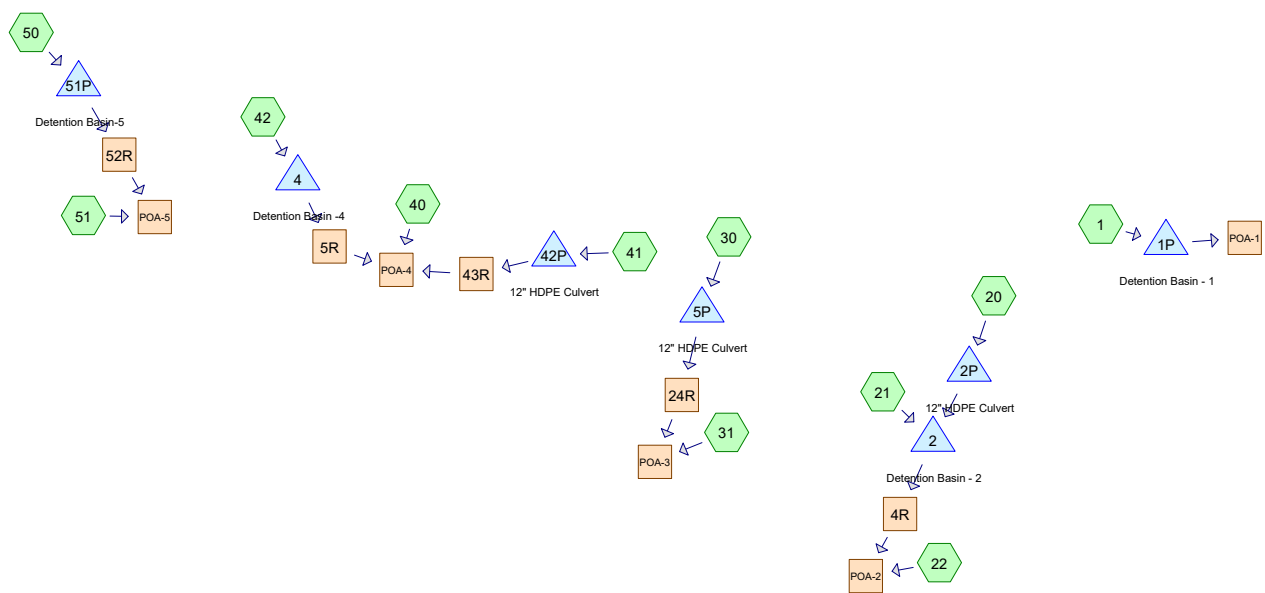
Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 2.76" for 100-Year event
Inflow = 13.6 cfs @ 12.31 hrs, Volume= 1.557 af
Outflow = 13.6 cfs @ 12.31 hrs, Volume= 1.557 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs



Routing Diagram for Post-Dev

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.580	30	Brush, Good, HSG A (20, 40, 42, 50)
0.210	76	Gravel roads, HSG A (20, 30, 40, 41)
0.050	96	Gravel surface, HSG A (equipment pad) (40)
6.750	30	Meadow, non-grazed, HSG A (1, 20, 21, 22, 30, 31, 40, 41, 42, 50, 51)
2.240	71	Meadow, non-grazed, HSG C (50)
1.230	74	Pasture/grassland/range, Good, HSG C (50)
2.190	30	Woods, Good, HSG A (1, 40, 42, 50)
13.250	42	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
9.780	HSG A	1, 20, 21, 22, 30, 31, 40, 41, 42, 50, 51
0.000	HSG B	
3.470	HSG C	50
0.000	HSG D	
0.000	Other	
13.250		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.580	0.000	0.000	0.000	0.000	0.580	Brush, Good	20, 40, 42, 50
0.210	0.000	0.000	0.000	0.000	0.210	Gravel roads	20, 30, 40, 41
0.050	0.000	0.000	0.000	0.000	0.050	Gravel surface	40
6.750	0.000	2.240	0.000	0.000	8.990	Meadow, non-grazed	1, 20, 21, 22, 30, 31, 40, 41, 42, 50, 51
0.000	0.000	1.230	0.000	0.000	1.230	Pasture/grassland/range, Good	50
2.190	0.000	0.000	0.000	0.000	2.190	Woods, Good	1, 40, 42, 50
9.780	0.000	3.470	0.000	0.000	13.250	TOTAL AREA	

Post-Dev*Type III 24-hr 2-Year Rainfall=3.22"*

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Time span=0.01-48.00 hrs, dt=0.01 hrs, 4800 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1:	Runoff Area=1.440 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=275' Tc=10.7 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment20:	Runoff Area=0.550 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=276' Tc=14.1 min CN=34 Runoff=0.0 cfs 0.000 af
Subcatchment21:	Runoff Area=0.030 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=76' Tc=3.9 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment22:	Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=90' Tc=4.7 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment30:	Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=117' Tc=5.2 min CN=33 Runoff=0.0 cfs 0.000 af
Subcatchment31:	Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=59' Tc=3.5 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment40:	Runoff Area=1.280 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=311' Tc=37.0 min CN=34 Runoff=0.0 cfs 0.000 af
Subcatchment41:	Runoff Area=0.270 ac 0.00% Impervious Runoff Depth=0.05" Flow Length=120' Tc=6.6 min CN=45 Runoff=0.0 cfs 0.001 af
Subcatchment42:	Runoff Area=2.190 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=395' Tc=12.6 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment50:	Runoff Area=6.660 ac 0.00% Impervious Runoff Depth=0.18" Flow Length=1,483' Tc=19.6 min CN=52 Runoff=0.3 cfs 0.099 af
Subcatchment51:	Runoff Area=0.100 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=65' Tc=1.7 min CN=30 Runoff=0.0 cfs 0.000 af
Reach 4R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=45.0' S=0.0378 '/' Capacity=52.9 cfs Outflow=0.0 cfs 0.000 af
Reach 5R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=60.0' S=0.0500 '/' Capacity=60.8 cfs Outflow=0.0 cfs 0.000 af
Reach 24R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=60.0' S=0.1667 '/' Capacity=111.0 cfs Outflow=0.0 cfs 0.000 af
Reach 43R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=43.0' S=0.2326 '/' Capacity=131.2 cfs Outflow=0.0 cfs 0.000 af
Reach 52R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=90.0' S=0.0556 '/' Capacity=64.1 cfs Outflow=0.0 cfs 0.000 af

Post-Dev*Type III 24-hr 2-Year Rainfall=3.22"*

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Reach POA-1:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-2:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-3:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-4:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-5:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 1P: Detention Basin - 1	Peak Elev=800.00' Storage=0 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 2: Detention Basin - 2	Peak Elev=804.00' Storage=0 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 2P: 12" HDPE Culvert	Peak Elev=806.00' Storage=0 cf Inflow=0.0 cfs 0.000 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.000 af
Pond 4: Detention Basin -4	Peak Elev=810.00' Storage=0 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 5P: 12" HDPE Culvert	Peak Elev=814.00' Storage=0 cf Inflow=0.0 cfs 0.000 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.000 af
Pond 42P: 12" HDPE Culvert	Peak Elev=814.15' Storage=45 cf Inflow=0.0 cfs 0.001 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.000 af
Pond 51P: Detention Basin-5	Peak Elev=819.06' Storage=4,303 cf Inflow=0.3 cfs 0.099 af Outflow=0.0 cfs 0.000 af

Total Runoff Area = 13.250 ac Runoff Volume = 0.100 af Average Runoff Depth = 0.09"
100.00% Pervious = 13.250 ac 0.00% Impervious = 0.000 ac

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Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Subcatchment 1:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
1.140	30	Meadow, non-grazed, HSG A
1.440	30	Weighted Average
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.0	145	0.1100	2.32		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.5	80	0.0030	0.38		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
10.7	275	Total			

Summary for Subcatchment 20:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.090	30	Brush, Good, HSG A
0.410	30	Meadow, non-grazed, HSG A
0.050	76	Gravel roads, HSG A
0.550	34	Weighted Average
0.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0080	0.07		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
2.3	226	0.0530	1.61		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
14.1	276	Total			

Post-Dev

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Summary for Subcatchment 21:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.030	30	Meadow, non-grazed, HSG A
0.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.1500	0.23		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
0.3	26	0.0540	1.63		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.9	76	Total			

Summary for Subcatchment 22:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.090	30	Meadow, non-grazed, HSG A
0.090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.3	40	0.0050	0.49		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
4.7	90	Total			

Summary for Subcatchment 30:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

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Area (ac)	CN	Description
0.040	76	Gravel roads, HSG A
0.490	30	Meadow, non-grazed, HSG A
0.530	33	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	67	0.0920	2.12		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
5.2	117	Total			

Summary for Subcatchment 31:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.110	30	Meadow, non-grazed, HSG A
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.1	9	0.1100	2.32		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
3.5	59	Total			

Summary for Subcatchment 40:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

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Area (ac)	CN	Description
0.100	30	Woods, Good, HSG A
0.080	30	Brush, Good, HSG A
* 0.050	96	Gravel surface, HSG A (equipment pad)
0.030	76	Gravel roads, HSG A
1.020	30	Meadow, non-grazed, HSG A
1.280	34	Weighted Average
1.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	35	0.0030	0.02		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
1.3	120	0.0500	1.57		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
0.6	80	0.1000	2.21		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0200	2.28		Shallow Concentrated Flow, E TO F Unpaved Kv= 16.1 fps
0.5	54	0.0600	1.71		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
37.0	311	Total			

Summary for Subcatchment 41:

Runoff = 0.0 cfs @ 15.32 hrs, Volume= 0.001 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.180	30	Meadow, non-grazed, HSG A
0.090	76	Gravel roads, HSG A
0.270	45	Weighted Average
0.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0420	0.14		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	70	0.1000	2.21		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
6.6	120	Total			

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Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Subcatchment 42:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.470	30	Woods, Good, HSG A
0.190	30	Brush, Good, HSG A
1.530	30	Meadow, non-grazed, HSG A
2.190	30	Weighted Average
2.190		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.1600	0.09		Sheet Flow, A TO B
					Woods: Dense underbrush n= 0.800 P2= 3.22"
0.9	95	0.1200	1.73		Shallow Concentrated Flow, B TO C
					Woodland Kv= 5.0 fps
2.4	250	0.0600	1.71		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
12.6	395	Total			

Summary for Subcatchment 50:

Runoff = 0.3 cfs @ 12.61 hrs, Volume= 0.099 af, Depth= 0.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
1.320	30	Woods, Good, HSG A
0.220	30	Brush, Good, HSG A
1.650	30	Meadow, non-grazed, HSG A
2.240	71	Meadow, non-grazed, HSG C
1.230	74	Pasture/grassland/range, Good, HSG C
6.660	52	Weighted Average
6.660		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E Woodland Kv= 5.0 fps
1.2	35	0.0090	0.47		Shallow Concentrated Flow, E TO F Woodland Kv= 5.0 fps
3.3	180	0.0170	0.91		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
19.6	1,483	Total			

Summary for Subcatchment 51:

[45] Hint: Runoff=Zero

Runoff = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (ac)	CN	Description
0.100	30	Meadow, non-grazed, HSG A
0.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.3300	0.26		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.4	45	0.0670	1.81		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
1.7	65	Total			

Summary for Reach 4R:

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 52.9 cfs

Post-Dev

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50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 45.0' Slope= 0.0378 '/'
Inlet Invert= 805.50', Outlet Invert= 803.80'

**Summary for Reach 5R:**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 60.8 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 60.0' Slope= 0.0500 '/'
Inlet Invert= 813.00', Outlet Invert= 810.00'

**Summary for Reach 24R:**

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

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Peak Storage= 0 cf @ 0.01 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 111.0 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 60.0' Slope= 0.1667 '/'

Inlet Invert= 814.00', Outlet Invert= 804.00'

**Summary for Reach 43R:**

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 131.2 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 43.0' Slope= 0.2326 '/'

Inlet Invert= 814.00', Outlet Invert= 804.00'

**Summary for Reach 52R:**

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 64.1 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 90.0' Slope= 0.0556 '/'

Inlet Invert= 815.00', Outlet Invert= 810.00'



Summary for Reach POA-1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin - 1

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 800.00' @ 0.01 hrs Surf.Area= 170 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
800.00	170	0	0
802.00	820	990	990

Device	Routing	Invert	Outlet Devices
#1	Primary	801.75'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Post-Dev

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Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=800.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir**(Controls 0.0 cfs)**Summary for Pond 2: Detention Basin - 2**

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 804.00' @ 0.01 hrs Surf.Area= 220 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	804.00'	940 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
804.00	220	0	0
806.00	720	940	940

Device	Routing	Invert	Outlet Devices
#1	Primary	805.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=804.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir**(Controls 0.0 cfs)**Summary for Pond 2P: 12" HDPE Culvert**

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 806.00' @ 0.01 hrs Surf.Area= 200 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no inflow)

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Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	1,700 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	200	0	0
808.00	1,500	1,700	1,700

Device	Routing	Invert	Outlet Devices
#1	Primary	806.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 806.50' / 806.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=806.00' (Free Discharge)↑**1=Culvert** (Controls 0.0 cfs)**Summary for Pond 4: Detention Basin -4**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 810.00' @ 0.01 hrs Surf.Area= 3,080 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	810.00'	19,280 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
810.00	3,080	0	0
812.00	4,760	7,840	7,840
814.00	6,680	11,440	19,280

Device	Routing	Invert	Outlet Devices
#1	Primary	813.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=810.00' (Free Discharge)↑**1=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Post-Dev

Type III 24-hr 2-Year Rainfall=3.22"

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Summary for Pond 5P: 12" HDPE Culvert

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 814.00' @ 0.01 hrs Surf.Area= 340 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	1,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	340	0	0
816.00	1,390	1,730	1,730

Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=814.00' (Free Discharge)
 ↑1=Culvert (Controls 0.0 cfs)

Summary for Pond 42P: 12" HDPE Culvert

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth = 0.05" for 2-Year event
 Inflow = 0.0 cfs @ 15.32 hrs, Volume= 0.001 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 814.15' @ 24.39 hrs Surf.Area= 365 sf Storage= 45 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	8,960 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	240	0	0
816.00	1,910	2,150	2,150
818.00	4,900	6,810	8,960

Post-Dev

Type III 24-hr 2-Year Rainfall=3.22"

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Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=814.00' (Free Discharge)

↑1=Culvert (Controls 0.0 cfs)

Summary for Pond 51P: Detention Basin-5

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 0.18" for 2-Year event
 Inflow = 0.3 cfs @ 12.61 hrs, Volume= 0.099 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 819.06' @ 25.14 hrs Surf.Area= 4,544 sf Storage= 4,303 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	818.00'	39,360 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
818.00	3,580	0	0
820.00	5,400	8,980	8,980
822.00	7,540	12,940	21,920
824.00	9,900	17,440	39,360

Device	Routing	Invert	Outlet Devices
#1	Primary	821.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=818.00' (Free Discharge)

↑1=Broad-Crested Rectangular Weir(Controls 0.0 cfs)

Post-Dev*Type III 24-hr 10-Year Rainfall=4.83"*

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Time span=0.01-48.00 hrs, dt=0.01 hrs, 4800 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1:	Runoff Area=1.440 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=275' Tc=10.7 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment20:	Runoff Area=0.550 ac 0.00% Impervious Runoff Depth=0.04" Flow Length=276' Tc=14.1 min CN=34 Runoff=0.0 cfs 0.002 af
Subcatchment21:	Runoff Area=0.030 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=76' Tc=3.9 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment22:	Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=90' Tc=4.7 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment30:	Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.03" Flow Length=117' Tc=5.2 min CN=33 Runoff=0.0 cfs 0.001 af
Subcatchment31:	Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=59' Tc=3.5 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment40:	Runoff Area=1.280 ac 0.00% Impervious Runoff Depth=0.04" Flow Length=311' Tc=37.0 min CN=34 Runoff=0.0 cfs 0.005 af
Subcatchment41:	Runoff Area=0.270 ac 0.00% Impervious Runoff Depth=0.39" Flow Length=120' Tc=6.6 min CN=45 Runoff=0.0 cfs 0.009 af
Subcatchment42:	Runoff Area=2.190 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=395' Tc=12.6 min CN=30 Runoff=0.0 cfs 0.000 af
Subcatchment50:	Runoff Area=6.660 ac 0.00% Impervious Runoff Depth=0.73" Flow Length=1,483' Tc=19.6 min CN=52 Runoff=2.7 cfs 0.405 af
Subcatchment51:	Runoff Area=0.100 ac 0.00% Impervious Runoff Depth=0.00" Flow Length=65' Tc=1.7 min CN=30 Runoff=0.0 cfs 0.000 af
Reach 4R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=45.0' S=0.0378 '/' Capacity=52.9 cfs Outflow=0.0 cfs 0.000 af
Reach 5R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=60.0' S=0.0500 '/' Capacity=60.8 cfs Outflow=0.0 cfs 0.000 af
Reach 24R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=60.0' S=0.1667 '/' Capacity=111.0 cfs Outflow=0.0 cfs 0.000 af
Reach 43R:	Avg. Flow Depth=0.00' Max Vel=0.44 fps Inflow=0.0 cfs 0.004 af n=0.030 L=43.0' S=0.2326 '/' Capacity=131.2 cfs Outflow=0.0 cfs 0.004 af
Reach 52R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=90.0' S=0.0556 '/' Capacity=64.1 cfs Outflow=0.0 cfs 0.000 af

Post-Dev*Type III 24-hr 10-Year Rainfall=4.83"*

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Reach POA-1:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-2:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-3:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Reach POA-4:	Inflow=0.0 cfs 0.008 af Outflow=0.0 cfs 0.008 af
Reach POA-5:	Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 1P: Detention Basin - 1	Peak Elev=800.03' Storage=6 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 2: Detention Basin - 2	Peak Elev=804.00' Storage=0 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 2P: 12" HDPE Culvert	Peak Elev=806.30' Storage=88 cf Inflow=0.0 cfs 0.002 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.000 af
Pond 4: Detention Basin -4	Peak Elev=810.00' Storage=9 cf Inflow=0.0 cfs 0.000 af Outflow=0.0 cfs 0.000 af
Pond 5P: 12" HDPE Culvert	Peak Elev=814.14' Storage=54 cf Inflow=0.0 cfs 0.001 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.000 af
Pond 42P: 12" HDPE Culvert	Peak Elev=814.54' Storage=253 cf Inflow=0.0 cfs 0.009 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.0 cfs 0.004 af
Pond 51P: Detention Basin-5	Peak Elev=821.40' Storage=17,622 cf Inflow=2.7 cfs 0.405 af Outflow=0.0 cfs 0.000 af

Total Runoff Area = 13.250 ac Runoff Volume = 0.422 af Average Runoff Depth = 0.38"
100.00% Pervious = 13.250 ac 0.00% Impervious = 0.000 ac

Post-Dev

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Summary for Subcatchment 1:

Runoff = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
1.140	30	Meadow, non-grazed, HSG A
1.440	30	Weighted Average
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.0	145	0.1100	2.32		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.5	80	0.0030	0.38		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
10.7	275	Total			

Summary for Subcatchment 20:

Runoff = 0.0 cfs @ 16.87 hrs, Volume= 0.002 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.090	30	Brush, Good, HSG A
0.410	30	Meadow, non-grazed, HSG A
0.050	76	Gravel roads, HSG A
0.550	34	Weighted Average
0.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0080	0.07		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
2.3	226	0.0530	1.61		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
14.1	276	Total			

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Summary for Subcatchment 21:

Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.030	30	Meadow, non-grazed, HSG A
0.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.1500	0.23		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
0.3	26	0.0540	1.63		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.9	76	Total			

Summary for Subcatchment 22:

Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.090	30	Meadow, non-grazed, HSG A
0.090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.3	40	0.0050	0.49		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
4.7	90	Total			

Summary for Subcatchment 30:

Runoff = 0.0 cfs @ 20.84 hrs, Volume= 0.001 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

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Type III 24-hr 10-Year Rainfall=4.83"

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Area (ac)	CN	Description
0.040	76	Gravel roads, HSG A
0.490	30	Meadow, non-grazed, HSG A
0.530	33	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	67	0.0920	2.12		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
5.2	117	Total			

Summary for Subcatchment 31:

Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.110	30	Meadow, non-grazed, HSG A
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.1	9	0.1100	2.32		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
3.5	59	Total			

Summary for Subcatchment 40:

Runoff = 0.0 cfs @ 17.23 hrs, Volume= 0.005 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.100	30	Woods, Good, HSG A
0.080	30	Brush, Good, HSG A
* 0.050	96	Gravel surface, HSG A (equipment pad)
0.030	76	Gravel roads, HSG A
1.020	30	Meadow, non-grazed, HSG A
1.280	34	Weighted Average
1.280		100.00% Pervious Area

Post-Dev

Type III 24-hr 10-Year Rainfall=4.83"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	35	0.0030	0.02		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
1.3	120	0.0500	1.57		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
0.6	80	0.1000	2.21		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0200	2.28		Shallow Concentrated Flow, E TO F Unpaved Kv= 16.1 fps
0.5	54	0.0600	1.71		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
37.0	311	Total			

Summary for Subcatchment 41:

Runoff = 0.0 cfs @ 12.34 hrs, Volume= 0.009 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.180	30	Meadow, non-grazed, HSG A
0.090	76	Gravel roads, HSG A
0.270	45	Weighted Average
0.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0420	0.14		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	70	0.1000	2.21		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
6.6	120	Total			

Summary for Subcatchment 42:

Runoff = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
0.470	30	Woods, Good, HSG A
0.190	30	Brush, Good, HSG A
1.530	30	Meadow, non-grazed, HSG A
2.190	30	Weighted Average
2.190		100.00% Pervious Area

Post-Dev

Type III 24-hr 10-Year Rainfall=4.83"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.1600	0.09		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
0.9	95	0.1200	1.73		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
2.4	250	0.0600	1.71		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
12.6	395	Total			

Summary for Subcatchment 50:

Runoff = 2.7 cfs @ 12.37 hrs, Volume= 0.405 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

Area (ac)	CN	Description
1.320	30	Woods, Good, HSG A
0.220	30	Brush, Good, HSG A
1.650	30	Meadow, non-grazed, HSG A
2.240	71	Meadow, non-grazed, HSG C
1.230	74	Pasture/grassland/range, Good, HSG C
6.660	52	Weighted Average
6.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E Woodland Kv= 5.0 fps
1.2	35	0.0090	0.47		Shallow Concentrated Flow, E TO F Woodland Kv= 5.0 fps
3.3	180	0.0170	0.91		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
19.6	1,483	Total			

Summary for Subcatchment 51:

Runoff = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.83"

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Area (ac)	CN	Description
0.100	30	Meadow, non-grazed, HSG A
0.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.3300	0.26		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.4	45	0.0670	1.81		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
1.7	65	Total			

Summary for Reach 4R:

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 52.9 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
 Side Slope Z-value= 50.0 '/' Top Width= 75.00'
 Length= 45.0' Slope= 0.0378 '/'
 Inlet Invert= 805.50', Outlet Invert= 803.80'

**Summary for Reach 5R:**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 60.8 cfs

Post-Dev

Type III 24-hr 10-Year Rainfall=4.83"

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50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 60.0' Slope= 0.0500 '/'
Inlet Invert= 813.00', Outlet Invert= 810.00'

**Summary for Reach 24R:**

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 111.0 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 60.0' Slope= 0.1667 '/'
Inlet Invert= 814.00', Outlet Invert= 804.00'

**Summary for Reach 43R:**

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth > 0.16" for 10-Year event
Inflow = 0.0 cfs @ 17.89 hrs, Volume= 0.004 af
Outflow = 0.0 cfs @ 17.95 hrs, Volume= 0.004 af, Atten= 0%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 1.6 min

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Peak Storage= 1 cf @ 17.92 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 131.2 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 43.0' Slope= 0.2326 '/'

Inlet Invert= 814.00', Outlet Invert= 804.00'

**Summary for Reach 52R:**

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min

Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs

Average Depth at Peak Storage= 0.00'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 64.1 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 90.0' Slope= 0.0556 '/'

Inlet Invert= 815.00', Outlet Invert= 810.00'

**Summary for Reach POA-1:**

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event

Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth > 0.03" for 10-Year event
Inflow = 0.0 cfs @ 17.72 hrs, Volume= 0.008 af
Outflow = 0.0 cfs @ 17.72 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin - 1

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af
Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

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Peak Elev= 800.03' @ 24.62 hrs Surf.Area= 181 sf Storage= 6 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
800.00	170	0	0
802.00	820	990	990

Device	Routing	Invert	Outlet Devices
#1	Primary	801.75'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=800.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir**(Controls 0.0 cfs)**Summary for Pond 2: Detention Basin - 2**

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 24.00 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 804.00' @ 24.23 hrs Surf.Area= 220 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	804.00'	940 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
804.00	220	0	0
806.00	720	940	940

Device	Routing	Invert	Outlet Devices
#1	Primary	805.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

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Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=804.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir** (Controls 0.0 cfs)**Summary for Pond 2P: 12" HDPE Culvert**

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth = 0.04" for 10-Year event
 Inflow = 0.0 cfs @ 16.87 hrs, Volume= 0.002 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 806.30' @ 24.79 hrs Surf.Area= 393 sf Storage= 88 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	1,700 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	200	0	0
808.00	1,500	1,700	1,700

Device	Routing	Invert	Outlet Devices
#1	Primary	806.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 806.50' / 806.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=806.00' (Free Discharge)↑1=**Culvert** (Controls 0.0 cfs)**Summary for Pond 4: Detention Basin -4**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.0 cfs @ 24.02 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 810.00' @ 24.73 hrs Surf.Area= 3,082 sf Storage= 9 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	810.00'	19,280 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
810.00	3,080	0	0
812.00	4,760	7,840	7,840
814.00	6,680	11,440	19,280

Device	Routing	Invert	Outlet Devices
#1	Primary	813.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=810.00' (Free Discharge)

↑1=**Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 5P: 12" HDPE Culvert

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.03" for 10-Year event
 Inflow = 0.0 cfs @ 20.84 hrs, Volume= 0.001 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 814.14' @ 24.30 hrs Surf.Area= 415 sf Storage= 54 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	1,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	340	0	0
816.00	1,390	1,730	1,730

Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=814.00' (Free Discharge)

↑1=**Culvert** (Controls 0.0 cfs)

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Summary for Pond 42P: 12" HDPE Culvert

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth = 0.39" for 10-Year event
 Inflow = 0.0 cfs @ 12.34 hrs, Volume= 0.009 af
 Outflow = 0.0 cfs @ 17.89 hrs, Volume= 0.004 af, Atten= 87%, Lag= 333.4 min
 Primary = 0.0 cfs @ 17.89 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 814.54' @ 17.89 hrs Surf.Area= 693 sf Storage= 253 cf

Plug-Flow detention time= 487.7 min calculated for 0.004 af (41% of inflow)
 Center-of-Mass det. time= 308.2 min (1,262.0 - 953.8)

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	8,960 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	240	0	0
816.00	1,910	2,150	2,150
818.00	4,900	6,810	8,960

Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 ' S Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.0 cfs @ 17.89 hrs HW=814.54' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.0 cfs @ 0.63 fps)

Summary for Pond 51P: Detention Basin-5

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 0.73" for 10-Year event
 Inflow = 2.7 cfs @ 12.37 hrs, Volume= 0.405 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 821.40' @ 25.14 hrs Surf.Area= 6,903 sf Storage= 17,622 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	818.00'	39,360 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
818.00	3,580	0	0
820.00	5,400	8,980	8,980
822.00	7,540	12,940	21,920
824.00	9,900	17,440	39,360

Device	Routing	Invert	Outlet Devices
#1	Primary	821.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=818.00' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.0 cfs)

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Time span=0.01-48.00 hrs, dt=0.01 hrs, 4800 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1:	Runoff Area=1.440 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=275' Tc=10.7 min CN=30 Runoff=0.3 cfs 0.069 af
Subcatchment20:	Runoff Area=0.550 ac 0.00% Impervious Runoff Depth=0.94" Flow Length=276' Tc=14.1 min CN=34 Runoff=0.2 cfs 0.043 af
Subcatchment21:	Runoff Area=0.030 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=76' Tc=3.9 min CN=30 Runoff=0.0 cfs 0.001 af
Subcatchment22:	Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=90' Tc=4.7 min CN=30 Runoff=0.0 cfs 0.004 af
Subcatchment30:	Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.84" Flow Length=117' Tc=5.2 min CN=33 Runoff=0.2 cfs 0.037 af
Subcatchment31:	Runoff Area=0.110 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=59' Tc=3.5 min CN=30 Runoff=0.0 cfs 0.005 af
Subcatchment40:	Runoff Area=1.280 ac 0.00% Impervious Runoff Depth=0.94" Flow Length=311' Tc=37.0 min CN=34 Runoff=0.4 cfs 0.100 af
Subcatchment41:	Runoff Area=0.270 ac 0.00% Impervious Runoff Depth=2.08" Flow Length=120' Tc=6.6 min CN=45 Runoff=0.6 cfs 0.047 af
Subcatchment42:	Runoff Area=2.190 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=395' Tc=12.6 min CN=30 Runoff=0.4 cfs 0.106 af
Subcatchment50:	Runoff Area=6.660 ac 0.00% Impervious Runoff Depth=2.88" Flow Length=1,483' Tc=19.6 min CN=52 Runoff=14.5 cfs 1.599 af
Subcatchment51:	Runoff Area=0.100 ac 0.00% Impervious Runoff Depth=0.58" Flow Length=65' Tc=1.7 min CN=30 Runoff=0.0 cfs 0.005 af
Reach 4R:	Avg. Flow Depth=0.00' Max Vel=0.27 fps Inflow=0.1 cfs 0.026 af n=0.030 L=45.0' S=0.0378 '/' Capacity=52.9 cfs Outflow=0.1 cfs 0.026 af
Reach 5R:	Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.0 cfs 0.000 af n=0.030 L=60.0' S=0.0500 '/' Capacity=60.8 cfs Outflow=0.0 cfs 0.000 af
Reach 24R:	Avg. Flow Depth=0.00' Max Vel=0.48 fps Inflow=0.1 cfs 0.032 af n=0.030 L=60.0' S=0.1667 '/' Capacity=111.0 cfs Outflow=0.1 cfs 0.032 af
Reach 43R:	Avg. Flow Depth=0.01' Max Vel=0.84 fps Inflow=0.3 cfs 0.042 af n=0.030 L=43.0' S=0.2326 '/' Capacity=131.2 cfs Outflow=0.3 cfs 0.042 af
Reach 52R:	Avg. Flow Depth=0.08' Max Vel=2.08 fps Inflow=9.0 cfs 1.179 af n=0.030 L=90.0' S=0.0556 '/' Capacity=64.1 cfs Outflow=9.0 cfs 1.179 af

Post-Dev*Type III 24-hr 100-Year Rainfall=8.64"*

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Reach POA-1:	Inflow=0.1 cfs 0.051 af Outflow=0.1 cfs 0.051 af
Reach POA-2:	Inflow=0.1 cfs 0.031 af Outflow=0.1 cfs 0.031 af
Reach POA-3:	Inflow=0.1 cfs 0.037 af Outflow=0.1 cfs 0.037 af
Reach POA-4:	Inflow=0.6 cfs 0.142 af Outflow=0.6 cfs 0.142 af
Reach POA-5:	Inflow=9.0 cfs 1.184 af Outflow=9.0 cfs 1.184 af
Pond 1P: Detention Basin - 1	Peak Elev=801.78' Storage=817 cf Inflow=0.3 cfs 0.069 af Outflow=0.1 cfs 0.051 af
Pond 2: Detention Basin - 2	Peak Elev=805.52' Storage=623 cf Inflow=0.2 cfs 0.040 af Outflow=0.1 cfs 0.026 af
Pond 2P: 12" HDPE Culvert	Peak Elev=806.72' Storage=315 cf Inflow=0.2 cfs 0.043 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.1 cfs 0.039 af
Pond 4: Detention Basin -4	Peak Elev=811.27' Storage=4,596 cf Inflow=0.4 cfs 0.106 af Outflow=0.0 cfs 0.000 af
Pond 5P: 12" HDPE Culvert	Peak Elev=814.67' Storage=342 cf Inflow=0.2 cfs 0.037 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.1 cfs 0.032 af
Pond 42P: 12" HDPE Culvert	Peak Elev=814.81' Storage=466 cf Inflow=0.6 cfs 0.047 af 12.0" Round Culvert n=0.020 L=16.0' S=0.0125 '/' Outflow=0.3 cfs 0.042 af
Pond 51P: Detention Basin-5	Peak Elev=822.00' Storage=21,884 cf Inflow=14.5 cfs 1.599 af Outflow=9.0 cfs 1.179 af

Total Runoff Area = 13.250 ac Runoff Volume = 2.016 af Average Runoff Depth = 1.83"
100.00% Pervious = 13.250 ac 0.00% Impervious = 0.000 ac

Post-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Summary for Subcatchment 1:

Runoff = 0.3 cfs @ 12.44 hrs, Volume= 0.069 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.300	30	Woods, Good, HSG A
1.140	30	Meadow, non-grazed, HSG A
1.440	30	Weighted Average
1.440		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.0	145	0.1100	2.32		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.5	80	0.0030	0.38		Shallow Concentrated Flow, C TO D
					Short Grass Pasture Kv= 7.0 fps
10.7	275	Total			

Summary for Subcatchment 20:

Runoff = 0.2 cfs @ 12.39 hrs, Volume= 0.043 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.090	30	Brush, Good, HSG A
0.410	30	Meadow, non-grazed, HSG A
0.050	76	Gravel roads, HSG A
0.550	34	Weighted Average
0.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0080	0.07		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
2.3	226	0.0530	1.61		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
14.1	276	Total			

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Summary for Subcatchment 21:

Runoff = 0.0 cfs @ 12.33 hrs, Volume= 0.001 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.030	30	Meadow, non-grazed, HSG A
0.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.1500	0.23		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
0.3	26	0.0540	1.63		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
3.9	76	Total			

Summary for Subcatchment 22:

Runoff = 0.0 cfs @ 12.34 hrs, Volume= 0.004 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.090	30	Meadow, non-grazed, HSG A
0.090		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B
					Grass: Dense n= 0.240 P2= 3.22"
1.3	40	0.0050	0.49		Shallow Concentrated Flow, B TO C
					Short Grass Pasture Kv= 7.0 fps
4.7	90	Total			

Summary for Subcatchment 30:

Runoff = 0.2 cfs @ 12.14 hrs, Volume= 0.037 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

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Type III 24-hr 100-Year Rainfall=8.64"

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Area (ac)	CN	Description
0.040	76	Gravel roads, HSG A
0.490	30	Meadow, non-grazed, HSG A
0.530	33	Weighted Average
0.530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0800	0.18		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	67	0.0920	2.12		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
5.2	117	Total			

Summary for Subcatchment 31:

Runoff = 0.0 cfs @ 12.32 hrs, Volume= 0.005 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.110	30	Meadow, non-grazed, HSG A
0.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.1800	0.25		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.1	9	0.1100	2.32		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
3.5	59	Total			

Summary for Subcatchment 40:

Runoff = 0.4 cfs @ 12.71 hrs, Volume= 0.100 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.100	30	Woods, Good, HSG A
0.080	30	Brush, Good, HSG A
* 0.050	96	Gravel surface, HSG A (equipment pad)
0.030	76	Gravel roads, HSG A
1.020	30	Meadow, non-grazed, HSG A
1.280	34	Weighted Average
1.280		100.00% Pervious Area

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Type III 24-hr 100-Year Rainfall=8.64"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
34.4	35	0.0030	0.02		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
1.3	120	0.0500	1.57		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
0.6	80	0.1000	2.21		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
0.2	22	0.0200	2.28		Shallow Concentrated Flow, E TO F Unpaved Kv= 16.1 fps
0.5	54	0.0600	1.71		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
37.0	311	Total			

Summary for Subcatchment 41:

Runoff = 0.6 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.180	30	Meadow, non-grazed, HSG A
0.090	76	Gravel roads, HSG A
0.270	45	Weighted Average
0.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0420	0.14		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.5	70	0.1000	2.21		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
6.6	120	Total			

Summary for Subcatchment 42:

Runoff = 0.4 cfs @ 12.47 hrs, Volume= 0.106 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
0.470	30	Woods, Good, HSG A
0.190	30	Brush, Good, HSG A
1.530	30	Meadow, non-grazed, HSG A
2.190	30	Weighted Average
2.190		100.00% Pervious Area

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Type III 24-hr 100-Year Rainfall=8.64"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.1600	0.09		Sheet Flow, A TO B Woods: Dense underbrush n= 0.800 P2= 3.22"
0.9	95	0.1200	1.73		Shallow Concentrated Flow, B TO C Woodland Kv= 5.0 fps
2.4	250	0.0600	1.71		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
12.6	395	Total			

Summary for Subcatchment 50:

Runoff = 14.5 cfs @ 12.30 hrs, Volume= 1.599 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

Area (ac)	CN	Description
1.320	30	Woods, Good, HSG A
0.220	30	Brush, Good, HSG A
1.650	30	Meadow, non-grazed, HSG A
2.240	71	Meadow, non-grazed, HSG C
1.230	74	Pasture/grassland/range, Good, HSG C
6.660	52	Weighted Average
6.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0200	0.13		Sheet Flow, A TO B Cultivated: Residue>20% n= 0.170 P2= 3.22"
0.4	43	0.0470	1.95		Shallow Concentrated Flow, B TO C Cultivated Straight Rows Kv= 9.0 fps
5.7	910	0.1450	2.67		Shallow Concentrated Flow, C TO D Short Grass Pasture Kv= 7.0 fps
2.8	265	0.1020	1.60		Shallow Concentrated Flow, D TO E Woodland Kv= 5.0 fps
1.2	35	0.0090	0.47		Shallow Concentrated Flow, E TO F Woodland Kv= 5.0 fps
3.3	180	0.0170	0.91		Shallow Concentrated Flow, F TO G Short Grass Pasture Kv= 7.0 fps
19.6	1,483	Total			

Summary for Subcatchment 51:

Runoff = 0.0 cfs @ 12.30 hrs, Volume= 0.005 af, Depth= 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.64"

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Area (ac)	CN	Description
0.100	30	Meadow, non-grazed, HSG A
0.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	20	0.3300	0.26		Sheet Flow, A TO B Grass: Dense n= 0.240 P2= 3.22"
0.4	45	0.0670	1.81		Shallow Concentrated Flow, B TO C Short Grass Pasture Kv= 7.0 fps
1.7	65	Total			

Summary for Reach 4R:

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.54" for 100-Year event
 Inflow = 0.1 cfs @ 14.39 hrs, Volume= 0.026 af
 Outflow = 0.1 cfs @ 14.49 hrs, Volume= 0.026 af, Atten= 0%, Lag= 6.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.27 fps, Min. Travel Time= 2.7 min
 Avg. Velocity = 0.19 fps, Avg. Travel Time= 4.0 min

Peak Storage= 11 cf @ 14.45 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 52.9 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
 Side Slope Z-value= 50.0 '/' Top Width= 75.00'
 Length= 45.0' Slope= 0.0378 '/'
 Inlet Invert= 805.50', Outlet Invert= 803.80'

**Summary for Reach 5R:**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.00" for 100-Year event
 Inflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.01 hrs
 Average Depth at Peak Storage= 0.00'
 Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 60.8 cfs

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50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 60.0' Slope= 0.0500 '/'
Inlet Invert= 813.00', Outlet Invert= 810.00'

**Summary for Reach 24R:**

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.72" for 100-Year event
Inflow = 0.1 cfs @ 12.89 hrs, Volume= 0.032 af
Outflow = 0.1 cfs @ 12.94 hrs, Volume= 0.032 af, Atten= 0%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 2.7 min

Peak Storage= 10 cf @ 12.91 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 111.0 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 50.0 '/' Top Width= 75.00'
Length= 60.0' Slope= 0.1667 '/'
Inlet Invert= 814.00', Outlet Invert= 804.00'

**Summary for Reach 43R:**

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth = 1.86" for 100-Year event
Inflow = 0.3 cfs @ 12.39 hrs, Volume= 0.042 af
Outflow = 0.3 cfs @ 12.41 hrs, Volume= 0.042 af, Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.84 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 1.6 min

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Peak Storage= 14 cf @ 12.39 hrs

Average Depth at Peak Storage= 0.01'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 131.2 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 43.0' Slope= 0.2326 '/'

Inlet Invert= 814.00', Outlet Invert= 804.00'



Summary for Reach 52R:

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 2.12" for 100-Year event

Inflow = 9.0 cfs @ 12.58 hrs, Volume= 1.179 af

Outflow = 9.0 cfs @ 12.60 hrs, Volume= 1.179 af, Atten= 0%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Max. Velocity= 2.08 fps, Min. Travel Time= 0.7 min

Avg. Velocity = 0.71 fps, Avg. Travel Time= 2.1 min

Peak Storage= 392 cf @ 12.59 hrs

Average Depth at Peak Storage= 0.08'

Bank-Full Depth= 0.25' Flow Area= 15.6 sf, Capacity= 64.1 cfs

50.00' x 0.25' deep channel, n= 0.030 Earth, grassed & winding

Side Slope Z-value= 50.0 '/' Top Width= 75.00'

Length= 90.0' Slope= 0.0556 '/'

Inlet Invert= 815.00', Outlet Invert= 810.00'



Summary for Reach POA-1:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.43" for 100-Year event

Inflow = 0.1 cfs @ 13.63 hrs, Volume= 0.051 af

Outflow = 0.1 cfs @ 13.63 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

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Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-2:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.670 ac, 0.00% Impervious, Inflow Depth = 0.55" for 100-Year event
Inflow = 0.1 cfs @ 14.49 hrs, Volume= 0.031 af
Outflow = 0.1 cfs @ 14.49 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-3:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.70" for 100-Year event
Inflow = 0.1 cfs @ 12.92 hrs, Volume= 0.037 af
Outflow = 0.1 cfs @ 12.92 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-4:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 3.740 ac, 0.00% Impervious, Inflow Depth = 0.45" for 100-Year event
Inflow = 0.6 cfs @ 12.62 hrs, Volume= 0.142 af
Outflow = 0.6 cfs @ 12.62 hrs, Volume= 0.142 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Reach POA-5:

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 6.760 ac, 0.00% Impervious, Inflow Depth = 2.10" for 100-Year event
Inflow = 9.0 cfs @ 12.60 hrs, Volume= 1.184 af
Outflow = 9.0 cfs @ 12.60 hrs, Volume= 1.184 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Detention Basin - 1

Inflow Area = 1.440 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
Inflow = 0.3 cfs @ 12.44 hrs, Volume= 0.069 af
Outflow = 0.1 cfs @ 13.63 hrs, Volume= 0.051 af, Atten= 58%, Lag= 71.4 min
Primary = 0.1 cfs @ 13.63 hrs, Volume= 0.051 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

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Peak Elev= 801.78' @ 13.63 hrs Surf.Area= 749 sf Storage= 817 cf

Plug-Flow detention time= 181.5 min calculated for 0.051 af (74% of inflow)

Center-of-Mass det. time= 78.3 min (1,050.3 - 972.0)

Volume	Invert	Avail.Storage	Storage Description
#1	800.00'	990 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
800.00	170	0	0
802.00	820	990	990

Device	Routing	Invert	Outlet Devices
#1	Primary	801.75'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.1 cfs @ 13.63 hrs HW=801.78' (Free Discharge)↑1=**Broad-Crested Rectangular Weir**(Weir Controls 0.1 cfs @ 0.41 fps)**Summary for Pond 2: Detention Basin - 2**

Inflow Area = 0.580 ac, 0.00% Impervious, Inflow Depth = 0.83" for 100-Year event
 Inflow = 0.2 cfs @ 12.67 hrs, Volume= 0.040 af
 Outflow = 0.1 cfs @ 14.39 hrs, Volume= 0.026 af, Atten= 57%, Lag= 103.3 min
 Primary = 0.1 cfs @ 14.39 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 805.52' @ 14.39 hrs Surf.Area= 600 sf Storage= 623 cf

Plug-Flow detention time= 242.6 min calculated for 0.026 af (65% of inflow)

Center-of-Mass det. time= 108.9 min (1,097.7 - 988.8)

Volume	Invert	Avail.Storage	Storage Description
#1	804.00'	940 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
804.00	220	0	0
806.00	720	940	940

Device	Routing	Invert	Outlet Devices
#1	Primary	805.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Post-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Primary OutFlow Max=0.1 cfs @ 14.39 hrs HW=805.52' (Free Discharge)↑1=**Broad-Crested Rectangular Weir** (Weir Controls 0.1 cfs @ 0.33 fps)**Summary for Pond 2P: 12" HDPE Culvert**

Inflow Area = 0.550 ac, 0.00% Impervious, Inflow Depth = 0.94" for 100-Year event
 Inflow = 0.2 cfs @ 12.39 hrs, Volume= 0.043 af
 Outflow = 0.1 cfs @ 12.67 hrs, Volume= 0.039 af, Atten= 40%, Lag= 17.3 min
 Primary = 0.1 cfs @ 12.67 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 806.72' @ 12.67 hrs Surf.Area= 671 sf Storage= 315 cf

Plug-Flow detention time= 95.4 min calculated for 0.039 af (90% of inflow)
 Center-of-Mass det. time= 50.5 min (989.7 - 939.2)

Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	1,700 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	200	0	0
808.00	1,500	1,700	1,700

Device	Routing	Invert	Outlet Devices
#1	Primary	806.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 806.50' / 806.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.1 cfs @ 12.67 hrs HW=806.72' (Free Discharge)↑1=**Culvert** (Barrel Controls 0.1 cfs @ 1.69 fps)**Summary for Pond 4: Detention Basin -4**

Inflow Area = 2.190 ac, 0.00% Impervious, Inflow Depth = 0.58" for 100-Year event
 Inflow = 0.4 cfs @ 12.47 hrs, Volume= 0.106 af
 Outflow = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.0 cfs @ 0.01 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 811.27' @ 24.73 hrs Surf.Area= 4,148 sf Storage= 4,596 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	810.00'	19,280 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Post-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
810.00	3,080	0	0
812.00	4,760	7,840	7,840
814.00	6,680	11,440	19,280

Device	Routing	Invert	Outlet Devices
#1	Primary	813.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.0 cfs @ 0.01 hrs HW=810.00' (Free Discharge)↑1=**Broad-Crested Rectangular Weir**(Controls 0.0 cfs)**Summary for Pond 5P: 12" HDPE Culvert**

Inflow Area = 0.530 ac, 0.00% Impervious, Inflow Depth = 0.84" for 100-Year event
Inflow = 0.2 cfs @ 12.14 hrs, Volume= 0.037 af
Outflow = 0.1 cfs @ 12.89 hrs, Volume= 0.032 af, Atten= 63%, Lag= 44.7 min
Primary = 0.1 cfs @ 12.89 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs

Peak Elev= 814.67' @ 12.89 hrs Surf.Area= 689 sf Storage= 342 cf

Plug-Flow detention time= 135.1 min calculated for 0.032 af (85% of inflow)

Center-of-Mass det. time= 71.2 min (1,009.6 - 938.4)

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	1,730 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	340	0	0
816.00	1,390	1,730	1,730

Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.1 cfs @ 12.89 hrs HW=814.67' (Free Discharge)↑1=**Culvert** (Barrel Controls 0.1 cfs @ 1.44 fps)

Post-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Summary for Pond 42P: 12" HDPE Culvert

Inflow Area = 0.270 ac, 0.00% Impervious, Inflow Depth = 2.08" for 100-Year event
 Inflow = 0.6 cfs @ 12.11 hrs, Volume= 0.047 af
 Outflow = 0.3 cfs @ 12.39 hrs, Volume= 0.042 af, Atten= 52%, Lag= 16.5 min
 Primary = 0.3 cfs @ 12.39 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 814.81' @ 12.39 hrs Surf.Area= 914 sf Storage= 466 cf

Plug-Flow detention time= 105.8 min calculated for 0.042 af (89% of inflow)
 Center-of-Mass det. time= 53.4 min (933.9 - 880.5)

Volume	Invert	Avail.Storage	Storage Description
#1	814.00'	8,960 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
814.00	240	0	0
816.00	1,910	2,150	2,150
818.00	4,900	6,810	8,960

Device	Routing	Invert	Outlet Devices
#1	Primary	814.50'	12.0" Round Culvert L= 16.0' Ke= 0.900 Inlet / Outlet Invert= 814.50' / 814.30' S= 0.0125 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.3 cfs @ 12.39 hrs HW=814.81' (Free Discharge)

↑**1=Culvert** (Barrel Controls 0.3 cfs @ 1.98 fps)

Summary for Pond 51P: Detention Basin-5

Inflow Area = 6.660 ac, 0.00% Impervious, Inflow Depth = 2.88" for 100-Year event
 Inflow = 14.5 cfs @ 12.30 hrs, Volume= 1.599 af
 Outflow = 9.0 cfs @ 12.58 hrs, Volume= 1.179 af, Atten= 37%, Lag= 16.9 min
 Primary = 9.0 cfs @ 12.58 hrs, Volume= 1.179 af

Routing by Stor-Ind method, Time Span= 0.01-48.00 hrs, dt= 0.01 hrs
 Peak Elev= 822.00' @ 12.58 hrs Surf.Area= 7,535 sf Storage= 21,884 cf

Plug-Flow detention time= 160.2 min calculated for 1.179 af (74% of inflow)
 Center-of-Mass det. time= 63.7 min (936.7 - 873.0)

Volume	Invert	Avail.Storage	Storage Description
#1	818.00'	39,360 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Post-Dev

Type III 24-hr 100-Year Rainfall=8.64"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
818.00	3,580	0	0
820.00	5,400	8,980	8,980
822.00	7,540	12,940	21,920
824.00	9,900	17,440	39,360

Device	Routing	Invert	Outlet Devices
#1	Primary	821.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.0 cfs @ 12.58 hrs HW=822.00' (Free Discharge)
 **1=Broad-Crested Rectangular Weir**(Weir Controls 9.0 cfs @ 1.83 fps)

Annual Site Inspection Protocol

Operation & Maintenance Department

SERVICES

During the Term, Contractor shall perform the following services on each System:

Each System will be installed with an Internet-based Data Acquisition System (DAS). The DAS will have the capability to send alarms identifying communication and power generation issues.

Description of Work	Frequency of Inspection
On-Call System Service Technician	Per request
Full System Electrical Inspection & Maintenance	One time per year
Module Washing	Optional (maximum once per year)
Vegetation Management	Minimum of once per year
Landscaping	Minimum of once per year
Gravel Access Road	Minimum of once per year

In the event that the Town of Hubbardston finds the facility owner failing to properly maintain the facility in working order, the town may issue a notice of violation. If after notice by the Permit Granting Authority to correct a violation requiring maintenance work, satisfactory corrections are not made by the owner(s) within thirty days, the Town may perform all necessary work to place the facility in proper working condition and place a municipal lien on the affected property as security for all of the costs assumed by the town to perform the work. The owner(s) of the facility shall be assessed the cost of the work and any penalties.

Scope of Work

1. On-call Service Technician:

In response to an automated DAS alarm or request by Customer, a Service Technician will be required to visit the site within three (3) business days of notification to trouble shoot and resolve the issue. Emergency situations may require faster response.

2. System Electrical Inspection & Maintenance:

a. Electrical Maintenance

The technician will:

- Perform a visual inspection of PV modules and array wiring, strain relief, mounting system, trackers, inverters, switchgear, transformers, combiner boxes, wireways and conduit, data acquisition system, weather sensors and outdoor lighting.
- Check pyranometers and reference cells.
- Record operational data from inverters and meters.
- IR Thermography may be used as part of the visual inspection process.

b. Inspect External and/or Internal DC Disconnects and Combiner Boxes

During the inspection, the technician will:

- Ensure that Imp testing is performed on all DC strings, and values are logged on the Borrego provided form.

- ii. Spot check torque values and tighten loose electrical connections.
 - c. Inverter and Transformer
 - The technician will:
 - i. Clean out all electrical enclosures
 - ii. Clean inverter air filters
 - iii. Perform Preventive Maintenance per manufacturer protocol as required to maintain inverter manufacturer's warranty.
 - d. AC Disconnects
 - i. The technician will check for proper operation.
 - e. DAS
 - i. Verify with Borrego O&M representative before leaving site that the DAS system is functioning properly.
 - f. Fencing, Gates, Civil
 - i. Annual visit will include a visual inspection of any fences, gates, equipment pads, etc. Facility improvements installed by Borrego Solar such as gravel access roads, etc. shall be inspected on a periodic basis per Borrego Solar.
 - g. Service Report
 - i. A report must be filed with Borrego noting results of the annual inspection.
3. **Module Washing.** At a maximum, modules might be washed once per year. Only clean water will be used. No chemical additives or cleaners will be used. Additional washings may be requested by Borrego based upon system performance objectives and site-specific environmental conditions.
4. **Vegetation Management.** The site shall be inspected for evidence of erosion and rilling in any slopes. Any such conditions shall be noted in the annual report for re-vegetating.
- Growth of trees or other vegetation that is having a shade impact on the arrays should be noted in the annual report. Vegetation growth (saplings, bush, large weeds, etc.) within any array fences or inverter enclosures shall be removed.
5. **Gravel Access Road.** The road and roadside swales shall be inspected for evidence of erosion, rilling and clogging. These conditions shall be noted and supported with photographs and locations as part of the annual report.

PV Engineers/Borrego Solar System, Inc.
Joe Thorpe, Director of Operations & Maintenance

Signature

Date

Long Term Pollution Prevention Plan

Hours of Operation

The hours of operation on site during construction will be as follows:

7AM – 5PM Monday – Friday

8AM – 12PM Saturday (No heavy equipment work or other significant noise generating activities permitted on Saturday)

Following construction completion, work on site will be infrequent. Maintenance activities will be conducted during the above specified hours, except in the case of emergency.

Good Housekeeping Practices

The Owner/Operator shall employ the use of good housekeeping practices by adhering to the maintenance schedules and procedures described in Appendix B - Operations and Maintenance Plan of this report.

Provisions for storing materials/waste products

The storing of hazardous materials and waste is not anticipated with this project. Materials Safety Data Sheets (MSDS) are not required since no materials or substances will be permanently stored on site.

Vehicle Washing

On site washing of vehicles is not anticipated with this project. Vehicles will be washed off site. Only clean vehicles are permitted on site. A concrete wash-out will be provided during construction for washing vehicles on entrance and exit from project, if necessary. Wash-out area to be reclaimed following construction.

Solar Panel Washing

The washing of panels is not typically required in the Northeast, as the average monthly rainfall amounts are sufficient to clean the panels. If it is determined that local conditions warrant cleaning of the panels, only clean water will be used.

Requirements for routine inspections and maintenance of stormwater BMP's

The Operator shall adhere to the maintenance schedules and procedures described in Appendix B - Operations and Maintenance Plan of this report.

Spill Prevention and Response Plans

There is a minimal risk of a large spill requiring action on this project. Hazardous materials (such as, pesticides, petroleum products, fertilizers, detergents, acids, paints, cleaning solvents, etc.) will not be stored on-site.

In the event of a spill of hazardous substances or oil, the following procedures must be followed:

- All measures must be taken to contain and abate the spill and to prevent the discharge of hazardous substances or oil to storm water or off-site
- For spills less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless and imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.
- For spills greater than five (5) gallons of material, immediately contact the MassDEP Emergency Response Program at (1-888-304-1133) and an approved emergency response contractor. Provide information to emergency response contractor (or coordinator) on the type of material that spilled, the location, the estimated quantity and the time of the spill.

If there is a Reportable Quantity (RQ) release, notify the National Response Center immediately at (800) 424-8802. Within 14 days a report must be submitted to the EPA Regional Office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Long Term Pollution Prevention Plan must be updated to reflect any changes or steps taken to prevent the same for reoccurring.

Provisions for maintenance of landscaped areas.

Ground cover shall be mowed a minimum of once per year. Additional mowing may be necessary.

Provisions for solid waste management

A solid waste management program during construction (including dumpster, trash receptacles) shall be implemented, inspected and maintained in accordance with local and state requirements. During construction a properly sized dumpster will be on-site. No permanent dumpsters are proposed.

Emergency Contacts

Borrego Solar

Joe Busch, Director of Operations

55 Technology Drive, Suite 2

Lowell, MA 01851

Mobile: 978-602-0630

Office: 978-513-2637

jbusch@borregosolar.com

Joe Thorpe, Director of Operations and Maintenance

55 Technology Drive, Suite 2

Lowell, MA 01851

Mobile: 617-820-8885

Office: 978-513-2608

jthorpe@borregosolar.com

MassDEP Western Regional Office

(413) 784-1100

United States Environmental Protection Agency

(800) 424-8802



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

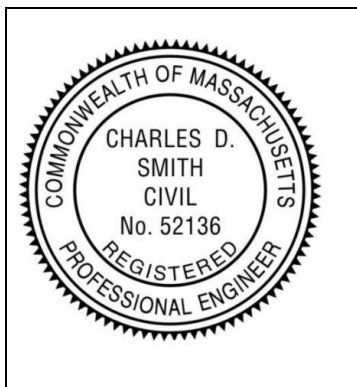
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



1-19-2017

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☒ New development
- ☐ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☒ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Detention basin

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☐ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☐ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
- ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
- ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
- ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
- ☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☐ The BMP is sized (and calculations provided) based on:
 - ☐ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☐ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☐ Name of the stormwater management system owners;
 - ☐ Party responsible for operation and maintenance;
 - ☐ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☐ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☐ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description	Average percent impervious area ^{2/}	Curve numbers for hydrologic soil group			
		A	B	C	D
Cover type and hydrologic condition					
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) ^{5/}		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

¹ Average runoff condition, and $I_a = 0.2S$.² The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.³ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.⁴ Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.⁵ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

^{1/} Average runoff condition, and $I_a=0.2S$ ^{2/} Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.^{3/} Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. ^{6/}	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

¹ Average runoff condition, and $I_a = 0.2S$.² *Poor:* <50% ground cover or heavily grazed with no mulch.*Fair:* 50 to 75% ground cover and not heavily grazed.*Good:* > 75% ground cover and lightly or only occasionally grazed.³ *Poor:* <50% ground cover.*Fair:* 50 to 75% ground cover.*Good:* >75% ground cover.⁴ Actual curve number is less than 30; use CN = 30 for runoff computations.⁵ CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.⁶ *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.*Fair:* Woods are grazed but not burned, and some forest litter covers the soil.*Good:* Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ^{2/}	A ^{3/}	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

^{1/} Average runoff condition, and $I_a S_{30} = 0.2S$. For range in humid regions, use table 2-2c.

^{2/} Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

^{3/} Curve numbers for group A have been developed only for desert shrub.