Drainage Report

Prepared For
Block 507.38 Lots 13.01, 13.02 & 13.03 (Existing Lot 13)
Franklin Township
Somerset County, New Jersey
Project Number: 1901FS.01

October 6, 2021
Revised July 25, 2022

Prepared for:
Awakening Dawn, LLC
161 Cedar Grove Lane
Somerset, NJ 08873

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Michael K. Ford, NJ PE No. 34722

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1.0 Introduction

This report outlines the results of a hydrologic and hydraulic stormwater runoff analysis conducted by Van Cleef Engineering Associates, LLC (VCEA) with regard to the proposed construction on Existing Lot 13 in Block 507.38 as designated by the Franklin Township Tax Maps. The lot consists of a total of approximately 5 acres and is located along Cedar Grove Lane within the R-40 zone.

This report has been prepared to summarize stormwater analysis design objectives, methodologies and calculations pertaining to the conveyance of stormwater runoff from the property under pre-developed and post-developed conditions.

2.0 Site Description

2.1 Pre-Developed Condition

The property is currently comprised of woods and a small residential dwelling. Other than a two-story frame dwelling with frame sheds located in the eastern corner of Lot 13, there are no existing structures. The adjacent properties that lie along Cedar Grove Lane are dedicated to residential uses, also located within the R-40 zone. The tract in question is comprised of one drainage area under pre-developed conditions. The runoff generated by Area 1 is conveyed to an existing storm sewer inlet near the eastern corner of Lot 13 via a combination of overland flow and an existing drainage ditch. The boundaries of the drainage area and the location of the corresponding point of analysis are shown on the Existing Drainage Area Map in Appendix J.

2.2 Post-Developed Condition

The proposed development of the site involves the subdivision of Lot 13 into 3 residential lots. One lot (Lot 13.01) will be dedicated to the existing two-story frame dwelling located on the site. The other two lots (Lots 13.02 & 13.03) will be flag lots to be developed for the construction of two new single-family dwellings with open space lawn areas, proposed wooded areas, and a small-scale infiltration basin for stormwater management purposes. As a result of this development, a portion of the existing woods will be converted to open space and impervious areas, which are land covers that are associated with lower runoff curve numbers. A portion of the disturbed area will be reforested to sustain the existing land cover and to assist with stormwater management. Furthermore, a 12'-wide shared private driveway will be constructed to provide access to Lots 13.02 & 13.03. The proposed small-scale infiltration basin will address the regulations pertaining to runoff quantity, runoff quality and groundwater recharge for a major development per N.J.A.C. 7:8. The post-

developed condition will feature two drainage areas, one that will be conveyed to the basin (Area 1A) and one that will bypass the basin (Area 1B). The runoff generated by Area 1A will be conveyed to the small-scale infiltration basin that lies to the beside the 12'-wide shared private driveway along the southwestern property line of Lot 13.03 via overland flow. The outflow from this basin will be ultimately conveyed into the existing Cedar Grove Lane storm sewer system and eventually to the existing storm sewer inlet near the eastern corner of proposed Lot 13.01. The runoff generated by Area 1B will bypass the small-scale infiltration basin. The runoff from Area 1B will follow drainage patterns similar to the pre-developed condition and ultimately be conveyed to the existing storm sewer inlet near the eastern corner of proposed Lot 13.01 via overland flow. Lastly, the small-scale infiltration will treat the runoff from the proposed motor vehicle surfaces to achieve 80% TSS removal and meet the requirements for stormwater runoff quality control. The boundaries of the drainage areas and the location of the corresponding point of analysis are shown on the Proposed Drainage Area Map in Appendix J.

3.0 Methodology

The assessment of stormwater runoff has been based upon the Soil Conservation Service Methodology as described in Technical Release No. 55 (TR55), "Urban Hydrology for Small Watershed." The theoretical storms that are referenced in this report are modeled via the 24-hour SCS Unit Dimensionless Hydrograph and the analysis is the rainfall distributions are based on the data provided for Region C by the NOAA. The recurrence intervals of 2, 10 and 100 years were analyzed via Bentley Pond Pack version 8i. The program is tailored to model the SCS Method for hydrograph generations and to perform interactive solutions of the continuity equation (outflow = inflow +/- storage) with the intermediate values of the routing curve obtained through linear interpretation.

According to the New Jersey Supplement to Chapter 2 of the Engineering Field Handbook published by the NRCS, the rainfall depths generated within Somerset County by the 2-year and 10-year design storms are as follows:

2-Year = 3.34 inches
10-Year = 5.01 inches

According to data provided by the NOAA, the rainfall depth generated within the tract by the 100-year design storm is 8.37 inches.

The Rational Method was utilized to determine whether the capacity provided by the

proposed outlet pipe is sufficient for the runoff generated by the 100-year storm event.

The Soil Conservation Service Soil Survey (SCS) for Somerset County was utilized in order to classify the soils within the tract.

Soil Symbol	Soil Name	Hydrologic Soil Group
PenB	Penn Silt Loam	C
RehB	Reaville Silt Loam	C

A map which delineates the boundaries of each of these soils is included in Appendix A.

4.0 Stormwater Management Objectives

The primary objective of this report is to demonstrate that the proposed stormwater management measures are designed in accordance with all of the applicable regulations pertaining to runoff quantity, quality, and groundwater recharge. The proposed improvements are designed to meet the requirements of Franklin Township, Residential Site Improvements Standards (RSIS), the New Jersey Department of Environmental Protection and the Standards for Soil Erosion and Sediment Control in New Jersey.

5.0 Runoff Quantity

Under post-developed conditions, the small-scale infiltration basin will ensure that the peak flow rates associated with the POA have been sufficiently reduced. The results of the analysis are tabulated below. Detailed information pertaining to the routing calculations and the associated hydrographs is included in Appendix B, C and D.

POA			
Storm Frequency	**Pre-Developed Peak Flow (CFS)**	**Allowable Peak Flow (CFS)**	**Post-Developed Peak Flow (CFS)**
2	0.66	0.33 (50%)	0.33 (50%)
10	1.62	1.22 (75%)	0.89 (55%)
100	3.92	3.14 (80%)	2.44 (62%)

In order to determine whether the emergency spillway pertaining to the infiltration basin is sufficient, routing calculations were performed under the assumption that the outlet structure is blocked. The results of these calculations are included in Appendix B1.

6.0 Small-Scale Infiltration Basin Elevation Summary

The water surface elevations within the small-scale infiltration basin along with the peak flow rates corresponding to the outflows are tabulated below:

Infiltration Basin		
Storm Frequency	**Water Surface Elevation (FT)**	**Outflow (CFS)**
WQDS	89.53	0.00
2	89.89	0.08
10	90.16	0.37
100	90.65	1.37

7.0 Runoff Quality

In order to fulfill the runoff quality requirements that are applicable to this development, the runoff generated by the proposed motor vehicle surface area during the Water Quality Design Storm will be treated via the sand bed within the small-scale infiltration basin. This stormwater management measure is designed to achieve a TSS removal rate of 80% and thus comply with N.J.A.C. 7:8-5.5. Calculations pertaining to the small-scale infiltration basin are included in Appendix G.

8.0 Groundwater Recharge

The total annual groundwater recharge volumes under pre-developed and post-developed conditions were determined via the New Jersey Groundwater Recharge Spreadsheet, which is included in Appendix F. The total annual recharge volume under pre-developed conditions is 51,079 cubic feet whereas the corresponding volume under post-developed conditions is 35,705 cubic feet. This results in a post-developed annual recharge deficit of 15,374 cubic feet. The small-scale infiltration basin will provide an annual recharge volume of 17,378 cubic feet; therefore, the small-scale infiltration basin provides sufficient annual groundwater recharge to replenish the deficit created by development.

9.0 Storm Sewer Design

The storm sewer network, comprised solely of the outlet pipe from the small-scale infiltration basin, was designed to convey the runoff generated by the 100-year design storm. The appropriate size of the outlet pipe was determined via the application of the Manning Formula and a Manning's Roughness Coefficient of 0.013. Flow rates were computed via the application of the Rational method (Q = CIA). Calculations are provided in Appendix E.

10.0 Geotechnical Investigations Summary Table

BMP	Area	Depth	Number of Soil Profile Pits Excavated	SHWT	Top of Bedrock Elevation	Number of Soil Profile Pits Required
Infiltration Basin	3,964 ft^2	6″	2	86.8′	81.9′	1

Although the soil profile pits corresponding to Soil Log 5-6 were excavated beyond the area of infiltration, these pits were excavated within 25 feet of the area of infiltration and thus count toward the required number of pits per Chapter 12 of the BMP Manual. Furthermore, this BMP is a linear BMP as defined by Chapter 12 and thus only 1 soil profile pit is required.

11.0 Conclusion

The proposed development will reduce the peak flow rates associated with the runoff generated by the disturbed area during the 2, 10 and 100-year design storms. Furthermore, 80% of the TSS within the runoff generated by the proposed motor vehicle surface will be removed via the sand bed in the small-scale infiltration basin. The drainage patterns under post-developed conditions are very similar to the corresponding patterns under pre-developed conditions, and all runoff from the disturbed area ends up at the same POA in post-developed conditions as it does in pre-developed conditions. Therefore, the proposed development will not negatively impact any off-site or downstream properties. This project has been designed in accordance with the standards set forth by various regulatory agencies including Franklin Township, the Residential Site Improvement Standards, the New Jersey Department of Environmental Protection, and the Somerset-Union Soil Conservation District. All engineering calculations and the associated drainage area maps are incorporated in the appendix for further review.

12.0 References

1. Urban Hydrology for Small Watersheds, TR-55, USDA Soil Conservation Service, June 1986.

2. NJDEP Stormwater Management Rules, NJAC 7:8, March 2, 2020.

3. NJDEP Stormwater Best Management Practices Manual, March 2021.

4. Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, July 2017.

5. Web Soil Survey, United States Department of Agriculture, Natural Resource Conservation Service, Version 8, 2008.

6. Franklin Township Municipal Code.

7. Bentley, StormCAD®, Version 8.11.02.75, 2011.

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Appendix A

Soil Map, Curve Numbers and Time of Concentration Calculations

Map Scale: 1:1,830 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

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 1:24,000.

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: Somerset County, New Jersey
Survey Area Data: Version 18, Jun 1, 2020

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

Date(s) aerial images were photographed: Sep 14, 2020—Oct 3, 2020

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
PenB	Penn silt loam, 2 to 6 percent slopes	5.1	95.2%
RehB	Reaville silt loam, 2 to 6 percent slopes	0.3	4.8%
Totals for Area of Interest		**5.4**	**100.0%**

Map Scale: 1:1,670 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

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

Soil Survey Area: Somerset County, New Jersey
Survey Area Data: Version 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 14, 2020—Oct 8, 2020

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
PenB	Penn silt loam, 2 to 6 percent slopes	C	4.5	94.9%
RehB	Reaville silt loam, 2 to 6 percent slopes	C	0.2	5.1%
Totals for Area of Interest			**4.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Depth to Water Table—Somerset County, New Jersey

Map Scale: 1:1,670 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

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Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
PenB	Penn silt loam, 2 to 6 percent slopes	>200	4.5	94.9%
RehB	Reaville silt loam, 2 to 6 percent slopes	46	0.2	5.1%
Totals for Area of Interest			**4.7**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Worksheet 2: Runoff Curve Number

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	
Select One:	Pre-Development				
Area Name	Area 1 - Pervious				

1. Runoff Curve Number

Names	Cover Description	CN			Area	Product
Soil Name and Hydrologic Group (appendix A)	(cover type, treatment, and hydrologic condition; percent impervious; unconnected/ connected area ratio)	Tab 2-2	Fig 2-3	Fig 2-4	acres miles %	CN x area
C	Woods - Good Condition	70			1.0942	76.594
				Totals	1.0942	76.594

CN (weighted) = total product/ total area= 76.594 / 1.0942

Use CN = 70.000

Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt)

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	

Select One: Pre-Development
Select One: Travel Time
Area Name: Area 1 - Pervious

Notes: Space for as many as two segements per flow type can be used for each worksheet
Include a Map, schematic, or description of flow segments

Sheet Flow (Applicable to Tc only)			Segment ID	A-B		
1	Surface Description (table 3-1)			Woods - Light Underbrush		
2	Mannings Roughness Coeff.,n (table 3-1)			0.4		
3	Flow Length, L (total L < 300 ft)		ft	100.00		
4	Two-yr 24-hr rainfall, P_2		in	3.34		
5	land slope, s		ft/ft	0.03326		
6	T_t=(0.007*(nL)^0.8/((P2^0.5)*(s^0.4))	Compute T_t	hr	0.286		0.286
Shallow Concentrated Flow			Segment ID	B-POA		
7	Surface Description (paved or unpaved)			Unpaved		
8	Flow Length, L		ft	523.24		
9	Watercourse Slope, s		ft/ft	0.01289		
10	Average velocity, V (figure 3-1)		ft/s	1.85		
11	T_t = L/(3600*V)	Compute Tt	hr	0.0786		0.0786
Channel Flow			Segment ID	N/A		
12	Cross sectional flow area, a		ft^2			
13	Wetted Perimeter, Pw		ft			
14	Hydraulic Radius, r=a/Pw	Compute r	ft			
15	Channel Slope, s		ft/ft			
16	Mannings roughness Coeff., n					
17	V = 1.49(r^(2/3))*(s^(1/2))/n	Compute V	ft/s			
18	Flow Length, L		ft			
19	T_t = L/(3600*V)	Compute Tt	hr			0.00
20	Water shed or Subarea Tc or Tt (add Tt in steps 6, 11,19)		hr			0.364
			min			21.86

Worksheet 2: Runoff Curve Number

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	
Select One:	Post-Development				
Area Name	Area 1A BASIN - Pervious				

1. Runoff Curve Number

Names	Cover Description	CN			Area	Product
Soil Name and Hydrologic Group (appendix A)	(cover type, treatment, and hydrologic condition; percent impervious; unconnected/ connected area ratio)	Tab 2-2	Fig 2-3	Fig 2-4	acres miles %	CN x area
C	Open Space - Good Condition	74			0.4842	35.8308
				Totals	0.4842	35.8308

CN (weighted) = total product/ total area= 35.831 / 0.4842

Use CN = 74.000

Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt)

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	

Select One: Post-Development
Select One: Travel Time
Area Name: Area 1A BASIN - Pervious

Notes: Space for as many as two segements per flow type can be used for each worksheet
Include a Map, schematic, or description of flow segments

Sheet Flow (Applicable to Tc only)			Segment ID	A-B	B-C	
1	Surface Description (table 3-1)			Dense Grasses		
2	Mannings Roughness Coeff.,n (table 3-1)			0.24		
3	Flow Length, L (total L ≤ 100 ft) - Using McCuen Spiess		ft	54.41		
4	Two-yr 24-hr rainfall, P_2		in	3.34		
5	land slope, s		ft/ft	0.01705		
6	T_t=(0.007*(nL)^0.8/((P2^0.5)*(s^0.4))	Compute T_t	hr	0.152		0.152
Shallow Concentrated Flow			Segment ID	B-C		
7	Surface Description (paved or unpaved)			Unpaved		
8	Flow Length, L		ft	124.09		
9	Watercourse Slope, s		ft/ft	0.02817		
10	Average velocity, V (figure 3-1)		ft/s	2.725		
11	T_t = L/(3600*V)	Compute Tt	hr	0.012649		0.01265
Channel Flow			Segment ID	N/A		
12	Cross sectional flow area, a		ft^2			
13	Wetted Perimeter, Pw		ft			
14	Hydraulic Radius, r=a/Pw	Compute r	ft			
15	Channel Slope, s		ft/ft			
16	Mannings roughness Coeff., n					
17	V = 1.49(r^(2/3))*(s^(1/2))/n	Compute V	ft/s			
18	Flow Length, L		ft			
19	T_t = L/(3600*V)	Compute Tt	hr			0.00
20	Water shed or Subarea Tc or Tt (add Tt in steps 6, 11,19)		hr			0.165
			min			9.91

Worksheet 2: Runoff Curve Number

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	
Select One:	Post-Development				
Area Name	Area 1A BASIN - Impervious				

1. Runoff Curve Number

Names	Cover Description	CN			Area	Product
Soil Name and Hydrologic Group (appendix A)	(cover type, treatment, and hydrologic condition; percent impervious; unconnected/ connected area ratio)	Tab 2-2	Fig 2-3	Fig 2-4	acres miles %	CN x area
C	Impervious areas	98			0.2294	22.4812
				Totals	0.2294	22.4812

CN (weighted) = total product/ total area= 22.481 / 0.2294

Use CN = 98.000

Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt)

Project 1901FS.01 By AC Date 10/6/2021
Location Franklin Township Checked Date
Select One: Post-Development
Select One: Travel Time
Area Name Area 1A BASIN - Impervious

Notes: Space for as many as two segements per flow type can be used for each worksheet
Include a Map, schematic, or description of flow segments

Sheet Flow (Applicable to Tc only)			Segment ID	A-B	B-C	
1	Surface Description (table 3-1)			Asphalt	Dense Grasses	
2	Mannings Roughness Coeff.,n (table 3-1)			0.011	0.24	
3	Flow Length, L (total L ≤ 100 ft) - Using McCuen Spiess		ft	11.88	88.12	**Use Maximum Value of 100 Feet**
4	Two-yr 24-hr rainfall, P_2		in	3.34	3.34	
5	land slope, s		ft/ft	0.04281	0.04281	
6	T_t=(0.007*(nL)^0.8/((P2^0.5)*(s^0.4))	Compute T_t	hr	0.00265	0.15518	0.158
Shallow Concentrated Flow			Segment ID	C-D		
7	Surface Description (paved or unpaved)			Unpaved		
8	Flow Length, L		ft	30.3		
9	Watercourse Slope, s		ft/ft	0.08809		
10	Average velocity, V (figure 3-1)		ft/s	4.8		
11	T_t = L/(3600*V)	Compute Tt	hr	0.00175		0.00175
Channel Flow			Segment ID	N/A		
12	Cross sectional flow area, a		ft^2			
13	Wetted Perimeter, Pw		ft			
14	Hydraulic Radius, r=a/Pw	Compute r	ft			
15	Channel Slope, s		ft/ft			
16	Mannings roughness Coeff., n					
17	V = 1.49(r^(2/3))*(s^(1/2))/n	Compute V	ft/s			
18	Flow Length, L		ft			
19	T_t = L/(3600*V)	Compute Tt	hr			0.000
20	Water shed or Subarea Tc or Tt (add Tt in steps 6, 11,19)		hr			0.160
			min			9.58

Worksheet 2: Runoff Curve Number

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	
Select One:	Post-Development				
Area Name	Area 1B BYPASS - Pervious				

1. Runoff Curve Number

Names	Cover Description	CN			Area	Product
Soil Name and Hydrologic Group (appendix A)	(cover type, treatment, and hydrologic condition; percent impervious; unconnected/ connected area ratio)	Tab 2-2	Fig 2-3	Fig 2-4	acres miles %	CN x area
C	Open Space - Good Condition	74			0.14	10.36
C	Woods - Good Condition	70			0.2214	15.498
				Totals	0.3614	25.858

CN (weighted) = total product/ total area= 25.858 / 0.3614

Use CN = 71.550

Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt)

Project 1901FS.01 By AC Date 10/6/2021
Location Franklin Township Checked Date
Select One: Post-Development
Select One: Travel Time
Area Name Area 1B BYPASS - Pervious

Notes: Space for as many as two segements per flow type can be used for each worksheet
Include a Map, schematic, or description of flow segments

Sheet Flow (Applicable to Tc only)			Segment ID	A-B	B-C	
1	Surface Description (table 3-1)			Dense Grasses	Woods - Light Underbrush	
2	Mannings Roughness Coeff.,n (table 3-1)			0.24	0.4	
3	Flow Length, L (total L ≤ 100 ft) - Using McCuen Spiess		ft	19.81	53.37	
4	Two-yr 24-hr rainfall, P_2		in	3.34	3.34	
5	land slope, s		ft/ft	0.03085	0.03085	
6	T_t=(0.007*(nL)^0.8/((P2^0.5)*(s^0.4))	Compute T_t	hr	0.054	0.178	0.232
Shallow Concentrated Flow			Segment ID	C-POA		
7	Surface Description (paved or unpaved)			Unpaved		
8	Flow Length, L		ft	551.22		
9	Watercourse Slope, s		ft/ft	0.01355		
10	Average velocity, V (figure 3-1)		ft/s	1.8		
11	T_t = L/(3600*V)	Compute Tt	hr	0.0851		0.085
Channel Flow			Segment ID	N/A		
12	Cross sectional flow area, a		ft^2			
13	Wetted Perimeter, Pw		ft			
14	Hydraulic Radius, r=a/Pw	Compute r	ft			
15	Channel Slope, s		ft/ft			
16	Mannings roughness Coeff., n					
17	V = 1.49(r^(2/3))*(s^(1/2))/n	Compute V	ft/s			
18	Flow Length, L		ft			
19	T_t = L/(3600*V)	Compute Tt	hr			0.00000
20	Water shed or Subarea Tc or Tt (add Tt in steps 6, 11,19)		hr			0.317
			min			19.01

Worksheet 2: Runoff Curve Number

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	
Select One:	Post-Development				
Area Name	Area 1B BYPASS - Pervious				

1. Runoff Curve Number

Names	Cover Description	CN			Area	Product
Soil Name and Hydrologic Group (appendix A)	(cover type, treatment, and hydrologic condition; percent impervious; unconnected/ connected area ratio)	Tab 2-2	Fig 2-3	Fig 2-4	acres miles %	CN x area
C	Impervious areas	98			0.0192	1.8816
				Totals	0.0192	1.8816

CN (weighted) = total product/ total area= 1.8816 / 0.0192

Use CN = 98.000

Worksheet 3: Time of Concentration (Tc) or Travel Time (Tt)

Project	1901FS.01	By	AC	Date	10/6/2021
Location	Franklin Township	Checked		Date	

Select One: Post-Development
Select One: Travel Time
Area Name: Area 1B BYPASS - Pervious

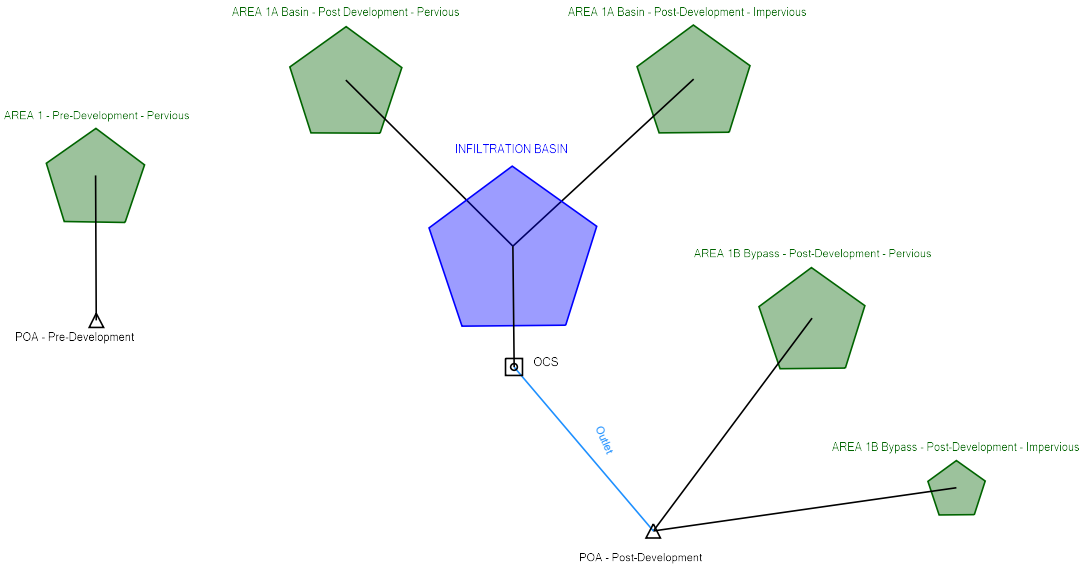
Notes: Space for as many as two segements per flow type can be used for each worksheet
Include a Map, schematic, or description of flow segments

Sheet Flow (Applicable to Tc only)			Segment ID	A-B		
1	Surface Description (table 3-1)			Asphalt		
2	Mannings Roughness Coeff.,n (table 3-1)			0.011		
3	Flow Length, L (total L ≤ 100 ft) - Using McCuen Spiess		ft	100.00		**Use Maximum Value of 100 Feet**
4	Two-yr 24-hr rainfall, P_2		in	3.34		
5	land slope, s		ft/ft	0.04479		
6	T_t=(0.007*(nL)^0.8/((P2^0.5)*(s^0.4))	Compute T_t	hr	0.0143		0.0143
Shallow Concentrated Flow			Segment ID	B-C		
7	Surface Description (paved or unpaved)			Paved		
8	Flow Length, L		ft	128.37		
9	Watercourse Slope, s		ft/ft	0.0192		
10	Average velocity, V (figure 3-1)		ft/s	2.8		
11	T_t = L/(3600*V)	Compute Tt	hr	0.0127		0.0127
Channel Flow			Segment ID	C-POA		
12	Cross sectional flow area, a		ft^2			
13	Wetted Perimeter, Pw		ft			
14	Hydraulic Radius, r=a/Pw	Compute r	ft			
15	Channel Slope, s		ft/ft			
16	Mannings roughness Coeff., n					
17	V = 1.49(r^(2/3))*(s^(1/2))/n	Compute V	ft/s	2	Assumed	
18	Flow Length, L		ft	63.42		
19	T_t = L/(3600*V)	Compute Tt	hr	0.00881		0.00881
20	Water shed or Subarea Tc or Tt (add Tt in steps 6, 11,19)		hr			0.0359
			min			2.15

Appendix B

Small-Scale Infiltration Basin Report

Scenario: 100-Year



Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft^3)	Time to Peak (min)	Peak Flow (ft^3/s)
AREA 1 - Pre-Development - Pervious	WQDS	1	131.00	105.00	0.05
AREA 1 - Pre-Development - Pervious	2-Year	2	3,522.00	738.00	0.66
AREA 1 - Pre-Development - Pervious	10-Year	10	8,087.00	735.00	1.62
AREA 1A Basin - Post Development - Pervious	WQDS	1	130.00	75.00	0.06
AREA 1A Basin - Post Development - Pervious	2-Year	2	1,940.00	729.00	0.49
AREA 1A Basin - Post Development - Pervious	10-Year	10	4,155.00	729.00	1.08
AREA 1A Basin - Post-Development - Impervious	WQDS	1	862.00	66.00	0.59
AREA 1A Basin - Post-Development - Impervious	2-Year	2	2,554.00	726.00	0.59
AREA 1A Basin - Post-Development - Impervious	10-Year	10	3,966.00	726.00	0.90
AREA 1B Bypass - Post -Development - Pervious	WQDS	1	61.00	87.00	0.02
AREA 1B Bypass - Post -Development - Pervious	2-Year	2	1,270.00	735.00	0.25
AREA 1B Bypass - Post -Development - Pervious	10-Year	10	2,835.00	735.00	0.60
AREA 1B Bypass - Post -Development - Impervious	WQDS	1	73.00	63.00	0.06
AREA 1B Bypass - Post -Development - Impervious	2-Year	2	214.00	723.00	0.05
AREA 1B Bypass - Post -Development - Impervious	10-Year	10	333.00	723.00	0.08

Node Summary

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
POA - Pre-Development	WQDS	1	131.00	105.00	0.05
POA - Pre-Development	2-Year	2	3,522.00	738.00	0.66
POA - Pre-Development	10-Year	10	8,087.00	735.00	1.62
POA - Post-Development	WQDS	1	158.00	63.00	0.06
POA - Post-Development	2-Year	2	5,010.00	738.00	0.33
POA - Post-Development	10-Year	10	10,321.00	738.00	0.89

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
INFILTRATION BASIN (IN)	WQDS	1	991.00	69.00	0.62	(N/A)	(N/A)
INFILTRATION BASIN (OUT)	WQDS	1	23.00	138.00	0.00	89.53	989.00
INFILTRATION BASIN (IN)	2-Year	2	4,494.00	729.00	1.07	(N/A)	(N/A)
INFILTRATION BASIN (OUT)	2-Year	2	3,526.00	849.00	0.08	89.89	2,725.00
INFILTRATION BASIN (IN)	10-Year	10	8,121.00	729.00	1.97	(N/A)	(N/A)
INFILTRATION BASIN (OUT)	10-Year	10	7,153.00	759.00	0.37	90.16	4,226.00

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
AREA 1 - Pre-Development - Pervious	100-Year	100	19,000.00	735.00	3.92
AREA 1A Basin - Post Development - Pervious	100-Year	100	9,242.00	729.00	2.39
AREA 1A Basin - Post-Development - Impervious	100-Year	100	6,769.00	726.00	1.51
AREA 1B Bypass - Post -Development - Impervious	100-Year	100	568.00	723.00	0.14
AREA 1B Bypass - Post -Development - Pervious	100-Year	100	6,517.00	735.00	1.41

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
POA - Post-Development	100-Year	100	22,127.00	735.00	2.44
POA - Pre-Development	100-Year	100	19,000.00	735.00	3.92

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
INFILTRATION BASIN (IN)	100-Year	100	16,011.00	729.00	3.89	(N/A)	(N/A)
INFILTRATION BASIN (OUT)	100-Year	100	15,043.00	750.00	1.37	90.65	7,408.00

Subsection: Outlet Input Data
Label: Outlet Structure
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	89.30 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	91.45 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice	Forward	TW	89.53	91.45
Rectangular Weir	Weir - 6"	Forward	TW	89.89	91.45
Rectangular Weir	Emergency Spillway - 80'	Forward	TW	90.65	91.45
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Orifice Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	89.53 ft
Orifice Diameter	2.50 in
Orifice Coefficient	0.600

Structure ID: Weir - 6" Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	89.89 ft
Weir Length	0.50 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Emergency Spillway - 80' Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	90.65 ft
Weir Length	80.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Elevation-Volume-Flow Table (Pond)
Label: INFILTRATION BASIN
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	89.30 ft
Volume (Initial)	0.00 ft³
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	3.00 min

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
89.30	0.00	0.00	3,964.0000	0.00	0.00	0.00
89.53	0.00	967.89	4,457.2169	0.00	0.00	10.75
89.80	0.07	2,253.58	5,073.1018	0.00	0.07	25.11
89.89	0.08	2,719.77	5,287.2506	0.00	0.08	30.30
90.30	0.53	5,079.70	6,208.8663	0.00	0.53	56.97
90.65	1.16	7,392.90	7,017.6802	0.00	1.16	83.30
90.80	15.42	8,472.57	7,379.4696	0.00	15.42	109.56
91.30	128.49	12,532.01	9,031.5656	0.00	128.49	267.74
91.45	174.87	13,932.05	9,639.0000	0.00	174.87	329.67

Appendix B1

Emergency Spillway

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
AREA 1 - Pre-Development - Pervious	100-Year	100	19,000.00	735.00	3.92
AREA 1A Basin - Post Development - Pervious	100-Year	100	9,242.00	729.00	2.39
AREA 1A Basin - Post-Development - Impervious	100-Year	100	6,769.00	726.00	1.51
AREA 1B Bypass - Post -Development - Impervious	100-Year	100	568.00	723.00	0.14
AREA 1B Bypass - Post -Development - Pervious	100-Year	100	6,517.00	735.00	1.41

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)
POA - Post-Development	100-Year	100	15,702.00	735.00	4.42
POA - Pre-Development	100-Year	100	19,000.00	735.00	3.92

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (min)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
INFILTRATION BASIN (IN)	100-Year	100	16,011.00	729.00	3.89	(N/A)	(N/A)
INFILTRATION BASIN (OUT)	100-Year	100	8,618.00	735.00	2.95	90.68	7,617.00

Subsection: Outlet Input Data
Label: Emergency Spillway
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	89.30 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	91.45 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Emergency Spillway - 80'	Forward	TW	90.65	91.45
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Emergency Spillway - 80' Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	90.65 ft
Weir Length	80.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Appendix C

Pre-Developed Hydrographs

Subsection: Unit Hydrograph Summary
Label: AREA 1 - Pre-Development - Pervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

Computational Time Increment	2.91 min
Time to Peak (Computed)	737.41 min
Flow (Peak, Computed)	0.66 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	738.00 min
Flow (Peak Interpolated Output)	0.66 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	47,662.5500 ft²
Maximum Retention (Pervious)	4.29 in
Maximum Retention (Pervious, 20 percent)	0.86 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.89 in
Runoff Volume (Pervious)	3,522.65 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,522.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	21.86 min
Computational Time Increment	2.91 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.40 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	14.57 min
Unit receding limb, Tr	58.29 min
Total unit time, Tb	72.87 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1 - Pre-Development - Pervious Storm Event: 2-Year
Scenario: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
678.00	0.00	0.00	0.00	0.00	0.01
693.00	0.01	0.01	0.02	0.02	0.04
708.00	0.05	0.07	0.10	0.13	0.19
723.00	0.27	0.38	0.49	0.58	0.64
738.00	0.66	0.64	0.61	0.56	0.52
753.00	0.47	0.42	0.37	0.33	0.29
768.00	0.26	0.23	0.21	0.20	0.18
783.00	0.17	0.16	0.15	0.14	0.14
798.00	0.13	0.13	0.13	0.12	0.12
813.00	0.12	0.12	0.11	0.11	0.11
828.00	0.11	0.11	0.11	0.10	0.10
843.00	0.10	0.10	0.10	0.09	0.09
858.00	0.09	0.09	0.09	0.09	0.09
873.00	0.09	0.09	0.08	0.08	0.08
888.00	0.08	0.08	0.08	0.08	0.08
903.00	0.08	0.08	0.07	0.07	0.07
918.00	0.07	0.07	0.07	0.07	0.07
933.00	0.07	0.07	0.07	0.06	0.06
948.00	0.06	0.06	0.06	0.06	0.06
963.00	0.06	0.06	0.05	0.05	0.05
978.00	0.05	0.05	0.05	0.05	0.05
993.00	0.05	0.05	0.05	0.05	0.05
1,008.00	0.05	0.05	0.05	0.05	0.05
1,023.00	0.04	0.04	0.04	0.04	0.04
1,038.00	0.04	0.04	0.04	0.04	0.04
1,053.00	0.04	0.04	0.04	0.04	0.04
1,068.00	0.04	0.04	0.04	0.04	0.04
1,083.00	0.04	0.03	0.03	0.03	0.03
1,098.00	0.03	0.03	0.03	0.03	0.03
1,113.00	0.03	0.03	0.03	0.03	0.03
1,128.00	0.03	0.03	0.03	0.03	0.03
1,143.00	0.03	0.03	0.03	0.03	0.03
1,158.00	0.03	0.03	0.03	0.03	0.03
1,173.00	0.03	0.03	0.03	0.03	0.03

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1 - Pre-Development - Pervious Storm Event: 2-Year
Scenario: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,188.00	0.03	0.03	0.03	0.03	0.03
1,203.00	0.03	0.03	0.03	0.03	0.03
1,218.00	0.03	0.03	0.03	0.03	0.03
1,233.00	0.03	0.03	0.03	0.03	0.03
1,248.00	0.03	0.03	0.03	0.03	0.03
1,263.00	0.03	0.03	0.03	0.03	0.03
1,278.00	0.03	0.03	0.02	0.02	0.02
1,293.00	0.02	0.02	0.02	0.02	0.02
1,308.00	0.02	0.02	0.02	0.02	0.02
1,323.00	0.02	0.02	0.02	0.02	0.02
1,338.00	0.02	0.02	0.02	0.02	0.02
1,353.00	0.02	0.02	0.02	0.02	0.02
1,368.00	0.02	0.02	0.02	0.02	0.02
1,383.00	0.02	0.02	0.02	0.02	0.02
1,398.00	0.02	0.02	0.02	0.02	0.02
1,413.00	0.02	0.02	0.02	0.02	0.02
1,428.00	0.02	0.02	0.02	0.02	0.02
1,443.00	0.02	0.02	0.02	0.01	0.01
1,458.00	0.01	0.01	0.00	0.00	0.00
1,473.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

Computational Time Increment	2.91 min
Time to Peak (Computed)	737.41 min
Flow (Peak, Computed)	1.63 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	735.00 min
Flow (Peak Interpolated Output)	1.62 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	47,662.5500 ft²
Maximum Retention (Pervious)	4.29 in
Maximum Retention (Pervious, 20 percent)	0.86 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.04 in
Runoff Volume (Pervious)	8,088.02 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	8,087.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	21.86 min
Computational Time Increment	2.91 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.40 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1 - Pre-Development - Pervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	14.57 min
Unit receding limb, Tr	58.29 min
Total unit time, Tb	72.87 min

Subsection: Unit Hydrograph (Hydrograph Table) | Return Event: 10 years
Label: AREA 1 - Pre-Development - Pervious | Storm Event: 10-Year
Scenario: 10-Year

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
591.00	0.00	0.00	0.00	0.00	0.00
606.00	0.01	0.01	0.01	0.01	0.01
621.00	0.01	0.02	0.02	0.02	0.02
636.00	0.02	0.03	0.03	0.03	0.03
651.00	0.04	0.04	0.04	0.05	0.05
666.00	0.05	0.06	0.06	0.07	0.07
681.00	0.08	0.08	0.09	0.10	0.11
696.00	0.12	0.14	0.17	0.21	0.25
711.00	0.32	0.39	0.49	0.64	0.84
726.00	1.09	1.33	1.52	1.62	1.62
741.00	1.55	1.44	1.31	1.18	1.06
756.00	0.93	0.82	0.71	0.63	0.55
771.00	0.50	0.45	0.42	0.39	0.36
786.00	0.34	0.32	0.30	0.29	0.28
801.00	0.27	0.26	0.25	0.25	0.24
816.00	0.24	0.23	0.23	0.23	0.22
831.00	0.22	0.21	0.21	0.21	0.20
846.00	0.20	0.19	0.19	0.19	0.18
861.00	0.18	0.18	0.18	0.17	0.17
876.00	0.17	0.17	0.17	0.16	0.16
891.00	0.16	0.16	0.16	0.15	0.15
906.00	0.15	0.15	0.15	0.14	0.14
921.00	0.14	0.14	0.14	0.13	0.13
936.00	0.13	0.13	0.13	0.12	0.12
951.00	0.12	0.12	0.12	0.11	0.11
966.00	0.11	0.11	0.11	0.10	0.10
981.00	0.10	0.10	0.10	0.10	0.10
996.00	0.10	0.09	0.09	0.09	0.09
1,011.00	0.09	0.09	0.09	0.09	0.09
1,026.00	0.09	0.09	0.08	0.08	0.08
1,041.00	0.08	0.08	0.08	0.08	0.08
1,056.00	0.08	0.08	0.07	0.07	0.07
1,071.00	0.07	0.07	0.07	0.07	0.07
1,086.00	0.07	0.07	0.07	0.06	0.06

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: AREA 1 - Pre-Development - Pervious Storm Event: 10-Year
Scenario: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,101.00	0.06	0.06	0.06	0.06	0.06
1,116.00	0.06	0.06	0.06	0.06	0.06
1,131.00	0.06	0.06	0.06	0.06	0.06
1,146.00	0.06	0.06	0.06	0.06	0.06
1,161.00	0.06	0.06	0.06	0.06	0.06
1,176.00	0.06	0.06	0.06	0.06	0.05
1,191.00	0.05	0.05	0.05	0.05	0.05
1,206.00	0.05	0.05	0.05	0.05	0.05
1,221.00	0.05	0.05	0.05	0.05	0.05
1,236.00	0.05	0.05	0.05	0.05	0.05
1,251.00	0.05	0.05	0.05	0.05	0.05
1,266.00	0.05	0.05	0.05	0.05	0.05
1,281.00	0.05	0.05	0.05	0.05	0.05
1,296.00	0.05	0.05	0.05	0.05	0.05
1,311.00	0.05	0.05	0.05	0.04	0.04
1,326.00	0.04	0.04	0.04	0.04	0.04
1,341.00	0.04	0.04	0.04	0.04	0.04
1,356.00	0.04	0.04	0.04	0.04	0.04
1,371.00	0.04	0.04	0.04	0.04	0.04
1,386.00	0.04	0.04	0.04	0.04	0.04
1,401.00	0.04	0.04	0.04	0.04	0.04
1,416.00	0.04	0.04	0.04	0.04	0.04
1,431.00	0.04	0.04	0.04	0.04	0.04
1,446.00	0.03	0.03	0.02	0.02	0.01
1,461.00	0.01	0.01	0.00	0.00	0.00
1,476.00	0.00	0.00	0.00	(N/A)	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1 - Pre-Development - Pervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

Computational Time Increment	2.91 min
Time to Peak (Computed)	734.50 min
Flow (Peak, Computed)	3.93 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	735.00 min
Flow (Peak Interpolated Output)	3.92 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	47,662.5500 ft²
Maximum Retention (Pervious)	4.29 in
Maximum Retention (Pervious, 20 percent)	0.86 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.78 in
Runoff Volume (Pervious)	19,001.02 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	19,000.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	21.86 min
Computational Time Increment	2.91 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.40 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	14.57 min
Unit receding limb, Tr	58.29 min
Total unit time, Tb	72.87 min

Subsection: Unit Hydrograph (Hydrograph Table) | Return Event: 100 years
Label: AREA 1 - Pre-Development - Pervious | Storm Event: 100-Year
Scenario: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	21.86 min
Area (User Defined)	47,662.5500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
468.00	0.00	0.00	0.00	0.00	0.00
483.00	0.00	0.01	0.01	0.01	0.01
498.00	0.01	0.01	0.01	0.02	0.02
513.00	0.02	0.02	0.02	0.02	0.02
528.00	0.03	0.03	0.03	0.03	0.04
543.00	0.04	0.04	0.05	0.05	0.06
558.00	0.06	0.06	0.06	0.06	0.07
573.00	0.07	0.07	0.07	0.08	0.08
588.00	0.08	0.08	0.09	0.09	0.10
603.00	0.10	0.11	0.11	0.11	0.12
618.00	0.12	0.13	0.14	0.15	0.16
633.00	0.17	0.17	0.18	0.18	0.18
648.00	0.19	0.19	0.20	0.20	0.21
663.00	0.22	0.23	0.24	0.25	0.27
678.00	0.29	0.31	0.33	0.36	0.38
693.00	0.40	0.44	0.49	0.56	0.67
708.00	0.80	0.97	1.17	1.42	1.77
723.00	2.25	2.82	3.36	3.76	3.92
738.00	3.85	3.63	3.32	2.99	2.67
753.00	2.37	2.08	1.80	1.56	1.36
768.00	1.20	1.07	0.97	0.90	0.83
783.00	0.77	0.72	0.67	0.63	0.60
798.00	0.58	0.55	0.53	0.51	0.49
813.00	0.48	0.47	0.46	0.46	0.46
828.00	0.46	0.47	0.47	0.46	0.45
843.00	0.43	0.42	0.40	0.39	0.38
858.00	0.38	0.37	0.36	0.36	0.35
873.00	0.34	0.33	0.33	0.33	0.33
888.00	0.32	0.32	0.32	0.31	0.30
903.00	0.30	0.30	0.31	0.32	0.32
918.00	0.31	0.30	0.29	0.28	0.28
933.00	0.28	0.27	0.26	0.26	0.25
948.00	0.24	0.24	0.23	0.22	0.22
963.00	0.22	0.22	0.22	0.22	0.21

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1 - Pre-Development - Pervious Storm Event: 100-Year
Scenario: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
978.00	0.21	0.20	0.20	0.19	0.19
993.00	0.19	0.19	0.19	0.18	0.17
1,008.00	0.16	0.16	0.16	0.16	0.17
1,023.00	0.17	0.17	0.17	0.17	0.17
1,038.00	0.18	0.19	0.19	0.18	0.17
1,053.00	0.16	0.16	0.15	0.15	0.15
1,068.00	0.15	0.14	0.14	0.14	0.14
1,083.00	0.14	0.13	0.13	0.13	0.13
1,098.00	0.13	0.13	0.13	0.12	0.12
1,113.00	0.11	0.11	0.12	0.12	0.13
1,128.00	0.12	0.12	0.11	0.11	0.10
1,143.00	0.10	0.11	0.11	0.12	0.12
1,158.00	0.12	0.12	0.11	0.11	0.10
1,173.00	0.10	0.10	0.10	0.10	0.10
1,188.00	0.10	0.11	0.12	0.12	0.12
1,203.00	0.12	0.11	0.11	0.10	0.10
1,218.00	0.10	0.10	0.10	0.10	0.10
1,233.00	0.10	0.10	0.10	0.10	0.10
1,248.00	0.10	0.10	0.10	0.10	0.10
1,263.00	0.10	0.10	0.11	0.12	0.12
1,278.00	0.12	0.12	0.11	0.11	0.10
1,293.00	0.10	0.10	0.10	0.10	0.09
1,308.00	0.09	0.08	0.07	0.07	0.07
1,323.00	0.07	0.08	0.08	0.09	0.09
1,338.00	0.09	0.09	0.09	0.09	0.09
1,353.00	0.09	0.09	0.08	0.07	0.07
1,368.00	0.07	0.07	0.08	0.08	0.09
1,383.00	0.09	0.08	0.08	0.07	0.07
1,398.00	0.07	0.07	0.08	0.08	0.08
1,413.00	0.07	0.07	0.06	0.07	0.07
1,428.00	0.08	0.08	0.08	0.07	0.07
1,443.00	0.06	0.06	0.05	0.05	0.04
1,458.00	0.03	0.02	0.01	0.01	0.01
1,473.00	0.01	0.00	0.00	0.00	0.00
1,488.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Appendix D

Post-Developed Hydrographs

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

Computational Time Increment	1.32 min
Time to Peak (Computed)	729.38 min
Flow (Peak, Computed)	0.49 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	729.00 min
Flow (Peak Interpolated Output)	0.49 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	21,090.5000 ft²
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.10 in
Runoff Volume (Pervious)	1,940.22 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,940.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.91 min
Computational Time Increment	1.32 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.32 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post Development - Pervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.61 min
Unit receding limb, Tr	26.43 min
Total unit time, Tb	33.03 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1A Basin - Post Development - Pervious Storm Event: 2-Year
Scenario: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
639.00	0.00	0.00	0.00	0.00	0.00
654.00	0.00	0.00	0.01	0.01	0.01
669.00	0.01	0.01	0.01	0.01	0.01
684.00	0.02	0.02	0.02	0.02	0.03
699.00	0.04	0.05	0.07	0.09	0.11
714.00	0.14	0.18	0.27	0.37	0.45
729.00	0.49	0.45	0.39	0.33	0.30
744.00	0.26	0.23	0.19	0.16	0.14
759.00	0.12	0.10	0.10	0.09	0.09
774.00	0.08	0.08	0.08	0.07	0.07
789.00	0.07	0.07	0.06	0.06	0.06
804.00	0.06	0.06	0.06	0.06	0.06
819.00	0.06	0.06	0.05	0.05	0.05
834.00	0.05	0.05	0.05	0.05	0.05
849.00	0.05	0.05	0.05	0.05	0.04
864.00	0.04	0.04	0.04	0.04	0.04
879.00	0.04	0.04	0.04	0.04	0.04
894.00	0.04	0.04	0.04	0.04	0.04
909.00	0.04	0.04	0.04	0.04	0.03
924.00	0.03	0.03	0.03	0.03	0.03
939.00	0.03	0.03	0.03	0.03	0.03
954.00	0.03	0.03	0.03	0.03	0.03
969.00	0.03	0.03	0.03	0.03	0.03
984.00	0.02	0.02	0.02	0.02	0.02
999.00	0.02	0.02	0.02	0.02	0.02
1,014.00	0.02	0.02	0.02	0.02	0.02
1,029.00	0.02	0.02	0.02	0.02	0.02
1,044.00	0.02	0.02	0.02	0.02	0.02
1,059.00	0.02	0.02	0.02	0.02	0.02
1,074.00	0.02	0.02	0.02	0.02	0.02
1,089.00	0.02	0.02	0.02	0.02	0.02
1,104.00	0.02	0.02	0.02	0.02	0.02
1,119.00	0.02	0.02	0.02	0.02	0.02
1,134.00	0.02	0.02	0.02	0.02	0.02

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1A Basin - Post Development - Pervious Storm Event: 2-Year
Scenario: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,149.00	0.02	0.02	0.01	0.01	0.01
1,164.00	0.01	0.01	0.01	0.01	0.01
1,179.00	0.01	0.01	0.01	0.01	0.01
1,194.00	0.01	0.01	0.01	0.01	0.01
1,209.00	0.01	0.01	0.01	0.01	0.01
1,224.00	0.01	0.01	0.01	0.01	0.01
1,239.00	0.01	0.01	0.01	0.01	0.01
1,254.00	0.01	0.01	0.01	0.01	0.01
1,269.00	0.01	0.01	0.01	0.01	0.01
1,284.00	0.01	0.01	0.01	0.01	0.01
1,299.00	0.01	0.01	0.01	0.01	0.01
1,314.00	0.01	0.01	0.01	0.01	0.01
1,329.00	0.01	0.01	0.01	0.01	0.01
1,344.00	0.01	0.01	0.01	0.01	0.01
1,359.00	0.01	0.01	0.01	0.01	0.01
1,374.00	0.01	0.01	0.01	0.01	0.01
1,389.00	0.01	0.01	0.01	0.01	0.01
1,404.00	0.01	0.01	0.01	0.01	0.01
1,419.00	0.01	0.01	0.01	0.01	0.01
1,434.00	0.01	0.01	0.01	0.01	0.01
1,449.00	0.00	0.00	0.00	(N/A)	(N/A)

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

Computational Time Increment	1.32 min
Time to Peak (Computed)	728.05 min
Flow (Peak, Computed)	1.08 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	729.00 min
Flow (Peak Interpolated Output)	1.08 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	21,090.5000 ft²
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.36 in
Runoff Volume (Pervious)	4,155.28 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4,155.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.91 min
Computational Time Increment	1.32 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.32 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post Development - Pervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.61 min
Unit receding limb, Tr	26.43 min
Total unit time, Tb	33.03 min

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
543.00	0.00	0.00	0.00	0.00	0.00
558.00	0.00	0.00	0.00	0.00	0.01
573.00	0.01	0.01	0.01	0.01	0.01
588.00	0.01	0.01	0.01	0.01	0.01
603.00	0.01	0.01	0.02	0.02	0.02
618.00	0.02	0.02	0.02	0.02	0.02
633.00	0.03	0.03	0.03	0.03	0.03
648.00	0.03	0.03	0.04	0.04	0.04
663.00	0.04	0.04	0.05	0.05	0.06
678.00	0.06	0.06	0.07	0.08	0.08
693.00	0.09	0.11	0.13	0.16	0.21
708.00	0.26	0.31	0.38	0.48	0.67
723.00	0.88	1.03	1.08	0.97	0.82
738.00	0.70	0.61	0.53	0.46	0.39
753.00	0.32	0.27	0.23	0.21	0.19
768.00	0.18	0.17	0.16	0.15	0.15
783.00	0.14	0.13	0.13	0.13	0.12
798.00	0.12	0.12	0.12	0.12	0.11
813.00	0.11	0.11	0.11	0.11	0.10
828.00	0.10	0.10	0.10	0.10	0.09
843.00	0.09	0.09	0.09	0.09	0.09
858.00	0.09	0.08	0.08	0.08	0.08
873.00	0.08	0.08	0.08	0.08	0.08
888.00	0.08	0.07	0.07	0.07	0.07
903.00	0.07	0.07	0.07	0.07	0.07
918.00	0.07	0.06	0.06	0.06	0.06
933.00	0.06	0.06	0.06	0.06	0.06
948.00	0.06	0.05	0.05	0.05	0.05
963.00	0.05	0.05	0.05	0.05	0.05
978.00	0.05	0.05	0.05	0.05	0.05
993.00	0.04	0.04	0.04	0.04	0.04
1,008.00	0.04	0.04	0.04	0.04	0.04
1,023.00	0.04	0.04	0.04	0.04	0.04
1,038.00	0.04	0.04	0.04	0.04	0.04

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: AREA 1A Basin - Post Development - Pervious Storm Event: 10-Year
Scenario: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,053.00	0.04	0.04	0.03	0.03	0.03
1,068.00	0.03	0.03	0.03	0.03	0.03
1,083.00	0.03	0.03	0.03	0.03	0.03
1,098.00	0.03	0.03	0.03	0.03	0.03
1,113.00	0.03	0.03	0.03	0.03	0.03
1,128.00	0.03	0.03	0.03	0.03	0.03
1,143.00	0.03	0.03	0.03	0.03	0.03
1,158.00	0.03	0.03	0.03	0.03	0.03
1,173.00	0.03	0.03	0.03	0.03	0.03
1,188.00	0.03	0.03	0.03	0.03	0.03
1,203.00	0.03	0.03	0.02	0.02	0.02
1,218.00	0.02	0.02	0.02	0.02	0.02
1,233.00	0.02	0.02	0.02	0.02	0.02
1,248.00	0.02	0.02	0.02	0.02	0.02
1,263.00	0.02	0.02	0.02	0.02	0.02
1,278.00	0.02	0.02	0.02	0.02	0.02
1,293.00	0.02	0.02	0.02	0.02	0.02
1,308.00	0.02	0.02	0.02	0.02	0.02
1,323.00	0.02	0.02	0.02	0.02	0.02
1,338.00	0.02	0.02	0.02	0.02	0.02
1,353.00	0.02	0.02	0.02	0.02	0.02
1,368.00	0.02	0.02	0.02	0.02	0.02
1,383.00	0.02	0.02	0.02	0.02	0.02
1,398.00	0.02	0.02	0.02	0.02	0.02
1,413.00	0.02	0.02	0.02	0.02	0.02
1,428.00	0.02	0.02	0.02	0.02	0.02
1,443.00	0.02	0.01	0.01	0.00	0.00
1,458.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

Computational Time Increment	1.28 min
Time to Peak (Computed)	726.80 min
Flow (Peak, Computed)	0.59 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	726.00 min
Flow (Peak Interpolated Output)	0.59 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	9,990.6200 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.07 in
Runoff Volume (Pervious)	2,553.54 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,554.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.58 min
Computational Time Increment	1.28 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.63 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.39 min
Unit receding limb, Tr	25.55 min
Total unit time, Tb	31.93 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 2-Year
Scenario: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
108.00	0.00	0.00	0.00	0.00	0.00
123.00	0.00	0.00	0.00	0.00	0.00
138.00	0.00	0.00	0.00	0.00	0.00
153.00	0.00	0.00	0.00	0.00	0.00
168.00	0.00	0.00	0.00	0.00	0.00
183.00	0.00	0.00	0.00	0.00	0.00
198.00	0.00	0.00	0.00	0.00	0.00
213.00	0.00	0.00	0.00	0.00	0.00
228.00	0.00	0.00	0.01	0.01	0.01
243.00	0.01	0.01	0.01	0.01	0.01
258.00	0.01	0.01	0.01	0.01	0.01
273.00	0.01	0.01	0.01	0.01	0.01
288.00	0.01	0.01	0.01	0.01	0.01
303.00	0.01	0.01	0.01	0.01	0.01
318.00	0.01	0.01	0.01	0.01	0.01
333.00	0.01	0.01	0.01	0.01	0.01
348.00	0.01	0.01	0.01	0.01	0.01
363.00	0.01	0.01	0.01	0.01	0.01
378.00	0.01	0.01	0.01	0.01	0.01
393.00	0.01	0.01	0.01	0.01	0.01
408.00	0.01	0.01	0.01	0.01	0.01
423.00	0.01	0.01	0.01	0.01	0.01
438.00	0.01	0.01	0.01	0.01	0.01
453.00	0.01	0.01	0.02	0.02	0.02
468.00	0.02	0.02	0.02	0.02	0.02
483.00	0.02	0.02	0.02	0.02	0.02
498.00	0.02	0.02	0.02	0.02	0.02
513.00	0.02	0.02	0.02	0.02	0.02
528.00	0.02	0.02	0.02	0.02	0.02
543.00	0.03	0.03	0.03	0.03	0.03
558.00	0.03	0.03	0.03	0.03	0.03
573.00	0.03	0.03	0.03	0.03	0.03
588.00	0.03	0.03	0.03	0.03	0.03
603.00	0.03	0.03	0.04	0.04	0.04

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 2-Year
Scenario: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
618.00	0.04	0.04	0.04	0.04	0.04
633.00	0.04	0.04	0.04	0.05	0.05
648.00	0.05	0.05	0.05	0.05	0.05
663.00	0.05	0.05	0.06	0.06	0.06
678.00	0.07	0.07	0.07	0.08	0.08
693.00	0.09	0.10	0.12	0.14	0.17
708.00	0.20	0.24	0.27	0.32	0.43
723.00	0.54	0.59	0.58	0.50	0.40
738.00	0.34	0.29	0.25	0.21	0.18
753.00	0.15	0.12	0.10	0.09	0.08
768.00	0.08	0.08	0.07	0.07	0.06
783.00	0.06	0.06	0.06	0.05	0.05
798.00	0.05	0.05	0.05	0.05	0.05
813.00	0.05	0.05	0.05	0.04	0.04
828.00	0.04	0.04	0.04	0.04	0.04
843.00	0.04	0.04	0.04	0.04	0.04
858.00	0.04	0.04	0.03	0.03	0.03
873.00	0.03	0.03	0.03	0.03	0.03
888.00	0.03	0.03	0.03	0.03	0.03
903.00	0.03	0.03	0.03	0.03	0.03
918.00	0.03	0.03	0.03	0.03	0.03
933.00	0.02	0.02	0.02	0.02	0.02
948.00	0.02	0.02	0.02	0.02	0.02
963.00	0.02	0.02	0.02	0.02	0.02
978.00	0.02	0.02	0.02	0.02	0.02
993.00	0.02	0.02	0.02	0.02	0.02
1,008.00	0.02	0.02	0.02	0.02	0.02
1,023.00	0.02	0.02	0.02	0.02	0.02
1,038.00	0.02	0.02	0.01	0.01	0.01
1,053.00	0.01	0.01	0.01	0.01	0.01
1,068.00	0.01	0.01	0.01	0.01	0.01
1,083.00	0.01	0.01	0.01	0.01	0.01
1,098.00	0.01	0.01	0.01	0.01	0.01
1,113.00	0.01	0.01	0.01	0.01	0.01
1,128.00	0.01	0.01	0.01	0.01	0.01
1,143.00	0.01	0.01	0.01	0.01	0.01
1,158.00	0.01	0.01	0.01	0.01	0.01
1,173.00	0.01	0.01	0.01	0.01	0.01
1,188.00	0.01	0.01	0.01	0.01	0.01
1,203.00	0.01	0.01	0.01	0.01	0.01
1,218.00	0.01	0.01	0.01	0.01	0.01
1,233.00	0.01	0.01	0.01	0.01	0.01
1,248.00	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 2-Year
Scenario: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,263.00	0.01	0.01	0.01	0.01	0.01
1,278.00	0.01	0.01	0.01	0.01	0.01
1,293.00	0.01	0.01	0.01	0.01	0.01
1,308.00	0.01	0.01	0.01	0.01	0.01
1,323.00	0.01	0.01	0.01	0.01	0.01
1,338.00	0.01	0.01	0.01	0.01	0.01
1,353.00	0.01	0.01	0.01	0.01	0.01
1,368.00	0.01	0.01	0.01	0.01	0.01
1,383.00	0.01	0.01	0.01	0.01	0.01
1,398.00	0.01	0.01	0.01	0.01	0.01
1,413.00	0.01	0.01	0.01	0.01	0.01
1,428.00	0.01	0.01	0.01	0.01	0.01
1,443.00	0.01	0.00	0.00	0.00	(N/A)

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

Computational Time Increment	1.28 min
Time to Peak (Computed)	726.80 min
Flow (Peak, Computed)	0.91 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	726.00 min
Flow (Peak Interpolated Output)	0.90 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	9,990.6200 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.76 in
Runoff Volume (Pervious)	3,965.58 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3,966.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.58 min
Computational Time Increment	1.28 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.63 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.39 min
Unit receding limb, Tr	25.55 min
Total unit time, Tb	31.93 min

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
66.00	0.00	0.00	0.00	0.00	0.00
81.00	0.00	0.00	0.00	0.00	0.00
96.00	0.00	0.00	0.00	0.00	0.00
111.00	0.00	0.00	0.00	0.00	0.00
126.00	0.00	0.00	0.00	0.01	0.01
141.00	0.01	0.01	0.01	0.01	0.01
156.00	0.01	0.01	0.01	0.01	0.01
171.00	0.01	0.01	0.01	0.01	0.01
186.00	0.01	0.01	0.01	0.01	0.01
201.00	0.01	0.01	0.01	0.01	0.01
216.00	0.01	0.01	0.01	0.01	0.01
231.00	0.01	0.01	0.01	0.01	0.01
246.00	0.01	0.01	0.01	0.01	0.01
261.00	0.01	0.01	0.01	0.01	0.01
276.00	0.01	0.01	0.01	0.01	0.01
291.00	0.01	0.01	0.01	0.01	0.01
306.00	0.01	0.01	0.01	0.01	0.01
321.00	0.01	0.01	0.01	0.01	0.01
336.00	0.01	0.01	0.01	0.01	0.01
351.00	0.02	0.02	0.02	0.02	0.02
366.00	0.02	0.02	0.02	0.02	0.02
381.00	0.02	0.02	0.02	0.02	0.02
396.00	0.02	0.02	0.02	0.02	0.02
411.00	0.02	0.02	0.02	0.02	0.02
426.00	0.02	0.02	0.02	0.02	0.02
441.00	0.02	0.02	0.02	0.02	0.02
456.00	0.02	0.02	0.03	0.03	0.03
471.00	0.03	0.03	0.03	0.03	0.03
486.00	0.03	0.03	0.03	0.03	0.03
501.00	0.03	0.03	0.03	0.03	0.03
516.00	0.03	0.03	0.04	0.04	0.04
531.00	0.04	0.04	0.04	0.04	0.04
546.00	0.04	0.04	0.04	0.04	0.04
561.00	0.04	0.04	0.05	0.05	0.05

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 10-Year
Scenario: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
576.00	0.05	0.05	0.05	0.05	0.05
591.00	0.05	0.05	0.05	0.05	0.05
606.00	0.05	0.06	0.06	0.06	0.06
621.00	0.06	0.06	0.06	0.07	0.07
636.00	0.07	0.07	0.07	0.07	0.07
651.00	0.07	0.08	0.08	0.08	0.08
666.00	0.08	0.09	0.09	0.10	0.10
681.00	0.11	0.11	0.12	0.12	0.13
696.00	0.15	0.18	0.22	0.26	0.31
711.00	0.36	0.41	0.50	0.66	0.82
726.00	0.90	0.89	0.76	0.62	0.51
741.00	0.44	0.38	0.32	0.27	0.22
756.00	0.18	0.16	0.14	0.13	0.12
771.00	0.11	0.11	0.10	0.10	0.09
786.00	0.09	0.09	0.08	0.08	0.08
801.00	0.08	0.08	0.08	0.07	0.07
816.00	0.07	0.07	0.07	0.07	0.07
831.00	0.06	0.06	0.06	0.06	0.06
846.00	0.06	0.06	0.06	0.05	0.05
861.00	0.05	0.05	0.05	0.05	0.05
876.00	0.05	0.05	0.05	0.05	0.05
891.00	0.05	0.05	0.05	0.04	0.04
906.00	0.04	0.04	0.04	0.04	0.04
921.00	0.04	0.04	0.04	0.04	0.04
936.00	0.04	0.04	0.04	0.03	0.03
951.00	0.03	0.03	0.03	0.03	0.03
966.00	0.03	0.03	0.03	0.03	0.03
981.00	0.03	0.03	0.03	0.03	0.03
996.00	0.03	0.03	0.03	0.03	0.03
1,011.00	0.03	0.03	0.03	0.02	0.02
1,026.00	0.02	0.02	0.02	0.02	0.02
1,041.00	0.02	0.02	0.02	0.02	0.02
1,056.00	0.02	0.02	0.02	0.02	0.02
1,071.00	0.02	0.02	0.02	0.02	0.02
1,086.00	0.02	0.02	0.02	0.02	0.02
1,101.00	0.02	0.02	0.02	0.02	0.02
1,116.00	0.02	0.02	0.02	0.02	0.02
1,131.00	0.02	0.02	0.02	0.02	0.02
1,146.00	0.02	0.02	0.02	0.02	0.02
1,161.00	0.02	0.02	0.02	0.02	0.02
1,176.00	0.02	0.02	0.02	0.02	0.02
1,191.00	0.02	0.02	0.02	0.02	0.02
1,206.00	0.02	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 10-Year
Scenario: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,221.00	0.01	0.01	0.01	0.01	0.01
1,236.00	0.01	0.01	0.01	0.01	0.01
1,251.00	0.01	0.01	0.01	0.01	0.01
1,266.00	0.01	0.01	0.01	0.01	0.01
1,281.00	0.01	0.01	0.01	0.01	0.01
1,296.00	0.01	0.01	0.01	0.01	0.01
1,311.00	0.01	0.01	0.01	0.01	0.01
1,326.00	0.01	0.01	0.01	0.01	0.01
1,341.00	0.01	0.01	0.01	0.01	0.01
1,356.00	0.01	0.01	0.01	0.01	0.01
1,371.00	0.01	0.01	0.01	0.01	0.01
1,386.00	0.01	0.01	0.01	0.01	0.01
1,401.00	0.01	0.01	0.01	0.01	0.01
1,416.00	0.01	0.01	0.01	0.01	0.01
1,431.00	0.01	0.01	0.01	0.01	0.01
1,446.00	0.01	0.00	0.00	0.00	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

Computational Time Increment	0.29 min
Time to Peak (Computed)	725.84 min
Flow (Peak, Computed)	0.05 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	723.00 min
Flow (Peak Interpolated Output)	0.05 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	838.0900 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.07 in
Runoff Volume (Pervious)	214.21 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	214.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.15 min
Computational Time Increment	0.29 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.61 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.43 min
Unit receding limb, Tr	5.73 min
Total unit time, Tb	7.17 min

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
414.00	0.00	0.00	0.00	0.00	0.00
429.00	0.00	0.00	0.00	0.00	0.00
444.00	0.00	0.00	0.00	0.00	0.00
459.00	0.00	0.00	0.00	0.00	0.00
474.00	0.00	0.00	0.00	0.00	0.00
489.00	0.00	0.00	0.00	0.00	0.00
504.00	0.00	0.00	0.00	0.00	0.00
519.00	0.00	0.00	0.00	0.00	0.00
534.00	0.00	0.00	0.00	0.00	0.00
549.00	0.00	0.00	0.00	0.00	0.00
564.00	0.00	0.00	0.00	0.00	0.00
579.00	0.00	0.00	0.00	0.00	0.00
594.00	0.00	0.00	0.00	0.00	0.00
609.00	0.00	0.00	0.00	0.00	0.00
624.00	0.00	0.00	0.00	0.00	0.00
639.00	0.00	0.00	0.00	0.00	0.00
654.00	0.00	0.00	0.00	0.00	0.00
669.00	0.01	0.01	0.01	0.01	0.01
684.00	0.01	0.01	0.01	0.01	0.01
699.00	0.02	0.02	0.02	0.02	0.03
714.00	0.03	0.05	0.05	0.05	0.05
729.00	0.03	0.03	0.02	0.02	0.02
744.00	0.02	0.01	0.01	0.01	0.01
759.00	0.01	0.01	0.01	0.01	0.01
774.00	0.01	0.00	0.00	0.00	0.00
789.00	0.00	0.00	0.00	0.00	0.00
804.00	0.00	0.00	0.00	0.00	0.00
819.00	0.00	0.00	0.00	0.00	0.00
834.00	0.00	0.00	0.00	0.00	0.00
849.00	0.00	0.00	0.00	0.00	0.00
864.00	0.00	0.00	0.00	0.00	0.00
879.00	0.00	0.00	0.00	0.00	0.00
894.00	0.00	0.00	0.00	0.00	0.00

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 2-Year

Return Event: 2 years
Storm Event: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
909.00	0.00	0.00	0.00	0.00	0.00
924.00	0.00	0.00	0.00	0.00	0.00
939.00	0.00	0.00	0.00	0.00	0.00
954.00	0.00	0.00	0.00	0.00	0.00
969.00	0.00	0.00	0.00	0.00	0.00
984.00	0.00	0.00	0.00	0.00	0.00
999.00	0.00	0.00	0.00	0.00	0.00
1,014.00	0.00	0.00	0.00	0.00	0.00
1,029.00	0.00	0.00	0.00	0.00	0.00
1,044.00	0.00	0.00	0.00	0.00	0.00
1,059.00	0.00	0.00	0.00	0.00	0.00
1,074.00	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

Computational Time Increment	0.29 min
Time to Peak (Computed)	725.84 min
Flow (Peak, Computed)	0.08 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	723.00 min
Flow (Peak Interpolated Output)	0.08 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	838.0900 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.76 in
Runoff Volume (Pervious)	332.66 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	333.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.15 min
Computational Time Increment	0.29 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.61 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.43 min
Unit receding limb, Tr	5.73 min
Total unit time, Tb	7.17 min

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
282.00	0.00	0.00	0.00	0.00	0.00
297.00	0.00	0.00	0.00	0.00	0.00
312.00	0.00	0.00	0.00	0.00	0.00
327.00	0.00	0.00	0.00	0.00	0.00
342.00	0.00	0.00	0.00	0.00	0.00
357.00	0.00	0.00	0.00	0.00	0.00
372.00	0.00	0.00	0.00	0.00	0.00
387.00	0.00	0.00	0.00	0.00	0.00
402.00	0.00	0.00	0.00	0.00	0.00
417.00	0.00	0.00	0.00	0.00	0.00
432.00	0.00	0.00	0.00	0.00	0.00
447.00	0.00	0.00	0.00	0.00	0.00
462.00	0.00	0.00	0.00	0.00	0.00
477.00	0.00	0.00	0.00	0.00	0.00
492.00	0.00	0.00	0.00	0.00	0.00
507.00	0.00	0.00	0.00	0.00	0.00
522.00	0.00	0.00	0.00	0.00	0.00
537.00	0.00	0.00	0.00	0.00	0.00
552.00	0.00	0.00	0.00	0.00	0.00
567.00	0.00	0.00	0.00	0.00	0.00
582.00	0.00	0.00	0.00	0.00	0.00
597.00	0.00	0.00	0.00	0.00	0.00
612.00	0.00	0.01	0.01	0.01	0.01
627.00	0.01	0.01	0.01	0.01	0.01
642.00	0.01	0.01	0.01	0.01	0.01
657.00	0.01	0.01	0.01	0.01	0.01
672.00	0.01	0.01	0.01	0.01	0.01
687.00	0.01	0.01	0.02	0.02	0.02
702.00	0.02	0.03	0.03	0.04	0.04
717.00	0.08	0.08	0.08	0.08	0.05
732.00	0.04	0.03	0.03	0.03	0.02
747.00	0.02	0.02	0.01	0.01	0.01
762.00	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 10-Year

Return Event: 10 years
Storm Event: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
777.00	0.01	0.01	0.01	0.01	0.01
792.00	0.01	0.01	0.01	0.01	0.01
807.00	0.01	0.01	0.01	0.01	0.01
822.00	0.01	0.01	0.01	0.01	0.01
837.00	0.00	0.00	0.00	0.00	0.00
852.00	0.00	0.00	0.00	0.00	0.00
867.00	0.00	0.00	0.00	0.00	0.00
882.00	0.00	0.00	0.00	0.00	0.00
897.00	0.00	0.00	0.00	0.00	0.00
912.00	0.00	0.00	0.00	0.00	0.00
927.00	0.00	0.00	0.00	0.00	0.00
942.00	0.00	0.00	0.00	0.00	0.00
957.00	0.00	0.00	0.00	0.00	0.00
972.00	0.00	0.00	0.00	0.00	0.00
987.00	0.00	0.00	0.00	0.00	0.00
1,002.00	0.00	0.00	0.00	0.00	0.00
1,017.00	0.00	0.00	0.00	0.00	0.00
1,032.00	0.00	0.00	0.00	0.00	0.00
1,047.00	0.00	0.00	0.00	0.00	0.00
1,062.00	0.00	0.00	0.00	0.00	0.00
1,077.00	0.00	0.00	0.00	0.00	0.00
1,092.00	0.00	0.00	0.00	0.00	0.00
1,107.00	0.00	0.00	0.00	0.00	0.00
1,122.00	0.00	0.00	0.00	0.00	0.00
1,137.00	0.00	0.00	0.00	0.00	0.00
1,152.00	0.00	0.00	0.00	0.00	0.00
1,167.00	0.00	0.00	0.00	0.00	0.00
1,182.00	0.00	0.00	0.00	0.00	0.00
1,197.00	0.00	0.00	0.00	0.00	0.00
1,212.00	0.00	0.00	0.00	0.00	0.00
1,227.00	0.00	0.00	0.00	0.00	0.00
1,242.00	0.00	0.00	0.00	0.00	0.00
1,257.00	0.00	0.00	0.00	0.00	0.00
1,272.00	0.00	0.00	0.00	0.00	0.00
1,287.00	0.00	0.00	0.00	0.00	0.00
1,302.00	0.00	0.00	0.00	0.00	0.00
1,317.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

Computational Time Increment	2.53 min
Time to Peak (Computed)	735.05 min
Flow (Peak, Computed)	0.25 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	735.00 min
Flow (Peak Interpolated Output)	0.25 ft³/s

Drainage Area	
SCS CN (Composite)	71.550
Area (User Defined)	15,742.8500 ft²
Maximum Retention (Pervious)	3.98 in
Maximum Retention (Pervious, 20 percent)	0.80 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.97 in
Runoff Volume (Pervious)	1,269.96 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1,270.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	19.01 min
Computational Time Increment	2.53 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.29 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	12.67 min
Unit receding limb, Tr	50.69 min
Total unit time, Tb	63.37 min

Storm Event	2-Year
Return Event	2 years
Duration	4,320.00 min
Depth	3.30 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
669.00	0.00	0.00	0.00	0.00	0.00
684.00	0.00	0.00	0.01	0.01	0.01
699.00	0.01	0.01	0.02	0.03	0.04
714.00	0.05	0.06	0.09	0.13	0.17
729.00	0.21	0.24	0.25	0.25	0.23
744.00	0.22	0.20	0.18	0.16	0.14
759.00	0.12	0.10	0.09	0.08	0.07
774.00	0.07	0.06	0.06	0.06	0.05
789.00	0.05	0.05	0.05	0.05	0.04
804.00	0.04	0.04	0.04	0.04	0.04
819.00	0.04	0.04	0.04	0.04	0.04
834.00	0.04	0.04	0.04	0.03	0.03
849.00	0.03	0.03	0.03	0.03	0.03
864.00	0.03	0.03	0.03	0.03	0.03
879.00	0.03	0.03	0.03	0.03	0.03
894.00	0.03	0.03	0.03	0.03	0.03
909.00	0.03	0.03	0.03	0.02	0.02
924.00	0.02	0.02	0.02	0.02	0.02
939.00	0.02	0.02	0.02	0.02	0.02
954.00	0.02	0.02	0.02	0.02	0.02
969.00	0.02	0.02	0.02	0.02	0.02
984.00	0.02	0.02	0.02	0.02	0.02
999.00	0.02	0.02	0.02	0.02	0.02
1,014.00	0.02	0.02	0.02	0.02	0.02
1,029.00	0.02	0.01	0.01	0.01	0.01
1,044.00	0.01	0.01	0.01	0.01	0.01
1,059.00	0.01	0.01	0.01	0.01	0.01
1,074.00	0.01	0.01	0.01	0.01	0.01
1,089.00	0.01	0.01	0.01	0.01	0.01
1,104.00	0.01	0.01	0.01	0.01	0.01
1,119.00	0.01	0.01	0.01	0.01	0.01
1,134.00	0.01	0.01	0.01	0.01	0.01
1,149.00	0.01	0.01	0.01	0.01	0.01
1,164.00	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: AREA 1B Bypass - Post-Development - Pervious Storm Event: 2-Year
Scenario: 2-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,179.00	0.01	0.01	0.01	0.01	0.01
1,194.00	0.01	0.01	0.01	0.01	0.01
1,209.00	0.01	0.01	0.01	0.01	0.01
1,224.00	0.01	0.01	0.01	0.01	0.01
1,239.00	0.01	0.01	0.01	0.01	0.01
1,254.00	0.01	0.01	0.01	0.01	0.01
1,269.00	0.01	0.01	0.01	0.01	0.01
1,284.00	0.01	0.01	0.01	0.01	0.01
1,299.00	0.01	0.01	0.01	0.01	0.01
1,314.00	0.01	0.01	0.01	0.01	0.01
1,329.00	0.01	0.01	0.01	0.01	0.01
1,344.00	0.01	0.01	0.01	0.01	0.01
1,359.00	0.01	0.01	0.01	0.01	0.01
1,374.00	0.01	0.01	0.01	0.01	0.01
1,389.00	0.01	0.01	0.01	0.01	0.01
1,404.00	0.01	0.01	0.01	0.01	0.01
1,419.00	0.01	0.01	0.01	0.01	0.01
1,434.00	0.01	0.01	0.01	0.01	0.01
1,449.00	0.00	0.00	0.00	0.00	0.00
1,464.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

Computational Time Increment	2.53 min
Time to Peak (Computed)	735.05 min
Flow (Peak, Computed)	0.61 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	735.00 min
Flow (Peak Interpolated Output)	0.60 ft³/s

Drainage Area	
SCS CN (Composite)	71.550
Area (User Defined)	15,742.8500 ft²
Maximum Retention (Pervious)	3.98 in
Maximum Retention (Pervious, 20 percent)	0.80 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.16 in
Runoff Volume (Pervious)	2,835.16 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2,835.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	19.01 min
Computational Time Increment	2.53 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.29 ft³/s

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	12.67 min
Unit receding limb, Tr	50.69 min
Total unit time, Tb	63.37 min

Storm Event	10-Year
Return Event	10 years
Duration	4,320.00 min
Depth	5.00 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
579.00	0.00	0.00	0.00	0.00	0.00
594.00	0.00	0.00	0.00	0.00	0.00
609.00	0.01	0.01	0.01	0.01	0.01
624.00	0.01	0.01	0.01	0.01	0.01
639.00	0.01	0.01	0.01	0.02	0.02
654.00	0.02	0.02	0.02	0.02	0.02
669.00	0.02	0.03	0.03	0.03	0.03
684.00	0.04	0.04	0.04	0.05	0.05
699.00	0.06	0.07	0.09	0.11	0.13
714.00	0.16	0.21	0.27	0.35	0.45
729.00	0.53	0.59	0.60	0.58	0.53
744.00	0.48	0.43	0.39	0.34	0.29
759.00	0.25	0.22	0.19	0.17	0.15
774.00	0.14	0.13	0.12	0.11	0.11
789.00	0.10	0.10	0.09	0.09	0.09
804.00	0.09	0.09	0.08	0.08	0.08
819.00	0.08	0.08	0.08	0.07	0.07
834.00	0.07	0.07	0.07	0.07	0.07
849.00	0.07	0.06	0.06	0.06	0.06
864.00	0.06	0.06	0.06	0.06	0.06
879.00	0.06	0.06	0.06	0.06	0.05
894.00	0.05	0.05	0.05	0.05	0.05
909.00	0.05	0.05	0.05	0.05	0.05
924.00	0.05	0.05	0.05	0.04	0.04
939.00	0.04	0.04	0.04	0.04	0.04
954.00	0.04	0.04	0.04	0.04	0.04
969.00	0.04	0.04	0.03	0.03	0.03
984.00	0.03	0.03	0.03	0.03	0.03
999.00	0.03	0.03	0.03	0.03	0.03
1,014.00	0.03	0.03	0.03	0.03	0.03
1,029.00	0.03	0.03	0.03	0.03	0.03
1,044.00	0.03	0.03	0.03	0.03	0.03
1,059.00	0.03	0.03	0.02	0.02	0.02
1,074.00	0.02	0.02	0.02	0.02	0.02

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: AREA 1B Bypass - Post-Development - Pervious Storm Event: 10-Year
Scenario: 10-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,089.00	0.02	0.02	0.02	0.02	0.02
1,104.00	0.02	0.02	0.02	0.02	0.02
1,119.00	0.02	0.02	0.02	0.02	0.02
1,134.00	0.02	0.02	0.02	0.02	0.02
1,149.00	0.02	0.02	0.02	0.02	0.02
1,164.00	0.02	0.02	0.02	0.02	0.02
1,179.00	0.02	0.02	0.02	0.02	0.02
1,194.00	0.02	0.02	0.02	0.02	0.02
1,209.00	0.02	0.02	0.02	0.02	0.02
1,224.00	0.02	0.02	0.02	0.02	0.02
1,239.00	0.02	0.02	0.02	0.02	0.02
1,254.00	0.02	0.02	0.02	0.02	0.02
1,269.00	0.02	0.02	0.02	0.02	0.02
1,284.00	0.02	0.02	0.02	0.02	0.02
1,299.00	0.02	0.02	0.02	0.02	0.02
1,314.00	0.02	0.02	0.02	0.02	0.02
1,329.00	0.02	0.01	0.01	0.01	0.01
1,344.00	0.01	0.01	0.01	0.01	0.01
1,359.00	0.01	0.01	0.01	0.01	0.01
1,374.00	0.01	0.01	0.01	0.01	0.01
1,389.00	0.01	0.01	0.01	0.01	0.01
1,404.00	0.01	0.01	0.01	0.01	0.01
1,419.00	0.01	0.01	0.01	0.01	0.01
1,434.00	0.01	0.01	0.01	0.01	0.01
1,449.00	0.01	0.01	0.01	0.00	0.00
1,464.00	0.00	0.00	0.00	(N/A)	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post Development - Pervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

Computational Time Increment	1.32 min
Time to Peak (Computed)	728.05 min
Flow (Peak, Computed)	2.42 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	729.00 min
Flow (Peak Interpolated Output)	2.39 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	21,090.5000 ft²
Maximum Retention (Pervious)	3.51 in
Maximum Retention (Pervious, 20 percent)	0.70 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.26 in
Runoff Volume (Pervious)	9,240.96 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	9,242.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.91 min
Computational Time Increment	1.32 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.32 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post Development - Pervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.61 min
Unit receding limb, Tr	26.43 min
Total unit time, Tb	33.03 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1A Basin - Post Development - Pervious Storm Event: 100-Year
Scenario: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	9.91 min
Area (User Defined)	21,090.5000 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
411.00	0.00	0.00	0.00	0.00	0.00
426.00	0.00	0.00	0.00	0.00	0.00
441.00	0.01	0.00	0.00	0.01	0.01
456.00	0.01	0.01	0.01	0.01	0.01
471.00	0.01	0.01	0.01	0.01	0.01
486.00	0.01	0.02	0.02	0.02	0.02
501.00	0.02	0.02	0.02	0.02	0.02
516.00	0.02	0.02	0.02	0.02	0.03
531.00	0.03	0.03	0.03	0.03	0.04
546.00	0.04	0.05	0.04	0.04	0.04
561.00	0.04	0.05	0.05	0.05	0.05
576.00	0.05	0.05	0.05	0.05	0.05
591.00	0.06	0.06	0.07	0.07	0.07
606.00	0.07	0.07	0.07	0.07	0.08
621.00	0.09	0.10	0.11	0.11	0.11
636.00	0.10	0.11	0.11	0.11	0.11
651.00	0.11	0.12	0.13	0.13	0.14
666.00	0.14	0.15	0.16	0.18	0.19
681.00	0.20	0.21	0.23	0.23	0.25
696.00	0.30	0.36	0.45	0.55	0.67
711.00	0.79	0.94	1.17	1.60	2.04
726.00	2.33	2.39	2.12	1.76	1.47
741.00	1.27	1.10	0.95	0.80	0.67
756.00	0.55	0.46	0.41	0.38	0.36
771.00	0.35	0.34	0.33	0.30	0.28
786.00	0.26	0.26	0.25	0.25	0.23
801.00	0.22	0.22	0.21	0.21	0.21
816.00	0.21	0.21	0.21	0.21	0.23
831.00	0.23	0.21	0.19	0.18	0.17
846.00	0.17	0.17	0.17	0.17	0.17
861.00	0.17	0.15	0.14	0.15	0.16
876.00	0.15	0.14	0.15	0.16	0.15
891.00	0.14	0.13	0.13	0.13	0.14
906.00	0.16	0.18	0.15	0.12	0.12

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1A Basin - Post Development - Pervious Storm Event: 100-Year
Scenario: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
921.00	0.12	0.13	0.13	0.13	0.12
936.00	0.11	0.10	0.11	0.11	0.11
951.00	0.10	0.09	0.09	0.10	0.11
966.00	0.11	0.10	0.09	0.09	0.09
981.00	0.09	0.09	0.09	0.09	0.09
996.00	0.09	0.08	0.07	0.06	0.07
1,011.00	0.08	0.08	0.08	0.09	0.08
1,026.00	0.07	0.07	0.08	0.10	0.10
1,041.00	0.09	0.07	0.06	0.07	0.07
1,056.00	0.07	0.06	0.07	0.07	0.07
1,071.00	0.06	0.07	0.07	0.06	0.05
1,086.00	0.05	0.05	0.06	0.07	0.06
1,101.00	0.05	0.05	0.05	0.04	0.05
1,116.00	0.06	0.07	0.06	0.05	0.05
1,131.00	0.05	0.04	0.04	0.04	0.05
1,146.00	0.06	0.07	0.06	0.05	0.05
1,161.00	0.05	0.04	0.04	0.04	0.04
1,176.00	0.04	0.04	0.04	0.05	0.06
1,191.00	0.07	0.06	0.05	0.05	0.05
1,206.00	0.04	0.04	0.04	0.04	0.04
1,221.00	0.04	0.04	0.04	0.04	0.04
1,236.00	0.04	0.04	0.04	0.04	0.04
1,251.00	0.04	0.04	0.04	0.04	0.05
1,266.00	0.06	0.07	0.06	0.05	0.05
1,281.00	0.05	0.04	0.04	0.04	0.04
1,296.00	0.04	0.04	0.04	0.04	0.03
1,311.00	0.02	0.02	0.03	0.04	0.04
1,326.00	0.04	0.04	0.04	0.04	0.04
1,341.00	0.04	0.04	0.04	0.04	0.04
1,356.00	0.03	0.02	0.02	0.03	0.04
1,371.00	0.04	0.04	0.04	0.04	0.04
1,386.00	0.03	0.02	0.02	0.03	0.04
1,401.00	0.04	0.04	0.04	0.03	0.02
1,416.00	0.02	0.03	0.04	0.04	0.04
1,431.00	0.04	0.03	0.02	0.02	0.03
1,446.00	0.02	0.01	0.01	0.00	0.00
1,461.00	0.00	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

Computational Time Increment	1.28 min
Time to Peak (Computed)	728.08 min
Flow (Peak, Computed)	1.53 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	726.00 min
Flow (Peak Interpolated Output)	1.51 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	9,990.6200 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.13 in
Runoff Volume (Pervious)	6,768.63 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,769.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	9.58 min
Computational Time Increment	1.28 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.63 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1A Basin - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	6.39 min
Unit receding limb, Tr	25.55 min
Total unit time, Tb	31.93 min

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	9.58 min
Area (User Defined)	9,990.6200 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
39.00	0.00	0.00	0.00	0.00	0.00
54.00	0.00	0.00	0.00	0.01	0.01
69.00	0.01	0.01	0.01	0.01	0.01
84.00	0.01	0.01	0.01	0.01	0.01
99.00	0.01	0.01	0.01	0.01	0.01
114.00	0.01	0.01	0.01	0.01	0.01
129.00	0.01	0.01	0.01	0.01	0.01
144.00	0.01	0.01	0.01	0.01	0.01
159.00	0.01	0.01	0.01	0.02	0.01
174.00	0.01	0.01	0.02	0.03	0.02
189.00	0.02	0.02	0.02	0.02	0.02
204.00	0.02	0.02	0.02	0.02	0.02
219.00	0.02	0.02	0.02	0.02	0.02
234.00	0.02	0.02	0.02	0.02	0.02
249.00	0.02	0.02	0.02	0.03	0.03
264.00	0.03	0.02	0.02	0.02	0.02
279.00	0.02	0.02	0.02	0.02	0.02
294.00	0.02	0.02	0.03	0.03	0.03
309.00	0.03	0.02	0.02	0.02	0.02
324.00	0.02	0.02	0.03	0.03	0.03
339.00	0.03	0.02	0.02	0.02	0.02
354.00	0.03	0.03	0.03	0.03	0.02
369.00	0.02	0.03	0.03	0.03	0.03
384.00	0.03	0.04	0.03	0.03	0.03
399.00	0.04	0.03	0.03	0.03	0.04
414.00	0.05	0.05	0.04	0.04	0.04
429.00	0.04	0.04	0.04	0.04	0.04
444.00	0.04	0.03	0.03	0.04	0.04
459.00	0.04	0.04	0.04	0.04	0.04
474.00	0.04	0.04	0.04	0.05	0.05
489.00	0.06	0.06	0.05	0.05	0.05
504.00	0.05	0.06	0.06	0.05	0.06
519.00	0.06	0.06	0.05	0.07	0.07
534.00	0.07	0.06	0.07	0.08	0.09

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 100-Year
Scenario: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
549.00	0.09	0.08	0.07	0.07	0.07
564.00	0.08	0.08	0.08	0.08	0.08
579.00	0.08	0.08	0.08	0.08	0.09
594.00	0.09	0.09	0.09	0.09	0.09
609.00	0.09	0.09	0.09	0.10	0.11
624.00	0.12	0.13	0.12	0.12	0.12
639.00	0.12	0.11	0.11	0.11	0.12
654.00	0.12	0.13	0.13	0.14	0.14
669.00	0.14	0.16	0.17	0.18	0.18
684.00	0.19	0.20	0.20	0.22	0.25
699.00	0.30	0.37	0.44	0.52	0.60
714.00	0.69	0.84	1.12	1.38	1.51
729.00	1.50	1.29	1.04	0.86	0.73
744.00	0.63	0.54	0.45	0.37	0.30
759.00	0.25	0.23	0.22	0.20	0.19
774.00	0.19	0.18	0.17	0.15	0.14
789.00	0.14	0.14	0.14	0.13	0.12
804.00	0.12	0.12	0.12	0.12	0.12
819.00	0.12	0.12	0.12	0.12	0.13
834.00	0.12	0.10	0.10	0.09	0.09
849.00	0.09	0.09	0.09	0.09	0.09
864.00	0.08	0.08	0.08	0.08	0.08
879.00	0.08	0.08	0.08	0.08	0.08
894.00	0.07	0.07	0.07	0.07	0.09
909.00	0.09	0.08	0.07	0.06	0.07
924.00	0.07	0.07	0.07	0.07	0.06
939.00	0.06	0.06	0.06	0.06	0.05
954.00	0.05	0.05	0.06	0.06	0.06
969.00	0.05	0.05	0.05	0.05	0.05
984.00	0.05	0.05	0.05	0.05	0.05
999.00	0.04	0.04	0.03	0.04	0.04
1,014.00	0.04	0.05	0.05	0.04	0.04
1,029.00	0.03	0.04	0.05	0.05	0.05
1,044.00	0.04	0.03	0.04	0.04	0.03
1,059.00	0.03	0.03	0.04	0.03	0.03
1,074.00	0.04	0.04	0.03	0.03	0.03
1,089.00	0.03	0.03	0.04	0.03	0.03
1,104.00	0.03	0.02	0.02	0.03	0.03
1,119.00	0.04	0.03	0.03	0.03	0.02
1,134.00	0.02	0.02	0.02	0.03	0.03
1,149.00	0.04	0.03	0.03	0.03	0.02
1,164.00	0.02	0.02	0.02	0.02	0.02
1,179.00	0.02	0.02	0.03	0.03	0.04

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1A Basin - Post-Development - Impervious Storm Event: 100-Year
Scenario: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,194.00	0.03	0.03	0.03	0.02	0.02
1,209.00	0.02	0.02	0.02	0.02	0.02
1,224.00	0.02	0.02	0.02	0.02	0.02
1,239.00	0.02	0.02	0.02	0.02	0.02
1,254.00	0.02	0.02	0.02	0.03	0.03
1,269.00	0.04	0.03	0.03	0.03	0.02
1,284.00	0.02	0.02	0.02	0.02	0.02
1,299.00	0.02	0.02	0.02	0.01	0.01
1,314.00	0.01	0.02	0.02	0.02	0.02
1,329.00	0.02	0.02	0.02	0.02	0.02
1,344.00	0.02	0.02	0.02	0.02	0.01
1,359.00	0.01	0.01	0.02	0.02	0.02
1,374.00	0.02	0.02	0.02	0.02	0.01
1,389.00	0.01	0.01	0.02	0.02	0.02
1,404.00	0.02	0.02	0.01	0.01	0.01
1,419.00	0.02	0.02	0.02	0.02	0.02
1,434.00	0.01	0.01	0.01	0.02	0.01
1,449.00	0.01	0.00	0.00	0.00	(N/A)

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

Computational Time Increment	0.29 min
Time to Peak (Computed)	725.84 min
Flow (Peak, Computed)	0.14 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	723.00 min
Flow (Peak Interpolated Output)	0.14 ft³/s

Drainage Area	
SCS CN (Composite)	98.000
Area (User Defined)	838.0900 ft²
Maximum Retention (Pervious)	0.20 in
Maximum Retention (Pervious, 20 percent)	0.04 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	8.13 in
Runoff Volume (Pervious)	567.80 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	568.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	2.15 min
Computational Time Increment	0.29 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.61 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	1.43 min
Unit receding limb, Tr	5.73 min
Total unit time, Tb	7.17 min

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	2.15 min
Area (User Defined)	838.0900 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
132.00	0.00	0.00	0.00	0.00	0.00
147.00	0.00	0.00	0.00	0.00	0.00
162.00	0.00	0.00	0.00	0.00	0.00
177.00	0.00	0.00	0.00	0.00	0.00
192.00	0.00	0.00	0.00	0.00	0.00
207.00	0.00	0.00	0.00	0.00	0.00
222.00	0.00	0.00	0.00	0.00	0.00
237.00	0.00	0.00	0.00	0.00	0.00
252.00	0.00	0.00	0.00	0.00	0.00
267.00	0.00	0.00	0.00	0.00	0.00
282.00	0.00	0.00	0.00	0.00	0.00
297.00	0.00	0.00	0.00	0.00	0.00
312.00	0.00	0.00	0.00	0.00	0.00
327.00	0.00	0.00	0.00	0.00	0.00
342.00	0.00	0.00	0.00	0.00	0.00
357.00	0.00	0.00	0.00	0.00	0.00
372.00	0.00	0.00	0.00	0.00	0.00
387.00	0.00	0.00	0.00	0.00	0.00
402.00	0.00	0.00	0.00	0.01	0.01
417.00	0.00	0.00	0.00	0.00	0.00
432.00	0.00	0.00	0.00	0.00	0.00
447.00	0.00	0.00	0.00	0.00	0.00
462.00	0.00	0.00	0.00	0.00	0.00
477.00	0.00	0.00	0.01	0.01	0.00
492.00	0.00	0.00	0.00	0.01	0.01
507.00	0.00	0.00	0.01	0.01	0.00
522.00	0.00	0.01	0.01	0.00	0.00
537.00	0.01	0.01	0.01	0.01	0.01
552.00	0.01	0.01	0.01	0.01	0.01
567.00	0.01	0.01	0.01	0.01	0.01
582.00	0.01	0.01	0.01	0.01	0.01
597.00	0.01	0.01	0.01	0.01	0.01
612.00	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
627.00	0.01	0.01	0.01	0.01	0.01
642.00	0.01	0.01	0.01	0.01	0.01
657.00	0.01	0.01	0.01	0.01	0.02
672.00	0.02	0.02	0.02	0.02	0.02
687.00	0.02	0.02	0.03	0.03	0.04
702.00	0.04	0.05	0.05	0.07	0.07
717.00	0.13	0.14	0.14	0.14	0.08
732.00	0.07	0.06	0.05	0.04	0.04
747.00	0.03	0.03	0.02	0.02	0.02
762.00	0.02	0.02	0.02	0.02	0.02
777.00	0.01	0.01	0.01	0.01	0.01
792.00	0.01	0.01	0.01	0.01	0.01
807.00	0.01	0.01	0.01	0.01	0.01
822.00	0.01	0.01	0.01	0.01	0.01
837.00	0.01	0.01	0.01	0.01	0.01
852.00	0.01	0.01	0.01	0.01	0.01
867.00	0.01	0.01	0.01	0.01	0.01
882.00	0.01	0.01	0.01	0.01	0.01
897.00	0.01	0.01	0.01	0.01	0.00
912.00	0.00	0.01	0.01	0.01	0.01
927.00	0.01	0.01	0.00	0.00	0.01
942.00	0.01	0.00	0.00	0.00	0.00
957.00	0.01	0.01	0.00	0.00	0.00
972.00	0.00	0.00	0.00	0.00	0.00
987.00	0.00	0.00	0.00	0.00	0.00
1,002.00	0.00	0.00	0.00	0.00	0.00
1,017.00	0.00	0.00	0.00	0.00	0.01
1,032.00	0.01	0.00	0.00	0.00	0.00
1,047.00	0.00	0.00	0.00	0.00	0.00
1,062.00	0.00	0.00	0.00	0.00	0.00
1,077.00	0.00	0.00	0.00	0.00	0.00
1,092.00	0.00	0.00	0.00	0.00	0.00
1,107.00	0.00	0.00	0.00	0.00	0.00
1,122.00	0.00	0.00	0.00	0.00	0.00
1,137.00	0.00	0.00	0.00	0.00	0.00
1,152.00	0.00	0.00	0.00	0.00	0.00
1,167.00	0.00	0.00	0.00	0.00	0.00
1,182.00	0.00	0.00	0.00	0.00	0.00
1,197.00	0.00	0.00	0.00	0.00	0.00
1,212.00	0.00	0.00	0.00	0.00	0.00
1,227.00	0.00	0.00	0.00	0.00	0.00
1,242.00	0.00	0.00	0.00	0.00	0.00

Subsection: Unit Hydrograph (Hydrograph Table)
Label: AREA 1B Bypass - Post-Development - Impervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
1,257.00	0.00	0.00	0.00	0.00	0.00
1,272.00	0.00	0.00	0.00	0.00	0.00
1,287.00	0.00	0.00	0.00	0.00	0.00
1,302.00	0.00	0.00	0.00	0.00	0.00
1,317.00	0.00	0.00	0.00	0.00	0.00
1,332.00	0.00	0.00	0.00	0.00	0.00
1,347.00	0.00	0.00	0.00	0.00	0.00
1,362.00	0.00	0.00	0.00	0.00	0.00
1,377.00	0.00	0.00	0.00	0.00	0.00
1,392.00	0.00	0.00	0.00	0.00	0.00
1,407.00	0.00	0.00	0.00	0.00	0.00
1,422.00	0.00	0.00	0.00	0.00	0.00
1,437.00	0.00	0.00	0.00	(N/A)	(N/A)

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

Computational Time Increment	2.53 min
Time to Peak (Computed)	732.52 min
Flow (Peak, Computed)	1.41 ft³/s
Output Increment	3.00 min
Time to Flow (Peak Interpolated Output)	735.00 min
Flow (Peak Interpolated Output)	1.41 ft³/s

Drainage Area	
SCS CN (Composite)	71.550
Area (User Defined)	15,742.8500 ft²
Maximum Retention (Pervious)	3.98 in
Maximum Retention (Pervious, 20 percent)	0.80 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.97 in
Runoff Volume (Pervious)	6,516.58 ft³

Hydrograph Volume (Area under Hydrograph curve)	
Volume	6,517.00 ft³

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	19.01 min
Computational Time Increment	2.53 min
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.29 ft³/s

Subsection: Unit Hydrograph Summary
Label: AREA 1B Bypass - Post-Development - Pervious
Scenario: 100-Year

Return Event: 100 years
Storm Event: 100-Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	12.67 min
Unit receding limb, Tr	50.69 min
Total unit time, Tb	63.37 min

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1B Bypass - Post-Development - Pervious Storm Event: 100-Year
Scenario: 100-Year

Storm Event	100-Year
Return Event	100 years
Duration	4,320.00 min
Depth	8.37 in
Time of Concentration (Composite)	19.01 min
Area (User Defined)	15,742.8500 ft²

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
456.00	0.00	0.00	0.00	0.00	0.00
471.00	0.00	0.00	0.00	0.00	0.00
486.00	0.00	0.01	0.01	0.01	0.01
501.00	0.01	0.01	0.01	0.01	0.01
516.00	0.01	0.01	0.01	0.01	0.01
531.00	0.01	0.01	0.02	0.02	0.02
546.00	0.02	0.02	0.02	0.02	0.02
561.00	0.02	0.02	0.03	0.03	0.03
576.00	0.03	0.03	0.03	0.03	0.03
591.00	0.03	0.03	0.04	0.04	0.04
606.00	0.04	0.04	0.04	0.04	0.05
621.00	0.05	0.05	0.06	0.06	0.06
636.00	0.07	0.07	0.07	0.07	0.07
651.00	0.07	0.07	0.08	0.08	0.08
666.00	0.09	0.09	0.09	0.10	0.11
681.00	0.12	0.12	0.13	0.14	0.15
696.00	0.16	0.18	0.21	0.26	0.31
711.00	0.38	0.46	0.56	0.70	0.89
726.00	1.10	1.29	1.40	1.41	1.33
741.00	1.21	1.08	0.96	0.84	0.73
756.00	0.63	0.54	0.47	0.40	0.36
771.00	0.32	0.30	0.28	0.26	0.24
786.00	0.23	0.21	0.20	0.19	0.19
801.00	0.18	0.17	0.17	0.16	0.16
816.00	0.16	0.15	0.15	0.15	0.16
831.00	0.16	0.16	0.16	0.15	0.14
846.00	0.14	0.13	0.13	0.13	0.13
861.00	0.12	0.12	0.12	0.11	0.11
876.00	0.11	0.11	0.11	0.11	0.11
891.00	0.11	0.11	0.10	0.10	0.10
906.00	0.10	0.11	0.11	0.11	0.10
921.00	0.10	0.09	0.09	0.09	0.09
936.00	0.09	0.09	0.08	0.08	0.08
951.00	0.08	0.08	0.07	0.07	0.07

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: AREA 1B Bypass - Post-Development - Pervious Storm Event: 100-Year
Scenario: 100-Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 3.00 min
Time on left represents time for first value in each row.

Time (min)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
966.00	0.08	0.08	0.07	0.07	0.07
981.00	0.07	0.07	0.06	0.06	0.06
996.00	0.06	0.06	0.06	0.06	0.05
1,011.00	0.05	0.05	0.06	0.06	0.06
1,026.00	0.06	0.06	0.06	0.06	0.06
1,041.00	0.07	0.06	0.06	0.06	0.05
1,056.00	0.05	0.05	0.05	0.05	0.05
1,071.00	0.05	0.05	0.05	0.05	0.05
1,086.00	0.04	0.04	0.04	0.04	0.04
1,101.00	0.04	0.04	0.04	0.04	0.04
1,116.00	0.04	0.04	0.04	0.04	0.04
1,131.00	0.04	0.04	0.04	0.03	0.03
1,146.00	0.04	0.04	0.04	0.04	0.04
1,161.00	0.04	0.04	0.04	0.03	0.03
1,176.00	0.03	0.03	0.03	0.03	0.04
1,191.00	0.04	0.04	0.04	0.04	0.04
1,206.00	0.04	0.04	0.03	0.03	0.03
1,221.00	0.03	0.03	0.03	0.03	0.03
1,236.00	0.03	0.03	0.03	0.03	0.03
1,251.00	0.03	0.03	0.03	0.03	0.03
1,266.00	0.04	0.04	0.04	0.04	0.04
1,281.00	0.04	0.04	0.04	0.03	0.03
1,296.00	0.03	0.03	0.03	0.03	0.03
1,311.00	0.03	0.02	0.02	0.02	0.02
1,326.00	0.03	0.03	0.03	0.03	0.03
1,341.00	0.03	0.03	0.03	0.03	0.03
1,356.00	0.03	0.03	0.02	0.02	0.02
1,371.00	0.02	0.03	0.03	0.03	0.03
1,386.00	0.03	0.02	0.02	0.02	0.02
1,401.00	0.02	0.03	0.03	0.03	0.02
1,416.00	0.02	0.02	0.02	0.02	0.03
1,431.00	0.03	0.03	0.02	0.02	0.02
1,446.00	0.02	0.02	0.01	0.01	0.01
1,461.00	0.00	0.00	0.00	0.00	0.00

Appendix E

Pipe Calculations

PIPE CAPACITY ANALYSIS

Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (ft)	System Intensity (in/h)	Slope (%)	Manning's n	Diameter (in)	Flow (cfs)	Capacity (Full Flow) (cfs)	Velocity (ft/s)	HGL (In) (ft)	HGL (Out) (ft)
OS-1	CB-1	86.80	85.75	60	8.00	1.76	0.011	15	1.37	10.13	5.76	87.26	86.06

Appendix F

Groundwater Recharge & Mounding

New Jersey Groundwater Recharge Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
SOMERSET CO., FRANKLIN TWP	45.7	1.48

Project Name:	1901FS.01
Description:	Groundwater Recharge
Analysis Date:	10/06/21

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.8772	Woods	Penn	12.9	40,945
2	0.217	Woods	Reaville	12.9	10,133
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Total =	1.1			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				12.9	51,079

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.1839	Woods	Penn	12.9	8,584
2	0.4048	Open space	Penn	12.3	18,085
3	0.1894	Impervious areas	Penn	0.0	-
4	0.101	Gravel, dirt	Penn	5.4	1,992
5	0.0375	Woods	Reaville	12.9	1,751
6	0.1184	Open space	Reaville	12.3	5,292
7	0.0592	Impervious areas	Reaville	0.0	-
8					
9					
10					
11					
12					
13					
14					
15					
Total =	1.1			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				9.0	35,705

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)
		10,829
Post-Development Annual Recharge Deficit=	***15,374***	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	3.99	(in)	DRWC=	1.99	(in)
ERWC =	1.04	(in)	EDRWC=	0.52	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
1901FS.01	Groundwater Recharge	10/06/21	INFILTRATION BASIN

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	4397.6	sq.ft
BMP Effective Depth, this is the design variable	dBMP	2.6	in
Upper level of the BMP surface (negative if above ground)	dBMPu	12.5	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	15.1	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	4	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.98	in
ERWC Modified to consider dEXC	EDRWC	0.44	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.36	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	1.22	in
Inches of Rainfall to capture	Pdesign	1.44	in
Recharge Provided Avg. over Imp. Area		20.9	in
Runoff Captured Avg. over imp. Area		31.8	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.44	unitless
BMP Volume	VBMP	941	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> Solve Problem to satisfy Annual Recharge
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	15,374	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	9,991	sq.ft
Root Zone Water Capacity	RWC	3.77	in
RWC Modified to consider dEXC	DRWC	1.69	in
Climatic Factor	C-factor	1.48	no units
Average Annual P	Pavg	45.7	in
Recharge Requirement over Imp. Area	dr	17.0	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		17,378	cu.ft
Avg BMP Recharge Efficiency		65.7%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.9%	%
%Runoff Infiltrated		89.3%	%
%Runoff Recharged		54.1%	%
%Rainfall Recharged		42.1%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

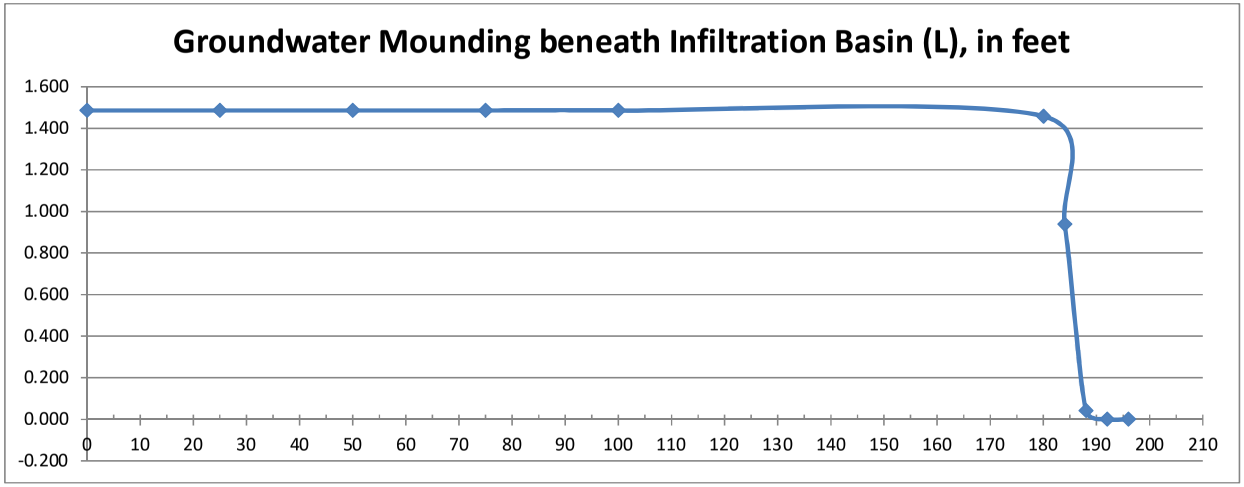
Input Values

3.50	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
3.50	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
184.495	x	1/2 length of basin (x direction, in feet)
6.000	y	1/2 width of basin (y direction, in feet)
0.77	t	Duration of infiltration period (hours)
2.00	hi(0)	Initial thickness of saturated zone (feet)

3.486	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.486	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.486	0
1.486	25
1.486	50
1.486	75
1.486	100
1.458	180
0.938	184
0.042	188
0.001	192
0.000	196

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

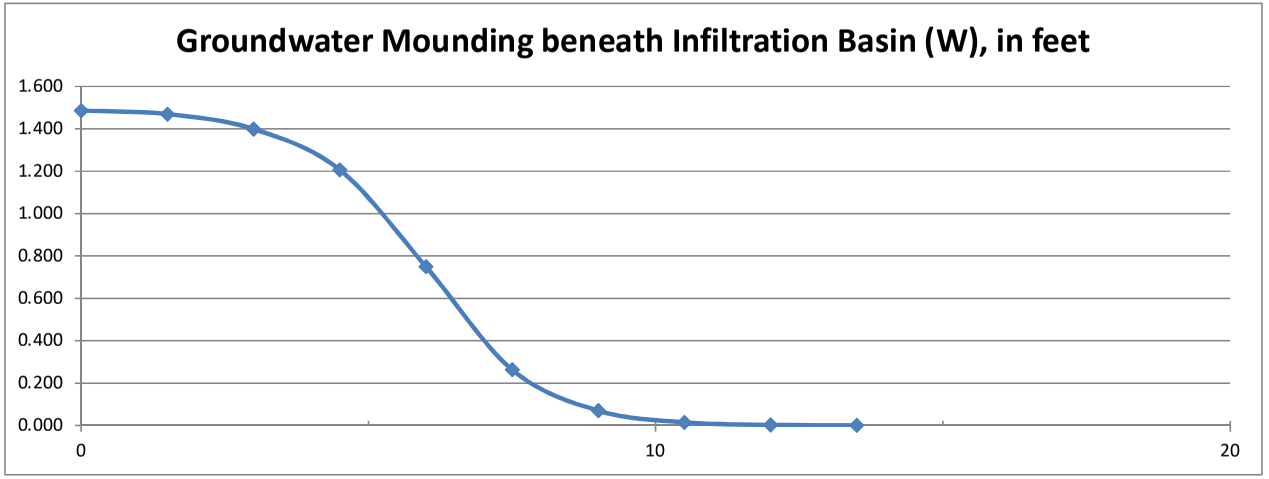
Input Values

3.50	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
3.50	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
6.000	x	1/2 length of basin (x direction, in feet)
184.495	y	1/2 width of basin (y direction, in feet)
0.77	t	Duration of infiltration period (hours)
2.00	hi(0)	Initial thickness of saturated zone (feet)

3.486	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.486	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.486	0
1.470	1.5
1.399	3
1.206	4.5
0.750	6
0.263	7.5
0.070	9
0.014	10.5
0.003	12
0.001	14

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Appendix G

BMP Calculations

BMP Calculations

I. Small-Scale Infiltration Basin

i. Parameters

Maximum Side-Slope = 3:1
Infiltration Area = 3,964 ft^2
WQDS Volume = 991 ft^3
Sand Layer Depth = 6 inches
Total Drainage Area = **0.71 Acre < 2.50 Acres**

ii. Drain Time

Per Chapter 9.8 of the NJDEP Stormwater BMP Manual:

$$Drain\ Time = \frac{WQDS\ Runoff\ Volume}{Infiltration\ Area\ x\ Design\ Permeability\ Rate} < 72\ \text{Hours}$$

Design Permeability Rate: 3.5 inches/hour (See Soil Log 6)
Drain Time = (991 ft^3)/[(3,964 ft^2) x (3.50 in/hr) x (1 ft/12 in)]
= **0.86 hour < 72 hours**

iii. Separation from SHWT

Infiltration Basin Bottom Elevation = 89.30
Thickness of Sand Layer = 6 inches = 0.50 ft
Elevation of Bottom of Sand Layer = 89.30 – 0.50 = 88.80
Highest SHWT Elevation = 86.8 (See Soil Log 6)
Minimum Separation = 88.80– 86.80 = **2 feet ≥ 2 feet**

Appendix H

Soil Data

161 Cedar Grove Lane
Franklin Township, Somerset County, NJ
Block 507.38, Lot 13

Soil Tests – 5/26/2020 – 5/27/2020

Soil Log #1

0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 46”	5YR 4/4	Fractured Shale; 15% Loam
46 - 81”	5YR 4/4	Fractured Shale; 10% Loam
		Isolated Mottle Area @ 46”
		Water @ 57” (24hr Static)
		Machine Refusal @ 81”

Soil Log #2

0 - 10”	5YR 4/3	Silt Loam; Granular, Friable
10 - 18”	5YR 5/4	Silt Loam; Subangular Blocky, Friable
18 - 48”	5YR 4/4	Fractured Shale; 15% Loam
48 - 84”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ 34” (5YR 5/2)
		Water @ 34”
		Machine Refusal @ 84”

Soil Log #3

0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 20”	5YR 5/4	Shaly Loam; 20% Shale Gravel, Subangular Blocky, Friable
20 - 86”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ 27” (5YR 5/2)
		Seepage @ 36”
		Machine Refusal @ 86”

Soil Log #4

0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 28”	5YR 4/4	Shaly Loam; Subangular Blocky, Friable
28 - 71”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ 35” (5YR 5/2)
		Water @ 35”
		Machine Refusal @ 71”

161 Cedar Grove Lane
Franklin Township, Somerset County, NJ
Block 507.38, Lot 13

Soil Tests – 5/26/2020 – 5/27/2020

Soil Log #5

0 - 10”	5YR 4/3	Loam
10 - 18”	5YR 4/4	Loam
18 - 42”	5YR 4/4	Fractured Shale; 15% Loam
42 - 78”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ ” (5YR 5/3)
		Water @ 30”
		Machine Refusal @ 78”

Soil Log #6

0 - 8”	5YR 4/3	Silt Loam; Granular, Friable
8 - 20”	5YR 5/4	Silt Loam; Subangular Blocky, Friable
20 - 48”	5YR 4/4	Fractured Shale; 15% Loam
48 - 90”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ 34” (5YR 5/1)
		Water @ 30”
		Machine Refusal @ 90”

Soil Log #7

0 - 10”	5YR 4/3	Loam; Subangular Blocky, Friable
10 - 28”	5YR 4/4	Shaly Loam; Subangular Blocky, Friable
28 - 80”	5YR 4/4	Fractured Shale; 10% Loam
		No Mottles
		Water @ 46”
		Machine Refusal @ 80”

Soil Log #8

0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 18”	5YR 5/4	Shaly Loam; Subangular Blocky, Friable
18 - 50”	5YR 4/4	Fractured Shale; 10% Loam
50 - 74”	5YR 4/4	Fractured Shale; 5% Loam

161 Cedar Grove Lane
Franklin Township, Somerset County, NJ
Block 507.38, Lot 13

Soil Tests – 5/26/2020 – 5/27/2020

Soil Log #8 (continued)

No Mottles
Water @ 47”
Machine Refusal @ 74”

Soil Log #9

0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 17”	5YR 5/4	Shaly Loam; Subangular Blocky, Friable, 30% Shale
17 - 47”	5YR 4/4	Fractured Shale; 10% Loam
47 - 70”	5YR 4/4	Fractured Shale; 5% Loam
		Isolated Pocket of Mottles @ 36”
		Water @ 45”
		Machine Refusal @ 70”

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:** _____

1. Log Number 1 Method (Check One): Profile Pit: _____ Boring: _____
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**
0 - 10”	5YR 4/3 Loam; Granular, Friable
10 - 46”	5YR 4/4 Fractured Shale; 15% Loam
46 - 81”	5YR 4/4 Fractured Shale; 10% Loam
	Isolated Mottle Area @ 46”
	Water @ 57” (24hr Static)
	Machine Refusal @ 81”

3. Ground Water Observations:
   ____Seepage - Indicate Depth: _____
   ____Pit/Boring Flooded - Depth After 24 Hours = _____

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 10”
   __X__ Massive Rock Substratum - Depth to Top 81”
   _____ Excessively Coarse Horizon - Depth Top to Bottom _____
   _____ Excessively Coarse Substratum - Depth to Top _____
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom _____
   _____ Hydraulically Restrictive Substratum - Depth to Top _____
   _____ Perched Zone of Saturation - Depth Top to Bottom _____
   _____ Regional Zone of Saturation - Depth to Top _____

5. Soil Suitability Classification: _____

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer _____ Date _____
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:** _____

1. Log Number 2 Method (Check One): Profile Pit: _____ Boring: _____
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**
0 - 10”	5YR 4/3 Silt Loam; Granular, Friable
10 - 18”	5YR 5/4 Silt Loam; Subangular Blocky, Friable
18 - 48”	5YR 4/4 Fractured Shale; 15% Loam
48 - 84”	5YR 4/4 Fractured Shale; 10% Loam
	Mottles @ 34” (5YR 5/2)
	Water @ 34”
	Machine Refusal @ 84”

3. Ground Water Observations:
   ____ Seepage - Indicate Depth: _____
   ____ Pit/Boring Flooded - Depth After 24 Hours = _____

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 18”
   __X__ Massive Rock Substratum - Depth to Top 84”
   _____ Excessively Coarse Horizon - Depth Top to Bottom _____
   _____ Excessively Coarse Substratum - Depth to Top _____
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom _____
   _____ Hydraulically Restrictive Substratum - Depth to Top _____
   _____ Perched Zone of Saturation - Depth Top to Bottom _____
   _____ Regional Zone of Saturation - Depth to Top _____

5. Soil Suitability Classification: _____

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Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer _____ Date _____
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:** _____

1. Log Number 3 Method (Check One): Profile Pit: _____ Boring: _____
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**
0 - 10”	5YR 4/3 Loam; Granular, Friable
10 - 20”	5YR 5/4 Shaly Loam; 20% Shale Gravel, Subangular Blocky, Friable
20 - 86”	5YR 4/4 Fractured Shale; 10% Loam
	Mottles @ 27” (5YR 5/2)
	Seepage @ 36”
	Machine Refusal @ 86”

3. Ground Water Observations:
   X Seepage - Indicate Depth: 36”
   ____ Pit/Boring Flooded - Depth After 24 Hours = _____

4. Soil Limiting Zones:
   X Fractured Rock Substratum - Depth to Top 20”
   X Massive Rock Substratum - Depth to Top 86”
   _____ Excessively Coarse Horizon - Depth Top to Bottom _____
   _____ Excessively Coarse Substratum - Depth to Top _____
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom _____
   _____ Hydraulically Restrictive Substratum - Depth to Top _____
   _____ Perched Zone of Saturation - Depth Top to Bottom _____
   _____ Regional Zone of Saturation - Depth to Top _____

5. Soil Suitability Classification: _____

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Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer _____ Date _____
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:**

1. Log Number 4 Method (Check One): Profile Pit: Boring:
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**
0 - 10”	5YR 4/3 Loam; Granular, Friable
10 - 28”	5YR 4/4 Shaly Loam; Subangular Blocky, Friable
28 - 71”	5YR 4/4 Fractured Shale; 10% Loam
	Mottles @ 35” (5YR 5/2)
	Water @ 35”
	Machine Refusal @ 71”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth:
   ___ Pit/Boring Flooded - Depth After 24 Hours =

4. Soil Limiting Zones:
   X Fractured Rock Substratum - Depth to Top 28”
   X Massive Rock Substratum - Depth to Top 71”
   ___ Excessively Coarse Horizon - Depth Top to Bottom
   ___ Excessively Coarse Substratum - Depth to Top
   ___ Hydraulically Restrictive Horizon - Depth Top to Bottom
   ___ Hydraulically Restrictive Substratum - Depth to Top
   ___ Perched Zone of Saturation - Depth Top to Bottom
   ___ Regional Zone of Saturation - Depth to Top

5. Soil Suitability Classification:

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer Date
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:** _____

1. Log Number 5 Method (Check One): Profile Pit: _____ Boring: _____
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**	
0 - 10”	5YR 4/3	Loam
10 - 18”	5YR 4/4	Loam
18 - 42”	5YR 4/4	Fractured Shale; 15% Loam
42 - 78”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ ” (5YR 5/3)
		Water @ 30”
		Machine Refusal @ 78”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth: _____
   ____ Pit/Boring Flooded - Depth After 24 Hours = _____

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 18”
   __X__ Massive Rock Substratum - Depth to Top 78”
   _____ Excessively Coarse Horizon - Depth Top to Bottom _____
   _____ Excessively Coarse Substratum - Depth to Top _____
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom _____
   _____ Hydraulically Restrictive Substratum - Depth to Top _____
   _____ Perched Zone of Saturation - Depth Top to Bottom _____
   _____ Regional Zone of Saturation - Depth to Top _____

5. Soil Suitability Classification: _____

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer _____ Date _____
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:**

1. Log Number 6 Method (Check One): Profile Pit: Boring:
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**	
0 - 8”	5YR 4/3	Silt Loam; Granular, Friable
8 - 20”	5YR 5/4	Silt Loam; Subangular Blocky, Friable
20 - 48”	5YR 4/4	Fractured Shale; 15% Loam
48 - 90”	5YR 4/4	Fractured Shale; 10% Loam
		Mottles @ 34” (5YR 5/1)
		Water @ 30”
		Machine Refusal @ 90”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth:
   ____ Pit/Boring Flooded - Depth After 24 Hours =

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 20”
   __X__ Massive Rock Substratum - Depth to Top 90”
   _____ Excessively Coarse Horizon - Depth Top to Bottom
   _____ Excessively Coarse Substratum - Depth to Top
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom
   _____ Hydraulically Restrictive Substratum - Depth to Top
   _____ Perched Zone of Saturation - Depth Top to Bottom
   _____ Regional Zone of Saturation - Depth to Top

5. Soil Suitability Classification:

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer Date
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:**

1. Log Number 7 Method (Check One): Profile Pit: Boring:
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**	
0 - 10”	5YR 4/3	Loam; Subangular Blocky, Friable
10 - 28”	5YR 4/4	Shaly Loam; Subangular Blocky, Friable
28 - 80”	5YR 4/4	Fractured Shale; 10% Loam
		No Mottles
		Water @ 46”
		Machine Refusal @ 80”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth:
   ___ Pit/Boring Flooded - Depth After 24 Hours =

4. Soil Limiting Zones:
   X Fractured Rock Substratum - Depth to Top 28”
   X Massive Rock Substratum - Depth to Top 80”
   ___ Excessively Coarse Horizon - Depth Top to Bottom
   ___ Excessively Coarse Substratum - Depth to Top
   ___ Hydraulically Restrictive Horizon - Depth Top to Bottom
   ___ Hydraulically Restrictive Substratum - Depth to Top
   ___ Perched Zone of Saturation - Depth Top to Bottom
   ___ Regional Zone of Saturation - Depth to Top

5. Soil Suitability Classification:

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer Date
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:**

1. Log Number 8 Method (Check One): Profile Pit: Boring:
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**	
0 - 10”	5YR 4/3	Loam; Granular, Friable
10 - 18”	5YR 5/4	Shaly Loam; Subangular Blocky, Friable
18 - 50”	5YR 4/4	Fractured Shale; 10% Loam
50 - 74”	5YR 4/4	Fractured Shale; 5% Loam
		No Mottles
		Water @ 47”
		Machine Refusal @ 74”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth:
   ____ Pit/Boring Flooded - Depth After 24 Hours =

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 18”
   __X__ Massive Rock Substratum - Depth to Top 74”
   _____ Excessively Coarse Horizon - Depth Top to Bottom
   _____ Excessively Coarse Substratum - Depth to Top
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom
   _____ Hydraulically Restrictive Substratum - Depth to Top
   _____ Perched Zone of Saturation - Depth Top to Bottom
   _____ Regional Zone of Saturation - Depth to Top

5. Soil Suitability Classification:

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer Date
Michael K. Ford, NJ PE License No. 34722

SOMERSET COUNTY/FRANKLIN TOWNSHIP
Form 2b - Soil Log and Interpretation

Block: 507.38 **Lot(s): 13** **Proposed Lot:**

1. Log Number 9 Method (Check One): Profile Pit: Boring:
   Date Recorded: 5/26/20-5/27/20

2. Soil Log

Depth (inches) Top-Bottom	**Munsell Color Name and Symbol; Estimated Textural Class; Estimated Volume % Coarse Fragment, If Present; Structure; Moist or Dry Consistence; Mottling - Abundance, Size and Contrast, If Present**
0 - 10”	5YR 4/3 Loam; Granular, Friable
10 - 17”	5YR 5/4 Shaly Loam; Subangular Blocky, Friable, 30% Shale
17 - 47”	5YR 4/4 Fractured Shale; 10% Loam
47 - 70”	5YR 4/4 Fractured Shale; 5% Loam
	Isolated Pocket of Mottles @ 36”
	Water @ 45”
	Machine Refusal @ 70”

3. Ground Water Observations:
   ___ Seepage - Indicate Depth:
   ____ Pit/Boring Flooded - Depth After 24 Hours =

4. Soil Limiting Zones:
   __X__ Fractured Rock Substratum - Depth to Top 17”
   __X__ Massive Rock Substratum - Depth to Top 70”
   _____ Excessively Coarse Horizon - Depth Top to Bottom
   _____ Excessively Coarse Substratum - Depth to Top
   _____ Hydraulically Restrictive Horizon - Depth Top to Bottom
   _____ Hydraulically Restrictive Substratum - Depth to Top
   _____ Perched Zone of Saturation - Depth Top to Bottom
   _____ Regional Zone of Saturation - Depth to Top

5. Soil Suitability Classification:

I hereby certify that the information furnished on Form 2b of this application is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (NJSA 58:10a-1 et seq.) and is subject to penalties as prescribed in NJAC 7:14-8.

Signature of Site Evaluator Kyle J. Paterson Date 5/27/2020

Signature of Engineer Date
Michael K. Ford, NJ PE License No. 34722

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #1

PIT BAIL #: SL #1

Depth to pit bottom: 6.67 ft. 24 static water level: 4.75 ft. (Dwater)

Depth to Impermeable Strata: 10.00 ft.; H = Dstratum - Dwater: 5.25 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27 (H - h)^2 \times 60 \text{ min/hr} \quad (K \text{ in inches/hr})$$

Tn(min)	Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	80.00	0.00	0.00	0.00			
t1	30.00	76.00	4.00	4.58	18.33	4.00	9.17	3.50	2.11
t2	30.00	74.00	4.42	4.58	20.24	2.00	19.29	3.75	2.52
t3	30.00	72.50	4.75	4.58	21.77	1.50	21.01	3.90	2.24
t4	408.00	57.50	8.50	4.58	38.96	15.00	30.36	4.58	4.50

Final pit depth (Dstratum) 6.67 ft.
24-hour groundwater reading 4.75 ft.
Height of 24 hour-reading above Dstratum 1.92 ft. (H)
Average height of water level above Dstratum 1.25 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

$$K = [\text{ hrise / t }] \times [\text{ Aav / 2.27 (H - h)}] \times 60 \text{ min/hr}$$

$$= [\ 15.00\ /\ 408\ ] \times [\ 30.36\ /\ 2.27\ (\ 3.67\ -\ 1.56\ )\ ] \times 60 \text{ min/hr}$$

$$= 13.98 \text{ in/hr}$$

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

N.J.P.E. & L.S. #20792

Engineer's Signature Michael K. Ford License # and Seal

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #2

PIT BAIL #: SL #2

Depth to pit bottom: 6.00 ft. 24 static water level: 2.83 ft. (Dwater)

Depth to Impermeable Strata: 9.00 ft.; H = Dstratum - Dwater: 6.17 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27 (H - h)^2 \times 60 \text{ min/hr} \quad (K \text{ in inches/hr})$$

Tn(min)		Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	72.00	0.00	0.00	0.00				
t1	15.00	66.75	5.42	4.58	24.83	5.25	12.41	3.22	4.15
t2	15.00	62.50	6.17	4.58	28.26	4.25	26.55	3.61	7.96
t3	15.00	60.25	7.42	4.58	33.99	2.25	31.13	3.89	5.38
t4	10.00	58.00	7.75	4.58	35.52	2.25	34.76	4.07	9.64

Final pit depth (Dstratum) 6.00 ft.
24-hour groundwater reading 2.83 ft.
Height of 24 hour-reading above Dstratum 3.17 ft. (H)
Average height of water level above Dstratum 1.07 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

K = [hrise / t] x [Aav / 2.27 (H - h)] x 60 min/hr

= [2.25 / 10]x[34.76 / 2.27 (10.03 - 1.15) x 60 min/hr

= 23.29 in/hr

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Engineer's Signature Michael K. Ford

N.J.P.E. & L.S. #20792

License # and Seal

hip **FORM 3F - PIT-BAIL TEST DATA SHEET**

Applicant: 0.00 Date Tested: 5 / 26-27 / 20

Block: 507.38 Ex. Lot: 13 Prop. L 13 FranklinTownship

SEI SOIL LOG SL3

PIT BAIL #: SL3

Depth to pit bottom: 5.58 ft. 24.00 static water level 2.92 ft. (Dwater)

Depth to Impermeable Strata: 8.38 ft.; H = Dstratum - Dwat 5.46 ft.

(Dstratum = 1.5 › pit depth assumed)

Calculate the following values and enter into the table below:

An = water surface area in square feet

hrise = water level rise in inches

Aav = average water surface area (An + previous An)/2 in sft.

h = average height of water level above Dstratum

(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

Ka = hrise/t x Aav/2.27 (H^2 -h ^2) x 60 min/hr (K in inches/hr)

Tn(min)	Dwater(i	l, w (ft)		An(sft	hrise(in)	Aav(s	h(ft)	Ka
t0	0.00	67.00	0.00	0.00	0.00			
t1	10.00	61.50	3.83	4.58	17.57	5.50	8.78	3.02	6.18
t2	10.00	59.50	5.00	4.58	22.92	2.00	20.24	3.33	5.73
t3	10.00	58.00	5.50	4.58	25.21	1.50	24.06	3.48	5.39
t4	10.00	56.50	6.17	4.58	28.26	1.50	26.74	3.60	6.31
t5	40.00	52.00	7.25	4.58	33.23	4.50	30.75	3.85	6.12

Final pit depth (Dstratum) 5.58 ft.

24-hour groundwater reading 2.92 ft.

Height of 24 hour-reading above Dstratum 2.67 ft. (H)

Average height of water level above Dstratum 1.06 ft. (h)

(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

K = [hrise / t] x [Aav / 2.27 (H^2 - h^2)] x 60 min/hr

= [4.50 / 40.00]x ##### / 2.27 (7.11 - 1.13) x 60 min/hr

= 15.28 in/hr

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

N.J.P.E. #34722

Engineer's Signature MICHAEL K. FORD License # and Seal

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #4

PIT BAIL #: SL #4

Depth to pit bottom: 4.58 ft. 24 static water level: 2.92 ft. (Dwater)

Depth to Impermeable Strata: 6.88 ft.; H = Dstratum - Dwater: 3.96 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27 (H - h)^2 \times 60 \text{ min/hr} \quad (K \text{ in inches/hr})$$

Tn(min)		Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	55.00	0.00	0.00	0.00				
t1	10.00	50.00	4.17	4.33	18.06	5.00	9.03	2.50	12.67
t2	5.00	43.00	7.08	4.17	29.51	7.00	23.78	3.00	131.99
t3	5.00	42.00	7.17	4.17	29.86	1.00	29.69	3.33	34.44
t4	20.00	40.50	7.42	4.17	30.90	1.50	30.38	3.44	15.64

Final pit depth (Dstratum) 4.58 ft.
24-hour groundwater reading 2.92 ft.
Height of 24 hour-reading above Dstratum 1.67 ft. (H)
Average height of water level above Dstratum 1.15 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

$$K = [\text{ hrise / t }] \times [\text{ Aav / 2.27 (H - h)}] \times 60 \text{ min/hr}$$

$$= [\ 1.50\ /\ 20\ ] \times [\ 30.38\ /\ 2.27\ (\ 2.78\ -\ 1.31\ )\ ] \times 60 \text{ min/hr}$$

$$= 41.12 \text{ in/hr}$$

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Engineer's Signature Michael K. Ford

N.J.P.E. & L.S. #20792

License # and Seal

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #5

PIT BAIL #: SL #5

Depth to pit bottom: 4.92 ft. 24 static water level: 2.50 ft. (Dwater)

Depth to Impermeable Strata: 7.38 ft.; H = Dstratum - Dwater: 4.88 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27 (H - h)^2 \times 60 \text{ min/hr} \quad (K \text{ in inches/hr})$$

Tn(min)		Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	59.00	0.00	0.00	0.00				
t1	10.00	55.00	4.58	4.17	19.10	4.00	9.55	2.63	5.98
t2	10.00	52.00	4.75	4.17	19.79	3.00	19.44	2.92	10.10
t3	20.00	49.00	6.33	4.17	26.39	3.00	23.09	3.17	6.66
t4	20.00	47.00	6.92	4.17	28.82	2.00	27.60	3.38	5.90

Final pit depth (Dstratum) 4.92 ft.
24-hour groundwater reading 2.50 ft.
Height of 24 hour-reading above Dstratum 2.42 ft. (H)
Average height of water level above Dstratum 0.92 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

$$K = [\text{ hrise / t }] \times [\text{ Aav / 2.27 (H - h)}] \times 60 \text{ min/hr}$$

$$= [\ 2.00\ /\ 20\ ] \times [\ 27.60\ / 2.27 (\ 5.84\ -\ 0.84\ ) \times 60 \text{ min/hr}$$

$$= 14.59 \text{ in/hr}$$

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

N.J.P.E. & L.S. #20792

Engineer's Signature Michael K. Ford License # and Seal

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #6

PIT BAIL #: SL #6

Depth to pit bottom: 6.75 ft. 24 static water level: 2.50 ft. (Dwater)

Depth to Impermeable Strata: 10.13 ft.; H = Dstratum - Dwater: 7.63 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27\ (H^2 - h^2) \times 60\ min/hr \quad (K\ in\ inches/hr)$$

Tn(min)		Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	81.00	0.00	0.00	0.00				
t1	5.00	77.00	4.25	4.00	17.00	4.00	8.50	3.54	3.94
t2	10.00	74.50	5.00	4.00	20.00	2.50	18.50	3.81	2.80
t3	10.00	72.00	5.58	4.00	22.33	2.50	21.17	4.02	3.33
t4	15.00	69.00	5.92	4.00	23.67	3.00	23.00	4.25	3.03

Final pit depth (Dstratum) 6.75 ft.
24-hour groundwater reading 2.50 ft.
Height of 24 hour-reading above Dstratum 4.25 ft. (H)
Average height of water level above Dstratum 0.88 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

$$K = [\ hrise / t\ ] \times [\ Aav / 2.27\ (H - h)\ ] \times 60\ min/hr$$

$$= [\ 3.00\ /\ 15\ ] \times [\ 23.00\ / 2.27\ (\ 18.06\ -\ 0.77\ ) \times 60\ min/hr$$

$$= 7.03\ in/hr$$

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

N.J.P.E. & L.S. #20792

Engineer's Signature Michael K. Ford License # and Seal

FORM 3F - PIT-BAIL TEST DATA SHEET

Applicant: 0 Date Tested: 5 / 26-27 / 20

Block: 507.38 Lot: 13 Prop. Lot: 13 Franklin Township

SEE SOIL LOG
SL #7

PIT BAIL #: SL #7

Depth to pit bottom: 5.83 ft. 24 static water level: 3.83 ft. (Dwater)

Depth to Impermeable Strata: 8.75 ft.; H = Dstratum - Dwater: 4.92 ft.
(Dstratum) 1.5 x pit depth assumed

Calculate the following values and enter into the table below:

An = water surface area in square feet
hrise = water level rise in inches
Aav = average water surface area (An + previous An)/2 in sft.
h = average height of water level above Dstratum
(take average of current water level and previous water level, convert to feet, and subtract from Dstratum) in ft.

$$Ka = hrise/t \times Aav/2.27 (H - h)^2 \times 60 \text{ min/hr} \quad (K \text{ in inches/hr})$$

Tn(min)	Dwater(in)	l, w (ft)		An(sft)	hrise(in)	Aav(sft)	) h(ft)	Ka
t0	0.00	70.00	0.00	0.00	0.00			
t1	10.00	62.00	4.25	3.33	14.17	8.00	7.08	3.25	11.00
t2	10.00	60.75	4.67	3.33	15.56	1.25	14.86	3.64	4.48
t3	20.00	59.00	4.92	3.50	17.21	1.75	16.38	3.76	3.78
t4	20.00	57.25	5.75	3.50	20.13	1.75	18.67	3.91	4.84

Final pit depth (Dstratum) 5.83 ft.
24-hour groundwater reading 3.83 ft.
Height of 24 hour-reading above Dstratum 2.00 ft. (H)
Average height of water level above Dstratum 0.99 ft. (h)
(take average of d beginning and end of last time interval recorded, convert to feet, and subtract from Dstratum)

Calculate K using above data and final time interval of test:

K = [hrise / t] x [Aav / 2.27 (H - h)] x 60 min/hr

= [1.75 / 20]x[18.67 / 2.27 (4.00 - 0.98) x 60 min/hr

= 14.29 in/hr

I hereby certify that the information furnished on this form is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Engineer's Signature Michael K. Ford

N.J.P.E. & L.S. #20792

License # and Seal

Appendix I

NSPS Worksheet

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project:	1901FS.01
Date:	October 6, 2021
User:	Michael K. Ford, P.E.
Notes:	Applicant: Stephen Sliwka
	Project Address: 161 Cedar Grove Lane, Franklin Township, Somerset County, New Jersey
	Block 507.38, Lot 13

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 5.0 **Acres**

B. Specify by Percent the Various Planning Areas Located within the Development Site:

State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area
Percent of Each Planning Area within Site:		100.0%					100.0%

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

Step 2 - Describe Existing or Pre-Developed Site Conditions

A. Specify Existing Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals		Points
		HSG A	HSG B	HSG C	HSG D			
1	Wetlands and Undisturbed Stream Buffers					0.0		0
2	Lawn and Open Space			0.2		0.2		9
3	Brush and Shrub					0.0		0
4	Meadow, Pasture, Grassland, or Range					0.0		0
5	Row Crop					0.0		0
6	Small Grain and Legumes					0.0		0
7	Woods - Indigenous					0.0		0
8	Woods - Planted			4.8		4.8		284
9	Woods and Grass Combination					0.0		0
10	Ponds, Lakes, and Other Open Water					0.0		0
11	Gravel and Dirt					0.0		0
12	Porous and Permeable Paving					0.0		0
13	Directly Connected Impervious			0.1		0.1		0
14	Unconnected Impervious with Small D/S Pervious					0.0		0
15	Unconnected Impervious with Large D/S Pervious					0.0		0
	HSG Subtotals (Acres):	0.0	0.0	5.0	0.0		**Total Area:**	5.0
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%		**Total % Area:**	100.0%

Points Subtotal: **294**

Total Existing Site Points: **294**

Step 3 - Describe Proposed or Post-Developed Site Conditions

A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals		Points
		HSG A	HSG B	HSG C	HSG D			
1	Wetlands and Undisturbed Stream Buffers					0.0		0
2	Lawn and Open Space			0.8		0.8		38
3	Brush and Shrub					0.0		0
4	Meadow, Pasture, Grassland, or Range					0.0		0
5	Row Crop					0.0		0
6	Small Grain and Legumes					0.0		0
7	Woods - Indigenous					0.0		0
8	Woods - Planted			3.9		3.9		232
9	Woods and Grass Combination					0.0		0
10	Ponds, Lakes, and Other Open Water					0.0		0
11	Gravel and Dirt					0.0		0
12	Porous and Permeable Paving					0.0		0
13	Directly Connected Impervious			0.3		0.3		0
14	Unconnected Impervious with Small D/S Pervious					0.0		0
15	Unconnected Impervious with Large D/S Pervious					0.0		0
	HSG Subtotals (Acres):	0.0	0.0	5.0	0.0		**Total Area:**	5.0
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%		**Total % Area:**	100.0%
							Points Subtotal:	**270**

B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

Total Directly Connected Impervious Coverage =	6%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	0%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	6%	% of Site
Effective Site Impervious Coverage =	6%	% of Site
Specify Source of Maximum Allowable Impervious Coverage:	Table	(None or Table)
Allowable Site Impervious Cover from Maximum Impervious Cover Table:	10%	

Note: See Maximum Impervious Cover Table Worksheet for Details

Points Subtotal: 18

C. Compare Proposed Site Disturbance with Maximum Allowable Site Disturbance:

Total Proposed Site Disturbance =	22%	% of Site
Maximum Allowable Site Disturbance by Municipal Ordinance =	100%	% of Site

Points Subtotal: 36

D. Describe Proposed Runoff Conveyance System:

Total Length of Runoff Conveyance System =	0	Feet
Length of Vegetated Runoff Conveyance System =	0	Feet
% of Total Runoff Conveyance System That is Vegetated =	0%	

Points Subtotal: 0

E. Residential Lot Clustering:

Percent of Total Site Area that will be Clustered =	78%	% of Site
Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) =	0.918	Acres
Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) =	0.000	Acres
Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =	28%	% of Clustered Site Portion

Points Subtotal: 36

F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:	Yes	(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:	100%	% of Lawn Areas

Points Subtotal: 23

G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	No	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	No	(Yes or No)

Points Subtotal: 0

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

Total Proposed Site Points: 384

Ratio of Proposed to Existing Site Points: 131%

Required Site Points Ratio: 88%

Nonstructural Point System Results: Proposed Nonstructural Measures are Adequate

Appendix J

Drainage Area Maps & Soil Log Exhibit