Stormwater Management Study

Northern Pass Transmission, LLC

Deerfield Substation
Project No. 58466

RE-ISSUED FOR PERMITTING
January 13, 2016

Stormwater Management Study

prepared for

Northern Pass Transmission, LLC

Deerfield Substation
Deerfield, Rockingham County, New Hampshire 03037

Project No. 58466

RE-ISSUED FOR PERMITTING
January 13, 2016

prepared by

Burns & McDonnell Engineering Company, Inc.

INDEX AND CERTIFICATION

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Certification

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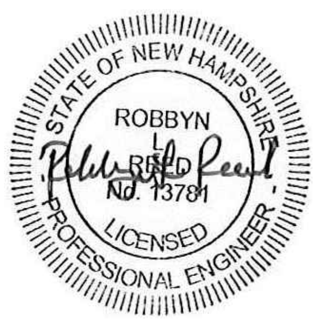

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Additional reference information provided by others and not certified by the above sealing Engineer.

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LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
BMcD	Burns & McDonnell
BMP	Best Management Practice
CFS	Cubic Feet per Second
E&S	Erosion and Sedimentation Control
FPS	Feet per Second
FT	Feet
LF	Linear Feet
LiDAR	Light Detection and Ranging
NAD	North American Datum
NAVD	North American Vertical Datum
NH DES	New Hampshire Department of Environmental Services
NPT	Northern Pass Transmission, LLC
ORW	Outstanding Resource Water
ROW	Right-of-way
TMDL	Total Maximum Daily Loads
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WQF	Water Quality Flow
WQV	Water Quality Volume

1.0 PROJECT OVERVIEW

1.1 Location and Project Summary

Northern Pass Transmission (NPT) plans to construct Deerfield Substation (Project), a new substation expansion located on Eversource owned property off Cate Road (43.140316 latitude and –71.186953 longitude) in Deerfield, Rockingham County, New Hampshire (Site).

Refer to Figure 1-1: USGS Site Location Map.

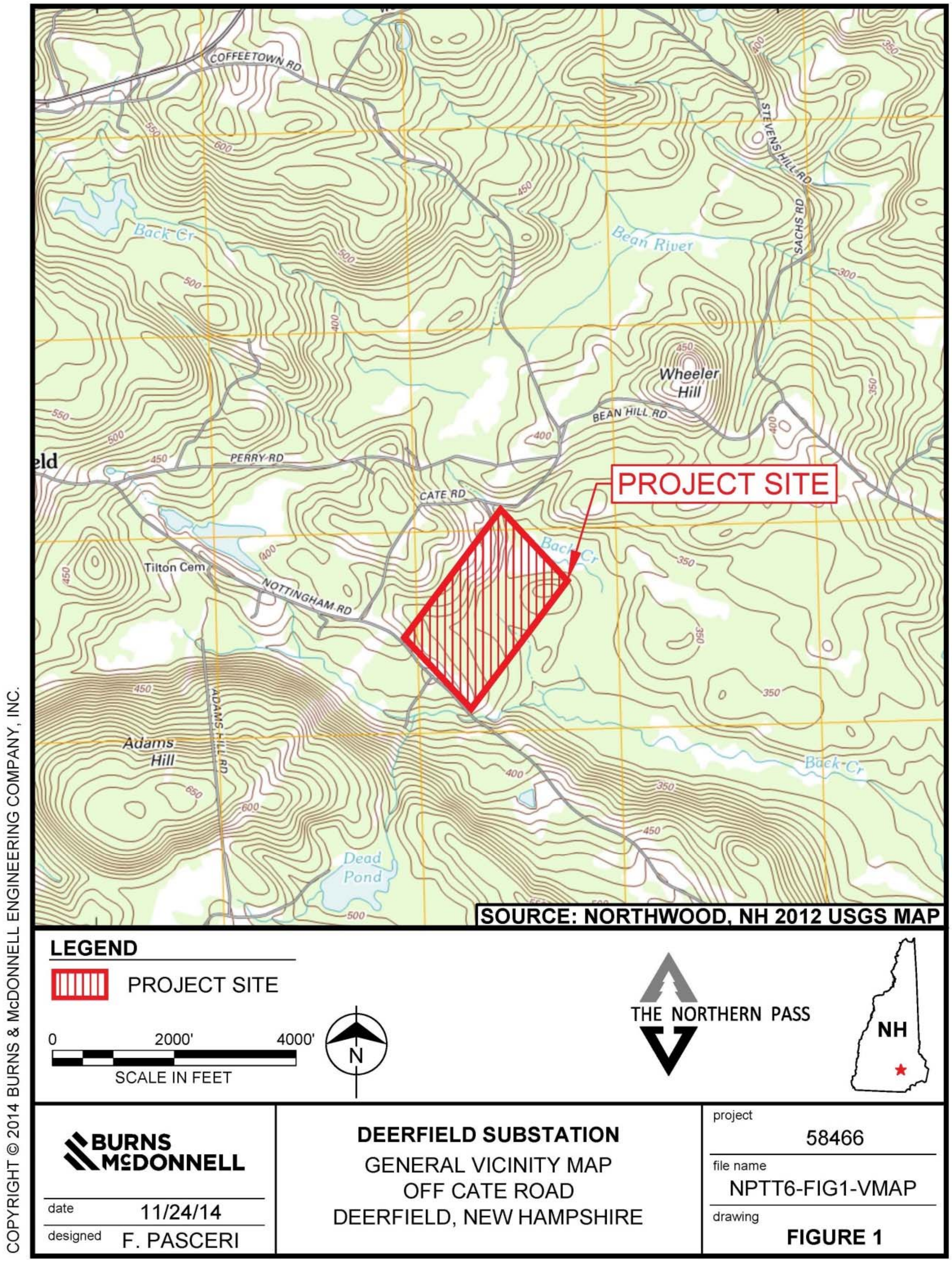
The Site is bounded by a power line right-of-way to the northwest, the existing Deerfield Substation to the northeast, a swampy area to the southeast and wooded areas to the southwest. The Site is located within the surface watershed of Back Creek which is a tributary to Pawtuckaway Lake.

Pre-development conditions primarily consist of undeveloped woodland with areas of meadow within an adjacent electric transmission line right-of-way. Stormwater runoff in existing conditions generally sheet flows overland from west to east to the existing wetlands located on the southeast portion of the Site.

The post-development conditions of the Site include construction of a substation associated with the Northern Pass Transmission (NPT) project. The NPT project is an approximately 200-mile AC and DC transmission line route extending from the United States/Canadian border in Pittsburg, NH to Deerfield, NH. The station development consists of a gravel pad approximately 380-ft by 420-ft with a perimeter fence and access gate. A gravel access drive is also proposed. The post-development conditions will increase the peak stormwater runoff rate and as a result, stormwater attenuation systems will be implemented. Wherever possible, the pre-development drainage and grading patterns were maintained in the post-development conditions.

A hydrologic model was developed to evaluate the pre- and post-development drainage conditions on the Site for the 2-, 10-, and 50-year design frequency storm events. The results of the analysis indicate that there is no increase in peak discharge rates in post-development conditions from pre-development conditions. The analyses summary, results, and model output are located in further sections. The Project Site property area is 62.86 acres. The Project will result in approximately 8.40-acres of disturbance, all of which is on-site. The existing impervious area within the property line is 1.19 acres and the additional impervious cover as a result of the project is 1.01 acres which accounts for structure footings, structures and pads, gravel driveway and the infiltration basin. The total impervious cover of the Site is 2.20 acres. The total undisturbed cover of the Site is 45.77 acres and includes previously disturbed areas.

Figure 1-1: USGS Site Location Map



1.2 Existing Conditions Survey Information

An Existing Conditions Plan with topography was prepared for the Project and was used as a base throughout the analysis and design of the Site Development Plans and Stormwater Management Study. In the instance where the watershed areas extended outside the survey topography limits, State published LiDAR was obtained from the New Hampshire GRANIT Statewide GIS Clearinghouse and used to determine the watershed limits.

Horizontal Datum: The survey references the New Hampshire State Plane Coordinate System, NAD 83. The Site Development Plans are drawn in the same state plane coordinate system.

Vertical Datum: North American Vertical Datum of 1988 (NAVD88). The proposed elevations referenced within the Site Development Plans refer to the same vertical datum.

1.3 Geotechnical Investigations

A Geotechnical Engineering Report has been prepared for NPT.

- "Geotechnical Engineering Report, Deerfield Substation Project, Northern Pass Transmission Line, Deerfield, New Hampshire" by Quanta Subsurface

Furthermore, infiltration testing has been completed for the site at specified locations relevant to the Stormwater Management Study. Refer to the Infiltration Feasibility Report included in Appendix H.

The geotechnical investigation report can be found in Appendix H.

1.4 Soils

National Resource Conservation Service (NRCS) Web Soil Survey describes the soil at the Project Site as Montauk and Ridgebury sandy loams, Scituate-Newfields and Urban-land canton complexes, and Greenwood mucky peat. The soils were classified as hydrologic soil groups B, C and D.

Additionally a soil survey report has been prepared by Normandeau Environmental Consultants for the area encompassed by the proposed limits of disturbance of the substation expansion. The report is titled "Northern Pass Transmission Project, Soil Survey Report for Transition Stations, Substation Expansions, and Converter Terminal" dated February 6, 2015. Site specific excerpts from this report are found in Appendix G. The soils identified in the report are classified as Hydrologic Group A to D.

Fifteen soil types are present on and in the vicinity of the Project Site according to the US Department of Agriculture Soil Conservation Service Soil Survey for Rockingham County, New Hampshire and the

Normandeau soils report. Eight of the soil units are located within the substation expansion limits of disturbance and identified on the Normandeau soils report. These soils are formed from lodgment of till overlain by windblown material. The soil units found within the soil survey limits are Montauk sandy loam (44) & (45) which is located in the southern half of the substation expansion limits of disturbance. Scituate fine sandy loam (448) and Chatfield Variant (189) are located on northern half of the limits of disturbance. Ridgebury sandy loam (656) & (926) is found near wetland areas. A small inclusion of rubble land (727) is found next to the existing substation. The soils mapped within the existing substation were identified as Urban land-Canton complex (799).

The NRCS Web Soil Survey information and site specific excerpts from the Normandeau report are located in Appendix G.

Table 1-1 below lists the soil types and hydrologic soil groups.

Table 1-1: Soil Types

Map Legend	Soil Type	Hydrologic Soil Group
44B	Montauk sandy loam, 3 to 8% slopes	C
44C	Montauk fine sandy loam, 8 to 15% slopes	C
44D	Montauk sandy loam, 15 to 25 % slopes	C
44E	Montauk sandy loam, 25 to 50% slopes	C
45C	Montauk fine sandy loam, 8 to 15% slopes, very stony	C
189B	Chatfield Varient, 3 to 8% slopes	B
189C	Chatfield Varient, 8 to 15% slopes	B
295	Greenwood mucky peat	D
447B	Scituate-Newfields complex, 3 to 8% slopes, very stony	C

Map Legend	Soil Type	Hydrologic Soil Group
448B	Scituate fine sandy loam, 3 to 8% slopes,	C
448C	Scituate fine sandy loam, 8 to 15% slopes	C
656 A/P	Ridgebury sandy loam, 0 to 3% slopes	C
657B	Ridgebury very fine sandy loam, 3 to 8 % slopes, very stony	C
926A	Ridgebury very fine sandy loam, 0 to 3 % slopes, somewhat poorly drained.	C
799A	Urban land – canton complex, 0 to 3% slopes	B
799	Urban land - canton complex, 3 to 15% slopes	B

This soil series has an erosion factor K of 0.15-0.37. The erosion factor K, with values ranging from 0.02 to 0.69, signifies how susceptible a soil is to erosion. The larger the K value the more susceptible the soil is to erosion by water. The K factor for the Project site indicates that the soils are moderately susceptible to erosion by water. The susceptibility of the soils to moderate erosion will be resolved by the site stabilization with rock and native vegetation.

1.5 Wetlands, Rivers, Streams and Vernal Pools

A report entitled “Wetlands, Rivers, Streams and Vernal Pools Resource Report and Impact Analysis” by Normandeau Environmental Consultants, dated October 1, 2015, has been prepared for the NPT Project. Environmentally sensitive areas were found within the Project Site. Refer to Appendix I for a copy of this report.

1.6 Floodplain

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Map No. 33015C0095E for Rockingham County, New Hampshire, Effective Date of May 17, 2005, the Project Site is located in Zone ‘X’, areas determined to be outside the 0.2% annual chance floodplain and within Zone “A”, special flood hazard area subject to inundation by the 1% annual chance flood, no base flood elevations determined. The area being developed for the substation expansion is outside of Zone “A” but within Zone “X”. The FIRM Map is located in Appendix F.

1.7 Receiving Surface Waters

The Site is within the Back Creek Watershed which is part of the Pawtuckaway Lake Watershed. The site and onsite intermittent streams and wetlands convey their flow to an unnamed tributary of Back Creek, which is tributary to Pawtuckaway Lake and ultimately the Piscataqua River.

1.8 Pre-Development Site Conditions

The Pre-developed site conditions consist of mostly wooded hill terrain with the exception of an existing power line right of way to the northwest of the site which consists of vegetated areas which have been cleared of trees and the existing substation facility to the northeast of the site which consists of a stone pad area and drives. The project site conveys runoff from stormwater events in a southeasterly direction towards existing on site wetlands and marshy areas and ultimately Back Creek. The site drains to two watershed areas and two outlet points. The watershed maps are located in Appendix A.

1.9 Post-Development Site Conditions

Pre-developed stormwater drainage patterns are mimicked in post-developed conditions and utilize the same two aforementioned Site discharge points as pre-development. Pre- and Post-development watershed maps are located in Appendix A. The post-development peak stormwater discharge rates are the same or below pre-development rates.

No new water or septic/sanitary sewer services are required for the Project.

No proposed improvements are located within a FEMA 100-year flood plain as a result; there are no adverse impacts to properties.

* * * * *

2.0 HYDROLOGY AND HYDRAULICS

The stormwater management for the Project has been developed to minimize the downstream effects of development at the Site. The stormwater requirements set forth by the New Hampshire Department of Environmental Services Stormwater Manual Volumes 1, 2, & 3, dated December 2008 and the New Hampshire Department of Transportation Manual on Design for Highways, Revision Date April 1998 were followed to the maximum extent practical for the design of the Site Development Plans and this Report.

The development of the Site results in the need to attenuate and infiltrate stormwater onsite. Two above-ground basins and one sand filter are proposed and are discussed in further detail below. One basin will serve to attenuate flows and the other will be utilized to infiltrate collected storm water. The following is the data used in the stormwater management analysis.

2.1 Methodology and Design Criteria

2.1.1 Rainfall Data

Type III 24-hour rainfall depths for Deerfield, Rockingham County were obtained from the Northeast Regional Climate Center – http://precip.eas.cornell.edu/.

Table 2-1: 24-Hour Type III Rainfall Data

Return Frequency (yr)	24 Hour Depth (in)
2	2.98
10	4.48
25	5.66
50	6.76

2.1.2 Runoff Data

The stormwater runoff calculations were completed using the USDA NRCS/SCS TR-55 runoff curve number method in Bentley's PondPack v8i modeling software. Refer to Appendix B for the inputs and generated outputs. The input values that were used in the PondPack model are shown in the tables below.

Maximum sheet flow length for unpaved areas according to the NH DES Stormwater Manual is 100-ft. Below are the standard SCS runoff curve numbers used in the hydrology modeling and the pre-development and post-development watershed cover data used in the hydrology modeling.

Table 2-2: Standard SCS Runoff Curve Numbers

Land Type	Hydrologic Soil Group	Curve Number
Woods	B	55
Woods	C	70
Woods	D	77
Meadow	B	58
Meadow	C	71
Meadow	D	78
Gravel	B	85
Gravel	C	89
Impervious (Asphalt Pavement, Water, Structures, Foundations)	-	98

Table 2-3: Pre-Developed Model Data

Subarea	Area (ac)	Curve Number	Time of Concentration (Minutes)
1	17.92	70	18.90
2	8.83	71	18.12
Total	26.75	-	-

Table 2-4: Post-Developed Model Data

Subarea	Area (ac)	Composite Curve Number	Time of Concentration (Minutes)
1A	7.96	71	17.04
1B	3.86	86	6.00
1C	0.12	63	6.00
1D	1.15	79	6.00
1E	0.15	82	6.00
1F	6.42	70	10.80
2	7.09	71	16.50
Total	26.75	-	-

The below table summarizes the Manning’s roughness coefficients used in the analysis.

Table 2-5: Manning’s Roughness Coefficients

Surface Description	Manning’s n
Grass, Dense grasses (sheet)	0.240
Smooth Surface Gravel (sheet)	0.100
Woods, Light underbrush (sheet)	0.400
Woods, Dense underbrush (sheet)	0.800
Concrete/RCP	0.013
PVC	0.010
HDPE	0.012
Grass w/ NAG Stabilization	0.045

Riprap (D_{50} = 6”)	0.069
Riprap (D_{50} = 12”)	0.078

2.2 Stormwater Modeling Results

For the proposed Project, two basins (DT-1 and IF-1) are proposed to be constructed. DT-1 will be located north of the new substation access drive and partly within the transmission line right of way. Detention basin DT-1 will collect runoff from post-development subarea 1A and attenuate the flows to Outlet 1 to be less than the pre-development flows. Infiltration basin IF-1 will be located on the southern side of the new substation access drive and east of the new substation expansion gravel pad and will collect runoff from post-development drainage subareas 1B, 1C, 1D and 1E. Flows from Infiltration Basin IF-1 will ultimately discharge to Outlet 1. Runoff from the substation pad (Subarea 1B) will collect into a French drain which will transmit the water to a stormwater swale (Swale SW-1B) with a check dam which will divert the water quality flow into a low flow pipe. The water quality storm will be conveyed into a surface sand filter (SF-1) by the low flow pipe while all greater storm events will overtop the check dam and be conveyed by swales to the infiltration basin. The gravel access road (Subarea 1E) will be collected by a trench drain and its flow will be conveyed by a pipe to Stormwater Swale SW-1C which drains into Infiltration Basin IF-1. The turnaround area will sheet flow into stormwater swales (SW-1B and SW-1C) which ultimately drain into Infiltration Basin IF-1. Remaining meadow areas within the watershed not draining to the basins (Subarea 1F) will drain to the same discharge points as the pre-development runoff. The basins each include a concrete outlet control structure to control the runoff rate from the basin and an emergency spillway to manage storm events larger than the 100 year storm event.

The proposed basins were analyzed to mitigate the impacts of stormwater runoff from changes in drainage patterns that would result from the construction of this project. The hydrology model was analyzed using an infiltration rate of 1.25 inches per hour for the Infiltration Basin IF-1 (based on results from field data). Both basins are designed to store and attenuate peak flows from storm events. The concrete outlet control structures will control the rate of runoff to below the pre-development runoff as shown by the modeling results. The following table summarizes flow conditions for the Project and the reduction of flow achieved by the basins.

As aforementioned, there are two Analysis Points for the Site. The tables below summarize the pre- and post-developed peak discharge runoff rates for each respective return frequency. Refer to Appendix A for the Pre-Developed and Post-Developed Watershed Maps. Modeling results and output can be found in Appendix B.

Table 2-6: Outlet-1 Flows

Return Frequency (yr)	Pre-Developed Flow (cfs)	Post-Developed Flow (cfs)
2	8.58	3.98
10	22.65	15.38
50	47.88	34.39

Table 2-7: Outlet-2 Flows

Return Frequency (yr)	Pre-Developed Flow (cfs)	Post-Developed Flow (cfs)
2	4.69	3.88
10	11.84	9.89
50	24.62	20.66

2.3 Detention Basin Design

The detention basin (DT-1) was designed and analyzed to provide long term stormwater attenuation once the Project has been constructed. The infiltration basin (IF-1) was designed and analyzed to provide long term stormwater attenuation, water quality treatment and infiltration once the Project has been constructed. The basins were designed to meet the requirements in the NH DES Stormwater Manual. The basins contain storm events up to and including the 50-year design storm with a minimum 1-ft freeboard to the basin crest elevation. The basins have been designed as to not require a State Dam permit. The tables below summarize the storage volumes and water surface elevations for each basin with respect to the design storm events.

Table 2-8: Detention Basin Storage Volume, DT-1

Elevation (feet-NAVD88)	Surface Area (ac)	Cumulative Storage Volume (Acre-ft)
379	0.000	0.000
380	0.390	0.130
381	0.428	0.539
382	0.468	0.987
383	0.510	1.476
384	0.555	2.008

Table 2-9: Detention Basin Water Surface Elevation, DT-1

Return Frequency (yr)	Maximum Water Surface Elevation (ft)
2	380.49
10	381.58
50	382.30

Table 2-10: Infiltration Basin Storage Volume, IF-1

Elevation (feet-NAVD88)	Surface Area (ac)	Cumulative Storage Volume (Acre-ft)
369	0.210	0.000
370	0.240	0.225
371	0.276	0.483
372	0.318	0.780
373	0.364	1.120

Table 2-11: Infiltration Basin Water Surface Elevation, IF-1

Return Frequency (yr)	Maximum Water Surface Elevation (ft)
2	370.30
10	370.93
50	371.66

2.4 Surface Sand Filter

The Surface Sand Filter (SF-1) was designed and analyzed to provide long term stormwater water quality treatment and infiltration once the Project has been constructed. To treat the Water Quality event (1 inch rainfall event), Surface Sand Filter (SF-1) will be constructed between the substation expansion pad and detention basin DT-1. The facility will treat impervious surfaces to be located inside of the station. At this point it is expected that the total impervious areas comprised of concrete footings, pads and control building will not exceed 0.32 acres. Based on the additional impervious area, the Water Quality Volume (WQV) for this project has been calculated to be 1,768 cf with a Water Quality Flow (WQF) of 0.266 cfs.

Stormwater collected from the pad will enter Stormwater Swale SW-1B where a check dam will divert flows up to the WQ storm. The Water Quality flow will continue on to the pre-treatment sedimentation chamber of the sand filter. Greater storms will overtop the check dam and be diverted via stormwater swales to the detention basin. The pre-treatment sedimentation chamber was sized to contain 25% of the WQV. In the pre-treatment sedimentation chamber, sediment will be given time to settle out before the water continues on to the surface sand filter through a connector pipe. The surface sand filter is designed to hold up to the 10-year storm, with the spillway elevation set above the level of 75% of the WQV. The flow from the spillway structure will be conveyed by a stormwater swale into infiltration basin IF-1.

Table 2-12: Sand Filter Storage Volume Below The Filter Bed

Elevation (feet-NAVD88)	Surface Area (sf)	Cumulative Storage Volume (cf)
373.75	603	0
374.00	603	60
375.00	603	302
375.90	603	519

Assumes a 0.4 void factor for filter material

Table 2-13: Sand Filter Storage Volume Above The Filter Bed

Elevation (feet-NAVD88)	Surface Area (sf)	Cumulative Storage Volume (cf)
375.90	576	0
376.00	603	59
377.00	906	808
378.00	1265	1889

Table 2-14: Sand Filter Forebay Storage Volume

Elevation (feet-NAVD88)	Surface Area (sf)	Cumulative Storage Volume (cf)
376.00	116	0
377.00	266	127
378.00	473	452

Table 2-15: Sand Filter Water Surface Elevation

Return Frequency (yr)	Maximum Water Surface Elevation (ft)
2	378.26
10	378.45

2.5 Storm Water Swales

The stormwater swale(s) are designed for the 10-year storm event with a minimum of one foot of freeboard. In addition, all open swales are expected to convey the 100-year storm event without overtopping. The swales will be lined with an erosion control blanket with vegetation or lined with rip-rap as specified in the Site Development Plans. The following table summarizes the design criteria as well as the proposed lining for the proposed open swales. The results show that the swales will be stable for storms up to the 10 year flow.

Table 2-16: Stormwater Swale Summary

Swale	10 Year Max. Flow (cfs)	10 Year Velocity (ft/s)	100 Year Max. Flow (cfs)	100 Year Velocity (ft/s)	Swale Depth	Swale Bottom Width (ft)	Side Slopes (H:V ft)	Slope %
SW-1A	11.97	1.83	31.61	2.34	2.5	2	3:1	0.50 %
SW-1A-R	11.97	3.68	31.61	4.74	2.5	2	3:1	10.00%
SW-1B	12.46	3.33	24.59	4.04	2.0	4	3:1	2.80%
SW-1C	15.55	3.64	32.11	4.46	2.0	4	3:1	3.00%

The table below summarizes the stormwater stabilization types. The calculations can be found in Appendix C.

Table 2-17: Stormwater Swale Stability

Swale	Stabilization Type	10 yr Design Discharge (cfs)	Allowable Shear Stress (psf)	Calculated Shear Stress
SW-1A	NAG SC250	11.97	8**	0.37
SW-1A-R	12” Riprap	11.97	4.8*	4.74
SW-1B	NAG SC250	12.46	8**	1.1
SW-1C	NAG SC250	15.55	8**	1.31

*From Table 2.3 Federal Highway Administration Hydraulic Engineering Circular No. 15, Third Edition
** Manufacturer’s maximum permissible shear stress

2.6 Basin Spillways

Basin spillways are designed for the 100-year storm event without overtopping the basin. The basin spillway will be lined with a riprap (D_{50}=12”) lining as specified in the Site Development Plans. The following table summarizes the design criteria as well as the proposed lining for the basin spillway. The results show that the basin spillway will be stable for storms up the 100 year flow.

Table 2-18: Basin Spillway Summary and Stability

Basin	*Max Flow (cfs)	*Velocity (ft/s)	Spillway (weir) Width (ft)	Side Slopes (H:V ft)	Downstream Slope (%)	Stabilization Type	Allowable Shear Stress (psf)	Calc. Shear Stress (psf)
DT-1	9.47	2.54	33	3:1	33.33	12” Riprap	4.8	2.29
IF-1	18.87	3.37	32	3:1	33.33	12” Riprap	4.8	3.53
SF-1	11.71	3.88	13	3:1	33.33	12” Riprap	4.8	4.57

*Utilizing 100 year maximum flow for detention basins spillways and 10 year maximum flow for sand filter spillway.

2.7 Storm Drainage Collection System

Storm drainage collection system conduit capacity calculations were performed using Bentley FlowMaster. Underdrain capacity calculations are performed using the Manning's equation in Bentley FlowMaster.

A storm drainage pipe system is proposed on-site to collect stormwater discharges from the substation stone pad. The pipe drainage system is designed to convey design storm events up to the 10-year storm event. Calculations storm drainage system are located in Appendix C.

A series of perforated underdrains are proposed under the cable trench boxes to relieve stormwater that may enter the boxes. Additional underdrains are located along the inside of the substation fence as well as elsewhere within the substation to act as curtain drains and aid in surface drainage.

Riprap outlet protection is provided at all pipe discharge locations refer to Section 2.8 for further information.

2.8 Outlet Protection

Outlet protection is designed for the 25-year frequency design storm as required by the NH DES Stormwater Manual. Calculations for riprap apron protection are located in Appendix C.

Table 2-19: Outlet Protection

Outlet No.	Length (ft)	Depth (in)	Width at culvert (ft)	Width at End of Apron (ft)	Median Stone Size (in)	25-Year Flow (cfs)	*25-Year Velocity (fps)
Low Flow Pipe	6	18	1	4	6	**0.204	**3.63
FES-1	13	18	4.5	17	6	1.79	5.57
FES-2	8	18	4	11	6	0.46	2.58
FES-3	20	60	6	26	20	8.77	5.91
FES-4	25	36	4	31	12	16.47	8.37

*Velocities are taken from FlowMaster Calculations for 25 year flows unless otherwise noted.
**Based on the Water Quality Event WQF

* * * * *

3.0 BEST MANAGEMENT PRACTICES

The proposed Stormwater Management System contains Best Management Practices (BMPs) that will, if maintained properly, will provide treatment of Site generated stormwater runoff. The proposed BMPs are described below.

3.1 Groundwater Recharge Volume & Water Quality Volume

Runoff from impervious areas of the site will be treated by a surface sand filter. The Water Quality Volume (WQV) to be treated from these areas is 1,768 cubic feet. The Ground Water Recharge Volume (GRV) to be provided from these areas is 116 cubic feet. The surface sand filter was designed to meet to meet the requirements in the NH DES Stormwater Manual. The Sand Filter was designed with a sediment forebay which will provide a minimum of 25% of the WQV, and a filter bed that will contain a minimum of 75% of the WQV. The sediment forebay is sized to contain 452 cubic feet which is greater than 25% of the WQV. The filter bed was sized to contain 1,889 cubic feet of storage and includes the storage above the filter but below the invert of the outlet structure, and the filter media voids. This volume is greater than 75% of the WQV. Groundwater recharge is being provided by the Infiltration Basin which will store and infiltrate runoff collected. The Infiltration Basin has a volume of 9,796 cubic feet below the lowest outlet at the outlet control structure. This volume is larger than both the WQV and the GRV. All runoff stored in the infiltration basin below the low flow orifice will recharge the underlying soils. The NH DES BMP worksheets and supporting calculations are located in Appendix D.

3.2 Temporary Erosion Controls

During construction of the proposed station, the Contractor will be responsible for installation, implementation, and maintenance of temporary erosion and sedimentation control measures, that if implemented and maintained properly, will help to prevent off-site tracking and conveyance of waterborne loss of sediment and debris. The specific measures proposed are located in the Site Development Plans, which are under separate cover.

Temporary erosion and sedimentation controls shall not be removed until construction is complete and site stabilization is achieved.

3.3 Permanent Erosion Controls

Upon completion of construction, the Site shall be stabilized by one or more of the following measures in accordance with the Site Development Plans (under separate cover):

3.3.1 Crushed Rock

Crushed rock will be installed on the station pad area and access roads. Additional rock may be required during final stabilization as a result of the original crushed rock application being disturbed during construction.

3.3.2 Seeding

Any disturbed area not proposed as an impervious or gravel surface will be restored to natural meadow vegetation over 4" of topsoil. Planting and mulching of permanent seed will occur as soon as practical after final grading, placement of topsoil, and soil preparation has been completed. Seeding should occur during the growing season.

3.3.3 Stormwater Swale Lining

Stormwater swales will be lined with a permanent erosion control blanket, vegetated or lined with Riprap to help prevent erosion.

3.3.4 Outlet Protection

Pipe outlets implement riprap outlet protection to help prevent scouring and erosion.

3.3.5 Flood Protection Analysis

Flood protection has been implemented for the detention basin as follows:

- Swales have been designed to convey the 10-year, 24-hour storm event with minimum 1.0 ft of freeboard;
- Swales have been designed to convey the 100-year, 24-hour storm event;
- Basins will detain the 2-year through 100-year, 24-hour storm event;
- An emergency spillway will be used to convey storm events larger than the 100-year storm, 24-hour event.

3.4 Antidegredation

There is no greater than 10% effective impervious cover (EIC) and no less than 65% undisturbed cover within the property boundary of the Site, therefore the Site satisfies the NHDES 1065 Rule. Refer to the Site Cover Plan located in Appendix A.

The Site stormwater runoff discharges to an impaired receiving water according to EPA 2008 Waterbody Report for Back Creek. As a result, pollutant loading calculations were performed using the NH DES standard Simple Method worksheet to demonstrate that there is no increase in Total Suspended Solids (TSS), Total Phosphorus (TP), and Total Nitrogen (TN) resulting from the Project. The pollutant loading calculations and other supporting information are located in Appendix J.

The Simple Method generates pollutant loads based on the pre- and post- drainage areas indicated on the Watershed Maps located in Appendix A. The proposed BMPs are designed to remove a percentage of the pollutants. Sub-watershed Post-Areas 1B, 1C, 1D and 1E are considered disconnected impervious area because they drain through a vegetated swale to a treatment BMP designed in accordance with AOT regulations. The disconnected impervious credit and the treatment BMPs provides water quality and limits post-development pollutant levels to less than the pre-development condition.

The Site lies within the NE Regional Mercury Total Maximum Daily Load (TMDL) according to EPA 2008 Waterbody Report for Back Creek. The Project is not anticipated to produce mercury byproducts, thus restrictions from the NE Regional Mercury TMDL are not applicable.

* * * * *

4.0 CONCLUSION

In order to mitigate the impacts of stormwater runoff caused by the addition of the substation, several BMPs were implemented. Those BMPs include the addition of vegetated swales, a sand filter and basins. The basins will also reduce the post-developed peak discharge rates below that of the pre-developed flows for the 2-year through the 50-year storm events. The basins utilize one outlet control structure and emergency spillway. The outlet control structure will control up to and including the 50-year storm event. The storm events larger than the 50-year storm event will discharge through the emergency spillway. The on-site BMPs have been designed in accordance with the New Hampshire Department of Environmental Services Stormwater Manual Volumes 1, 2, & 3.

* * * * *

APPENDIX A – PRE- AND POST-DEVELOPMENT WATERSHED MAPS

SOIL TYPE LEGEND

Map Legend	Soil Type	Hydrologic Soil Group
44B	Montauk sandy loam, 3 to 8% slopes	C
44C	Montauk fine sandy loam, 8 to 15% slopes	C
44D	Montauk sandy loam, 15 to 25 % slopes	C
44E	Montauk sandy loam, 25 to 50% slopes	C
45C	Montauk fine sandy loam, 8 to 15% slopes, very stony	C
189B	Chatfield Varient, 3 to 8% slopes	B
189C	Chatfield Varient, 8 to 15% slopes	B
295	Greenwood mucky peat	A/D
447B	Scituate-Newfields complex, 3 to 8% slopes, very stony	C
448B	Scituate fine sandy loam, 3 to 8% slopes,	C
448C	Scituate fine sandy loam, 8 to 15% slopes	C
656 A/P	Ridgebury sandy loam, 0 to 3% slopes	C
657B	Ridgebury very fine sandy loam, 3 to 8 % slopes, very stony	C
926A	Ridgebury very fine sandy loam, 0 to 3 % slopes, somewhat poorly drained.	C
799A	Urban land – canton complex, 0 to 3% slopes	B
799	Urban land - canton complex, 3 to 15% slopes	B

HSG TOTAL AREA IN ACRES

HSG	AREA 1	AREA 2	TOTAL
A	-	-	-
B	1.437	-	1.437
C	15.254	8.216	23.470
D	1.006	0.615	1.621
WATER	0.158	-	0.158
IMPERVIOUS	0.071	-	0.071
TOTAL	17.926	8.831	26.757

LEGEND

PRE-DEVELOPMENT SUB-AREA BOUNDARY
NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY
TIME OF CONCENTRATION
140B NRCS SOIL DESIGNATION
380.50 SPOT ELEVATION

NORTH

0 100' 200'
SCALE IN FEET

FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
2	REVISED PER PERMIT REVIEW COMMENTS	1/13/17	KAM	RLR	RLR
1	ISSUED FOR PERMITTING	10/1/15	FP	RLR	BSS

SEAL

THE NORTHERN PASS
Transmission Business

#

DEERFIELD SUBSTATION
PRE–DEVELOPMENT
WATERSHED MAP

DATE: 10/1/2015
SCALE: H 1" = 100'

DES: LRM CHK: RLR
DRW: FP APR: BSS
TOWN: DEERFIELD, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT6-WSHED-PRE
REVISION: 11/10/2013

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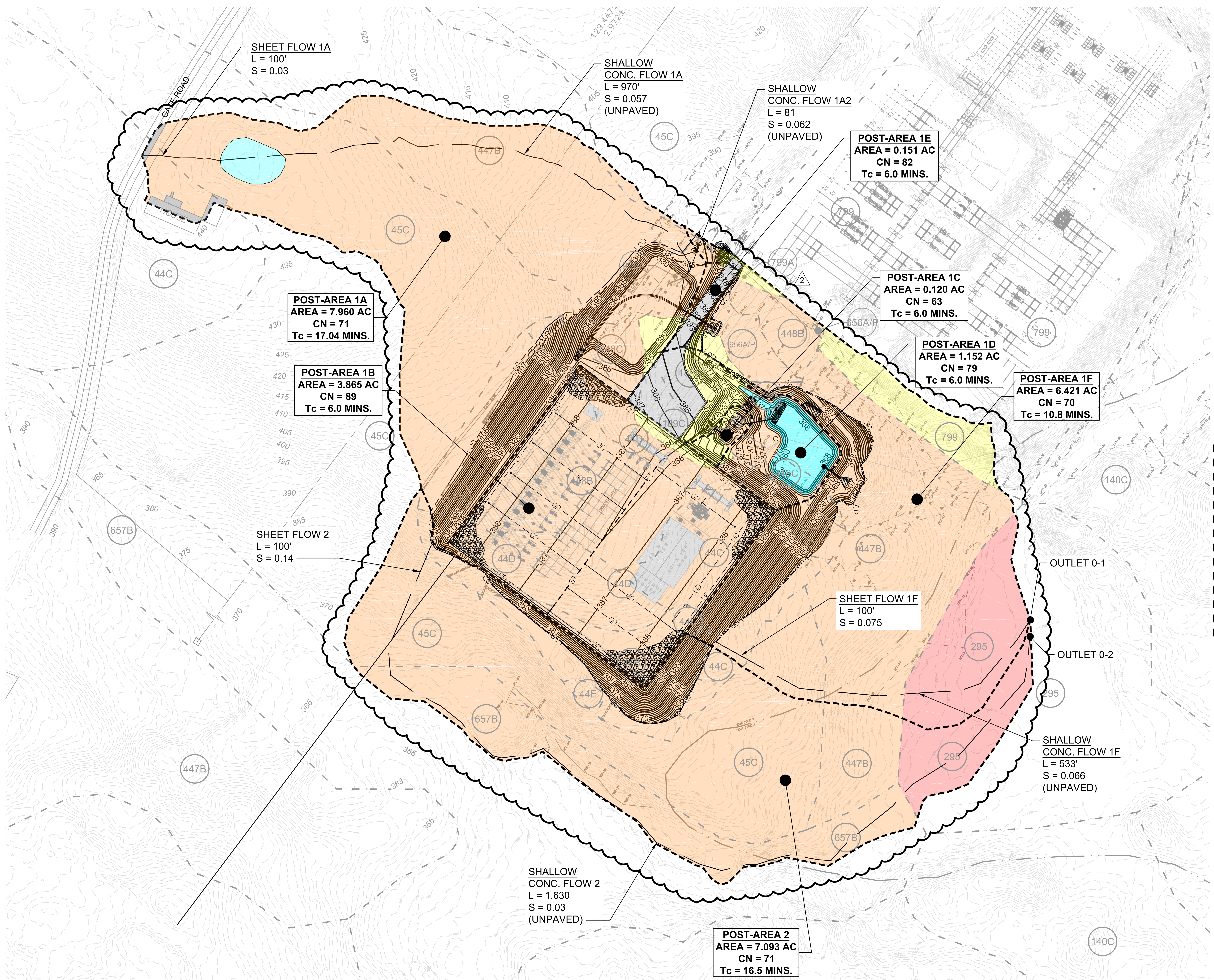

SOIL TYPE LEGEND

Map Legend	Soil Type	Hydrologic Soil Group
44B	Montauk sandy loam, 3 to 8% slopes	C
44C	Montauk fine sandy loam, 8 to 15% slopes	C
44D	Montauk sandy loam, 15 to 25 % slopes	C
44E	Montauk sandy loam, 25 to 50% slopes	C
45C	Montauk fine sandy loam, 8 to 15% slopes, very stony	C
189B	Chatfield Varient, 3 to 8% slopes	B
189C	Chatfield Varient, 8 to 15% slopes	B
295	Greenwood mucky peat	D
447B	Scituate-Newfields complex, 3 to 8% slopes, very stony	C
448B	Scituate fine sandy loam, 3 to 8% slopes,	C
448C	Scituate fine sandy loam, 8 to 15% slopes	C
656 A/P	Ridgebury sandy loam, 0 to 3% slopes	C
657B	Ridgebury very fine sandy loam, 3 to 8 % slopes, very stony	C
926A	Ridgebury very fine sandy loam, 0 to 3 % slopes, somewhat poorly drained.	C
799A	Urban land – canton complex, 0 to 3% slopes	B
799	Urban land - canton complex, 3 to 15% slopes	B

HSG TOTAL AREA IN ACRES

HSG	AREA 1A	AREA 1B	AREA 1C	AREA 1D	AREA 1E	AREA 1F	AREA 2	TOTAL
A	-	-	-	-	-	-	-	-
B	0.099	0.075	0.071	0.498	0.004	0.651	-	1.398
C	7.632	3.470	0.049	0.338	0.046	4.765	6.478	22.778
D	-	-	-	-	-	1.005	0.615	1.620
WATER	0.158	-	-	0.316	-	-	-	0.474
IMPERVIOUS	0.071	0.320	-	-	0.101	-	-	0.492
TOTAL	7.960	3.865	0.120	1.152	0.151	6.421	7.093	26.762

LEGEND

POST-DEVELOPMENT SUB-AREA BOUNDARY

NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY

TIME OF CONCENTRATION

140B NRCS SOIL DESIGNATION

380.50 SPOT ELEVATION

NORTH

0 100' 200'
SCALE IN FEET

FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
2	REVISED PER PERMIT REVIEW COMMENTS	1/13/17	KAM	RLR	RLR
1	ISSUED FOR PERMITTING	10/1/15	FP	RLR	BSS

SEAL

A/E INFO

THE NORTHERN PASS
Transmission Business
#

DEERFIELD SUBSTATION
POST-DEVELOPMENT
WATERSHED MAP

SCALE: H 1" = 100'
DATE: 10/1/2015

DES: LRM CHK: RLR
DRW: FP APR: BSS
TOWN: DEERFIELD, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT6-WSHED-POST
REVISION: 11/10/2013

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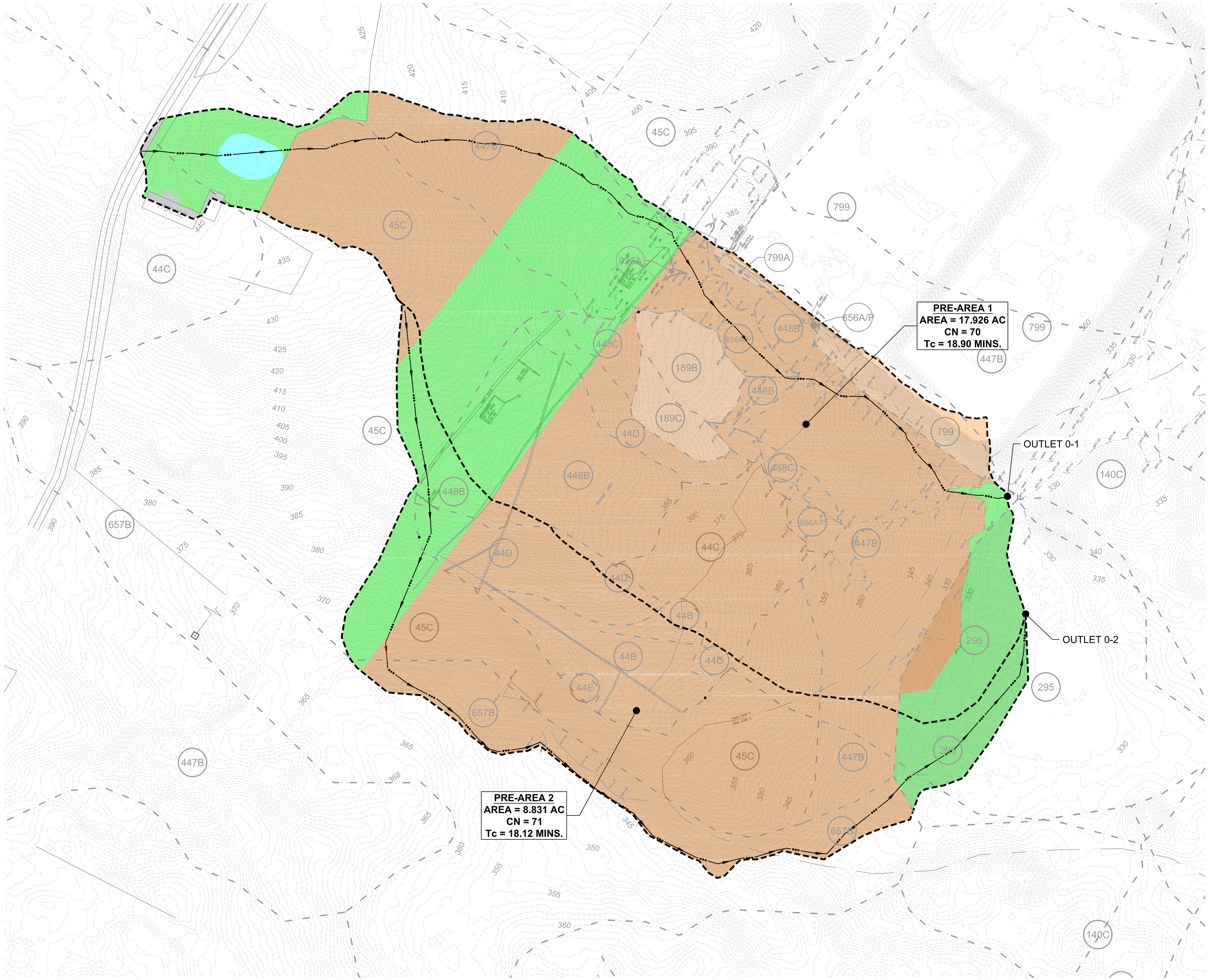

COVER TYPE TOTAL AREA IN ACRES			
COVER TYPE	AREA 1	AREA 2	TOTAL
WOODS (HSG B)	1.310	-	1.310
WOODS (HSG C)	11.024	7.049	18.073
WOODS (HSG D)	0.246	-	0.246
MEADOW (HSG C)	4.230	1.167	5.397
MEADOW (HSG D)	0.760	0.615	1.375
IMPERVIOUS (HSG C)	0.071	-	0.071
GRAVEL (HSG B)	0.127	-	0.127
WATER (HSG C)	0.158	-	0.158
TOTAL	17.926	8.831	26.757

LEGEND

- PRE-DEVELOPMENT SUB-AREA BOUNDARY
- NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY
- TIME OF CONCENTRATION
- 140B NRCS SOIL DESIGNATION

NORTH

0 100' 200'
SCALE IN FEET

NOTES:

REFER TO PRE-DEVELOPMENT WATERSHED MAP DRAWING NPTT6-WSHED-PRE FOR FURTHER INFORMATION

FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
1	ISSUED FOR PERMITTING	1/13/17	KAM	RLR	RLR

SEAL

A/E INFO

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Transmission Business

#

DEERFIELD SUBSTATION
PRE-DEVELOPMENT
COVER TYPE SUMMARY

DATE: 7/16/2016
SCALE: H 1" = 100'

DES: XXX CHK: XXX
DRW: XXX APR: XXX
TOWN: DEERFIELD, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT6-WSHED-PRE-COVER
REVISION: 11/10/2013

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COVER TYPE TOTAL AREA IN ACRES								
COVER TYPE	AREA 1A	AREA 1B	AREA 1C	AREA 1D	AREA 1E	AREA 1F	AREA 2	TOTAL
WOODS (HSG B)	-	-	-	-	-	0.476	-	0.476
WOODS (HSG C)	2.778	-	-	-	-	3.720	5.401	11.90
WOODS (HSG D)	-	-	-	-	-	0.246	-	0.246
MEADOW (HSG B)	0.099	0.004	0.071	0.230	0.004	0.042	-	0.450
MEADOW (HSG C)	4.852	0.079	0.049	0.327	0.046	1.045	1.077	7.475
MEADOW (HSG D)	-	-	-	-	-	0.759	0.615	1.374
IMPERVIOUS (HSG C)	0.071	0.320	-	-	-	-	-	0.391
GRAVEL (HSG B)	-	0.071	-	0.268	0.040	0.133	-	0.512
GRAVEL (HSG C)	0.002	3.391	-	0.011	0.061	-	-	3.465
WATER (HSG C)	0.158	-	-	0.316	-	-	-	0.474
TOTAL	7.960	3.865	0.120	1.152	0.151	6.421	7.093	26.762

LEGEND

POST-DEVELOPMENT SUB-AREA BOUNDARY

NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY

TIME OF CONCENTRATION

140B NRCS SOIL DESIGNATION

NORTH

0 100' 200'
SCALE IN FEET

NOTES:

REFER TO POST-DEVELOPMENT WATERSHED MAP DRAWING NPTT6-WSHED-POST FOR FURTHER INFORMATION

FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	DATE	REVISION	DRWN	CHKD	APPRV.
1	1/13/17	ISSUED FOR PERMITTING	KAM	RLR	RLR

THE NORTHERN PASS
Transmission Business

DEERFIELD SUBSTATION
POST-DEVELOPMENT
COVER TYPE SUMMARY

DATE: 7/19/2016
SCALE: H 1" = 100'

DES: XXX CHK: XXX
DRW: XXX APR: XXX
TOWN: DEERFIELD, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT6-WSHED-POST-COVER
REVISION: 11/10/2013

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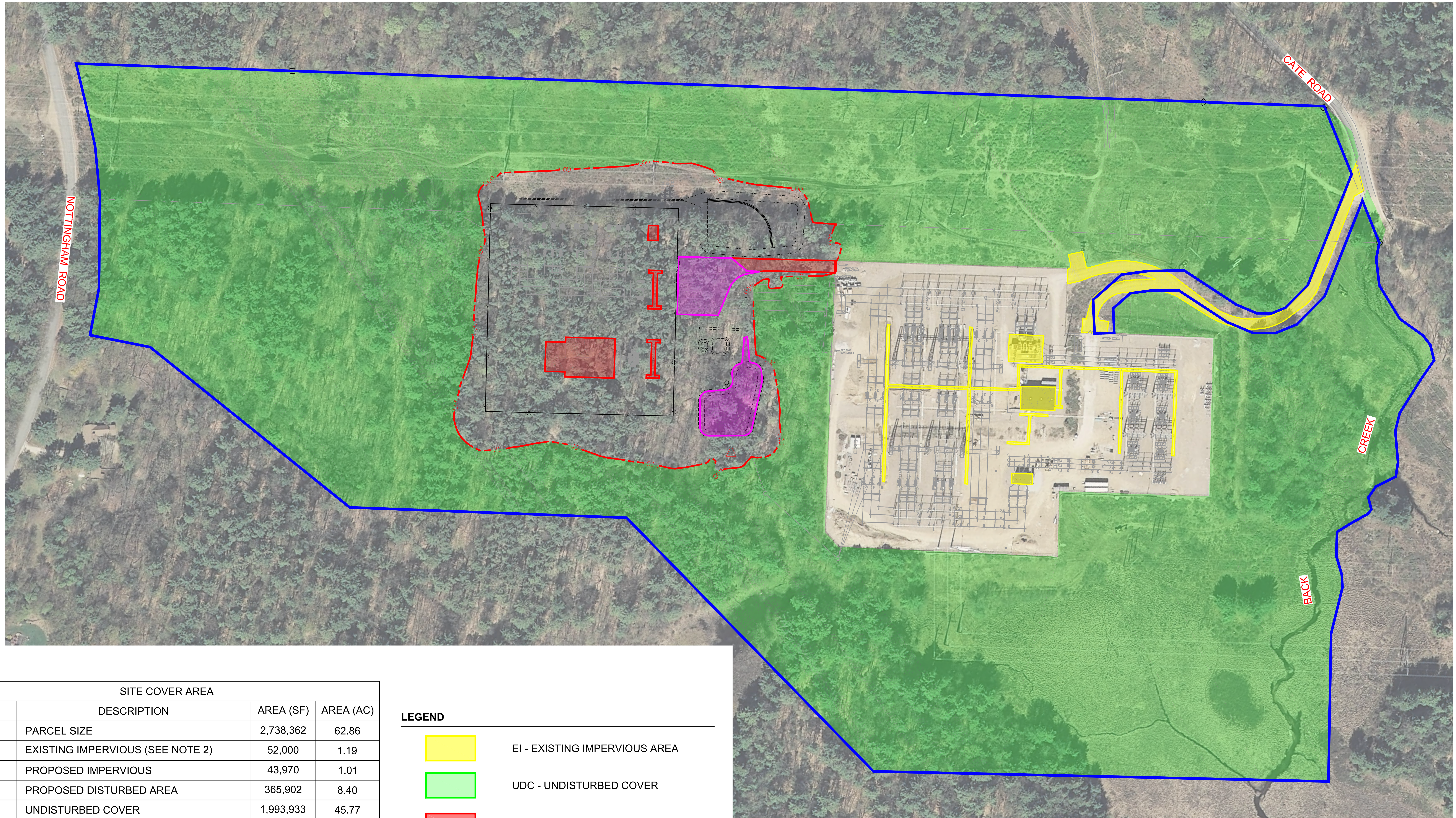

SITE COVER AREA			
ITEM	DESCRIPTION	AREA (SF)	AREA (AC)
PS	PARCEL SIZE	2,738,362	62.86
EI	EXISTING IMPERVIOUS (SEE NOTE 2)	52,000	1.19
PI	PROPOSED IMPERVIOUS	43,970	1.01
PDA	PROPOSED DISTURBED AREA	365,902	8.40
UDC	UNDISTURBED COVER	1,993,933	45.77
DA	DISCONNECTED AREA	26,080	0.60

SITE COVER TABULATION			
ITEM	DESCRIPTION	FORMULA	TOTAL
TIC	TOTAL IMPERVIOUS COVER (ACRES)	EI + PI	2.20 AC
EIC	EFFECTIVE IMPERVIOUS COVER (ACRES)	TIC - DA	1.60 AC
EIC %	EIC PERCENTAGE	EIC / PS	2.6%
UDC %	UDC PERCENTAGE	UDC / PS	72.8%

LEGEND

- EI - EXISTING IMPERVIOUS AREA
- UDC - UNDISTURBED COVER
- PI - PROPOSED IMPERVIOUS AREA
- DIA - PROPOSED DISCONNECTED IMPERVIOUS AREA
- EXISTING PARCEL LINE
- LOD — PROPOSED LIMIT OF DISTURBANCE LINE (LOD)

MAP REFERENCES:

1. 2011 ORTHOIMAGERY OBTAINED IN .SID FORMAT FROM NH STATEWIDE GIS CLEARINGHOUSE WEBSITE AT www.granit.unh.edu.
   TILES USED: 1110002300 & 1110002350
2. AREA FOR EXISTING SUBSTATION ASSUMES 52,000 SQUARE FEET OF EXISTING IMPERVIOUS AREA FOR STRUCTURE FOOTINGS, ROADWAYS, STRUCTURES AND PADS.

NORTH

0 100' 200'
SCALE IN FEET

FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
2	REISSUED FOR PERMITTING	1/13/17	RLR	CJK	RLR
1	ISSUED FOR PERMITTING	10/1/15	FP	RLR	BSS

SEAL

A/E INFO

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Transmission Business

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DEERFIELD SUBSTATION
SITE COVER PLAN

SCALE: H 1" = 100'
DATE: 10/1/2015

DES: LRM CHK: RLR
DRW: FP APR: BSS
TOWN: DEERFIELD, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT6-SCP
REVISION: 11/10/2013

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APPENDIX B – HYDROLOGY MODEL (PONDPACK)

Extreme Precipitation Tables

Northeast Regional Climate Center

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

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.187 degrees West
Latitude	43.141 degrees North
Elevation	Unknown/Unavailable
Date/Time	Tue, 30 Dec 2014 13:37:37 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.49	0.65	0.81	1.02	**1yr**	0.70	0.98	1.19	1.51	1.94	2.49	2.72	**1yr**	2.21	2.62	3.04	3.74	4.31	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.28	**2yr**	0.87	1.16	1.48	1.87	2.36	2.98	3.32	**2yr**	2.64	3.20	3.70	4.40	5.02	**2yr**
5yr	0.37	0.58	0.73	0.97	1.24	1.59	**5yr**	1.07	1.45	1.85	2.35	2.97	3.76	4.24	**5yr**	3.33	4.08	4.69	5.55	6.27	**5yr**
10yr	0.41	0.65	0.82	1.12	1.46	1.88	**10yr**	1.26	1.71	2.20	2.80	3.55	4.48	5.10	**10yr**	3.97	4.91	5.62	6.60	7.42	**10yr**
25yr	0.49	0.77	0.98	1.35	1.80	2.34	**25yr**	1.55	2.13	2.76	3.53	4.48	5.66	6.52	**25yr**	5.01	6.27	7.15	8.33	9.28	**25yr**
50yr	0.55	0.88	1.12	1.57	2.11	2.78	**50yr**	1.82	2.52	3.28	4.21	5.35	6.76	7.85	**50yr**	5.98	7.55	8.58	9.93	10.99	**50yr**
100yr	0.61	0.99	1.28	1.82	2.48	3.30	**100yr**	2.14	2.98	3.91	5.03	6.39	8.07	9.46	**100yr**	7.14	9.10	10.29	11.85	13.03	**100yr**
200yr	0.70	1.14	1.48	2.12	2.92	3.91	**200yr**	2.52	3.52	4.64	5.99	7.63	9.64	11.40	**200yr**	8.53	10.97	12.35	14.14	15.45	**200yr**
500yr	0.83	1.36	1.78	2.58	3.62	4.89	**500yr**	3.13	4.41	5.84	7.56	9.65	12.20	14.61	**500yr**	10.80	14.04	15.74	17.89	19.38	**500yr**

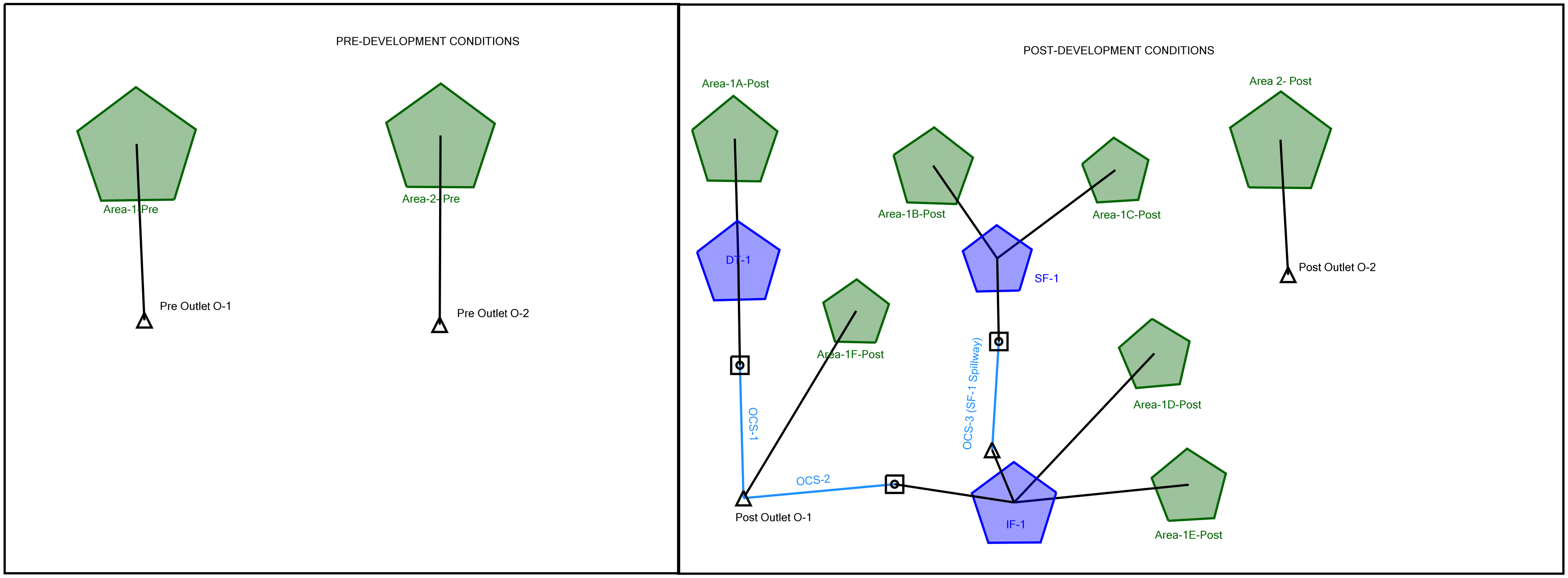
Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.35	0.43	0.57	0.70	0.89	1yr	0.61	0.87	0.99	1.29	1.54	2.01	2.48	1yr	1.78	2.39	2.79	3.40	3.81	1yr
2yr	0.31	0.48	0.59	0.80	0.99	1.17	2yr	0.85	1.15	1.34	1.78	2.28	2.88	3.18	2yr	2.55	3.06	3.56	4.27	4.87	2yr
5yr	0.35	0.54	0.67	0.92	1.17	1.40	5yr	1.01	1.37	1.59	2.08	2.68	3.40	3.79	5yr	3.01	3.64	4.21	5.20	5.69	5yr
10yr	0.39	0.60	0.74	1.03	1.34	1.59	10yr	1.15	1.56	1.79	2.36	3.02	3.84	4.30	10yr	3.40	4.14	4.78	6.00	6.39	10yr
25yr	0.45	0.68	0.85	1.21	1.59	1.89	25yr	1.37	1.85	2.10	2.74	3.54	4.47	5.07	25yr	3.95	4.87	5.66	7.27	8.10	25yr
50yr	0.50	0.76	0.94	1.35	1.82	2.16	50yr	1.57	2.11	2.37	3.08	3.98	5.00	5.70	50yr	4.42	5.48	6.40	8.39	9.30	50yr
100yr	0.56	0.84	1.06	1.53	2.09	2.47	100yr	1.81	2.42	2.68	3.46	4.48	5.59	6.41	100yr	4.95	6.17	7.27	9.70	10.65	100yr
200yr	0.62	0.94	1.19	1.72	2.40	2.82	200yr	2.07	2.75	3.02	3.87	5.04	6.21	8.56	200yr	5.49	8.23	8.24	11.22	12.21	200yr
500yr	0.73	1.09	1.40	2.04	2.89	3.37	500yr	2.50	3.29	3.55	4.51	5.91	7.10	10.36	500yr	6.28	9.96	9.72	13.62	14.60	500yr

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.54	0.72	0.89	1.07	1yr	0.77	1.05	1.23	1.66	2.10	2.72	3.11	1yr	2.41	3.00	3.41	4.00	4.74	1yr
2yr	0.33	0.51	0.62	0.84	1.04	1.25	2yr	0.90	1.22	1.44	1.89	2.42	3.15	3.50	2yr	2.79	3.37	3.89	4.56	5.21	2yr
5yr	0.40	0.62	0.77	1.05	1.34	1.58	5yr	1.15	1.55	1.83	2.39	3.06	4.13	4.74	5yr	3.66	4.56	5.20	5.90	6.88	5yr
10yr	0.47	0.73	0.90	1.26	1.63	1.92	10yr	1.41	1.88	2.20	2.89	3.67	5.13	5.98	10yr	4.54	5.75	6.52	7.22	8.52	10yr
25yr	0.59	0.90	1.12	1.60	2.10	2.49	25yr	1.81	2.44	2.84	3.70	4.67	6.84	8.19	25yr	6.05	7.87	8.78	9.44	10.48	25yr
50yr	0.69	1.05	1.31	1.89	2.54	3.03	50yr	2.19	2.96	3.43	4.46	5.61	8.51	10.40	50yr	7.53	10.00	11.01	11.57	12.75	50yr
100yr	0.82	1.24	1.56	2.25	3.09	3.68	100yr	2.66	3.60	4.16	5.39	6.76	10.60	13.22	100yr	9.38	12.72	13.81	14.18	15.55	100yr
200yr	0.97	1.46	1.85	2.68	3.74	4.48	200yr	3.22	4.38	5.05	6.52	8.13	13.25	14.67	200yr	11.73	14.11	17.34	17.39	18.97	200yr
500yr	1.22	1.81	2.33	3.39	4.81	5.81	500yr	4.15	5.68	6.51	8.41	10.40	17.80	19.68	500yr	15.76	18.93	23.41	22.81	24.71	500yr

Scenario: Rockingham Co 2-year



Project Summary

Title	NPT Deerfield Substation Expansion Stormwater Model
Engineer	R. Reed
Company	Burns & McDonnell
Date	12/28/2016

Notes

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Area-1-Pre	Rockingham Co 2-year	2	1.045	12.250	8.58
Area-1-Pre	Rockingham Co 10-year	10	2.469	12.250	22.65
Area-1-Pre	Rockingham Co 50-year	50	5.091	12.250	47.88
Area-1-Pre	Rockingham Co 100-year	100	6.737	12.250	63.35
Area-2- Pre	Rockingham Co 2-year	2	0.549	12.250	4.69
Area-2- Pre	Rockingham Co 10-year	10	1.270	12.250	11.84
Area-2- Pre	Rockingham Co 50-year	50	2.583	12.200	24.62
Area-2- Pre	Rockingham Co 100-year	100	3.404	12.200	32.54
Area-1A-Post	Rockingham Co 2-year	2	0.495	12.250	4.33
Area-1A-Post	Rockingham Co 10-year	10	1.145	12.200	10.90
Area-1A-Post	Rockingham Co 50-year	50	2.329	12.200	22.83
Area-1A-Post	Rockingham Co 100-year	100	3.069	12.200	30.13
Area-1C-Post	Rockingham Co 2-year	2	0.004	12.150	0.04
Area-1C-Post	Rockingham Co 10-year	10	0.012	12.100	0.13
Area-1C-Post	Rockingham Co 50-year	50	0.027	12.100	0.33
Area-1C-Post	Rockingham Co 100-year	100	0.037	12.100	0.46
Area-1D-Post	Rockingham Co 2-year	2	0.113	12.100	1.36
Area-1D-Post	Rockingham Co 10-year	10	0.226	12.100	2.77
Area-1D-Post	Rockingham Co 50-year	50	0.419	12.100	5.06
Area-1D-Post	Rockingham Co 100-year	100	0.535	12.100	6.39
Area-1B-Post	Rockingham Co 2-year	2	0.605	12.100	7.33
Area-1B-Post	Rockingham Co 10-year	10	1.054	12.100	12.46
Area-1B-Post	Rockingham Co 50-year	50	1.762	12.100	20.19
Area-1B-Post	Rockingham Co 100-year	100	2.174	12.100	24.59
Area-1F-Post	Rockingham Co 2-year	2	0.375	12.150	3.68
Area-1F-Post	Rockingham Co 10-year	10	0.886	12.150	9.69
Area-1F-Post	Rockingham Co 50-year	50	1.827	12.150	20.45
Area-1F-Post	Rockingham Co 100-year	100	2.417	12.150	27.04

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Area 2- Post	Rockingham Co 2-year	2	0.441	12.250	3.88
Area 2- Post	Rockingham Co 10-year	10	1.020	12.200	9.89
Area 2- Post	Rockingham Co 50-year	50	2.076	12.200	20.66
Area 2- Post	Rockingham Co 100-year	100	2.735	12.200	27.24
Area-1E-Post	Rockingham Co 2-year	2	0.017	12.100	0.21
Area-1E-Post	Rockingham Co 10-year	10	0.033	12.100	0.40
Area-1E-Post	Rockingham Co 50-year	50	0.059	12.100	0.70
Area-1E-Post	Rockingham Co 100-year	100	0.074	12.100	0.88

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Pre Outlet O-1	Rockingham Co 2-year	2	1.045	12.250	8.58
Pre Outlet O-1	Rockingham Co 10-year	10	2.469	12.250	22.65
Pre Outlet O-1	Rockingham Co 50-year	50	5.091	12.250	47.88
Pre Outlet O-1	Rockingham Co 100-year	100	6.737	12.250	63.35
Pre Outlet O-2	Rockingham Co 2-year	2	0.549	12.250	4.69
Pre Outlet O-2	Rockingham Co 10-year	10	1.270	12.250	11.84
Pre Outlet O-2	Rockingham Co 50-year	50	2.583	12.200	24.62
Pre Outlet O-2	Rockingham Co 100-year	100	3.404	12.200	32.54
Post Outlet O-2	Rockingham Co 2-year	2	0.441	12.250	3.88
Post Outlet O-2	Rockingham Co 10-year	10	1.020	12.200	9.89
Post Outlet O-2	Rockingham Co 50-year	50	2.076	12.200	20.66
Post Outlet O-2	Rockingham Co 100-year	100	2.735	12.200	27.24
Post Outlet O-1	Rockingham Co 2-year	2	0.774	12.250	3.98
Post Outlet O-1	Rockingham Co 10-year	10	1.988	12.200	15.38
Post Outlet O-1	Rockingham Co 50-year	50	4.959	12.150	34.39
Post Outlet O-1	Rockingham Co 100-year	100	6.805	12.150	44.30

Pond Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
IF-1 (IN)	Rockingham Co 2-year	2	0.660	12.100	8.77	(N/A)	(N/A)
IF-1 (OUT)	Rockingham Co 2-year	2	0.213	12.550	1.61	370.30	0.299
IF-1 (IN)	Rockingham Co 10-year	10	1.243	12.100	15.55	(N/A)	(N/A)
IF-1 (OUT)	Rockingham Co 10-year	10	0.716	12.350	6.84	370.93	0.464
IF-1 (IN)	Rockingham Co 50-year	50	2.181	12.100	26.05	(N/A)	(N/A)
IF-1 (OUT)	Rockingham Co 50-year	50	1.583	12.250	14.81	371.66	0.673
IF-1 (IN)	Rockingham Co 100-year	100	2.733	12.100	32.11	(N/A)	(N/A)
IF-1 (OUT)	Rockingham Co 100-year	100	2.112	12.250	18.87	372.01	0.783
SF-1 (IN)	Rockingham Co 2-year	2	0.610	12.100	7.37	(N/A)	(N/A)
SF-1 (OUT)	Rockingham Co 2-year	2	0.530	12.100	7.20	378.26	0.066
SF-1 (IN)	Rockingham Co 10-year	10	1.066	12.100	12.59	(N/A)	(N/A)
SF-1 (OUT)	Rockingham Co 10-year	10	0.984	12.100	12.38	378.45	0.075
SF-1 (IN)	Rockingham Co 50-year	50	1.789	12.100	20.52	(N/A)	(N/A)
SF-1 (OUT)	Rockingham Co 50-year	50	1.703	12.100	20.29	378.63	0.083
SF-1 (IN)	Rockingham Co 100-year	100	2.211	12.100	25.05	(N/A)	(N/A)
SF-1 (OUT)	Rockingham Co 100-year	100	2.124	12.100	24.84	378.72	0.088
DT-1 (IN)	Rockingham Co 2-year	2	0.495	12.250	4.33	(N/A)	(N/A)
DT-1 (OUT)	Rockingham Co 2-year	2	0.185	19.100	0.19	380.49	0.324
DT-1 (IN)	Rockingham Co 10-year	10	1.145	12.200	10.90	(N/A)	(N/A)
DT-1 (OUT)	Rockingham Co 10-year	10	0.386	16.550	0.60	381.58	0.794
DT-1 (IN)	Rockingham Co 50-year	50	2.329	12.200	22.83	(N/A)	(N/A)
DT-1 (OUT)	Rockingham Co 50-year	50	1.549	12.850	4.76	382.30	1.130
DT-1 (IN)	Rockingham Co 100-year	100	3.069	12.200	30.13	(N/A)	(N/A)
DT-1 (OUT)	Rockingham Co 100-year	100	2.277	12.700	9.47	382.81	1.381

Time-Depth Curve: 100-yr	
Label	100-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.3	0.3	0.3
4.000	0.3	0.4	0.4	0.4	0.4
4.500	0.4	0.4	0.4	0.4	0.4
5.000	0.5	0.5	0.5	0.5	0.5
5.500	0.5	0.5	0.5	0.6	0.6
6.000	0.6	0.6	0.6	0.6	0.6
6.500	0.7	0.7	0.7	0.7	0.7
7.000	0.7	0.7	0.8	0.8	0.8
7.500	0.8	0.8	0.9	0.9	0.9
8.000	0.9	0.9	1.0	1.0	1.0
8.500	1.0	1.1	1.1	1.1	1.1
9.000	1.2	1.2	1.2	1.3	1.3
9.500	1.3	1.4	1.4	1.4	1.5
10.000	1.5	1.6	1.6	1.7	1.7
10.500	1.7	1.8	1.8	1.9	2.0
11.000	2.0	2.1	2.2	2.2	2.3
11.500	2.4	2.5	2.7	3.0	3.4
12.000	4.0	4.7	5.1	5.3	5.5
12.500	5.7	5.8	5.8	5.9	6.0
13.000	6.1	6.1	6.2	6.2	6.3
13.500	6.3	6.4	6.4	6.5	6.5
14.000	6.5	6.6	6.6	6.7	6.7
14.500	6.7	6.8	6.8	6.8	6.9
15.000	6.9	6.9	7.0	7.0	7.0
15.500	7.0	7.1	7.1	7.1	7.1
16.000	7.2	7.2	7.2	7.2	7.2
16.500	7.2	7.3	7.3	7.3	7.3
17.000	7.3	7.4	7.4	7.4	7.4
17.500	7.4	7.4	7.4	7.5	7.5
18.000	7.5	7.5	7.5	7.5	7.5
18.500	7.6	7.6	7.6	7.6	7.6
19.000	7.6	7.6	7.6	7.6	7.7
19.500	7.7	7.7	7.7	7.7	7.7
20.000	7.7	7.7	7.7	7.8	7.8
20.500	7.8	7.8	7.8	7.8	7.8
21.000	7.8	7.8	7.8	7.9	7.9
21.500	7.9	7.9	7.9	7.9	7.9

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
22.000	7.9	7.9	7.9	7.9	7.9
22.500	8.0	8.0	8.0	8.0	8.0
23.000	8.0	8.0	8.0	8.0	8.0
23.500	8.0	8.0	8.0	8.1	8.1
24.000	8.1	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 10-yr	
Label	10-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.2	0.2	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.3	0.3	0.3	0.3	0.3
6.000	0.3	0.3	0.3	0.3	0.4
6.500	0.4	0.4	0.4	0.4	0.4
7.000	0.4	0.4	0.4	0.4	0.4
7.500	0.5	0.5	0.5	0.5	0.5
8.000	0.5	0.5	0.5	0.5	0.6
8.500	0.6	0.6	0.6	0.6	0.6
9.000	0.7	0.7	0.7	0.7	0.7
9.500	0.7	0.8	0.8	0.8	0.8
10.000	0.8	0.9	0.9	0.9	0.9
10.500	1.0	1.0	1.0	1.1	1.1
11.000	1.1	1.2	1.2	1.2	1.3
11.500	1.3	1.4	1.5	1.7	1.9
12.000	2.2	2.6	2.8	3.0	3.1
12.500	3.1	3.2	3.2	3.3	3.3
13.000	3.4	3.4	3.4	3.5	3.5
13.500	3.5	3.5	3.6	3.6	3.6
14.000	3.6	3.7	3.7	3.7	3.7
14.500	3.7	3.8	3.8	3.8	3.8
15.000	3.8	3.8	3.9	3.9	3.9
15.500	3.9	3.9	3.9	3.9	4.0
16.000	4.0	4.0	4.0	4.0	4.0
16.500	4.0	4.0	4.0	4.1	4.1
17.000	4.1	4.1	4.1	4.1	4.1
17.500	4.1	4.1	4.1	4.1	4.2
18.000	4.2	4.2	4.2	4.2	4.2
18.500	4.2	4.2	4.2	4.2	4.2
19.000	4.2	4.2	4.2	4.2	4.3
19.500	4.3	4.3	4.3	4.3	4.3
20.000	4.3	4.3	4.3	4.3	4.3
20.500	4.3	4.3	4.3	4.3	4.3
21.000	4.3	4.3	4.4	4.4	4.4
21.500	4.4	4.4	4.4	4.4	4.4

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
22.000	4.4	4.4	4.4	4.4	4.4
22.500	4.4	4.4	4.4	4.4	4.4
23.000	4.4	4.4	4.4	4.5	4.5
23.500	4.5	4.5	4.5	4.5	4.5
24.000	4.5	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 2-yr	
Label	2-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	2 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.1
4.500	0.1	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.2	0.2	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.4	0.4	0.5	0.5	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.6	0.6	0.6	0.6	0.6
10.500	0.6	0.7	0.7	0.7	0.7
11.000	0.7	0.8	0.8	0.8	0.9
11.500	0.9	0.9	1.0	1.1	1.2
12.000	1.5	1.7	1.9	2.0	2.0
12.500	2.1	2.1	2.2	2.2	2.2
13.000	2.2	2.3	2.3	2.3	2.3
13.500	2.3	2.4	2.4	2.4	2.4
14.000	2.4	2.4	2.4	2.5	2.5
14.500	2.5	2.5	2.5	2.5	2.5
15.000	2.5	2.6	2.6	2.6	2.6
15.500	2.6	2.6	2.6	2.6	2.6
16.000	2.6	2.6	2.7	2.7	2.7
16.500	2.7	2.7	2.7	2.7	2.7
17.000	2.7	2.7	2.7	2.7	2.7
17.500	2.7	2.7	2.8	2.8	2.8
18.000	2.8	2.8	2.8	2.8	2.8
18.500	2.8	2.8	2.8	2.8	2.8
19.000	2.8	2.8	2.8	2.8	2.8
19.500	2.8	2.8	2.8	2.8	2.8
20.000	2.9	2.9	2.9	2.9	2.9
20.500	2.9	2.9	2.9	2.9	2.9
21.000	2.9	2.9	2.9	2.9	2.9
21.500	2.9	2.9	2.9	2.9	2.9

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
22.000	2.9	2.9	2.9	2.9	2.9
22.500	2.9	2.9	2.9	2.9	3.0
23.000	3.0	3.0	3.0	3.0	3.0
23.500	3.0	3.0	3.0	3.0	3.0
24.000	3.0	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 50-yr	
Label	50-yr
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	50 years

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.3	0.3	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.4	0.4	0.4
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.5	0.5	0.5
6.000	0.5	0.5	0.5	0.5	0.5
6.500	0.5	0.6	0.6	0.6	0.6
7.000	0.6	0.6	0.6	0.7	0.7
7.500	0.7	0.7	0.7	0.7	0.8
8.000	0.8	0.8	0.8	0.8	0.8
8.500	0.9	0.9	0.9	0.9	1.0
9.000	1.0	1.0	1.0	1.1	1.1
9.500	1.1	1.2	1.2	1.2	1.2
10.000	1.3	1.3	1.3	1.4	1.4
10.500	1.5	1.5	1.5	1.6	1.6
11.000	1.7	1.7	1.8	1.9	1.9
11.500	2.0	2.1	2.3	2.5	2.8
12.000	3.4	3.9	4.2	4.5	4.6
12.500	4.7	4.8	4.9	5.0	5.0
13.000	5.1	5.1	5.2	5.2	5.3
13.500	5.3	5.3	5.4	5.4	5.4
14.000	5.5	5.5	5.5	5.6	5.6
14.500	5.6	5.7	5.7	5.7	5.7
15.000	5.8	5.8	5.8	5.8	5.9
15.500	5.9	5.9	5.9	6.0	6.0
16.000	6.0	6.0	6.0	6.0	6.1
16.500	6.1	6.1	6.1	6.1	6.1
17.000	6.1	6.2	6.2	6.2	6.2
17.500	6.2	6.2	6.2	6.3	6.3
18.000	6.3	6.3	6.3	6.3	6.3
18.500	6.3	6.3	6.3	6.4	6.4
19.000	6.4	6.4	6.4	6.4	6.4
19.500	6.4	6.4	6.4	6.5	6.5
20.000	6.5	6.5	6.5	6.5	6.5
20.500	6.5	6.5	6.5	6.5	6.5
21.000	6.6	6.6	6.6	6.6	6.6
21.500	6.6	6.6	6.6	6.6	6.6

CUMULATIVE RAINFALL (in)
Output Time Increment = 0.100 hours
Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
22.000	6.6	6.6	6.6	6.7	6.7
22.500	6.7	6.7	6.7	6.7	6.7
23.000	6.7	6.7	6.7	6.7	6.7
23.500	6.7	6.7	6.7	6.7	6.8
24.000	6.8	(N/A)	(N/A)	(N/A)	(N/A)

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.140 ft/ft
2 Year 24 Hour Depth	3.0 in
Average Velocity	0.25 ft/s
Segment Time of Concentration	0.113 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,630.00 ft
Is Paved?	False
Slope	0.030 ft/ft
Average Velocity	2.79 ft/s
Segment Time of Concentration	0.162 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.275 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.0 in
Average Velocity	0.13 ft/s
Segment Time of Concentration	0.209 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	970.00 ft
Is Paved?	False
Slope	0.057 ft/ft
Average Velocity	3.85 ft/s
Segment Time of Concentration	0.070 hours

Segment #3: TR-55 Shallow Concentrated Flow	
Hydraulic Length	81.00 ft
Is Paved?	False
Slope	0.062 ft/ft
Average Velocity	4.02 ft/s
Segment Time of Concentration	0.006 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.284 hours

==== SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.075 ft/ft
2 Year 24 Hour Depth	3.0 in
Average Velocity	0.19 ft/s
Segment Time of Concentration	0.145 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	533.00 ft
Is Paved?	False
Slope	0.066 ft/ft
Average Velocity	4.15 ft/s
Segment Time of Concentration	0.036 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.180 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.0 in
Average Velocity	0.13 ft/s
Segment Time of Concentration	0.210 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,615.00 ft
Is Paved?	False
Slope	0.069 ft/ft
Average Velocity	4.24 ft/s
Segment Time of Concentration	0.106 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.315 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	100.00 ft
Manning's n	0.240
Slope	0.096 ft/ft
2 Year 24 Hour Depth	3.0 in
Average Velocity	0.21 ft/s
Segment Time of Concentration	0.131 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	2,038.00 ft
Is Paved?	False
Slope	0.042 ft/ft
Average Velocity	3.31 ft/s
Segment Time of Concentration	0.171 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.302 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	5.401	0.0	0.0	70.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	1.077	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.615	0.0	0.0	78.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	7.093	(N/A)	(N/A)	70.845

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	2.778	0.0	0.0	70.000
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.099	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	4.852	0.0	0.0	71.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.071	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.002	0.0	0.0	89.000
Water/Pond Soil C	98.000	0.158	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	7.960	(N/A)	(N/A)	71.271

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.004	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.079	0.0	0.0	71.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.320	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.071	0.0	0.0	85.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	3.391	0.0	0.0	89.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	3.865	(N/A)	(N/A)	89.272

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.071	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.049	0.0	0.0	71.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.120	(N/A)	(N/A)	63.308

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.230	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.327	0.0	0.0	71.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.268	0.0	0.0	85.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.011	0.0	0.0	89.000
Water/Pond	98.000	0.316	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	1.152	(N/A)	(N/A)	79.240

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.004	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.046	0.0	0.0	71.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.040	0.0	0.0	85.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.061	0.0	0.0	89.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.151	(N/A)	(N/A)	81.636

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	0.476	0.0	0.0	55.000
Woods - good - Soil C	70.000	3.720	0.0	0.0	70.000
Woods - good - Soil D	77.000	0.246	0.0	0.0	77.000
Meadow - cont. grass (non grazed) - ---- - Soil B	58.000	0.042	0.0	0.0	58.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	1.045	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.759	0.0	0.0	78.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.133	0.0	0.0	85.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	6.421	(N/A)	(N/A)	70.497

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil B	55.000	1.310	0.0	0.0	55.000
Woods - good - Soil C	70.000	11.024	0.0	0.0	70.000
Woods - good - Soil D	77.000	0.246	0.0	0.0	77.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	4.230	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.760	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.071	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil B	85.000	0.127	0.0	0.0	85.000
Water/Pond	98.000	0.158	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	17.926	(N/A)	(N/A)	70.039

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	7.049	0.0	0.0	70.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	1.167	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.615	0.0	0.0	78.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	8.831	(N/A)	(N/A)	70.689

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.238 hours
Flow (Peak, Computed)	3.91 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	3.88 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.093 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.443 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.441 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.275 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.24 ft³/s
Unit peak time, Tp	0.183 hours
Unit receding limb, Tr	0.733 hours
Total unit time, Tb	0.916 hours

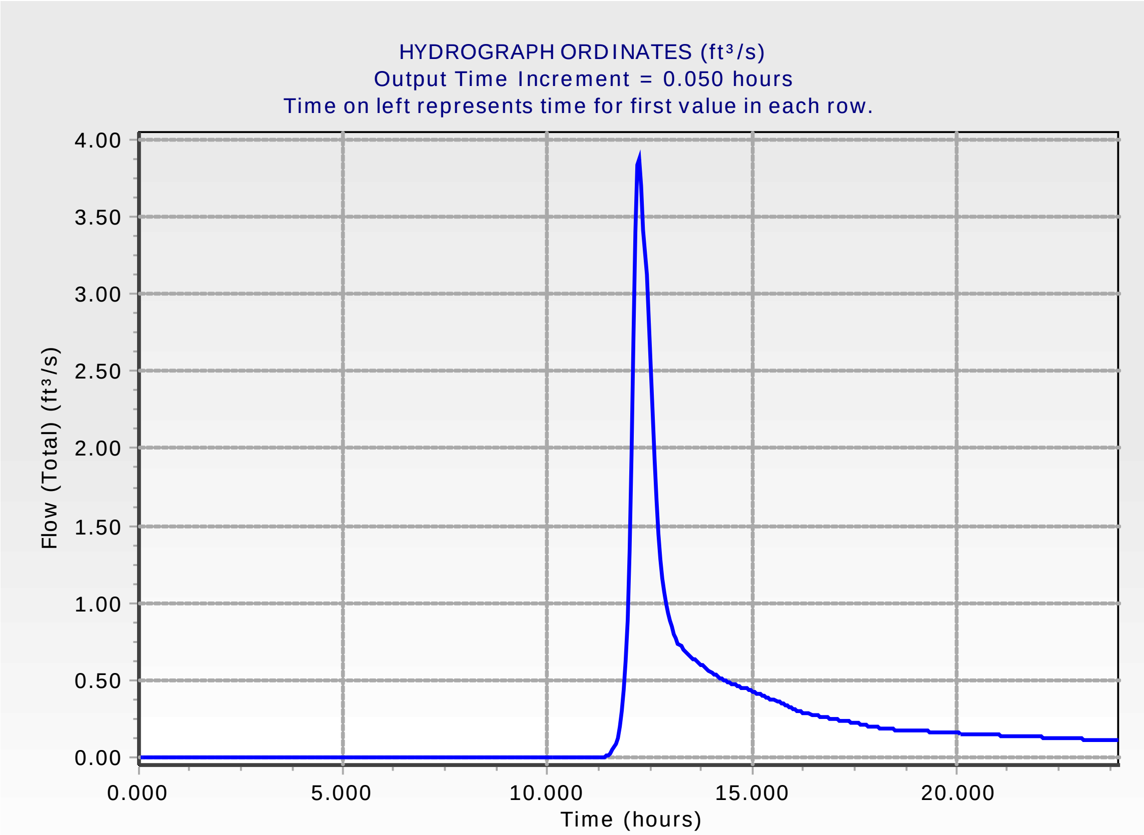
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.350	0.00	0.00	0.01	0.02	0.03
11.600	0.05	0.08	0.13	0.20	0.30
11.850	0.44	0.62	0.89	1.33	1.96
12.100	2.71	3.40	3.84	3.88	3.70
12.350	3.42	3.13	2.83	2.53	2.23
12.600	1.93	1.67	1.45	1.28	1.16
12.850	1.07	1.00	0.94	0.89	0.84
13.100	0.80	0.77	0.74	0.72	0.70
13.350	0.69	0.67	0.66	0.65	0.64
13.600	0.63	0.62	0.61	0.60	0.59
13.850	0.58	0.57	0.56	0.55	0.54
14.100	0.53	0.52	0.51	0.51	0.50
14.350	0.49	0.49	0.48	0.48	0.47
14.600	0.47	0.46	0.46	0.45	0.45
14.850	0.44	0.44	0.43	0.43	0.42
15.100	0.42	0.41	0.41	0.40	0.40
15.350	0.39	0.38	0.38	0.37	0.37
15.600	0.36	0.36	0.35	0.34	0.34
15.850	0.33	0.33	0.32	0.32	0.31
16.100	0.30	0.30	0.29	0.29	0.29
16.350	0.28	0.28	0.28	0.28	0.27
16.600	0.27	0.27	0.27	0.26	0.26
16.850	0.26	0.26	0.25	0.25	0.25
17.100	0.24	0.24	0.24	0.24	0.23
17.350	0.23	0.23	0.23	0.22	0.22
17.600	0.22	0.22	0.21	0.21	0.21
17.850	0.20	0.20	0.20	0.20	0.19
18.100	0.19	0.19	0.19	0.19	0.18
18.350	0.18	0.18	0.18	0.18	0.18
18.600	0.18	0.18	0.18	0.18	0.18
18.850	0.18	0.17	0.17	0.17	0.17
19.100	0.17	0.17	0.17	0.17	0.17
19.350	0.17	0.17	0.17	0.17	0.16
19.600	0.16	0.16	0.16	0.16	0.16
19.850	0.16	0.16	0.16	0.16	0.16
20.100	0.16	0.15	0.15	0.15	0.15
20.350	0.15	0.15	0.15	0.15	0.15
20.600	0.15	0.15	0.15	0.15	0.15
20.850	0.15	0.15	0.14	0.14	0.14
21.100	0.14	0.14	0.14	0.14	0.14
21.350	0.14	0.14	0.14	0.14	0.14
21.600	0.14	0.14	0.14	0.14	0.13
21.850	0.13	0.13	0.13	0.13	0.13

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.100	0.13	0.13	0.13	0.13	0.13
22.350	0.13	0.13	0.13	0.13	0.13
22.600	0.12	0.12	0.12	0.12	0.12
22.850	0.12	0.12	0.12	0.12	0.12
23.100	0.12	0.12	0.12	0.12	0.12
23.350	0.11	0.11	0.11	0.11	0.11
23.600	0.11	0.11	0.11	0.11	0.11
23.850	0.11	0.11	0.11	0.11	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.201 hours
Flow (Peak, Computed)	9.90 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	9.89 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.093 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	1.024 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.020 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.275 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.24 ft³/s
Unit peak time, Tp	0.183 hours
Unit receding limb, Tr	0.733 hours
Total unit time, Tb	0.916 hours

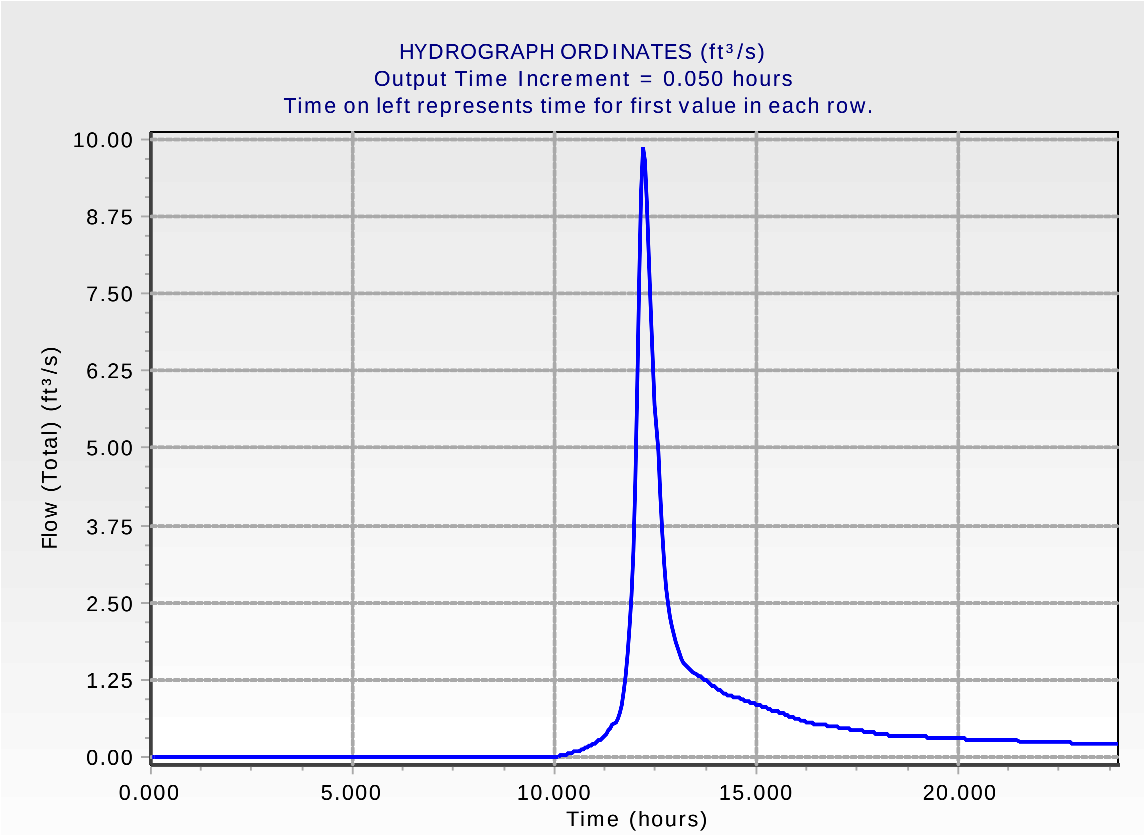
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.950	0.00	0.00	0.01	0.01	0.02
10.200	0.02	0.03	0.04	0.05	0.06
10.450	0.07	0.08	0.10	0.11	0.12
10.700	0.14	0.15	0.16	0.18	0.20
10.950	0.21	0.23	0.25	0.27	0.29
11.200	0.32	0.35	0.39	0.43	0.47
11.450	0.51	0.56	0.63	0.72	0.85
11.700	1.05	1.32	1.67	2.11	2.62
11.950	3.34	4.47	6.02	7.73	9.16
12.200	9.89	9.67	8.98	8.09	7.25
12.450	6.46	5.70	4.95	4.25	3.63
12.700	3.14	2.76	2.48	2.28	2.11
12.950	1.98	1.87	1.77	1.68	1.60
13.200	1.54	1.49	1.45	1.42	1.39
13.450	1.36	1.34	1.32	1.30	1.27
13.700	1.25	1.23	1.21	1.19	1.16
13.950	1.14	1.12	1.10	1.08	1.06
14.200	1.04	1.02	1.01	1.00	0.98
14.450	0.97	0.96	0.95	0.94	0.93
14.700	0.92	0.91	0.90	0.89	0.87
14.950	0.86	0.85	0.84	0.83	0.82
15.200	0.81	0.80	0.78	0.77	0.76
15.450	0.75	0.74	0.73	0.72	0.70
15.700	0.69	0.68	0.67	0.66	0.64
15.950	0.63	0.62	0.61	0.60	0.59
16.200	0.58	0.57	0.56	0.56	0.55
16.450	0.54	0.54	0.53	0.53	0.52
16.700	0.52	0.51	0.51	0.50	0.50
16.950	0.49	0.49	0.48	0.48	0.47
17.200	0.47	0.46	0.46	0.45	0.45
17.450	0.44	0.43	0.43	0.42	0.42
17.700	0.41	0.41	0.40	0.40	0.39
17.950	0.39	0.38	0.38	0.37	0.37
18.200	0.36	0.36	0.36	0.35	0.35
18.450	0.35	0.35	0.35	0.35	0.34
18.700	0.34	0.34	0.34	0.34	0.34
18.950	0.33	0.33	0.33	0.33	0.33
19.200	0.33	0.33	0.32	0.32	0.32
19.450	0.32	0.32	0.32	0.31	0.31
19.700	0.31	0.31	0.31	0.31	0.30
19.950	0.30	0.30	0.30	0.30	0.30
20.200	0.30	0.29	0.29	0.29	0.29
20.450	0.29	0.29	0.29	0.29	0.28

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.700	0.28	0.28	0.28	0.28	0.28
20.950	0.28	0.28	0.28	0.27	0.27
21.200	0.27	0.27	0.27	0.27	0.27
21.450	0.27	0.26	0.26	0.26	0.26
21.700	0.26	0.26	0.26	0.26	0.25
21.950	0.25	0.25	0.25	0.25	0.25
22.200	0.25	0.25	0.24	0.24	0.24
22.450	0.24	0.24	0.24	0.24	0.24
22.700	0.23	0.23	0.23	0.23	0.23
22.950	0.23	0.23	0.23	0.22	0.22
23.200	0.22	0.22	0.22	0.22	0.22
23.450	0.22	0.22	0.21	0.21	0.21
23.700	0.21	0.21	0.21	0.21	0.20
23.950	0.20	0.20	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
10.00
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.201 hours
Flow (Peak, Computed)	20.68 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	20.66 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.093 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.5 in
Runoff Volume (Pervious)	2.082 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.076 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.275 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.24 ft³/s
Unit peak time, Tp	0.183 hours
Unit receding limb, Tr	0.733 hours
Total unit time, Tb	0.916 hours

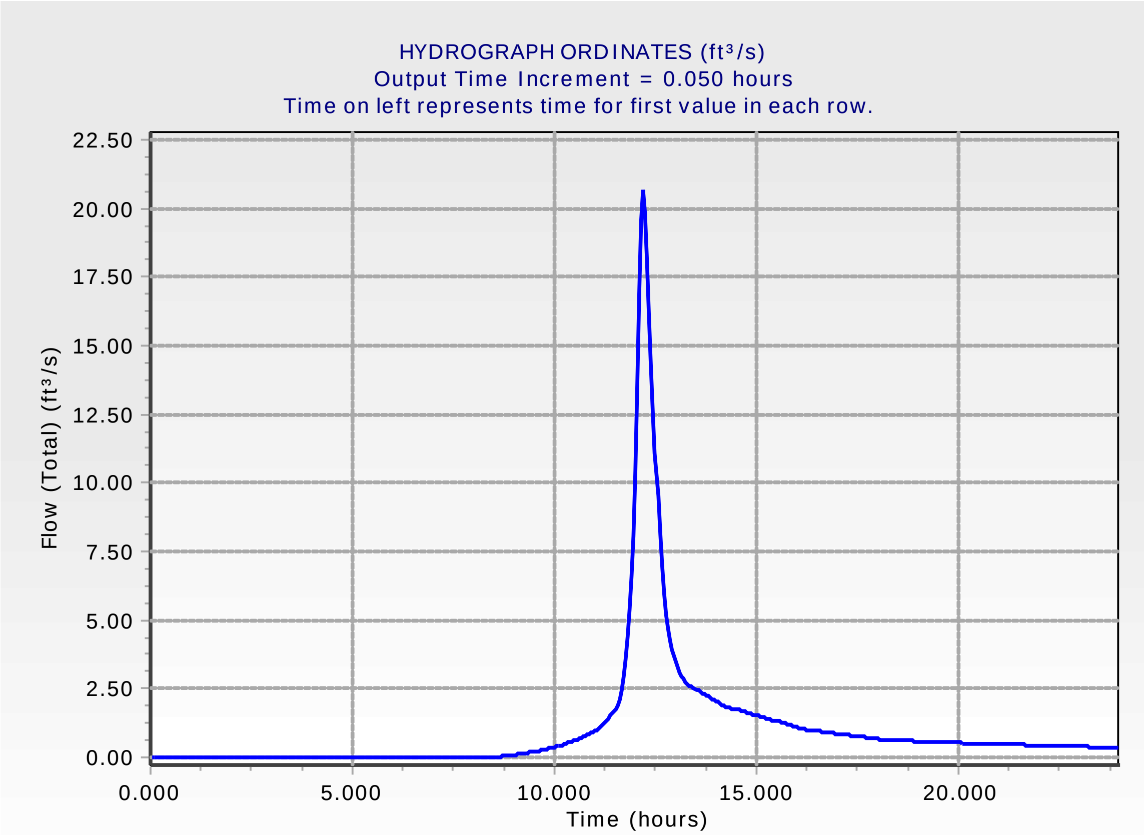
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.350	0.00	0.00	0.01	0.01	0.02
8.600	0.02	0.03	0.04	0.04	0.05
8.850	0.06	0.07	0.08	0.09	0.10
9.100	0.11	0.13	0.14	0.15	0.16
9.350	0.18	0.19	0.20	0.22	0.23
9.600	0.25	0.26	0.28	0.29	0.31
9.850	0.32	0.34	0.36	0.38	0.39
10.100	0.41	0.43	0.46	0.48	0.50
10.350	0.53	0.56	0.59	0.61	0.65
10.600	0.68	0.71	0.74	0.78	0.81
10.850	0.85	0.88	0.92	0.96	1.00
11.100	1.05	1.10	1.17	1.24	1.33
11.350	1.43	1.53	1.64	1.76	1.91
11.600	2.12	2.45	2.94	3.61	4.43
11.850	5.42	6.56	8.09	10.44	13.57
12.100	16.91	19.53	20.66	19.87	18.19
12.350	16.18	14.34	12.66	11.07	9.55
12.600	8.15	6.93	5.96	5.21	4.68
12.850	4.28	3.96	3.70	3.48	3.28
13.100	3.11	2.97	2.85	2.75	2.68
13.350	2.61	2.56	2.51	2.47	2.42
13.600	2.38	2.34	2.29	2.25	2.21
13.850	2.17	2.13	2.08	2.04	2.00
14.100	1.96	1.92	1.89	1.86	1.83
14.350	1.81	1.78	1.76	1.74	1.72
14.600	1.70	1.68	1.66	1.64	1.62
14.850	1.60	1.58	1.56	1.53	1.51
15.100	1.49	1.47	1.45	1.43	1.41
15.350	1.39	1.37	1.34	1.32	1.30
15.600	1.28	1.26	1.24	1.22	1.19
15.850	1.17	1.15	1.13	1.11	1.09
16.100	1.07	1.05	1.03	1.02	1.00
16.350	0.99	0.98	0.97	0.96	0.95
16.600	0.94	0.93	0.92	0.91	0.90
16.850	0.89	0.88	0.88	0.87	0.86
17.100	0.85	0.84	0.83	0.82	0.81
17.350	0.80	0.79	0.78	0.77	0.76
17.600	0.75	0.74	0.73	0.72	0.71
17.850	0.70	0.69	0.68	0.67	0.66
18.100	0.66	0.65	0.64	0.63	0.63
18.350	0.63	0.62	0.62	0.62	0.61
18.600	0.61	0.61	0.60	0.60	0.60
18.850	0.60	0.59	0.59	0.59	0.58

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.100	0.58	0.58	0.58	0.57	0.57
19.350	0.57	0.56	0.56	0.56	0.56
19.600	0.55	0.55	0.55	0.54	0.54
19.850	0.54	0.54	0.53	0.53	0.53
20.100	0.52	0.52	0.52	0.52	0.52
20.350	0.51	0.51	0.51	0.51	0.50
20.600	0.50	0.50	0.50	0.49	0.49
20.850	0.49	0.49	0.49	0.48	0.48
21.100	0.48	0.48	0.48	0.47	0.47
21.350	0.47	0.47	0.46	0.46	0.46
21.600	0.46	0.46	0.45	0.45	0.45
21.850	0.45	0.45	0.44	0.44	0.44
22.100	0.44	0.43	0.43	0.43	0.43
22.350	0.43	0.42	0.42	0.42	0.42
22.600	0.41	0.41	0.41	0.41	0.41
22.850	0.40	0.40	0.40	0.40	0.39
23.100	0.39	0.39	0.39	0.39	0.38
23.350	0.38	0.38	0.38	0.38	0.37
23.600	0.37	0.37	0.37	0.36	0.36
23.850	0.36	0.36	0.35	0.35	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

Computational Time Increment	0.037 hours
Time to Peak (Computed)	12.201 hours
Flow (Peak, Computed)	27.26 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	27.24 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.093 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.6 in
Runoff Volume (Pervious)	2.743 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.735 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.275 hours
Computational Time Increment	0.037 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.24 ft³/s
Unit peak time, Tp	0.183 hours
Unit receding limb, Tr	0.733 hours
Total unit time, Tb	0.916 hours

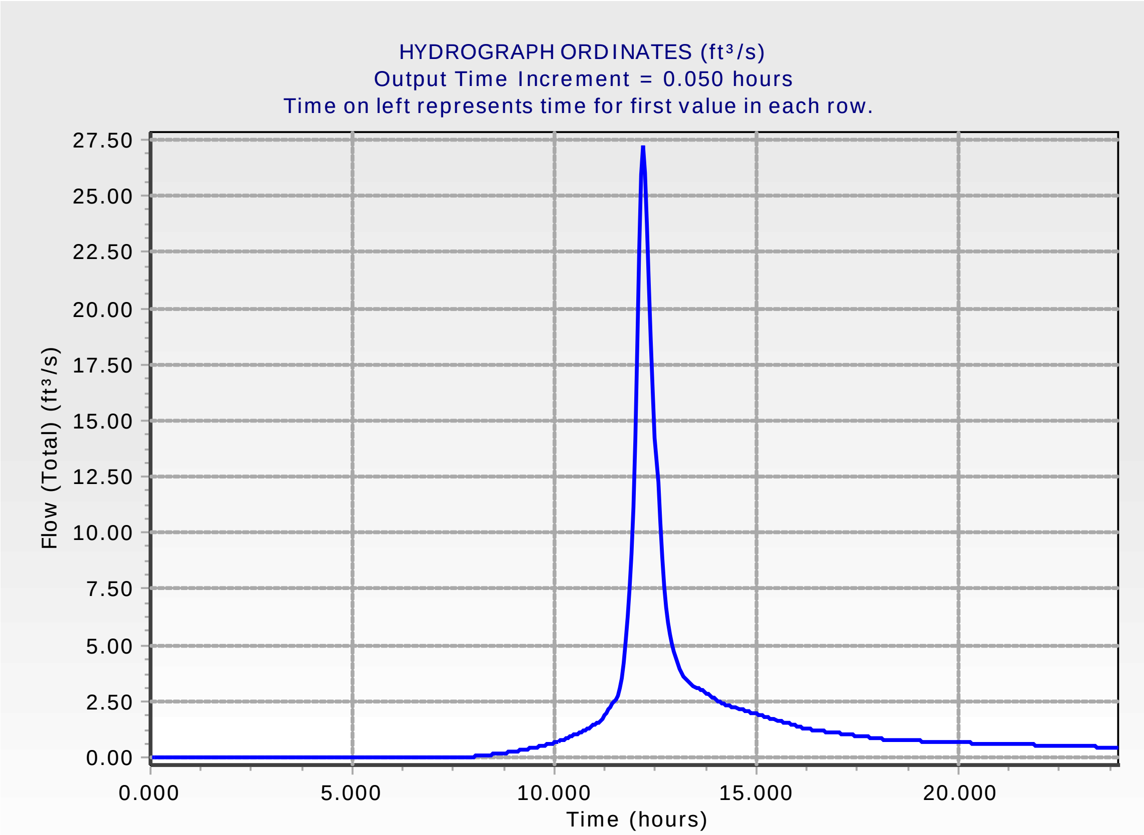
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.275 hours
Area (User Defined)	7.093 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.600	0.00	0.00	0.01	0.01	0.02
7.850	0.02	0.03	0.03	0.04	0.05
8.100	0.06	0.06	0.07	0.08	0.09
8.350	0.10	0.11	0.12	0.13	0.14
8.600	0.15	0.17	0.18	0.19	0.21
8.850	0.22	0.23	0.25	0.26	0.28
9.100	0.30	0.31	0.33	0.35	0.37
9.350	0.39	0.40	0.42	0.44	0.46
9.600	0.48	0.51	0.53	0.55	0.57
9.850	0.59	0.62	0.64	0.67	0.69
10.100	0.72	0.74	0.77	0.81	0.84
10.350	0.88	0.92	0.96	1.00	1.04
10.600	1.08	1.13	1.17	1.22	1.27
10.850	1.31	1.36	1.41	1.47	1.52
11.100	1.58	1.66	1.75	1.85	1.97
11.350	2.11	2.25	2.40	2.56	2.76
11.600	3.06	3.51	4.19	5.11	6.23
11.850	7.57	9.09	11.12	14.20	18.30
12.100	22.61	25.92	27.24	26.07	23.75
12.350	21.05	18.60	16.36	14.26	12.28
12.600	10.46	8.89	7.63	6.66	5.97
12.850	5.45	5.04	4.71	4.43	4.18
13.100	3.96	3.77	3.61	3.49	3.39
13.350	3.32	3.25	3.18	3.12	3.07
13.600	3.01	2.96	2.90	2.85	2.79
13.850	2.74	2.69	2.63	2.58	2.52
14.100	2.47	2.42	2.38	2.34	2.31
14.350	2.28	2.25	2.22	2.20	2.17
14.600	2.14	2.12	2.09	2.06	2.04
14.850	2.01	1.98	1.96	1.93	1.90
15.100	1.88	1.85	1.82	1.80	1.77
15.350	1.74	1.72	1.69	1.66	1.64
15.600	1.61	1.58	1.55	1.53	1.50
15.850	1.47	1.45	1.42	1.39	1.36
16.100	1.34	1.31	1.29	1.27	1.26
16.350	1.24	1.23	1.22	1.20	1.19
16.600	1.18	1.17	1.16	1.14	1.13
16.850	1.12	1.11	1.10	1.08	1.07
17.100	1.06	1.05	1.04	1.02	1.01
17.350	1.00	0.99	0.98	0.96	0.95
17.600	0.94	0.93	0.92	0.90	0.89
17.850	0.88	0.87	0.86	0.84	0.83
18.100	0.82	0.81	0.80	0.79	0.79

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.350	0.78	0.78	0.77	0.77	0.77
18.600	0.76	0.76	0.76	0.75	0.75
18.850	0.75	0.74	0.74	0.73	0.73
19.100	0.73	0.72	0.72	0.72	0.71
19.350	0.71	0.71	0.70	0.70	0.70
19.600	0.69	0.69	0.68	0.68	0.68
19.850	0.67	0.67	0.67	0.66	0.66
20.100	0.66	0.65	0.65	0.65	0.64
20.350	0.64	0.64	0.63	0.63	0.63
20.600	0.63	0.62	0.62	0.62	0.61
20.850	0.61	0.61	0.61	0.60	0.60
21.100	0.60	0.60	0.59	0.59	0.59
21.350	0.59	0.58	0.58	0.58	0.57
21.600	0.57	0.57	0.57	0.56	0.56
21.850	0.56	0.56	0.55	0.55	0.55
22.100	0.54	0.54	0.54	0.54	0.53
22.350	0.53	0.53	0.52	0.52	0.52
22.600	0.52	0.51	0.51	0.51	0.51
22.850	0.50	0.50	0.50	0.49	0.49
23.100	0.49	0.49	0.48	0.48	0.48
23.350	0.47	0.47	0.47	0.47	0.46
23.600	0.46	0.46	0.46	0.45	0.45
23.850	0.45	0.44	0.44	0.44	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
27.50
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

Computational Time Increment	0.038 hours
Time to Peak (Computed)	12.249 hours
Flow (Peak, Computed)	4.33 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	4.33 ft^3/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.960 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.497 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.495 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.284 hours
Computational Time Increment	0.038 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	31.71 ft^3/s
Unit peak time, Tp	0.190 hours
Unit receding limb, Tr	0.758 hours
Total unit time, Tb	0.948 hours

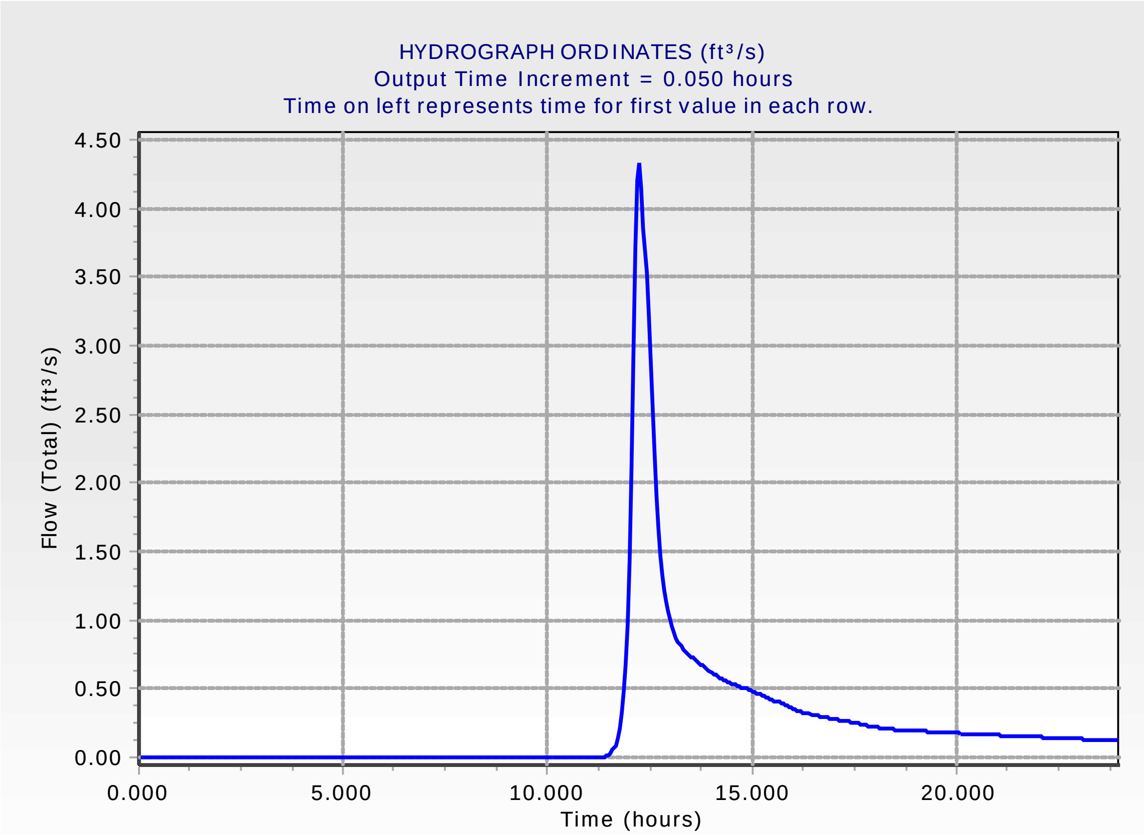
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.350	0.00	0.00	0.01	0.02	0.03
11.600	0.05	0.09	0.14	0.22	0.33
11.850	0.48	0.67	0.96	1.44	2.12
12.100	2.94	3.71	4.21	4.33	4.15
12.350	3.86	3.54	3.22	2.89	2.55
12.600	2.21	1.91	1.66	1.47	1.33
12.850	1.22	1.14	1.07	1.01	0.96
13.100	0.91	0.87	0.84	0.81	0.79
13.350	0.77	0.76	0.75	0.73	0.72
13.600	0.71	0.70	0.69	0.68	0.67
13.850	0.66	0.64	0.63	0.62	0.61
14.100	0.60	0.59	0.58	0.57	0.56
14.350	0.56	0.55	0.54	0.54	0.53
14.600	0.53	0.52	0.52	0.51	0.50
14.850	0.50	0.49	0.49	0.48	0.48
15.100	0.47	0.46	0.46	0.45	0.44
15.350	0.44	0.43	0.43	0.42	0.41
15.600	0.41	0.40	0.39	0.39	0.38
15.850	0.37	0.37	0.36	0.35	0.35
16.100	0.34	0.34	0.33	0.33	0.32
16.350	0.32	0.32	0.31	0.31	0.31
16.600	0.30	0.30	0.30	0.30	0.29
16.850	0.29	0.29	0.28	0.28	0.28
17.100	0.28	0.27	0.27	0.27	0.26
17.350	0.26	0.26	0.25	0.25	0.25
17.600	0.25	0.24	0.24	0.24	0.23
17.850	0.23	0.23	0.22	0.22	0.22
18.100	0.22	0.21	0.21	0.21	0.21
18.350	0.21	0.20	0.20	0.20	0.20
18.600	0.20	0.20	0.20	0.20	0.20
18.850	0.20	0.20	0.19	0.19	0.19
19.100	0.19	0.19	0.19	0.19	0.19
19.350	0.19	0.19	0.19	0.19	0.18
19.600	0.18	0.18	0.18	0.18	0.18
19.850	0.18	0.18	0.18	0.18	0.18
20.100	0.17	0.17	0.17	0.17	0.17
20.350	0.17	0.17	0.17	0.17	0.17
20.600	0.17	0.17	0.17	0.17	0.16
20.850	0.16	0.16	0.16	0.16	0.16
21.100	0.16	0.16	0.16	0.16	0.16
21.350	0.16	0.16	0.16	0.16	0.15
21.600	0.15	0.15	0.15	0.15	0.15
21.850	0.15	0.15	0.15	0.15	0.15

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.100	0.15	0.15	0.15	0.14	0.14
22.350	0.14	0.14	0.14	0.14	0.14
22.600	0.14	0.14	0.14	0.14	0.14
22.850	0.14	0.14	0.13	0.13	0.13
23.100	0.13	0.13	0.13	0.13	0.13
23.350	0.13	0.13	0.13	0.13	0.13
23.600	0.13	0.12	0.12	0.12	0.12
23.850	0.12	0.12	0.12	0.12	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

Computational Time Increment	0.038 hours
Time to Peak (Computed)	12.211 hours
Flow (Peak, Computed)	11.01 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	10.90 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.960 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	1.149 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.145 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.284 hours
Computational Time Increment	0.038 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	31.71 ft³/s
Unit peak time, Tp	0.190 hours
Unit receding limb, Tr	0.758 hours
Total unit time, Tb	0.948 hours

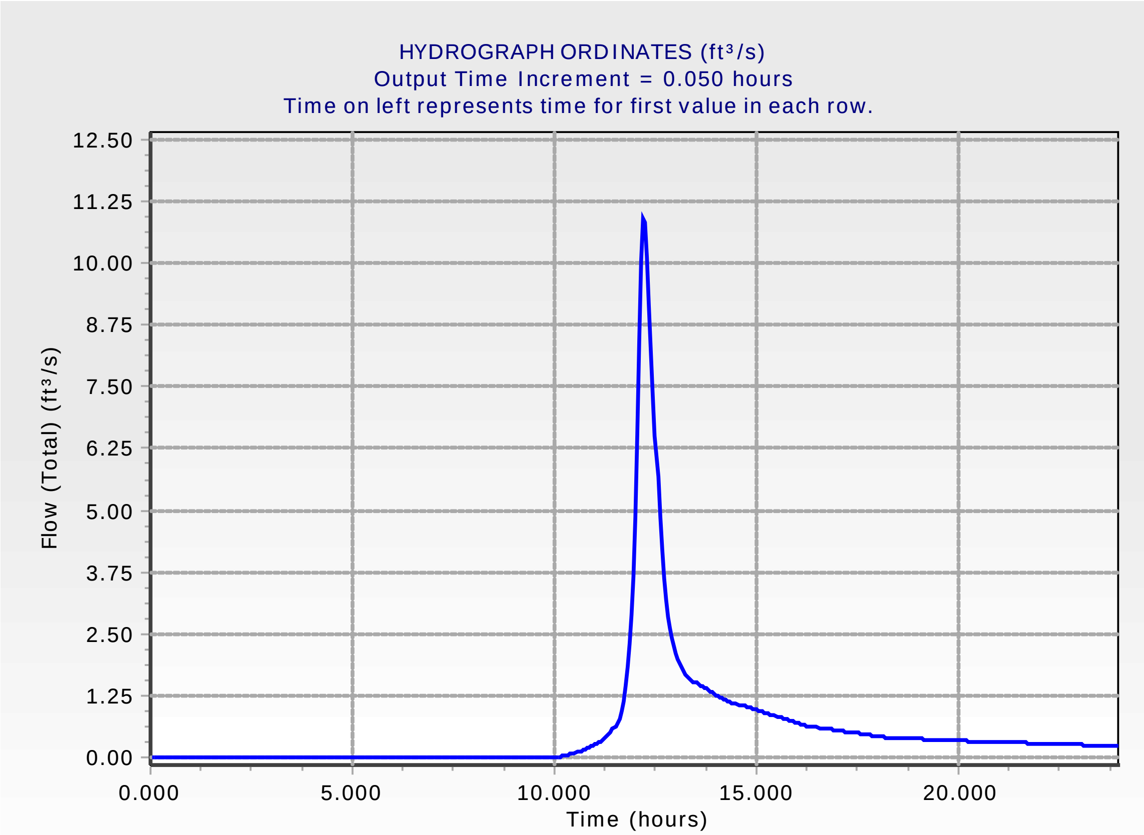
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.950	0.00	0.00	0.01	0.01	0.02
10.200	0.02	0.03	0.04	0.05	0.07
10.450	0.08	0.09	0.10	0.12	0.13
10.700	0.15	0.17	0.18	0.20	0.22
10.950	0.24	0.26	0.28	0.30	0.33
11.200	0.35	0.39	0.43	0.47	0.52
11.450	0.57	0.63	0.70	0.79	0.93
11.700	1.15	1.44	1.83	2.30	2.87
11.950	3.65	4.87	6.54	8.43	10.03
12.200	10.90	10.83	10.11	9.17	8.24
12.450	7.37	6.52	5.67	4.89	4.19
12.700	3.61	3.18	2.85	2.61	2.41
12.950	2.26	2.12	2.00	1.90	1.81
13.200	1.74	1.68	1.64	1.60	1.57
13.450	1.54	1.51	1.48	1.46	1.43
13.700	1.41	1.38	1.36	1.34	1.31
13.950	1.29	1.26	1.24	1.21	1.19
14.200	1.17	1.15	1.13	1.12	1.11
14.450	1.09	1.08	1.07	1.06	1.04
14.700	1.03	1.02	1.01	1.00	0.98
14.950	0.97	0.96	0.95	0.93	0.92
15.200	0.91	0.90	0.88	0.87	0.86
15.450	0.84	0.83	0.82	0.80	0.79
15.700	0.78	0.76	0.75	0.74	0.72
15.950	0.71	0.70	0.68	0.67	0.66
16.200	0.65	0.64	0.63	0.63	0.62
16.450	0.61	0.61	0.60	0.59	0.59
16.700	0.58	0.58	0.57	0.57	0.56
16.950	0.55	0.55	0.54	0.54	0.53
17.200	0.52	0.52	0.51	0.51	0.50
17.450	0.49	0.49	0.48	0.48	0.47
17.700	0.46	0.46	0.45	0.45	0.44
17.950	0.43	0.43	0.42	0.42	0.41
18.200	0.41	0.40	0.40	0.40	0.40
18.450	0.39	0.39	0.39	0.39	0.39
18.700	0.38	0.38	0.38	0.38	0.38
18.950	0.38	0.37	0.37	0.37	0.37
19.200	0.37	0.37	0.36	0.36	0.36
19.450	0.36	0.36	0.35	0.35	0.35
19.700	0.35	0.35	0.35	0.34	0.34
19.950	0.34	0.34	0.34	0.34	0.33
20.200	0.33	0.33	0.33	0.33	0.33
20.450	0.32	0.32	0.32	0.32	0.32

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.700	0.32	0.32	0.32	0.31	0.31
20.950	0.31	0.31	0.31	0.31	0.31
21.200	0.30	0.30	0.30	0.30	0.30
21.450	0.30	0.30	0.29	0.29	0.29
21.700	0.29	0.29	0.29	0.29	0.29
21.950	0.28	0.28	0.28	0.28	0.28
22.200	0.28	0.28	0.27	0.27	0.27
22.450	0.27	0.27	0.27	0.27	0.27
22.700	0.26	0.26	0.26	0.26	0.26
22.950	0.26	0.26	0.25	0.25	0.25
23.200	0.25	0.25	0.25	0.25	0.24
23.450	0.24	0.24	0.24	0.24	0.24
23.700	0.24	0.23	0.23	0.23	0.23
23.950	0.23	0.23	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
12.50
11.25
10.00
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

Computational Time Increment	0.038 hours
Time to Peak (Computed)	12.211 hours
Flow (Peak, Computed)	22.97 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	22.83 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.960 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.5 in
Runoff Volume (Pervious)	2.336 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.329 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.284 hours
Computational Time Increment	0.038 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	31.71 ft³/s
Unit peak time, Tp	0.190 hours
Unit receding limb, Tr	0.758 hours
Total unit time, Tb	0.948 hours

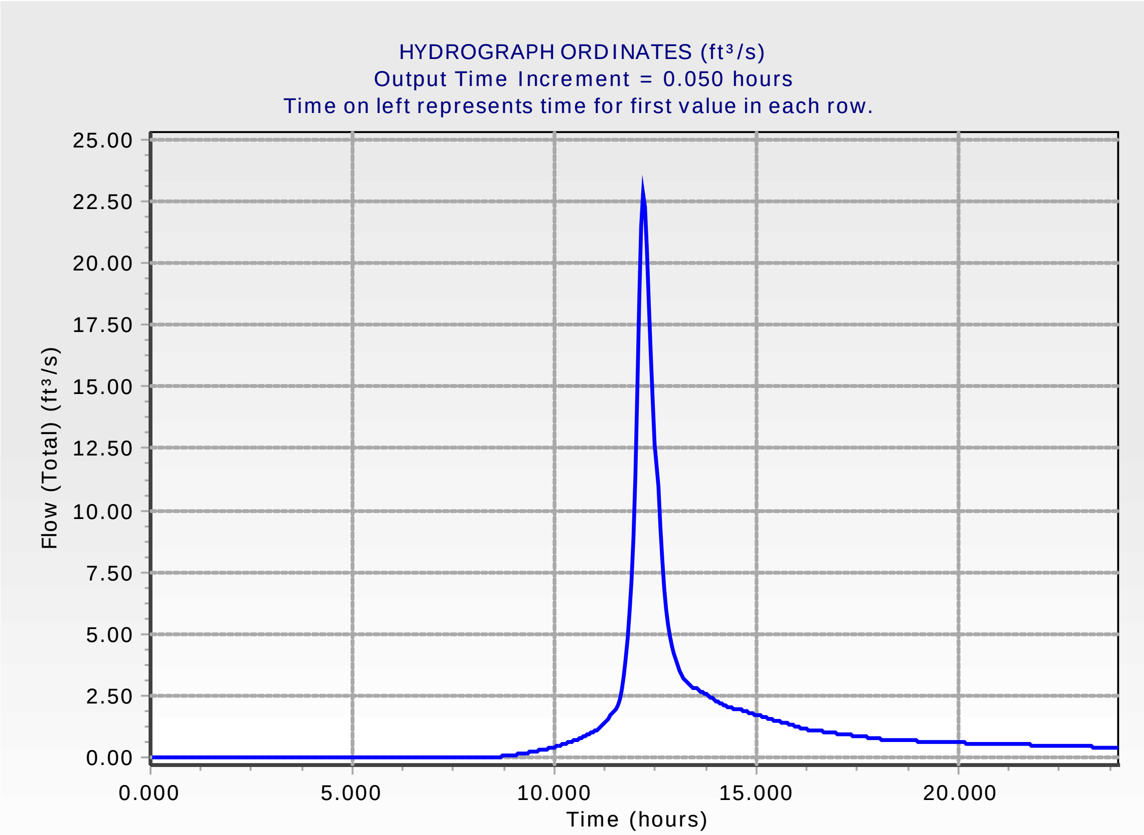
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
8.350	0.00	0.00	0.01	0.01	0.02
8.600	0.02	0.03	0.04	0.05	0.06
8.850	0.07	0.08	0.09	0.10	0.11
9.100	0.13	0.14	0.15	0.17	0.18
9.350	0.19	0.21	0.22	0.24	0.26
9.600	0.27	0.29	0.31	0.32	0.34
9.850	0.36	0.38	0.40	0.42	0.44
10.100	0.46	0.48	0.51	0.53	0.56
10.350	0.59	0.62	0.65	0.68	0.72
10.600	0.75	0.79	0.83	0.86	0.90
10.850	0.94	0.98	1.03	1.07	1.12
11.100	1.17	1.23	1.30	1.38	1.48
11.350	1.59	1.70	1.83	1.96	2.12
11.600	2.35	2.71	3.23	3.95	4.86
11.850	5.95	7.20	8.87	11.39	14.79
12.100	18.49	21.46	22.83	22.30	20.53
12.350	18.38	16.32	14.47	12.69	10.96
12.600	9.38	8.00	6.86	6.01	5.38
12.850	4.90	4.52	4.22	3.95	3.73
13.100	3.53	3.36	3.22	3.11	3.02
13.350	2.95	2.88	2.83	2.78	2.73
13.600	2.68	2.63	2.58	2.53	2.49
13.850	2.44	2.39	2.34	2.30	2.25
14.100	2.20	2.16	2.12	2.09	2.06
14.350	2.03	2.01	1.98	1.96	1.93
14.600	1.91	1.89	1.87	1.84	1.82
14.850	1.80	1.77	1.75	1.73	1.70
15.100	1.68	1.66	1.63	1.61	1.58
15.350	1.56	1.54	1.51	1.49	1.46
15.600	1.44	1.42	1.39	1.37	1.34
15.850	1.32	1.30	1.27	1.25	1.22
16.100	1.20	1.18	1.16	1.14	1.13
16.350	1.12	1.10	1.09	1.08	1.07
16.600	1.06	1.05	1.04	1.03	1.02
16.850	1.00	0.99	0.98	0.97	0.96
17.100	0.95	0.94	0.93	0.92	0.91
17.350	0.90	0.89	0.88	0.87	0.86
17.600	0.84	0.83	0.82	0.81	0.80
17.850	0.79	0.78	0.77	0.76	0.75
18.100	0.74	0.73	0.72	0.71	0.71
18.350	0.70	0.70	0.70	0.69	0.69
18.600	0.69	0.68	0.68	0.68	0.67
18.850	0.67	0.67	0.66	0.66	0.66

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.100	0.65	0.65	0.65	0.64	0.64
19.350	0.64	0.63	0.63	0.63	0.62
19.600	0.62	0.62	0.62	0.61	0.61
19.850	0.61	0.60	0.60	0.60	0.59
20.100	0.59	0.59	0.58	0.58	0.58
20.350	0.58	0.57	0.57	0.57	0.57
20.600	0.56	0.56	0.56	0.56	0.55
20.850	0.55	0.55	0.55	0.54	0.54
21.100	0.54	0.54	0.53	0.53	0.53
21.350	0.53	0.52	0.52	0.52	0.52
21.600	0.51	0.51	0.51	0.51	0.50
21.850	0.50	0.50	0.50	0.50	0.49
22.100	0.49	0.49	0.49	0.48	0.48
22.350	0.48	0.47	0.47	0.47	0.47
22.600	0.47	0.46	0.46	0.46	0.46
22.850	0.45	0.45	0.45	0.45	0.44
23.100	0.44	0.44	0.44	0.43	0.43
23.350	0.43	0.43	0.42	0.42	0.42
23.600	0.42	0.41	0.41	0.41	0.41
23.850	0.40	0.40	0.40	0.39	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

Computational Time Increment	0.038 hours
Time to Peak (Computed)	12.211 hours
Flow (Peak, Computed)	30.27 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	30.13 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	7.960 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.6 in
Runoff Volume (Pervious)	3.078 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	3.069 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.284 hours
Computational Time Increment	0.038 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	31.71 ft³/s
Unit peak time, Tp	0.190 hours
Unit receding limb, Tr	0.758 hours
Total unit time, Tb	0.948 hours

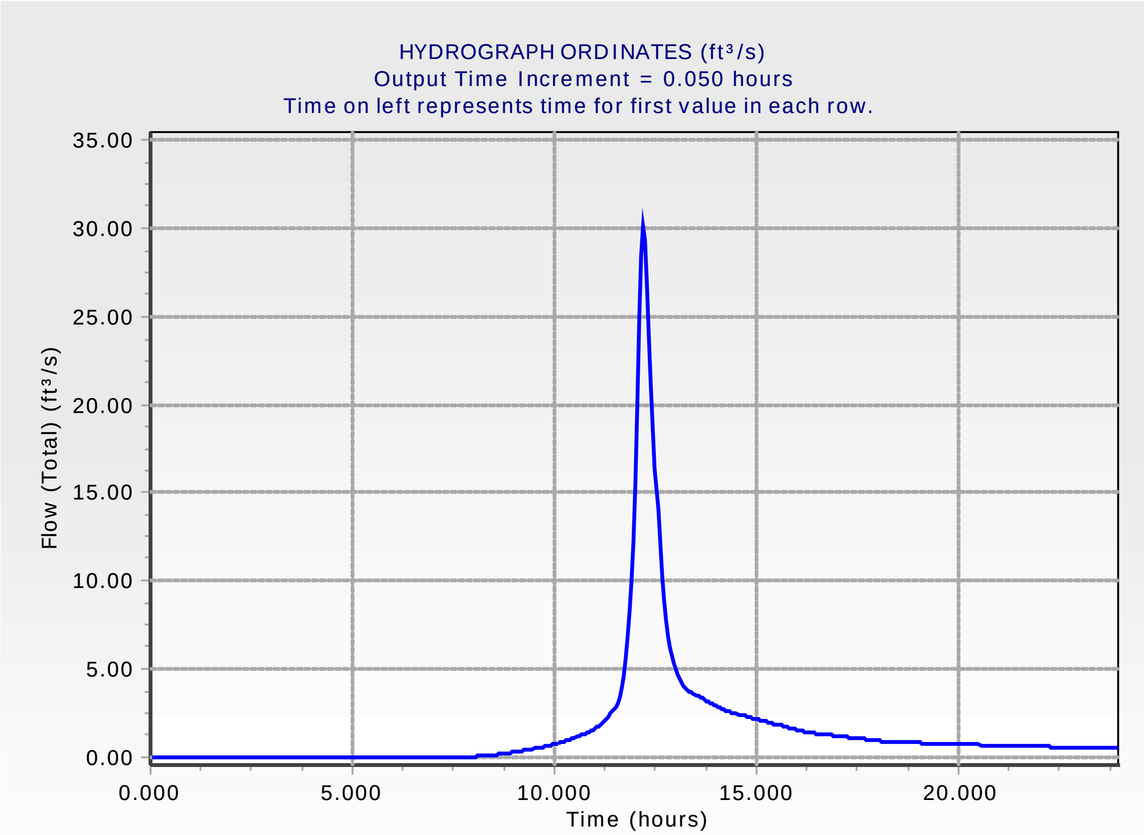
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.284 hours
Area (User Defined)	7.960 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
7.600	0.00	0.00	0.01	0.01	0.02
7.850	0.02	0.03	0.04	0.04	0.05
8.100	0.06	0.07	0.08	0.09	0.10
8.350	0.11	0.12	0.13	0.14	0.16
8.600	0.17	0.18	0.20	0.21	0.23
8.850	0.24	0.26	0.28	0.29	0.31
9.100	0.33	0.35	0.37	0.39	0.41
9.350	0.43	0.45	0.47	0.49	0.52
9.600	0.54	0.56	0.59	0.61	0.64
9.850	0.66	0.69	0.72	0.74	0.77
10.100	0.80	0.83	0.86	0.90	0.94
10.350	0.98	1.02	1.07	1.11	1.16
10.600	1.21	1.26	1.31	1.36	1.41
10.850	1.47	1.52	1.58	1.64	1.70
11.100	1.77	1.85	1.95	2.06	2.20
11.350	2.34	2.50	2.67	2.85	3.07
11.600	3.39	3.88	4.61	5.60	6.84
11.850	8.31	9.98	12.19	15.51	19.95
12.100	24.74	28.50	30.13	29.28	26.83
12.350	23.93	21.17	18.71	16.37	14.11
12.600	12.05	10.26	8.79	7.69	6.87
12.850	6.24	5.76	5.37	5.03	4.74
13.100	4.49	4.27	4.09	3.95	3.83
13.350	3.74	3.66	3.58	3.52	3.45
13.600	3.39	3.33	3.27	3.21	3.14
13.850	3.08	3.02	2.96	2.90	2.84
14.100	2.78	2.73	2.68	2.64	2.60
14.350	2.56	2.53	2.50	2.47	2.44
14.600	2.41	2.38	2.35	2.32	2.29
14.850	2.26	2.23	2.20	2.17	2.14
15.100	2.11	2.08	2.05	2.02	1.99
15.350	1.96	1.93	1.90	1.87	1.84
15.600	1.81	1.78	1.75	1.72	1.69
15.850	1.66	1.63	1.60	1.56	1.53
16.100	1.51	1.48	1.46	1.43	1.42
16.350	1.40	1.38	1.37	1.35	1.34
16.600	1.33	1.31	1.30	1.29	1.27
16.850	1.26	1.25	1.23	1.22	1.21
17.100	1.19	1.18	1.17	1.15	1.14
17.350	1.12	1.11	1.10	1.08	1.07
17.600	1.06	1.04	1.03	1.02	1.00
17.850	0.99	0.98	0.96	0.95	0.94
18.100	0.92	0.91	0.90	0.89	0.89

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.350	0.88	0.87	0.87	0.87	0.86
18.600	0.86	0.85	0.85	0.85	0.84
18.850	0.84	0.83	0.83	0.82	0.82
19.100	0.82	0.81	0.81	0.80	0.80
19.350	0.80	0.79	0.79	0.78	0.78
19.600	0.78	0.77	0.77	0.76	0.76
19.850	0.76	0.75	0.75	0.74	0.74
20.100	0.74	0.73	0.73	0.73	0.72
20.350	0.72	0.72	0.71	0.71	0.71
20.600	0.70	0.70	0.70	0.69	0.69
20.850	0.69	0.68	0.68	0.68	0.68
21.100	0.67	0.67	0.67	0.66	0.66
21.350	0.66	0.65	0.65	0.65	0.64
21.600	0.64	0.64	0.64	0.63	0.63
21.850	0.63	0.62	0.62	0.62	0.61
22.100	0.61	0.61	0.61	0.60	0.60
22.350	0.60	0.59	0.59	0.59	0.58
22.600	0.58	0.58	0.57	0.57	0.57
22.850	0.56	0.56	0.56	0.56	0.55
23.100	0.55	0.55	0.54	0.54	0.54
23.350	0.53	0.53	0.53	0.53	0.52
23.600	0.52	0.52	0.51	0.51	0.51
23.850	0.50	0.50	0.50	0.49	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	7.36 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	7.33 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	3.865 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	0.606 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.605 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.79 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

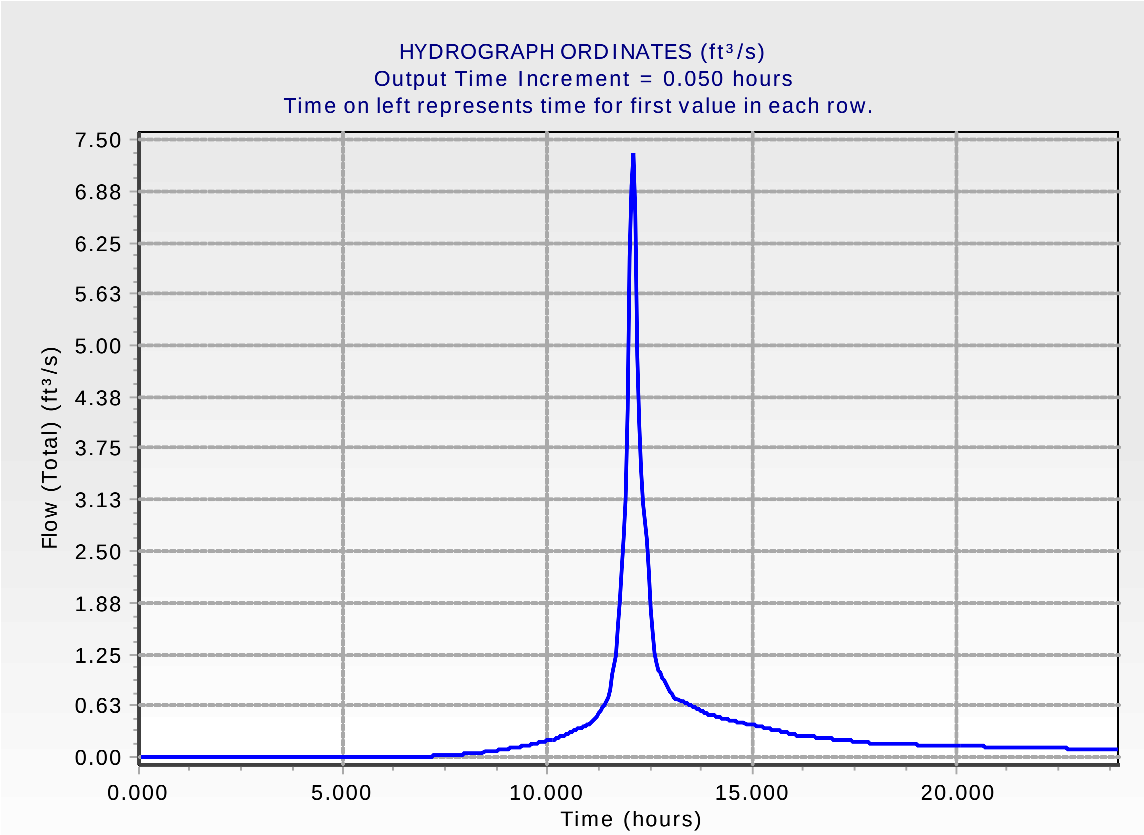
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
6.700	0.00	0.00	0.00	0.00	0.00
6.950	0.01	0.01	0.01	0.01	0.01
7.200	0.01	0.01	0.01	0.02	0.02
7.450	0.02	0.02	0.02	0.02	0.03
7.700	0.03	0.03	0.03	0.03	0.03
7.950	0.04	0.04	0.04	0.04	0.04
8.200	0.05	0.05	0.05	0.06	0.06
8.450	0.06	0.06	0.07	0.07	0.07
8.700	0.08	0.08	0.08	0.09	0.09
8.950	0.10	0.10	0.10	0.11	0.11
9.200	0.12	0.12	0.13	0.13	0.14
9.450	0.14	0.15	0.15	0.16	0.16
9.700	0.17	0.17	0.18	0.18	0.19
9.950	0.19	0.20	0.21	0.21	0.22
10.200	0.23	0.24	0.25	0.26	0.27
10.450	0.28	0.29	0.30	0.31	0.32
10.700	0.33	0.34	0.35	0.36	0.37
10.950	0.39	0.40	0.41	0.44	0.46
11.200	0.50	0.53	0.57	0.60	0.64
11.450	0.68	0.72	0.83	1.00	1.24
11.700	1.58	1.90	2.30	2.67	3.12
11.950	4.23	6.08	6.93	7.33	6.59
12.200	4.89	4.06	3.49	3.09	2.64
12.450	2.26	1.81	1.53	1.25	1.13
12.700	1.06	1.02	0.97	0.93	0.88
12.950	0.84	0.79	0.76	0.73	0.71
13.200	0.70	0.69	0.67	0.66	0.65
13.450	0.64	0.63	0.62	0.61	0.59
13.700	0.58	0.57	0.56	0.55	0.54
13.950	0.52	0.51	0.50	0.49	0.49
14.200	0.48	0.48	0.47	0.46	0.46
14.450	0.45	0.45	0.44	0.44	0.43
14.700	0.42	0.42	0.41	0.41	0.40
14.950	0.40	0.39	0.39	0.38	0.37
15.200	0.37	0.36	0.36	0.35	0.35
15.450	0.34	0.33	0.33	0.32	0.32
15.700	0.31	0.31	0.30	0.29	0.29
15.950	0.28	0.28	0.27	0.27	0.26
16.200	0.26	0.26	0.26	0.25	0.25
16.450	0.25	0.25	0.24	0.24	0.24
16.700	0.24	0.23	0.23	0.23	0.23
16.950	0.22	0.22	0.22	0.22	0.21
17.200	0.21	0.21	0.21	0.20	0.20

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
17.450	0.20	0.20	0.19	0.19	0.19
17.700	0.19	0.18	0.18	0.18	0.18
17.950	0.17	0.17	0.17	0.17	0.16
18.200	0.16	0.16	0.16	0.16	0.16
18.450	0.16	0.16	0.16	0.16	0.16
18.700	0.16	0.16	0.15	0.15	0.15
18.950	0.15	0.15	0.15	0.15	0.15
19.200	0.15	0.15	0.15	0.15	0.15
19.450	0.15	0.14	0.14	0.14	0.14
19.700	0.14	0.14	0.14	0.14	0.14
19.950	0.14	0.14	0.14	0.13	0.13
20.200	0.13	0.13	0.13	0.13	0.13
20.450	0.13	0.13	0.13	0.13	0.13
20.700	0.13	0.13	0.13	0.13	0.13
20.950	0.13	0.13	0.12	0.12	0.12
21.200	0.12	0.12	0.12	0.12	0.12
21.450	0.12	0.12	0.12	0.12	0.12
21.700	0.12	0.12	0.12	0.12	0.11
21.950	0.11	0.11	0.11	0.11	0.11
22.200	0.11	0.11	0.11	0.11	0.11
22.450	0.11	0.11	0.11	0.11	0.11
22.700	0.11	0.10	0.10	0.10	0.10
22.950	0.10	0.10	0.10	0.10	0.10
23.200	0.10	0.10	0.10	0.10	0.10
23.450	0.10	0.10	0.10	0.09	0.09
23.700	0.09	0.09	0.09	0.09	0.09
23.950	0.09	0.09	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
7.50
6.88
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	12.48 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	12.46 ft³/s

Drainage Area	
SCS CN (Composite)	89.000
Area (User Defined)	3.865 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	1.055 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.054 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.79 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

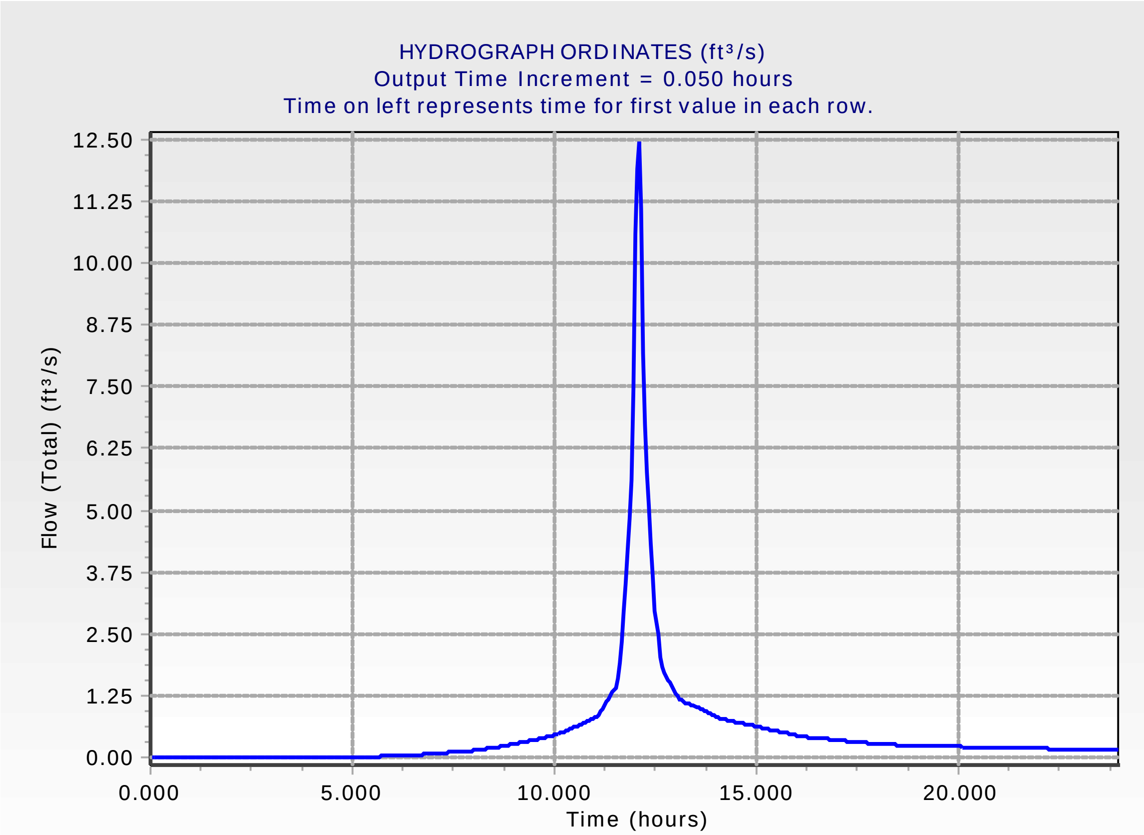
Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
5.000	0.00	0.00	0.00	0.00	0.01
5.250	0.01	0.01	0.01	0.01	0.01
5.500	0.01	0.02	0.02	0.02	0.02
5.750	0.02	0.02	0.02	0.03	0.03
6.000	0.03	0.03	0.03	0.03	0.04
6.250	0.04	0.04	0.04	0.04	0.05
6.500	0.05	0.05	0.05	0.06	0.06
6.750	0.06	0.06	0.07	0.07	0.07
7.000	0.07	0.08	0.08	0.08	0.09
7.250	0.09	0.09	0.09	0.10	0.10
7.500	0.10	0.11	0.11	0.11	0.12
7.750	0.12	0.12	0.13	0.13	0.14
8.000	0.14	0.14	0.15	0.15	0.16
8.250	0.17	0.17	0.18	0.18	0.19
8.500	0.20	0.20	0.21	0.22	0.23
8.750	0.23	0.24	0.25	0.26	0.26
9.000	0.27	0.28	0.29	0.30	0.30
9.250	0.31	0.32	0.33	0.34	0.35
9.500	0.36	0.37	0.37	0.38	0.39
9.750	0.40	0.41	0.42	0.43	0.44
10.000	0.45	0.46	0.48	0.49	0.51
10.250	0.52	0.54	0.56	0.58	0.59
10.500	0.61	0.63	0.65	0.67	0.69
10.750	0.71	0.73	0.74	0.76	0.78
11.000	0.81	0.83	0.88	0.92	0.99
11.250	1.05	1.11	1.17	1.25	1.31
11.500	1.38	1.58	1.90	2.33	2.95
11.750	3.52	4.21	4.83	5.59	7.49
12.000	10.59	11.92	12.46	11.08	8.16
12.250	6.74	5.77	5.09	4.34	3.71
12.500	2.96	2.49	2.04	1.85	1.73
12.750	1.65	1.57	1.51	1.43	1.36
13.000	1.28	1.23	1.18	1.15	1.13
13.250	1.11	1.09	1.07	1.05	1.03
13.500	1.01	1.00	0.98	0.96	0.94
13.750	0.92	0.90	0.88	0.86	0.84
14.000	0.82	0.81	0.79	0.78	0.77
14.250	0.76	0.75	0.75	0.74	0.73
14.500	0.72	0.71	0.70	0.69	0.68
14.750	0.67	0.66	0.65	0.64	0.64
15.000	0.63	0.62	0.61	0.60	0.59
15.250	0.58	0.57	0.56	0.55	0.54
15.500	0.53	0.52	0.51	0.51	0.50

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
15.750	0.49	0.48	0.47	0.46	0.45
16.000	0.44	0.43	0.43	0.42	0.42
16.250	0.41	0.41	0.40	0.40	0.40
16.500	0.39	0.39	0.38	0.38	0.38
16.750	0.37	0.37	0.36	0.36	0.36
17.000	0.35	0.35	0.34	0.34	0.33
17.250	0.33	0.33	0.32	0.32	0.31
17.500	0.31	0.31	0.30	0.30	0.29
17.750	0.29	0.29	0.28	0.28	0.27
18.000	0.27	0.27	0.26	0.26	0.26
18.250	0.26	0.26	0.26	0.26	0.25
18.500	0.25	0.25	0.25	0.25	0.25
18.750	0.25	0.25	0.24	0.24	0.24
19.000	0.24	0.24	0.24	0.24	0.24
19.250	0.23	0.23	0.23	0.23	0.23
19.500	0.23	0.23	0.23	0.23	0.22
19.750	0.22	0.22	0.22	0.22	0.22
20.000	0.22	0.22	0.21	0.21	0.21
20.250	0.21	0.21	0.21	0.21	0.21
20.500	0.21	0.21	0.21	0.20	0.20
20.750	0.20	0.20	0.20	0.20	0.20
21.000	0.20	0.20	0.20	0.19	0.19
21.250	0.19	0.19	0.19	0.19	0.19
21.500	0.19	0.19	0.19	0.19	0.18
21.750	0.18	0.18	0.18	0.18	0.18
22.000	0.18	0.18	0.18	0.18	0.18
22.250	0.17	0.17	0.17	0.17	0.17
22.500	0.17	0.17	0.17	0.17	0.17
22.750	0.17	0.16	0.16	0.16	0.16
23.000	0.16	0.16	0.16	0.16	0.16
23.250	0.16	0.15	0.15	0.15	0.15
23.500	0.15	0.15	0.15	0.15	0.15
23.750	0.15	0.15	0.15	0.14	0.14
24.000	0.14	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Area-1B-Post

Return Event: 10 years
Storm Event: 10-yr



Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	20.22 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	20.19 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	3.865 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	5.5 in
Runoff Volume (Pervious)	1.763 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.762 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.79 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

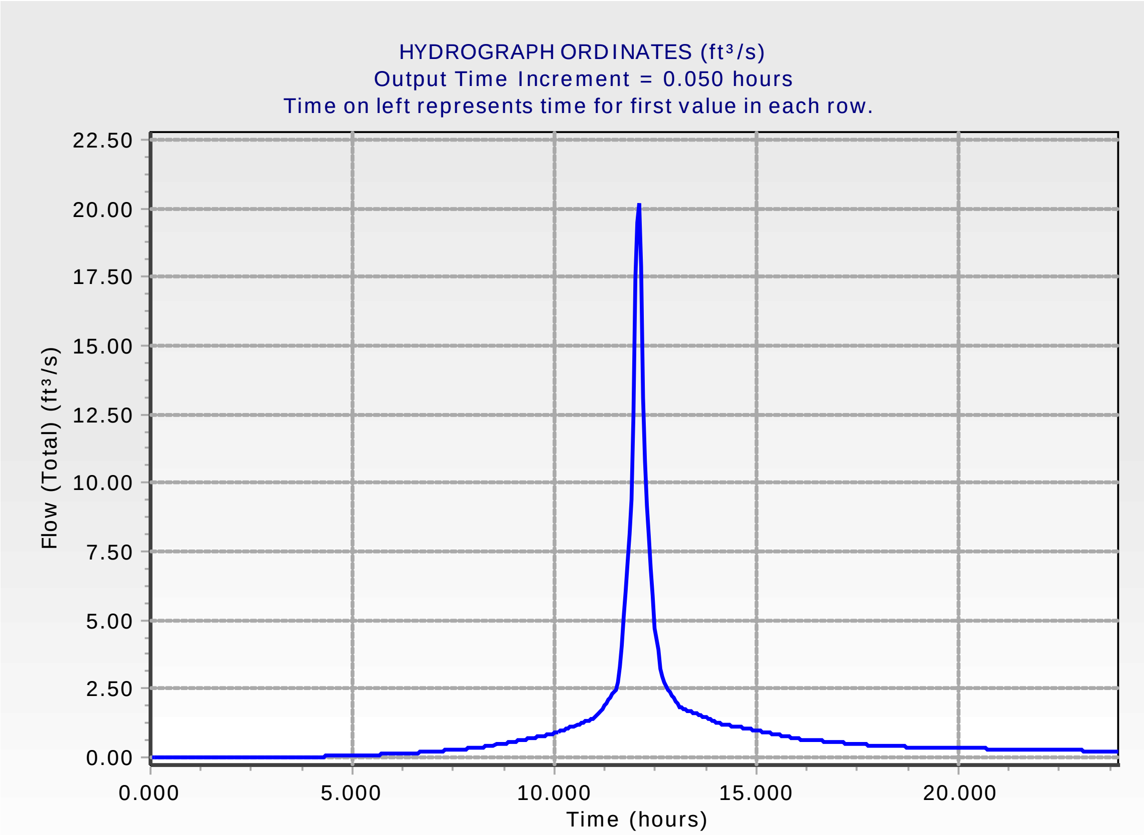
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
3.550	0.00	0.00	0.00	0.01	0.01
3.800	0.01	0.01	0.01	0.02	0.02
4.050	0.02	0.02	0.03	0.03	0.03
4.300	0.03	0.04	0.04	0.04	0.04
4.550	0.05	0.05	0.05	0.05	0.06
4.800	0.06	0.06	0.06	0.07	0.07
5.050	0.07	0.07	0.08	0.08	0.08
5.300	0.08	0.09	0.09	0.09	0.09
5.550	0.10	0.10	0.10	0.11	0.11
5.800	0.11	0.11	0.12	0.12	0.12
6.050	0.12	0.13	0.13	0.14	0.14
6.300	0.15	0.15	0.15	0.16	0.16
6.550	0.17	0.17	0.18	0.18	0.19
6.800	0.19	0.20	0.20	0.21	0.21
7.050	0.22	0.23	0.23	0.24	0.24
7.300	0.25	0.25	0.26	0.27	0.27
7.550	0.28	0.28	0.29	0.30	0.30
7.800	0.31	0.32	0.32	0.33	0.34
8.050	0.34	0.35	0.36	0.37	0.39
8.300	0.40	0.41	0.42	0.43	0.45
8.550	0.46	0.47	0.48	0.50	0.51
8.800	0.52	0.54	0.55	0.56	0.58
9.050	0.59	0.61	0.62	0.64	0.65
9.300	0.67	0.68	0.69	0.71	0.73
9.550	0.74	0.76	0.77	0.79	0.80
9.800	0.82	0.83	0.85	0.87	0.88
10.050	0.90	0.92	0.95	0.98	1.00
10.300	1.03	1.06	1.09	1.12	1.15
10.550	1.18	1.21	1.24	1.27	1.30
10.800	1.34	1.37	1.40	1.43	1.46
11.050	1.51	1.58	1.66	1.77	1.87
11.300	1.99	2.09	2.20	2.31	2.43
11.550	2.76	3.31	4.04	5.09	6.03
11.800	7.17	8.17	9.39	12.46	17.47
12.050	19.48	20.19	17.85	13.09	10.76
12.300	9.19	8.09	6.88	5.88	4.69
12.550	3.94	3.23	2.92	2.73	2.61
12.800	2.48	2.38	2.25	2.15	2.02
13.050	1.94	1.85	1.81	1.77	1.74
13.300	1.71	1.68	1.65	1.62	1.59
13.550	1.56	1.53	1.50	1.47	1.44
13.800	1.41	1.38	1.35	1.32	1.29
14.050	1.27	1.24	1.23	1.21	1.20

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
14.300	1.18	1.17	1.15	1.14	1.12
14.550	1.11	1.09	1.08	1.06	1.05
14.800	1.04	1.02	1.01	0.99	0.98
15.050	0.96	0.95	0.93	0.92	0.91
15.300	0.89	0.88	0.86	0.85	0.83
15.550	0.82	0.80	0.79	0.77	0.76
15.800	0.74	0.73	0.71	0.70	0.69
16.050	0.68	0.66	0.66	0.65	0.64
16.300	0.64	0.63	0.62	0.62	0.61
16.550	0.60	0.60	0.59	0.59	0.58
16.800	0.57	0.57	0.56	0.55	0.55
17.050	0.54	0.53	0.53	0.52	0.51
17.300	0.51	0.50	0.49	0.49	0.48
17.550	0.48	0.47	0.46	0.46	0.45
17.800	0.44	0.44	0.43	0.43	0.42
18.050	0.41	0.41	0.41	0.41	0.40
18.300	0.40	0.40	0.40	0.40	0.39
18.550	0.39	0.39	0.39	0.39	0.38
18.800	0.38	0.38	0.38	0.38	0.37
19.050	0.37	0.37	0.37	0.37	0.37
19.300	0.36	0.36	0.36	0.36	0.35
19.550	0.35	0.35	0.35	0.35	0.35
19.800	0.34	0.34	0.34	0.34	0.34
20.050	0.33	0.33	0.33	0.33	0.33
20.300	0.33	0.33	0.32	0.32	0.32
20.550	0.32	0.32	0.32	0.31	0.31
20.800	0.31	0.31	0.31	0.31	0.31
21.050	0.31	0.30	0.30	0.30	0.30
21.300	0.30	0.30	0.30	0.29	0.29
21.550	0.29	0.29	0.29	0.29	0.29
21.800	0.28	0.28	0.28	0.28	0.28
22.050	0.28	0.28	0.27	0.27	0.27
22.300	0.27	0.27	0.27	0.27	0.26
22.550	0.26	0.26	0.26	0.26	0.26
22.800	0.25	0.25	0.25	0.25	0.25
23.050	0.25	0.25	0.24	0.24	0.24
23.300	0.24	0.24	0.24	0.24	0.23
23.550	0.23	0.23	0.23	0.23	0.23
23.800	0.23	0.22	0.22	0.22	0.22


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	24.62 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	24.59 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	3.865 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	6.8 in
Runoff Volume (Pervious)	2.176 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.174 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	43.79 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

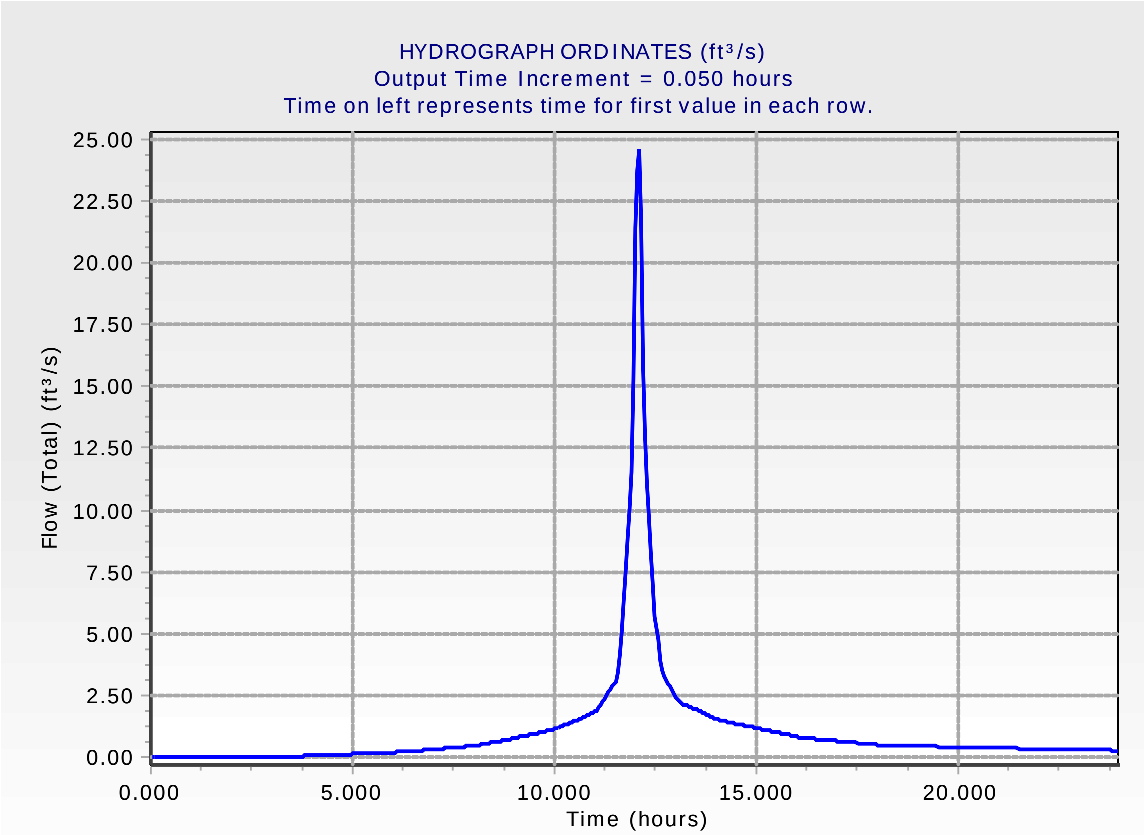
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	3.865 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
3.050	0.00	0.00	0.00	0.01	0.01
3.300	0.01	0.02	0.02	0.02	0.02
3.550	0.03	0.03	0.03	0.04	0.04
3.800	0.04	0.04	0.05	0.05	0.05
4.050	0.06	0.06	0.06	0.07	0.07
4.300	0.07	0.08	0.08	0.08	0.09
4.550	0.09	0.09	0.09	0.10	0.10
4.800	0.10	0.11	0.11	0.11	0.12
5.050	0.12	0.12	0.13	0.13	0.13
5.300	0.14	0.14	0.14	0.15	0.15
5.550	0.15	0.16	0.16	0.17	0.17
5.800	0.17	0.18	0.18	0.18	0.19
6.050	0.19	0.19	0.20	0.20	0.21
6.300	0.22	0.22	0.23	0.23	0.24
6.550	0.25	0.25	0.26	0.27	0.27
6.800	0.28	0.29	0.29	0.30	0.31
7.050	0.31	0.32	0.33	0.34	0.34
7.300	0.35	0.36	0.37	0.37	0.38
7.550	0.39	0.40	0.40	0.41	0.42
7.800	0.43	0.44	0.45	0.45	0.46
8.050	0.47	0.48	0.50	0.51	0.52
8.300	0.54	0.55	0.57	0.59	0.60
8.550	0.62	0.63	0.65	0.67	0.68
8.800	0.70	0.72	0.73	0.75	0.77
9.050	0.78	0.80	0.82	0.84	0.86
9.300	0.87	0.89	0.91	0.93	0.95
9.550	0.97	0.98	1.00	1.02	1.04
9.800	1.06	1.08	1.10	1.12	1.14
10.050	1.16	1.19	1.22	1.25	1.29
10.300	1.33	1.36	1.40	1.43	1.47
10.550	1.50	1.54	1.58	1.62	1.65
10.800	1.69	1.73	1.77	1.81	1.85
11.050	1.91	1.99	2.09	2.23	2.35
11.300	2.49	2.61	2.76	2.88	3.04
11.550	3.45	4.12	5.03	6.32	7.47
11.800	8.86	10.07	11.56	15.29	21.39
12.050	23.78	24.59	21.70	15.90	13.05
12.300	11.14	9.79	8.33	7.11	5.67
12.550	4.76	3.90	3.52	3.30	3.15
12.800	3.00	2.87	2.72	2.59	2.44
13.050	2.34	2.24	2.18	2.14	2.10
13.300	2.06	2.03	1.99	1.96	1.92
13.550	1.89	1.85	1.81	1.77	1.74

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
13.800	1.70	1.67	1.63	1.60	1.56
14.050	1.53	1.50	1.48	1.46	1.44
14.300	1.42	1.41	1.39	1.37	1.35
14.550	1.34	1.32	1.30	1.28	1.27
14.800	1.25	1.23	1.21	1.20	1.18
15.050	1.16	1.14	1.13	1.11	1.09
15.300	1.07	1.06	1.04	1.02	1.00
15.550	0.99	0.97	0.95	0.93	0.92
15.800	0.90	0.88	0.86	0.84	0.83
16.050	0.81	0.80	0.79	0.78	0.77
16.300	0.77	0.76	0.75	0.74	0.74
16.550	0.73	0.72	0.71	0.70	0.70
16.800	0.69	0.68	0.67	0.67	0.66
17.050	0.65	0.64	0.64	0.63	0.62
17.300	0.61	0.61	0.60	0.59	0.58
17.550	0.57	0.56	0.56	0.55	0.54
17.800	0.53	0.53	0.52	0.51	0.50
18.050	0.50	0.49	0.49	0.49	0.49
18.300	0.48	0.48	0.48	0.48	0.47
18.550	0.47	0.47	0.47	0.46	0.46
18.800	0.46	0.46	0.45	0.45	0.45
19.050	0.45	0.45	0.44	0.44	0.44
19.300	0.44	0.43	0.43	0.43	0.43
19.550	0.42	0.42	0.42	0.42	0.42
19.800	0.41	0.41	0.41	0.41	0.40
20.050	0.40	0.40	0.40	0.40	0.40
20.300	0.39	0.39	0.39	0.39	0.39
20.550	0.38	0.38	0.38	0.38	0.38
20.800	0.38	0.37	0.37	0.37	0.37
21.050	0.37	0.37	0.36	0.36	0.36
21.300	0.36	0.36	0.36	0.35	0.35
21.550	0.35	0.35	0.35	0.34	0.34
21.800	0.34	0.34	0.34	0.34	0.33
22.050	0.33	0.33	0.33	0.33	0.33
22.300	0.32	0.32	0.32	0.32	0.32
22.550	0.32	0.31	0.31	0.31	0.31
22.800	0.31	0.30	0.30	0.30	0.30
23.050	0.30	0.29	0.29	0.29	0.29
23.300	0.29	0.29	0.29	0.29	0.28
23.550	0.28	0.28	0.28	0.28	0.27
23.800	0.27	0.27	0.27	0.27	0.27


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	0.04 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	0.04 ft³/s

Drainage Area

SCS CN (Composite)	63.000
Area (User Defined)	0.120 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.4 in
Runoff Volume (Pervious)	0.004 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.004 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.36 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

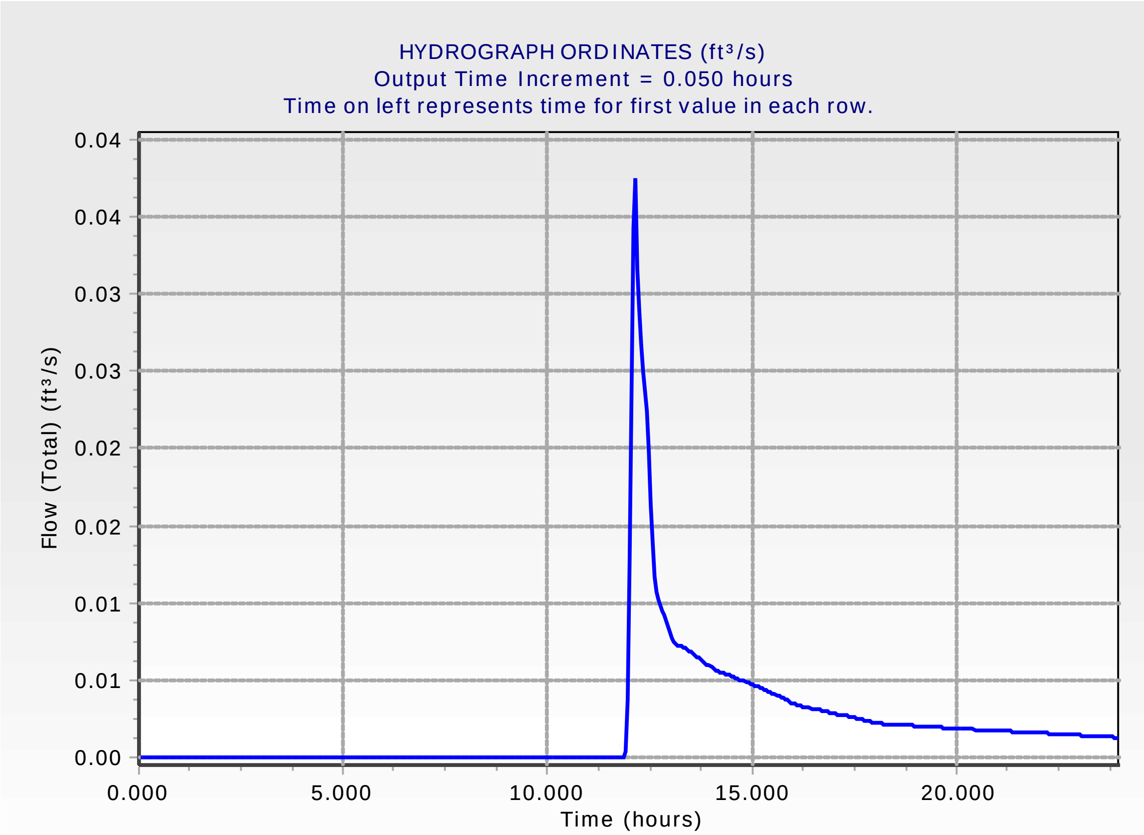
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.900	0.00	0.00	0.01	0.02	0.03
12.150	0.04	0.03	0.03	0.03	0.03
12.400	0.02	0.02	0.02	0.01	0.01
12.650	0.01	0.01	0.01	0.01	0.01
12.900	0.01	0.01	0.01	0.01	0.01
13.150	0.01	0.01	0.01	0.01	0.01
13.400	0.01	0.01	0.01	0.01	0.01
13.650	0.01	0.01	0.01	0.01	0.01
13.900	0.01	0.01	0.01	0.01	0.01
14.150	0.01	0.01	0.01	0.01	0.01
14.400	0.01	0.01	0.01	0.01	0.01
14.650	0.01	0.01	0.00	0.00	0.00
14.900	0.00	0.00	0.00	0.00	0.00
15.150	0.00	0.00	0.00	0.00	0.00
15.400	0.00	0.00	0.00	0.00	0.00
15.650	0.00	0.00	0.00	0.00	0.00
15.900	0.00	0.00	0.00	0.00	0.00
16.150	0.00	0.00	0.00	0.00	0.00
16.400	0.00	0.00	0.00	0.00	0.00
16.650	0.00	0.00	0.00	0.00	0.00
16.900	0.00	0.00	0.00	0.00	0.00
17.150	0.00	0.00	0.00	0.00	0.00
17.400	0.00	0.00	0.00	0.00	0.00
17.650	0.00	0.00	0.00	0.00	0.00
17.900	0.00	0.00	0.00	0.00	0.00
18.150	0.00	0.00	0.00	0.00	0.00
18.400	0.00	0.00	0.00	0.00	0.00
18.650	0.00	0.00	0.00	0.00	0.00
18.900	0.00	0.00	0.00	0.00	0.00
19.150	0.00	0.00	0.00	0.00	0.00
19.400	0.00	0.00	0.00	0.00	0.00
19.650	0.00	0.00	0.00	0.00	0.00
19.900	0.00	0.00	0.00	0.00	0.00
20.150	0.00	0.00	0.00	0.00	0.00
20.400	0.00	0.00	0.00	0.00	0.00
20.650	0.00	0.00	0.00	0.00	0.00
20.900	0.00	0.00	0.00	0.00	0.00
21.150	0.00	0.00	0.00	0.00	0.00
21.400	0.00	0.00	0.00	0.00	0.00
21.650	0.00	0.00	0.00	0.00	0.00
21.900	0.00	0.00	0.00	0.00	0.00
22.150	0.00	0.00	0.00	0.00	0.00
22.400	0.00	0.00	0.00	0.00	0.00

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.650	0.00	0.00	0.00	0.00	0.00
22.900	0.00	0.00	0.00	0.00	0.00
23.150	0.00	0.00	0.00	0.00	0.00
23.400	0.00	0.00	0.00	0.00	0.00
23.650	0.00	0.00	0.00	0.00	0.00
23.900	0.00	0.00	0.00	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.04
0.04
0.03
0.03
0.02
0.02
0.01
0.01
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	0.14 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.13 ft³/s

Drainage Area	
SCS CN (Composite)	63.000
Area (User Defined)	0.120 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.2 in
Runoff Volume (Pervious)	0.012 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.012 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.36 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

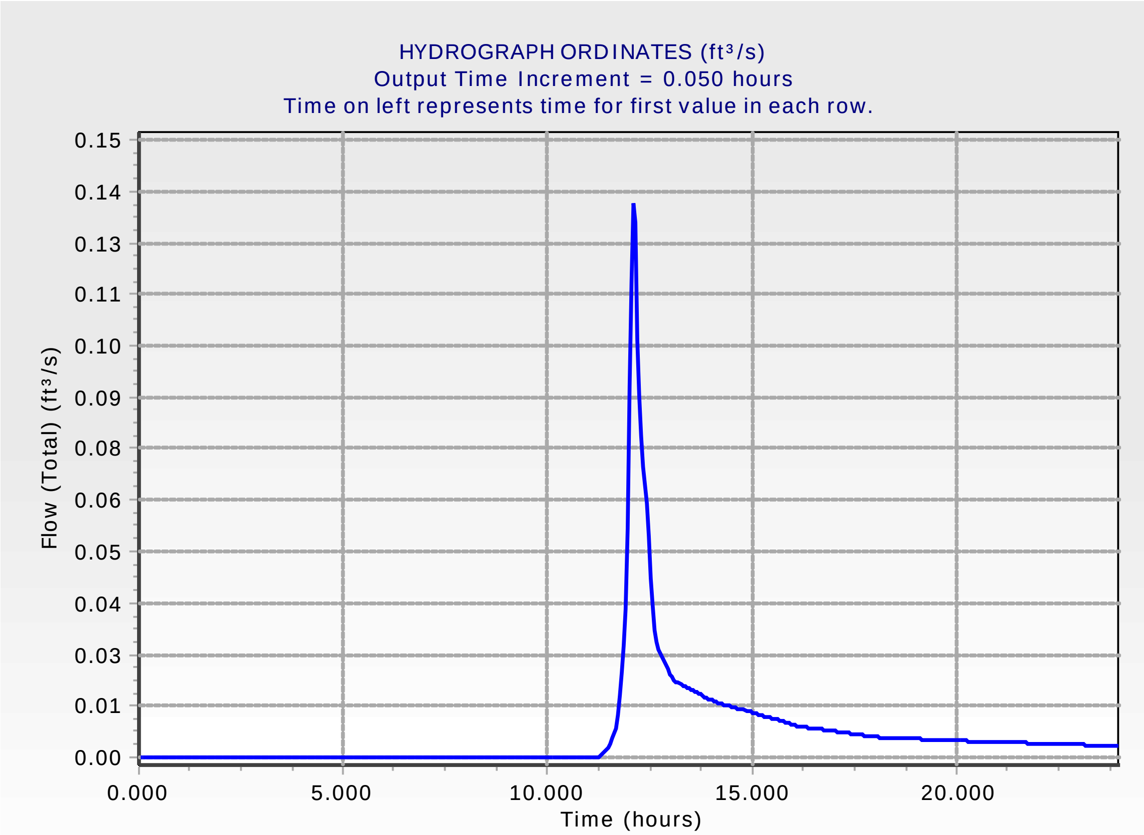
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.350	0.00	0.00	0.00	0.00	0.00
11.600	0.00	0.01	0.01	0.01	0.02
11.850	0.03	0.04	0.06	0.09	0.12
12.100	0.13	0.13	0.10	0.09	0.08
12.350	0.07	0.06	0.05	0.04	0.04
12.600	0.03	0.03	0.03	0.03	0.02
12.850	0.02	0.02	0.02	0.02	0.02
13.100	0.02	0.02	0.02	0.02	0.02
13.350	0.02	0.02	0.02	0.02	0.02
13.600	0.02	0.02	0.02	0.02	0.01
13.850	0.01	0.01	0.01	0.01	0.01
14.100	0.01	0.01	0.01	0.01	0.01
14.350	0.01	0.01	0.01	0.01	0.01
14.600	0.01	0.01	0.01	0.01	0.01
14.850	0.01	0.01	0.01	0.01	0.01
15.100	0.01	0.01	0.01	0.01	0.01
15.350	0.01	0.01	0.01	0.01	0.01
15.600	0.01	0.01	0.01	0.01	0.01
15.850	0.01	0.01	0.01	0.01	0.01
16.100	0.01	0.01	0.01	0.01	0.01
16.350	0.01	0.01	0.01	0.01	0.01
16.600	0.01	0.01	0.01	0.01	0.01
16.850	0.01	0.01	0.01	0.01	0.01
17.100	0.01	0.01	0.01	0.01	0.01
17.350	0.01	0.01	0.01	0.01	0.01
17.600	0.01	0.01	0.01	0.01	0.01
17.850	0.01	0.01	0.01	0.00	0.00
18.100	0.00	0.00	0.00	0.00	0.00
18.350	0.00	0.00	0.00	0.00	0.00
18.600	0.00	0.00	0.00	0.00	0.00
18.850	0.00	0.00	0.00	0.00	0.00
19.100	0.00	0.00	0.00	0.00	0.00
19.350	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00
19.850	0.00	0.00	0.00	0.00	0.00
20.100	0.00	0.00	0.00	0.00	0.00
20.350	0.00	0.00	0.00	0.00	0.00
20.600	0.00	0.00	0.00	0.00	0.00
20.850	0.00	0.00	0.00	0.00	0.00
21.100	0.00	0.00	0.00	0.00	0.00
21.350	0.00	0.00	0.00	0.00	0.00
21.600	0.00	0.00	0.00	0.00	0.00
21.850	0.00	0.00	0.00	0.00	0.00

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.100	0.00	0.00	0.00	0.00	0.00
22.350	0.00	0.00	0.00	0.00	0.00
22.600	0.00	0.00	0.00	0.00	0.00
22.850	0.00	0.00	0.00	0.00	0.00
23.100	0.00	0.00	0.00	0.00	0.00
23.350	0.00	0.00	0.00	0.00	0.00
23.600	0.00	0.00	0.00	0.00	0.00
23.850	0.00	0.00	0.00	0.00	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.15
0.14
0.13
0.11
0.10
0.09
0.08
0.06
0.05
0.04
0.03
0.01
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	0.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.33 ft³/s

Drainage Area

SCS CN (Composite)	63.000
Area (User Defined)	0.120 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.7 in
Runoff Volume (Pervious)	0.027 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.027 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.36 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

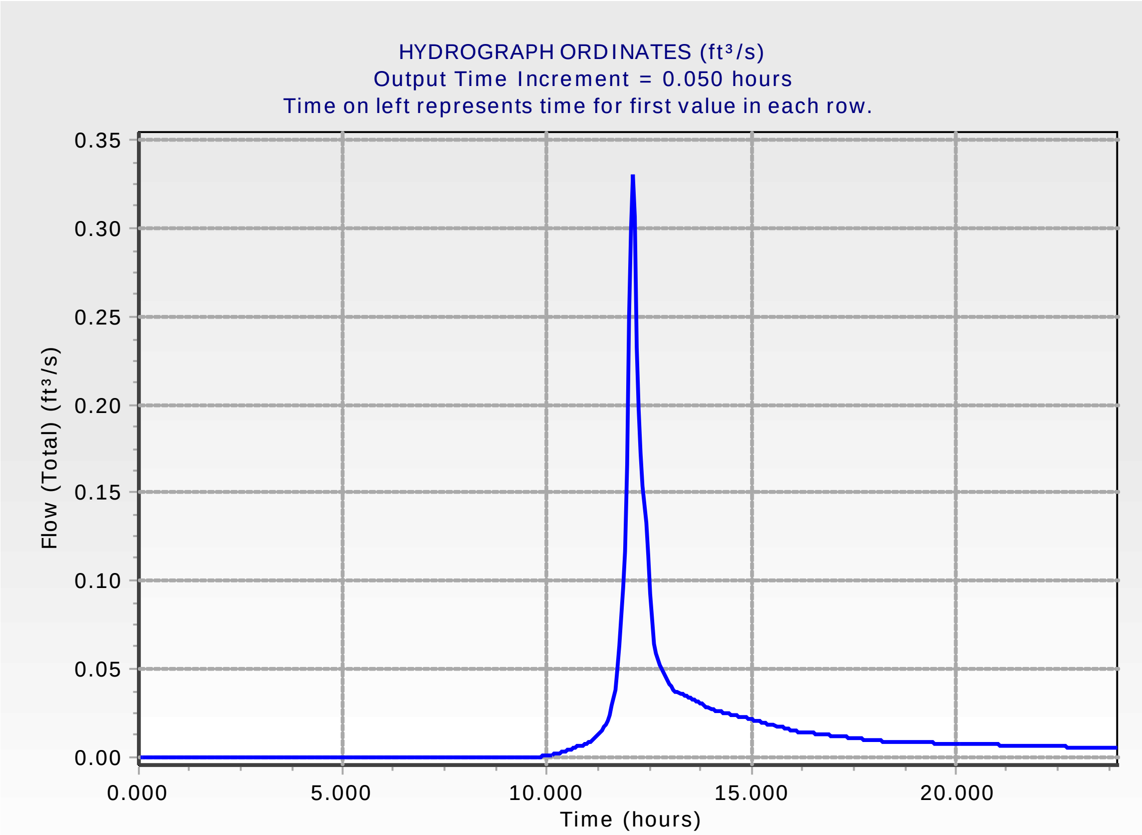
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
10.000	0.00	0.00	0.00	0.00	0.00
10.250	0.00	0.00	0.00	0.00	0.00
10.500	0.00	0.00	0.00	0.01	0.01
10.750	0.01	0.01	0.01	0.01	0.01
11.000	0.01	0.01	0.01	0.01	0.01
11.250	0.01	0.01	0.02	0.02	0.02
11.500	0.02	0.02	0.03	0.04	0.05
11.750	0.06	0.08	0.10	0.12	0.17
12.000	0.25	0.30	0.33	0.31	0.23
12.250	0.20	0.17	0.15	0.13	0.11
12.500	0.09	0.08	0.06	0.06	0.06
12.750	0.05	0.05	0.05	0.05	0.04
13.000	0.04	0.04	0.04	0.04	0.04
13.250	0.04	0.04	0.04	0.03	0.03
13.500	0.03	0.03	0.03	0.03	0.03
13.750	0.03	0.03	0.03	0.03	0.03
14.000	0.03	0.03	0.03	0.03	0.03
14.250	0.03	0.03	0.03	0.02	0.02
14.500	0.02	0.02	0.02	0.02	0.02
14.750	0.02	0.02	0.02	0.02	0.02
15.000	0.02	0.02	0.02	0.02	0.02
15.250	0.02	0.02	0.02	0.02	0.02
15.500	0.02	0.02	0.02	0.02	0.02
15.750	0.02	0.02	0.02	0.02	0.02
16.000	0.02	0.02	0.01	0.01	0.01
16.250	0.01	0.01	0.01	0.01	0.01
16.500	0.01	0.01	0.01	0.01	0.01
16.750	0.01	0.01	0.01	0.01	0.01
17.000	0.01	0.01	0.01	0.01	0.01
17.250	0.01	0.01	0.01	0.01	0.01
17.500	0.01	0.01	0.01	0.01	0.01
17.750	0.01	0.01	0.01	0.01	0.01
18.000	0.01	0.01	0.01	0.01	0.01
18.250	0.01	0.01	0.01	0.01	0.01
18.500	0.01	0.01	0.01	0.01	0.01
18.750	0.01	0.01	0.01	0.01	0.01
19.000	0.01	0.01	0.01	0.01	0.01
19.250	0.01	0.01	0.01	0.01	0.01
19.500	0.01	0.01	0.01	0.01	0.01
19.750	0.01	0.01	0.01	0.01	0.01
20.000	0.01	0.01	0.01	0.01	0.01
20.250	0.01	0.01	0.01	0.01	0.01
20.500	0.01	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.750	0.01	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01	0.01
23.250	0.01	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	0.46 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.46 ft³/s

Drainage Area

SCS CN (Composite)	63.000
Area (User Defined)	0.120 acres
Maximum Retention (Pervious)	5.9 in
Maximum Retention (Pervious, 20 percent)	1.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.7 in
Runoff Volume (Pervious)	0.037 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.037 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.36 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

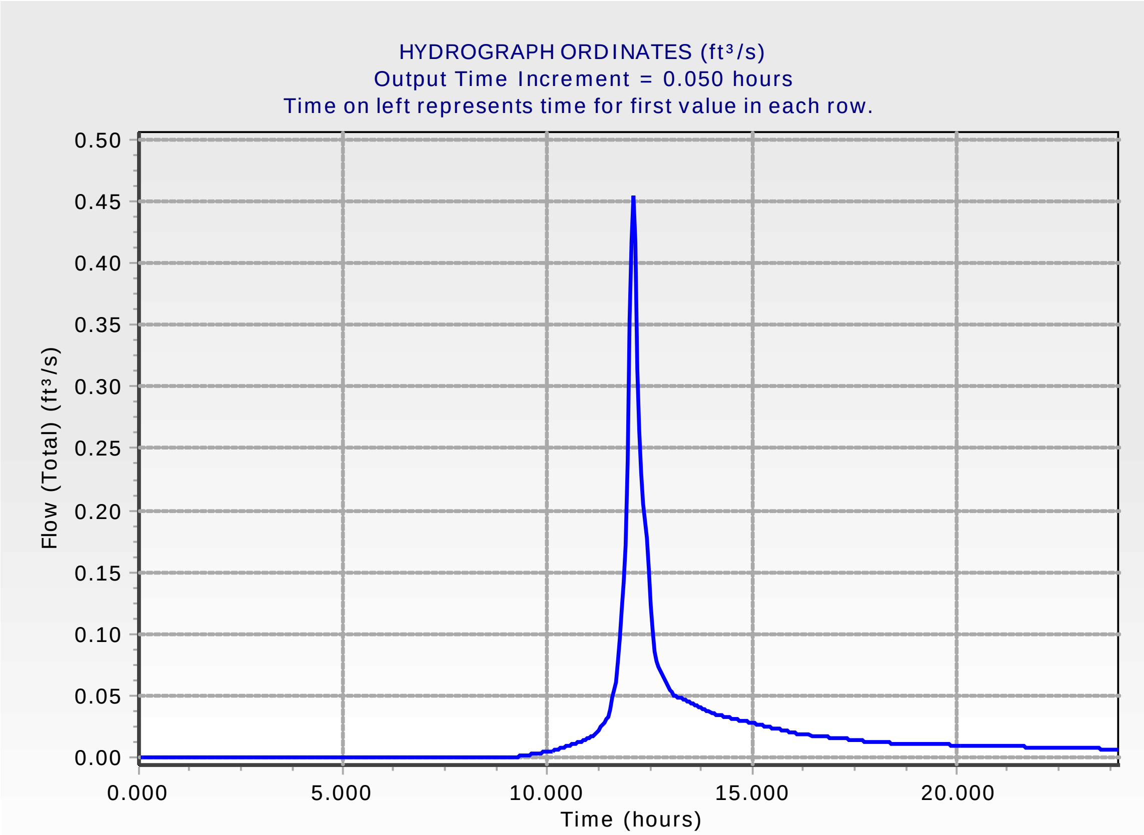
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.120 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.300	0.00	0.00	0.00	0.00	0.00
9.550	0.00	0.00	0.00	0.00	0.00
9.800	0.00	0.00	0.00	0.00	0.00
10.050	0.01	0.01	0.01	0.01	0.01
10.300	0.01	0.01	0.01	0.01	0.01
10.550	0.01	0.01	0.01	0.01	0.01
10.800	0.01	0.01	0.01	0.01	0.02
11.050	0.02	0.02	0.02	0.02	0.02
11.300	0.02	0.03	0.03	0.03	0.03
11.550	0.04	0.05	0.06	0.08	0.10
11.800	0.12	0.14	0.17	0.24	0.36
12.050	0.42	0.46	0.42	0.31	0.26
12.300	0.23	0.21	0.18	0.15	0.12
12.550	0.10	0.09	0.08	0.07	0.07
12.800	0.07	0.06	0.06	0.06	0.05
13.050	0.05	0.05	0.05	0.05	0.05
13.300	0.05	0.05	0.05	0.04	0.04
13.550	0.04	0.04	0.04	0.04	0.04
13.800	0.04	0.04	0.04	0.04	0.04
14.050	0.04	0.03	0.03	0.03	0.03
14.300	0.03	0.03	0.03	0.03	0.03
14.550	0.03	0.03	0.03	0.03	0.03
14.800	0.03	0.03	0.03	0.03	0.03
15.050	0.03	0.03	0.03	0.03	0.03
15.300	0.03	0.03	0.02	0.02	0.02
15.550	0.02	0.02	0.02	0.02	0.02
15.800	0.02	0.02	0.02	0.02	0.02
16.050	0.02	0.02	0.02	0.02	0.02
16.300	0.02	0.02	0.02	0.02	0.02
16.550	0.02	0.02	0.02	0.02	0.02
16.800	0.02	0.02	0.02	0.02	0.02
17.050	0.02	0.02	0.02	0.02	0.02
17.300	0.01	0.01	0.01	0.01	0.01
17.550	0.01	0.01	0.01	0.01	0.01
17.800	0.01	0.01	0.01	0.01	0.01
18.050	0.01	0.01	0.01	0.01	0.01
18.300	0.01	0.01	0.01	0.01	0.01
18.550	0.01	0.01	0.01	0.01	0.01
18.800	0.01	0.01	0.01	0.01	0.01
19.050	0.01	0.01	0.01	0.01	0.01
19.300	0.01	0.01	0.01	0.01	0.01
19.550	0.01	0.01	0.01	0.01	0.01
19.800	0.01	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.050	0.01	0.01	0.01	0.01	0.01
20.300	0.01	0.01	0.01	0.01	0.01
20.550	0.01	0.01	0.01	0.01	0.01
20.800	0.01	0.01	0.01	0.01	0.01
21.050	0.01	0.01	0.01	0.01	0.01
21.300	0.01	0.01	0.01	0.01	0.01
21.550	0.01	0.01	0.01	0.01	0.01
21.800	0.01	0.01	0.01	0.01	0.01
22.050	0.01	0.01	0.01	0.01	0.01
22.300	0.01	0.01	0.01	0.01	0.01
22.550	0.01	0.01	0.01	0.01	0.01
22.800	0.01	0.01	0.01	0.01	0.01
23.050	0.01	0.01	0.01	0.01	0.01
23.300	0.01	0.01	0.01	0.01	0.01
23.550	0.01	0.01	0.01	0.01	0.01
23.800	0.01	0.01	0.01	0.01	0.01


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	1.38 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	1.36 ft³/s

Drainage Area

SCS CN (Composite)	79.000
Area (User Defined)	1.152 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.2 in
Runoff Volume (Pervious)	0.113 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.113 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.05 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

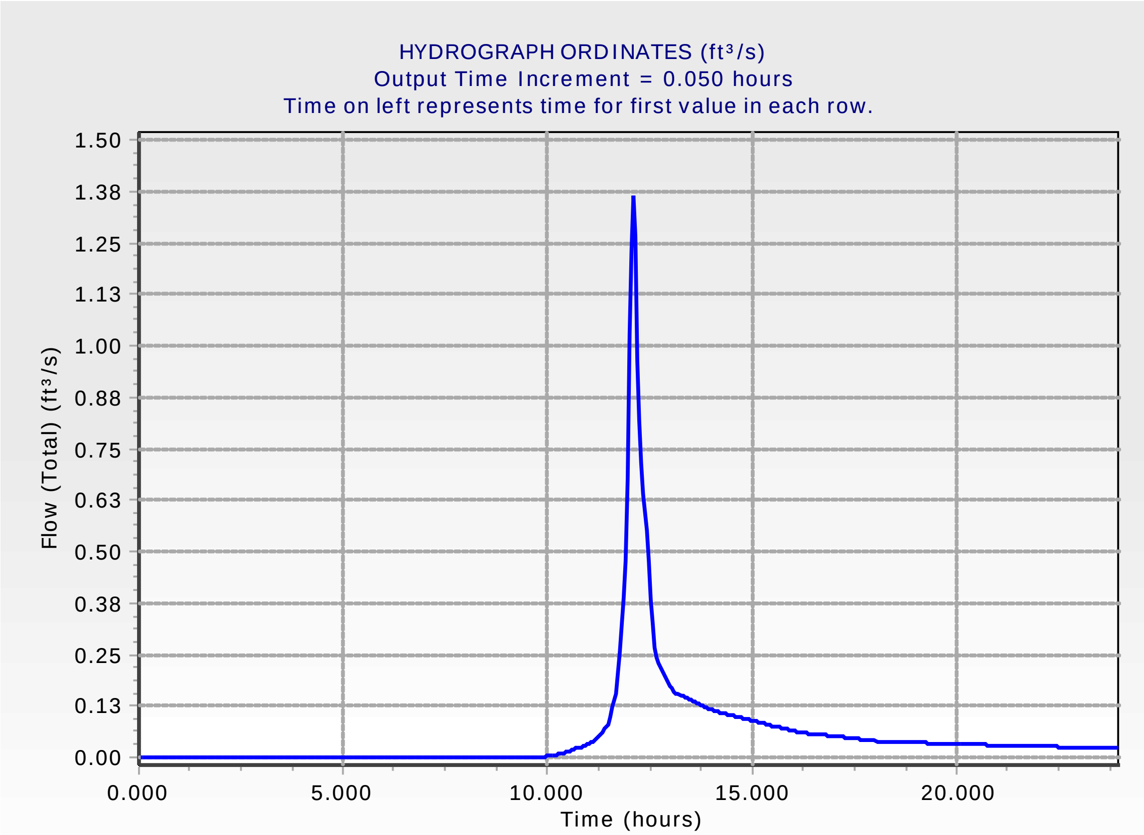
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.900	0.00	0.00	0.00	0.00	0.00
10.150	0.01	0.01	0.01	0.01	0.01
10.400	0.01	0.01	0.01	0.02	0.02
10.650	0.02	0.02	0.02	0.02	0.03
10.900	0.03	0.03	0.03	0.04	0.04
11.150	0.04	0.05	0.05	0.06	0.06
11.400	0.07	0.07	0.08	0.10	0.12
11.650	0.15	0.20	0.26	0.32	0.39
11.900	0.48	0.68	1.03	1.23	1.36
12.150	1.27	0.96	0.82	0.71	0.64
12.400	0.55	0.48	0.38	0.33	0.27
12.650	0.24	0.23	0.22	0.21	0.20
12.900	0.19	0.18	0.17	0.17	0.16
13.150	0.16	0.15	0.15	0.15	0.15
13.400	0.14	0.14	0.14	0.14	0.14
13.650	0.13	0.13	0.13	0.13	0.12
13.900	0.12	0.12	0.12	0.11	0.11
14.150	0.11	0.11	0.11	0.11	0.11
14.400	0.10	0.10	0.10	0.10	0.10
14.650	0.10	0.10	0.10	0.09	0.09
14.900	0.09	0.09	0.09	0.09	0.09
15.150	0.09	0.08	0.08	0.08	0.08
15.400	0.08	0.08	0.08	0.08	0.07
15.650	0.07	0.07	0.07	0.07	0.07
15.900	0.07	0.07	0.06	0.06	0.06
16.150	0.06	0.06	0.06	0.06	0.06
16.400	0.06	0.06	0.06	0.06	0.06
16.650	0.06	0.06	0.05	0.05	0.05
16.900	0.05	0.05	0.05	0.05	0.05
17.150	0.05	0.05	0.05	0.05	0.05
17.400	0.05	0.05	0.05	0.05	0.04
17.650	0.04	0.04	0.04	0.04	0.04
17.900	0.04	0.04	0.04	0.04	0.04
18.150	0.04	0.04	0.04	0.04	0.04
18.400	0.04	0.04	0.04	0.04	0.04
18.650	0.04	0.04	0.04	0.04	0.04
18.900	0.04	0.04	0.04	0.04	0.04
19.150	0.04	0.04	0.04	0.03	0.03
19.400	0.03	0.03	0.03	0.03	0.03
19.650	0.03	0.03	0.03	0.03	0.03
19.900	0.03	0.03	0.03	0.03	0.03
20.150	0.03	0.03	0.03	0.03	0.03
20.400	0.03	0.03	0.03	0.03	0.03

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.650	0.03	0.03	0.03	0.03	0.03
20.900	0.03	0.03	0.03	0.03	0.03
21.150	0.03	0.03	0.03	0.03	0.03
21.400	0.03	0.03	0.03	0.03	0.03
21.650	0.03	0.03	0.03	0.03	0.03
21.900	0.03	0.03	0.03	0.03	0.03
22.150	0.03	0.03	0.03	0.03	0.03
22.400	0.03	0.03	0.03	0.03	0.03
22.650	0.03	0.03	0.03	0.02	0.02
22.900	0.02	0.02	0.02	0.02	0.02
23.150	0.02	0.02	0.02	0.02	0.02
23.400	0.02	0.02	0.02	0.02	0.02
23.650	0.02	0.02	0.02	0.02	0.02
23.900	0.02	0.02	0.02	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
1.50
1.38
1.25
1.13
1.00
0.88
0.75
0.63
0.50
0.38
0.25
0.13
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	2.79 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	2.77 ft³/s

Drainage Area

SCS CN (Composite)	79.000
Area (User Defined)	1.152 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	0.227 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.226 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.05 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

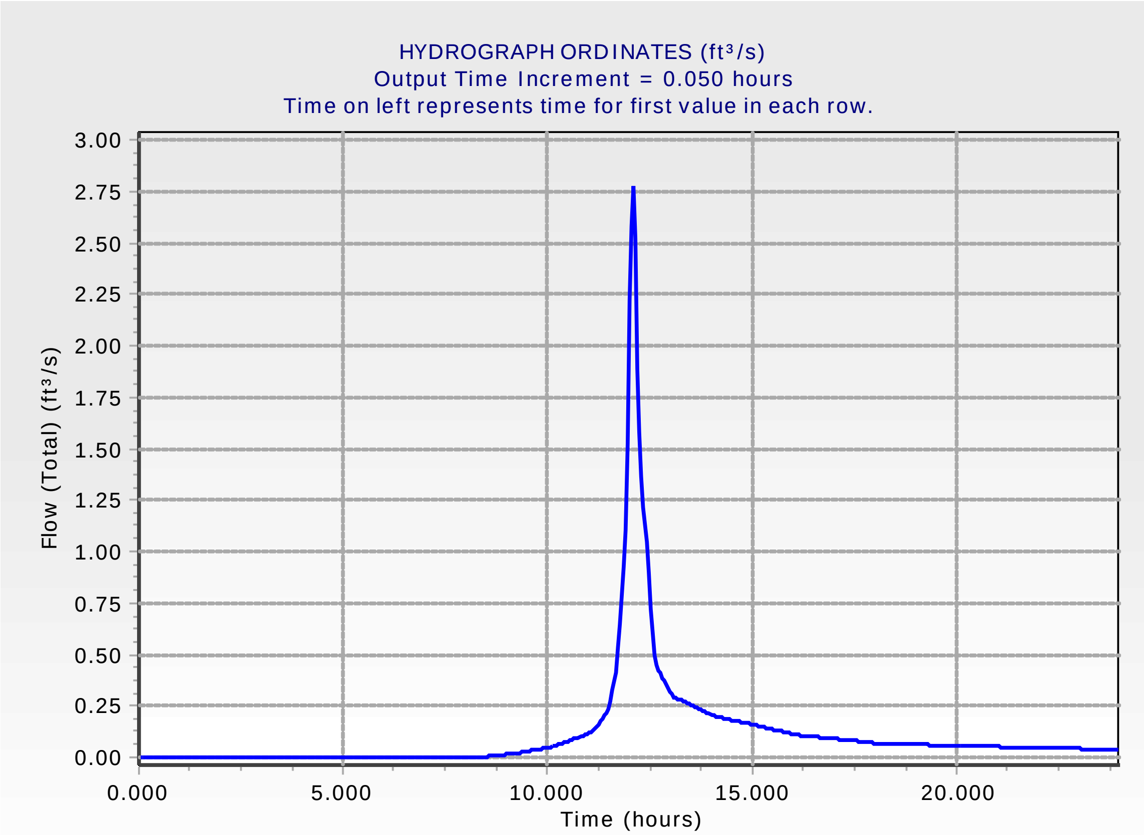
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.300	0.00	0.00	0.00	0.00	0.00
8.550	0.00	0.01	0.01	0.01	0.01
8.800	0.01	0.01	0.01	0.01	0.01
9.050	0.02	0.02	0.02	0.02	0.02
9.300	0.02	0.02	0.03	0.03	0.03
9.550	0.03	0.03	0.03	0.04	0.04
9.800	0.04	0.04	0.04	0.05	0.05
10.050	0.05	0.05	0.06	0.06	0.06
10.300	0.06	0.07	0.07	0.07	0.08
10.550	0.08	0.09	0.09	0.09	0.10
10.800	0.10	0.10	0.11	0.11	0.12
11.050	0.12	0.13	0.14	0.15	0.16
11.300	0.18	0.19	0.20	0.22	0.23
11.550	0.27	0.33	0.41	0.53	0.64
11.800	0.79	0.93	1.10	1.52	2.22
12.050	2.58	2.77	2.52	1.89	1.58
12.300	1.37	1.21	1.04	0.90	0.72
12.550	0.61	0.50	0.45	0.42	0.41
12.800	0.39	0.37	0.35	0.34	0.32
13.050	0.31	0.29	0.29	0.28	0.28
13.300	0.27	0.27	0.26	0.26	0.25
13.550	0.25	0.24	0.24	0.24	0.23
13.800	0.23	0.22	0.22	0.21	0.21
14.050	0.20	0.20	0.20	0.20	0.19
14.300	0.19	0.19	0.19	0.18	0.18
14.550	0.18	0.18	0.18	0.17	0.17
14.800	0.17	0.17	0.16	0.16	0.16
15.050	0.16	0.16	0.15	0.15	0.15
15.300	0.15	0.14	0.14	0.14	0.14
15.550	0.13	0.13	0.13	0.13	0.13
15.800	0.12	0.12	0.12	0.12	0.11
16.050	0.11	0.11	0.11	0.11	0.11
16.300	0.11	0.10	0.10	0.10	0.10
16.550	0.10	0.10	0.10	0.10	0.10
16.800	0.09	0.09	0.09	0.09	0.09
17.050	0.09	0.09	0.09	0.09	0.09
17.300	0.08	0.08	0.08	0.08	0.08
17.550	0.08	0.08	0.08	0.08	0.08
17.800	0.07	0.07	0.07	0.07	0.07
18.050	0.07	0.07	0.07	0.07	0.07
18.300	0.07	0.07	0.07	0.07	0.07
18.550	0.07	0.07	0.06	0.06	0.06
18.800	0.06	0.06	0.06	0.06	0.06

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.050	0.06	0.06	0.06	0.06	0.06
19.300	0.06	0.06	0.06	0.06	0.06
19.550	0.06	0.06	0.06	0.06	0.06
19.800	0.06	0.06	0.06	0.06	0.06
20.050	0.06	0.06	0.06	0.06	0.06
20.300	0.05	0.05	0.05	0.05	0.05
20.550	0.05	0.05	0.05	0.05	0.05
20.800	0.05	0.05	0.05	0.05	0.05
21.050	0.05	0.05	0.05	0.05	0.05
21.300	0.05	0.05	0.05	0.05	0.05
21.550	0.05	0.05	0.05	0.05	0.05
21.800	0.05	0.05	0.05	0.05	0.05
22.050	0.05	0.05	0.05	0.05	0.05
22.300	0.05	0.05	0.05	0.04	0.04
22.550	0.04	0.04	0.04	0.04	0.04
22.800	0.04	0.04	0.04	0.04	0.04
23.050	0.04	0.04	0.04	0.04	0.04
23.300	0.04	0.04	0.04	0.04	0.04
23.550	0.04	0.04	0.04	0.04	0.04
23.800	0.04	0.04	0.04	0.04	0.04


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	5.07 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	5.06 ft³/s

Drainage Area

SCS CN (Composite)	79.000
Area (User Defined)	1.152 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.4 in
Runoff Volume (Pervious)	0.419 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.419 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.05 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

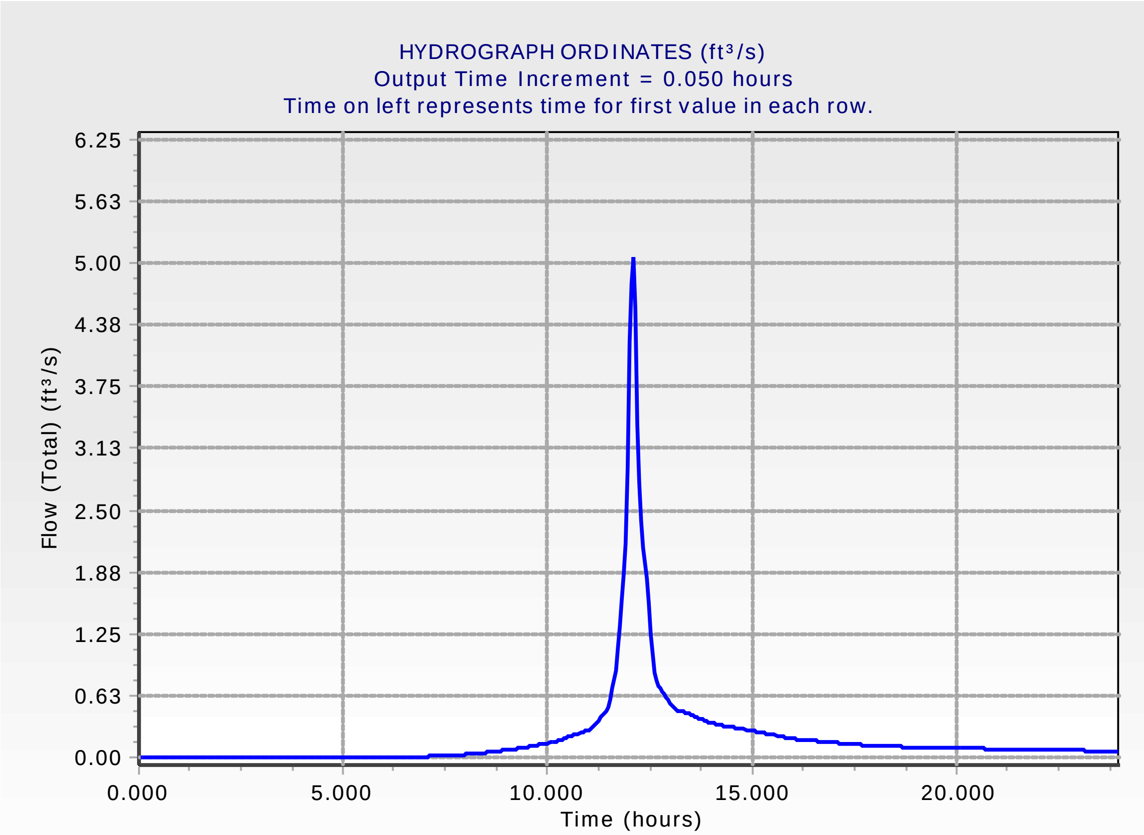
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.01	0.01	0.01
7.000	0.01	0.01	0.01	0.01	0.01
7.250	0.01	0.01	0.01	0.02	0.02
7.500	0.02	0.02	0.02	0.02	0.02
7.750	0.02	0.03	0.03	0.03	0.03
8.000	0.03	0.03	0.03	0.03	0.04
8.250	0.04	0.04	0.04	0.04	0.05
8.500	0.05	0.05	0.05	0.06	0.06
8.750	0.06	0.06	0.07	0.07	0.07
9.000	0.08	0.08	0.08	0.08	0.09
9.250	0.09	0.09	0.10	0.10	0.10
9.500	0.11	0.11	0.11	0.12	0.12
9.750	0.12	0.13	0.13	0.14	0.14
10.000	0.14	0.15	0.15	0.16	0.17
10.250	0.17	0.18	0.18	0.19	0.20
10.500	0.21	0.21	0.22	0.23	0.23
10.750	0.24	0.25	0.26	0.27	0.27
11.000	0.28	0.29	0.31	0.33	0.35
11.250	0.37	0.40	0.42	0.45	0.48
11.500	0.51	0.58	0.70	0.87	1.11
11.750	1.33	1.60	1.86	2.17	2.94
12.000	4.21	4.79	5.06	4.53	3.36
12.250	2.79	2.40	2.12	1.81	1.55
12.500	1.24	1.05	0.86	0.78	0.73
12.750	0.70	0.66	0.64	0.60	0.58
13.000	0.54	0.52	0.50	0.49	0.48
13.250	0.47	0.46	0.45	0.45	0.44
13.500	0.43	0.42	0.41	0.41	0.40
13.750	0.39	0.38	0.37	0.37	0.36
14.000	0.35	0.34	0.34	0.33	0.33
14.250	0.33	0.32	0.32	0.31	0.31
14.500	0.31	0.30	0.30	0.29	0.29
14.750	0.29	0.28	0.28	0.27	0.27
15.000	0.27	0.26	0.26	0.26	0.25
15.250	0.25	0.24	0.24	0.24	0.23
15.500	0.23	0.22	0.22	0.22	0.21
15.750	0.21	0.20	0.20	0.20	0.19
16.000	0.19	0.19	0.18	0.18	0.18
16.250	0.18	0.17	0.17	0.17	0.17
16.500	0.17	0.17	0.16	0.16	0.16
16.750	0.16	0.16	0.16	0.15	0.15
17.000	0.15	0.15	0.15	0.15	0.14

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
17.250	0.14	0.14	0.14	0.14	0.13
17.500	0.13	0.13	0.13	0.13	0.13
17.750	0.12	0.12	0.12	0.12	0.12
18.000	0.12	0.11	0.11	0.11	0.11
18.250	0.11	0.11	0.11	0.11	0.11
18.500	0.11	0.11	0.11	0.11	0.11
18.750	0.11	0.11	0.11	0.10	0.10
19.000	0.10	0.10	0.10	0.10	0.10
19.250	0.10	0.10	0.10	0.10	0.10
19.500	0.10	0.10	0.10	0.10	0.10
19.750	0.10	0.10	0.09	0.09	0.09
20.000	0.09	0.09	0.09	0.09	0.09
20.250	0.09	0.09	0.09	0.09	0.09
20.500	0.09	0.09	0.09	0.09	0.09
20.750	0.09	0.09	0.09	0.09	0.09
21.000	0.09	0.09	0.08	0.08	0.08
21.250	0.08	0.08	0.08	0.08	0.08
21.500	0.08	0.08	0.08	0.08	0.08
21.750	0.08	0.08	0.08	0.08	0.08
22.000	0.08	0.08	0.08	0.08	0.08
22.250	0.08	0.07	0.07	0.07	0.07
22.500	0.07	0.07	0.07	0.07	0.07
22.750	0.07	0.07	0.07	0.07	0.07
23.000	0.07	0.07	0.07	0.07	0.07
23.250	0.07	0.07	0.07	0.07	0.07
23.500	0.07	0.06	0.06	0.06	0.06
23.750	0.06	0.06	0.06	0.06	0.06
24.000	0.06	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	6.41 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	6.39 ft³/s

Drainage Area

SCS CN (Composite)	79.000
Area (User Defined)	1.152 acres
Maximum Retention (Pervious)	2.7 in
Maximum Retention (Pervious, 20 percent)	0.5 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	5.6 in
Runoff Volume (Pervious)	0.535 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.535 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	13.05 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

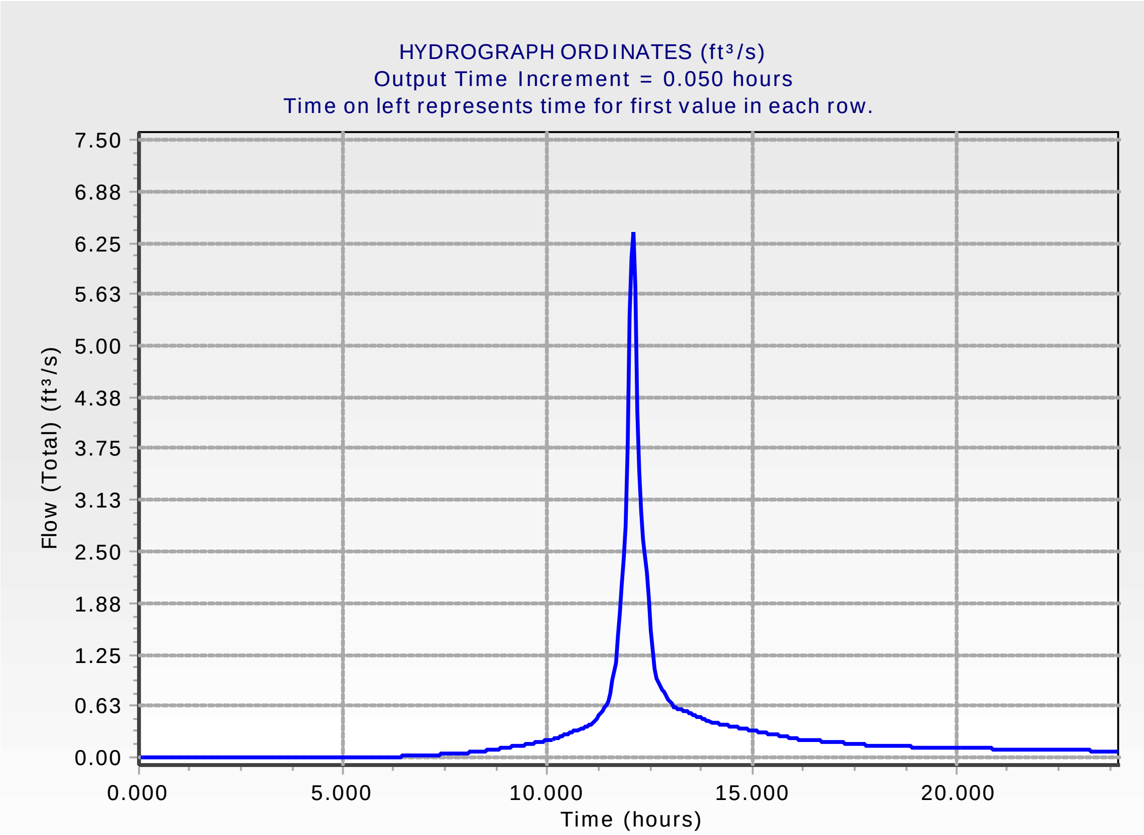
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	1.152 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.01	0.01	0.01	0.01
6.250	0.01	0.01	0.01	0.01	0.01
6.500	0.01	0.01	0.01	0.02	0.02
6.750	0.02	0.02	0.02	0.02	0.02
7.000	0.02	0.03	0.03	0.03	0.03
7.250	0.03	0.03	0.03	0.04	0.04
7.500	0.04	0.04	0.04	0.04	0.05
7.750	0.05	0.05	0.05	0.05	0.05
8.000	0.06	0.06	0.06	0.06	0.06
8.250	0.07	0.07	0.07	0.08	0.08
8.500	0.08	0.09	0.09	0.09	0.10
8.750	0.10	0.10	0.11	0.11	0.11
9.000	0.12	0.12	0.13	0.13	0.13
9.250	0.14	0.14	0.15	0.15	0.16
9.500	0.16	0.16	0.17	0.17	0.18
9.750	0.18	0.19	0.19	0.20	0.20
10.000	0.21	0.21	0.22	0.23	0.24
10.250	0.24	0.25	0.26	0.27	0.28
10.500	0.29	0.30	0.31	0.32	0.33
10.750	0.34	0.35	0.36	0.37	0.38
11.000	0.39	0.40	0.42	0.45	0.48
11.250	0.51	0.54	0.57	0.61	0.64
11.500	0.68	0.77	0.93	1.15	1.46
11.750	1.75	2.10	2.42	2.81	3.78
12.000	5.38	6.08	6.39	5.71	4.22
12.250	3.49	2.99	2.64	2.25	1.93
12.500	1.54	1.30	1.06	0.96	0.90
12.750	0.86	0.82	0.79	0.75	0.71
13.000	0.67	0.64	0.62	0.60	0.59
13.250	0.58	0.57	0.56	0.55	0.54
13.500	0.53	0.52	0.51	0.50	0.49
13.750	0.48	0.47	0.46	0.45	0.44
14.000	0.43	0.42	0.42	0.41	0.40
14.250	0.40	0.40	0.39	0.39	0.38
14.500	0.38	0.37	0.37	0.36	0.36
14.750	0.35	0.35	0.34	0.34	0.33
15.000	0.33	0.32	0.32	0.31	0.31
15.250	0.30	0.30	0.29	0.29	0.29
15.500	0.28	0.28	0.27	0.27	0.26
15.750	0.26	0.25	0.25	0.24	0.24
16.000	0.23	0.23	0.22	0.22	0.22
16.250	0.22	0.21	0.21	0.21	0.21

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
16.500	0.21	0.20	0.20	0.20	0.20
16.750	0.20	0.19	0.19	0.19	0.19
17.000	0.18	0.18	0.18	0.18	0.18
17.250	0.17	0.17	0.17	0.17	0.17
17.500	0.16	0.16	0.16	0.16	0.15
17.750	0.15	0.15	0.15	0.15	0.14
18.000	0.14	0.14	0.14	0.14	0.14
18.250	0.14	0.14	0.14	0.13	0.13
18.500	0.13	0.13	0.13	0.13	0.13
18.750	0.13	0.13	0.13	0.13	0.13
19.000	0.13	0.13	0.13	0.12	0.12
19.250	0.12	0.12	0.12	0.12	0.12
19.500	0.12	0.12	0.12	0.12	0.12
19.750	0.12	0.12	0.12	0.12	0.11
20.000	0.11	0.11	0.11	0.11	0.11
20.250	0.11	0.11	0.11	0.11	0.11
20.500	0.11	0.11	0.11	0.11	0.11
20.750	0.11	0.11	0.11	0.10	0.10
21.000	0.10	0.10	0.10	0.10	0.10
21.250	0.10	0.10	0.10	0.10	0.10
21.500	0.10	0.10	0.10	0.10	0.10
21.750	0.10	0.10	0.10	0.10	0.09
22.000	0.09	0.09	0.09	0.09	0.09
22.250	0.09	0.09	0.09	0.09	0.09
22.500	0.09	0.09	0.09	0.09	0.09
22.750	0.09	0.09	0.09	0.09	0.09
23.000	0.08	0.08	0.08	0.08	0.08
23.250	0.08	0.08	0.08	0.08	0.08
23.500	0.08	0.08	0.08	0.08	0.08
23.750	0.08	0.08	0.08	0.08	0.08
24.000	0.08	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
7.50
6.88
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	0.21 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.21 ft^3/s

Drainage Area

SCS CN (Composite)	82.000
Area (User Defined)	0.151 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.4 in
Runoff Volume (Pervious)	0.017 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.017 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.71 ft^3/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

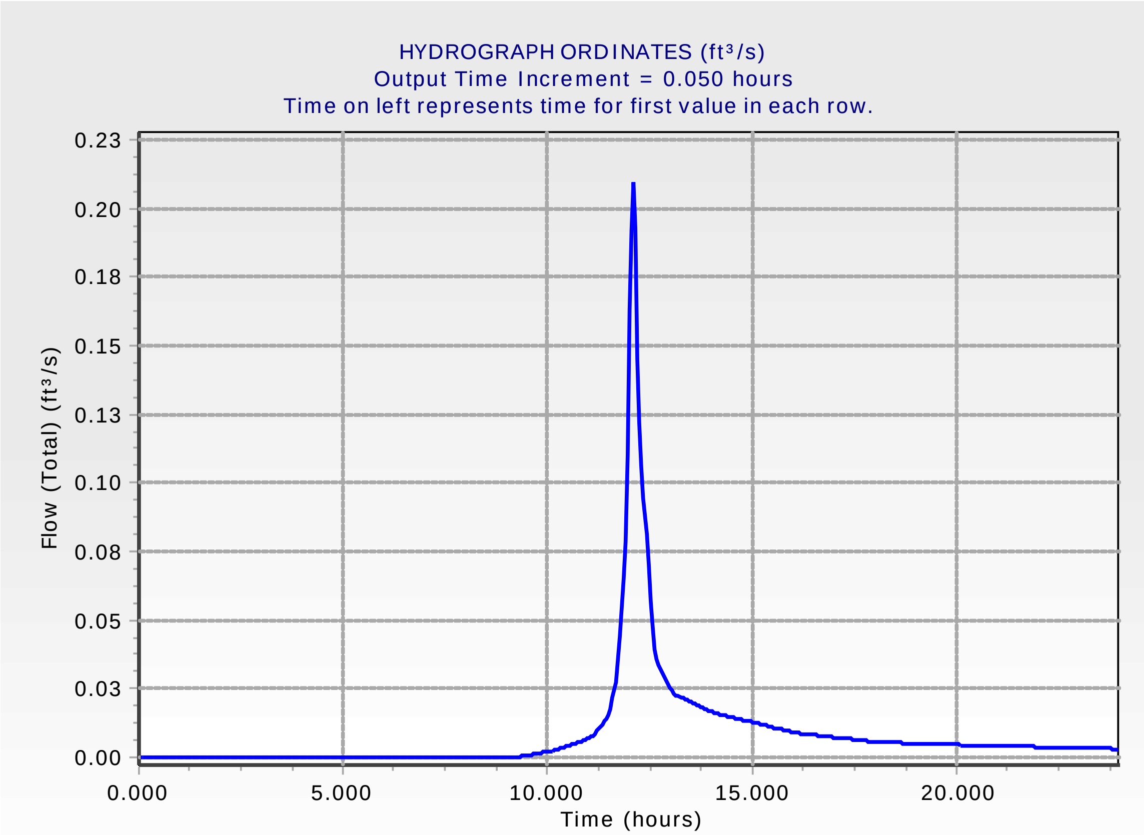
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
9.600	0.00	0.00	0.00	0.00	0.00
9.850	0.00	0.00	0.00	0.00	0.00
10.100	0.00	0.00	0.00	0.00	0.00
10.350	0.00	0.00	0.00	0.00	0.00
10.600	0.00	0.00	0.01	0.01	0.01
10.850	0.01	0.01	0.01	0.01	0.01
11.100	0.01	0.01	0.01	0.01	0.01
11.350	0.01	0.01	0.01	0.02	0.02
11.600	0.02	0.03	0.04	0.04	0.05
11.850	0.07	0.08	0.11	0.16	0.19
12.100	0.21	0.19	0.15	0.12	0.11
12.350	0.09	0.08	0.07	0.06	0.05
12.600	0.04	0.04	0.03	0.03	0.03
12.850	0.03	0.03	0.03	0.03	0.02
13.100	0.02	0.02	0.02	0.02	0.02
13.350	0.02	0.02	0.02	0.02	0.02
13.600	0.02	0.02	0.02	0.02	0.02
13.850	0.02	0.02	0.02	0.02	0.02
14.100	0.02	0.02	0.02	0.02	0.02
14.350	0.02	0.01	0.01	0.01	0.01
14.600	0.01	0.01	0.01	0.01	0.01
14.850	0.01	0.01	0.01	0.01	0.01
15.100	0.01	0.01	0.01	0.01	0.01
15.350	0.01	0.01	0.01	0.01	0.01
15.600	0.01	0.01	0.01	0.01	0.01
15.850	0.01	0.01	0.01	0.01	0.01
16.100	0.01	0.01	0.01	0.01	0.01
16.350	0.01	0.01	0.01	0.01	0.01
16.600	0.01	0.01	0.01	0.01	0.01
16.850	0.01	0.01	0.01	0.01	0.01
17.100	0.01	0.01	0.01	0.01	0.01
17.350	0.01	0.01	0.01	0.01	0.01
17.600	0.01	0.01	0.01	0.01	0.01
17.850	0.01	0.01	0.01	0.01	0.01
18.100	0.01	0.01	0.01	0.01	0.01
18.350	0.01	0.01	0.01	0.01	0.01
18.600	0.01	0.01	0.01	0.01	0.01
18.850	0.01	0.01	0.01	0.01	0.01
19.100	0.01	0.01	0.01	0.00	0.00
19.350	0.00	0.00	0.00	0.00	0.00
19.600	0.00	0.00	0.00	0.00	0.00
19.850	0.00	0.00	0.00	0.00	0.00
20.100	0.00	0.00	0.00	0.00	0.00

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.350	0.00	0.00	0.00	0.00	0.00
20.600	0.00	0.00	0.00	0.00	0.00
20.850	0.00	0.00	0.00	0.00	0.00
21.100	0.00	0.00	0.00	0.00	0.00
21.350	0.00	0.00	0.00	0.00	0.00
21.600	0.00	0.00	0.00	0.00	0.00
21.850	0.00	0.00	0.00	0.00	0.00
22.100	0.00	0.00	0.00	0.00	0.00
22.350	0.00	0.00	0.00	0.00	0.00
22.600	0.00	0.00	0.00	0.00	0.00
22.850	0.00	0.00	0.00	0.00	0.00
23.100	0.00	0.00	0.00	0.00	0.00
23.350	0.00	0.00	0.00	0.00	0.00
23.600	0.00	0.00	0.00	0.00	0.00
23.850	0.00	0.00	0.00	0.00	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.23
0.20
0.18
0.15
0.13
0.10
0.08
0.05
0.03
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	0.40 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.40 ft³/s

Drainage Area

SCS CN (Composite)	82.000
Area (User Defined)	0.151 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.6 in
Runoff Volume (Pervious)	0.033 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.033 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.71 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

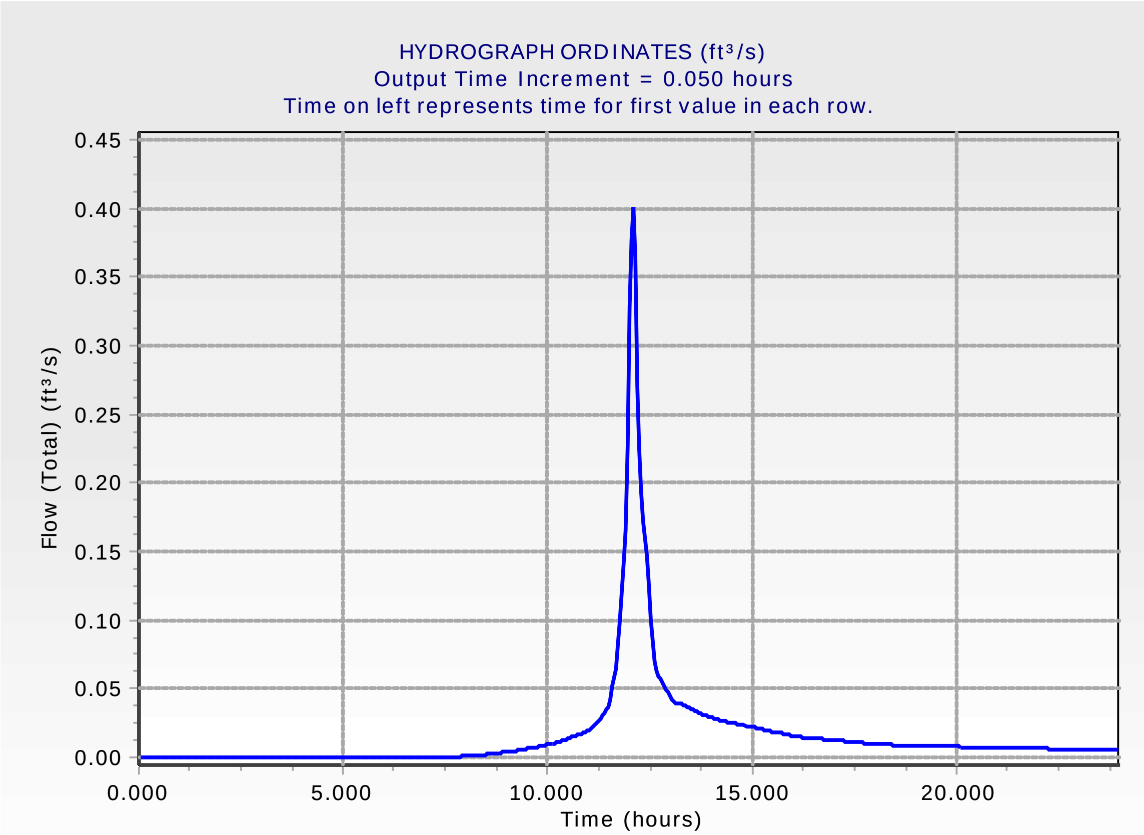
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	0.00
8.500	0.00	0.00	0.00	0.00	0.00
8.750	0.00	0.00	0.00	0.00	0.00
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.01	0.01	0.01	0.01	0.01
9.500	0.01	0.01	0.01	0.01	0.01
9.750	0.01	0.01	0.01	0.01	0.01
10.000	0.01	0.01	0.01	0.01	0.01
10.250	0.01	0.01	0.01	0.01	0.01
10.500	0.01	0.01	0.01	0.02	0.02
10.750	0.02	0.02	0.02	0.02	0.02
11.000	0.02	0.02	0.02	0.02	0.03
11.250	0.03	0.03	0.03	0.03	0.03
11.500	0.04	0.04	0.05	0.06	0.08
11.750	0.10	0.12	0.14	0.17	0.23
12.000	0.33	0.38	0.40	0.36	0.27
12.250	0.22	0.19	0.17	0.15	0.13
12.500	0.10	0.09	0.07	0.06	0.06
12.750	0.06	0.05	0.05	0.05	0.05
13.000	0.04	0.04	0.04	0.04	0.04
13.250	0.04	0.04	0.04	0.04	0.04
13.500	0.04	0.03	0.03	0.03	0.03
13.750	0.03	0.03	0.03	0.03	0.03
14.000	0.03	0.03	0.03	0.03	0.03
14.250	0.03	0.03	0.03	0.03	0.03
14.500	0.03	0.02	0.02	0.02	0.02
14.750	0.02	0.02	0.02	0.02	0.02
15.000	0.02	0.02	0.02	0.02	0.02
15.250	0.02	0.02	0.02	0.02	0.02
15.500	0.02	0.02	0.02	0.02	0.02
15.750	0.02	0.02	0.02	0.02	0.02
16.000	0.02	0.02	0.02	0.01	0.01
16.250	0.01	0.01	0.01	0.01	0.01
16.500	0.01	0.01	0.01	0.01	0.01
16.750	0.01	0.01	0.01	0.01	0.01
17.000	0.01	0.01	0.01	0.01	0.01
17.250	0.01	0.01	0.01	0.01	0.01
17.500	0.01	0.01	0.01	0.01	0.01
17.750	0.01	0.01	0.01	0.01	0.01
18.000	0.01	0.01	0.01	0.01	0.01
18.250	0.01	0.01	0.01	0.01	0.01
18.500	0.01	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.750	0.01	0.01	0.01	0.01	0.01
19.000	0.01	0.01	0.01	0.01	0.01
19.250	0.01	0.01	0.01	0.01	0.01
19.500	0.01	0.01	0.01	0.01	0.01
19.750	0.01	0.01	0.01	0.01	0.01
20.000	0.01	0.01	0.01	0.01	0.01
20.250	0.01	0.01	0.01	0.01	0.01
20.500	0.01	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01	0.01
23.250	0.01	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	0.71 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.70 ft³/s

Drainage Area

SCS CN (Composite)	82.000
Area (User Defined)	0.151 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.7 in
Runoff Volume (Pervious)	0.059 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.059 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.71 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

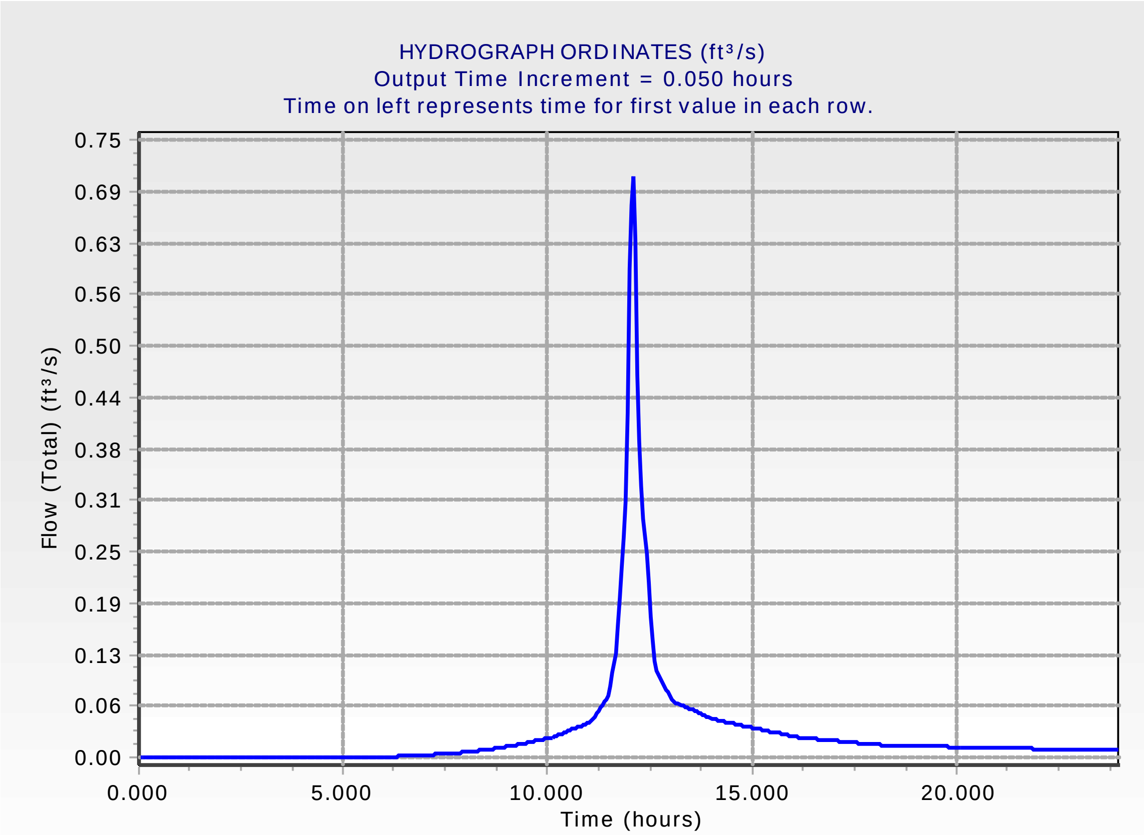
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	0.00
6.750	0.00	0.00	0.00	0.00	0.00
7.000	0.00	0.00	0.00	0.00	0.00
7.250	0.00	0.00	0.00	0.00	0.00
7.500	0.00	0.00	0.00	0.00	0.01
7.750	0.01	0.01	0.01	0.01	0.01
8.000	0.01	0.01	0.01	0.01	0.01
8.250	0.01	0.01	0.01	0.01	0.01
8.500	0.01	0.01	0.01	0.01	0.01
8.750	0.01	0.01	0.01	0.01	0.01
9.000	0.01	0.01	0.01	0.01	0.01
9.250	0.02	0.02	0.02	0.02	0.02
9.500	0.02	0.02	0.02	0.02	0.02
9.750	0.02	0.02	0.02	0.02	0.02
10.000	0.02	0.02	0.02	0.03	0.03
10.250	0.03	0.03	0.03	0.03	0.03
10.500	0.03	0.03	0.03	0.04	0.04
10.750	0.04	0.04	0.04	0.04	0.04
11.000	0.04	0.04	0.05	0.05	0.05
11.250	0.06	0.06	0.06	0.07	0.07
11.500	0.07	0.09	0.10	0.13	0.16
11.750	0.19	0.23	0.27	0.31	0.42
12.000	0.59	0.67	0.70	0.63	0.46
12.250	0.38	0.33	0.29	0.25	0.21
12.500	0.17	0.14	0.12	0.11	0.10
12.750	0.10	0.09	0.09	0.08	0.08
13.000	0.07	0.07	0.07	0.07	0.06
13.250	0.06	0.06	0.06	0.06	0.06
13.500	0.06	0.06	0.06	0.06	0.05
13.750	0.05	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05	0.04
14.250	0.04	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.03	0.03
15.250	0.03	0.03	0.03	0.03	0.03
15.500	0.03	0.03	0.03	0.03	0.03
15.750	0.03	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.02	0.02	0.02
16.250	0.02	0.02	0.02	0.02	0.02
16.500	0.02	0.02	0.02	0.02	0.02
16.750	0.02	0.02	0.02	0.02	0.02

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
17.000	0.02	0.02	0.02	0.02	0.02
17.250	0.02	0.02	0.02	0.02	0.02
17.500	0.02	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02	0.02
18.250	0.02	0.01	0.01	0.01	0.01
18.500	0.01	0.01	0.01	0.01	0.01
18.750	0.01	0.01	0.01	0.01	0.01
19.000	0.01	0.01	0.01	0.01	0.01
19.250	0.01	0.01	0.01	0.01	0.01
19.500	0.01	0.01	0.01	0.01	0.01
19.750	0.01	0.01	0.01	0.01	0.01
20.000	0.01	0.01	0.01	0.01	0.01
20.250	0.01	0.01	0.01	0.01	0.01
20.500	0.01	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01	0.01
23.250	0.01	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
0.75
0.69
0.63
0.56
0.50
0.44
0.38
0.31
0.25
0.19
0.13
0.06
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

Computational Time Increment	0.013 hours
Time to Peak (Computed)	12.107 hours
Flow (Peak, Computed)	0.88 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	0.88 ft³/s

Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.151 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.9 in
Runoff Volume (Pervious)	0.075 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.074 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.100 hours
Computational Time Increment	0.013 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.71 ft³/s
Unit peak time, Tp	0.067 hours
Unit receding limb, Tr	0.267 hours
Total unit time, Tb	0.333 hours

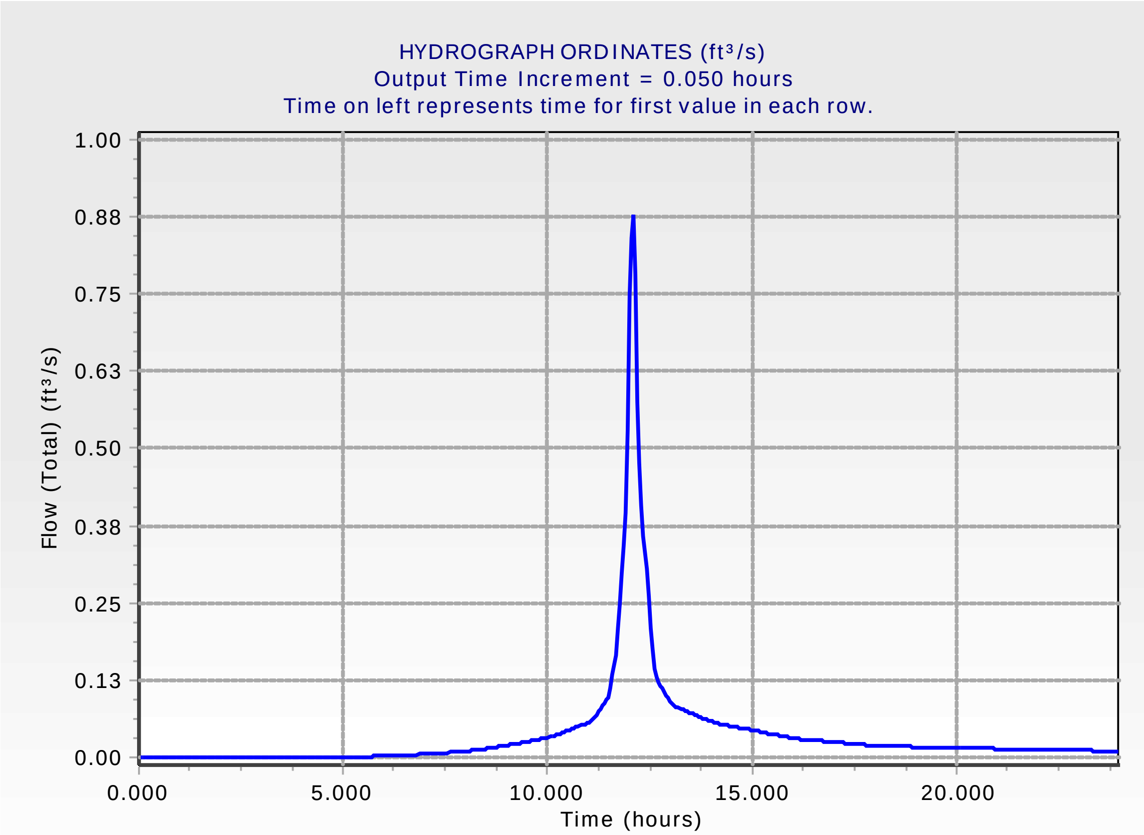
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.100 hours
Area (User Defined)	0.151 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.450	0.00	0.00	0.00	0.00	0.00
5.700	0.00	0.00	0.00	0.00	0.00
5.950	0.00	0.00	0.00	0.00	0.00
6.200	0.00	0.00	0.00	0.00	0.00
6.450	0.00	0.00	0.00	0.00	0.00
6.700	0.00	0.00	0.00	0.00	0.00
6.950	0.01	0.01	0.01	0.01	0.01
7.200	0.01	0.01	0.01	0.01	0.01
7.450	0.01	0.01	0.01	0.01	0.01
7.700	0.01	0.01	0.01	0.01	0.01
7.950	0.01	0.01	0.01	0.01	0.01
8.200	0.01	0.01	0.01	0.01	0.01
8.450	0.01	0.01	0.01	0.02	0.02
8.700	0.02	0.02	0.02	0.02	0.02
8.950	0.02	0.02	0.02	0.02	0.02
9.200	0.02	0.02	0.02	0.02	0.02
9.450	0.02	0.03	0.03	0.03	0.03
9.700	0.03	0.03	0.03	0.03	0.03
9.950	0.03	0.03	0.03	0.03	0.03
10.200	0.04	0.04	0.04	0.04	0.04
10.450	0.04	0.04	0.04	0.05	0.05
10.700	0.05	0.05	0.05	0.05	0.05
10.950	0.06	0.06	0.06	0.06	0.07
11.200	0.07	0.07	0.08	0.08	0.09
11.450	0.09	0.10	0.11	0.13	0.17
11.700	0.21	0.25	0.30	0.34	0.40
11.950	0.53	0.75	0.84	0.88	0.78
12.200	0.58	0.48	0.41	0.36	0.31
12.450	0.26	0.21	0.18	0.14	0.13
12.700	0.12	0.12	0.11	0.11	0.10
12.950	0.10	0.09	0.09	0.08	0.08
13.200	0.08	0.08	0.08	0.08	0.07
13.450	0.07	0.07	0.07	0.07	0.07
13.700	0.07	0.06	0.06	0.06	0.06
13.950	0.06	0.06	0.06	0.06	0.06
14.200	0.05	0.05	0.05	0.05	0.05
14.450	0.05	0.05	0.05	0.05	0.05
14.700	0.05	0.05	0.05	0.05	0.05
14.950	0.04	0.04	0.04	0.04	0.04
15.200	0.04	0.04	0.04	0.04	0.04
15.450	0.04	0.04	0.04	0.04	0.04
15.700	0.03	0.03	0.03	0.03	0.03
15.950	0.03	0.03	0.03	0.03	0.03

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
16.200	0.03	0.03	0.03	0.03	0.03
16.450	0.03	0.03	0.03	0.03	0.03
16.700	0.03	0.03	0.03	0.03	0.03
16.950	0.03	0.02	0.02	0.02	0.02
17.200	0.02	0.02	0.02	0.02	0.02
17.450	0.02	0.02	0.02	0.02	0.02
17.700	0.02	0.02	0.02	0.02	0.02
17.950	0.02	0.02	0.02	0.02	0.02
18.200	0.02	0.02	0.02	0.02	0.02
18.450	0.02	0.02	0.02	0.02	0.02
18.700	0.02	0.02	0.02	0.02	0.02
18.950	0.02	0.02	0.02	0.02	0.02
19.200	0.02	0.02	0.02	0.02	0.02
19.450	0.02	0.02	0.02	0.02	0.02
19.700	0.02	0.02	0.02	0.02	0.02
19.950	0.02	0.02	0.02	0.02	0.02
20.200	0.02	0.01	0.01	0.01	0.01
20.450	0.01	0.01	0.01	0.01	0.01
20.700	0.01	0.01	0.01	0.01	0.01
20.950	0.01	0.01	0.01	0.01	0.01
21.200	0.01	0.01	0.01	0.01	0.01
21.450	0.01	0.01	0.01	0.01	0.01
21.700	0.01	0.01	0.01	0.01	0.01
21.950	0.01	0.01	0.01	0.01	0.01
22.200	0.01	0.01	0.01	0.01	0.01
22.450	0.01	0.01	0.01	0.01	0.01
22.700	0.01	0.01	0.01	0.01	0.01
22.950	0.01	0.01	0.01	0.01	0.01
23.200	0.01	0.01	0.01	0.01	0.01
23.450	0.01	0.01	0.01	0.01	0.01
23.700	0.01	0.01	0.01	0.01	0.01
23.950	0.01	0.01	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
1.00
0.88
0.75
0.63
0.50
0.38
0.25
0.13
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

Computational Time Increment	0.024 hours
Time to Peak (Computed)	12.177 hours
Flow (Peak, Computed)	3.72 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	3.68 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	6.421 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.376 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.375 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.180 hours
Computational Time Increment	0.024 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.31 ft³/s
Unit peak time, Tp	0.120 hours
Unit receding limb, Tr	0.481 hours
Total unit time, Tb	0.602 hours

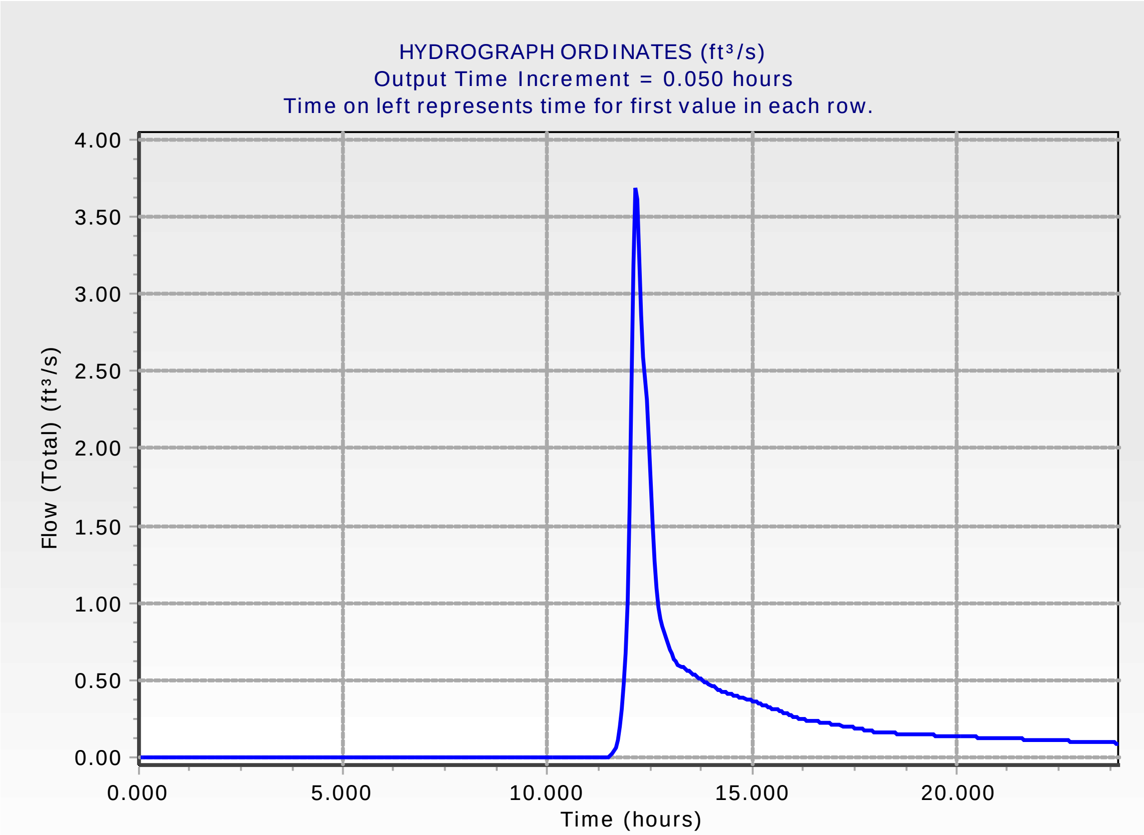
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.450	0.00	0.00	0.01	0.03	0.06
11.700	0.12	0.20	0.32	0.47	0.67
11.950	1.00	1.62	2.42	3.19	3.68
12.200	3.61	3.24	2.87	2.59	2.32
12.450	2.06	1.78	1.51	1.27	1.09
12.700	0.97	0.90	0.84	0.80	0.77
12.950	0.73	0.70	0.67	0.64	0.62
13.200	0.60	0.59	0.58	0.57	0.57
13.450	0.56	0.55	0.54	0.53	0.52
13.700	0.52	0.51	0.50	0.49	0.48
13.950	0.47	0.46	0.45	0.45	0.44
14.200	0.43	0.43	0.43	0.42	0.42
14.450	0.41	0.41	0.40	0.40	0.40
14.700	0.39	0.39	0.38	0.38	0.37
14.950	0.37	0.36	0.36	0.36	0.35
15.200	0.35	0.34	0.34	0.33	0.33
15.450	0.32	0.32	0.31	0.31	0.30
15.700	0.30	0.29	0.29	0.28	0.28
15.950	0.27	0.27	0.26	0.26	0.25
16.200	0.25	0.25	0.25	0.24	0.24
16.450	0.24	0.24	0.23	0.23	0.23
16.700	0.23	0.23	0.22	0.22	0.22
16.950	0.22	0.21	0.21	0.21	0.21
17.200	0.21	0.20	0.20	0.20	0.20
17.450	0.19	0.19	0.19	0.19	0.18
17.700	0.18	0.18	0.18	0.17	0.17
17.950	0.17	0.17	0.17	0.16	0.16
18.200	0.16	0.16	0.16	0.16	0.16
18.450	0.16	0.16	0.16	0.15	0.15
18.700	0.15	0.15	0.15	0.15	0.15
18.950	0.15	0.15	0.15	0.15	0.15
19.200	0.15	0.15	0.15	0.14	0.14
19.450	0.14	0.14	0.14	0.14	0.14
19.700	0.14	0.14	0.14	0.14	0.14
19.950	0.14	0.14	0.14	0.13	0.13
20.200	0.13	0.13	0.13	0.13	0.13
20.450	0.13	0.13	0.13	0.13	0.13
20.700	0.13	0.13	0.13	0.13	0.13
20.950	0.13	0.13	0.12	0.12	0.12
21.200	0.12	0.12	0.12	0.12	0.12
21.450	0.12	0.12	0.12	0.12	0.12
21.700	0.12	0.12	0.12	0.12	0.12
21.950	0.12	0.11	0.11	0.11	0.11

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.200	0.11	0.11	0.11	0.11	0.11
22.450	0.11	0.11	0.11	0.11	0.11
22.700	0.11	0.11	0.11	0.11	0.10
22.950	0.10	0.10	0.10	0.10	0.10
23.200	0.10	0.10	0.10	0.10	0.10
23.450	0.10	0.10	0.10	0.10	0.10
23.700	0.10	0.10	0.09	0.09	0.09
23.950	0.09	0.09	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

Computational Time Increment	0.024 hours
Time to Peak (Computed)	12.153 hours
Flow (Peak, Computed)	9.71 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	9.69 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	6.421 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	0.888 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.886 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.180 hours
Computational Time Increment	0.024 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.31 ft³/s
Unit peak time, Tp	0.120 hours
Unit receding limb, Tr	0.481 hours
Total unit time, Tb	0.602 hours

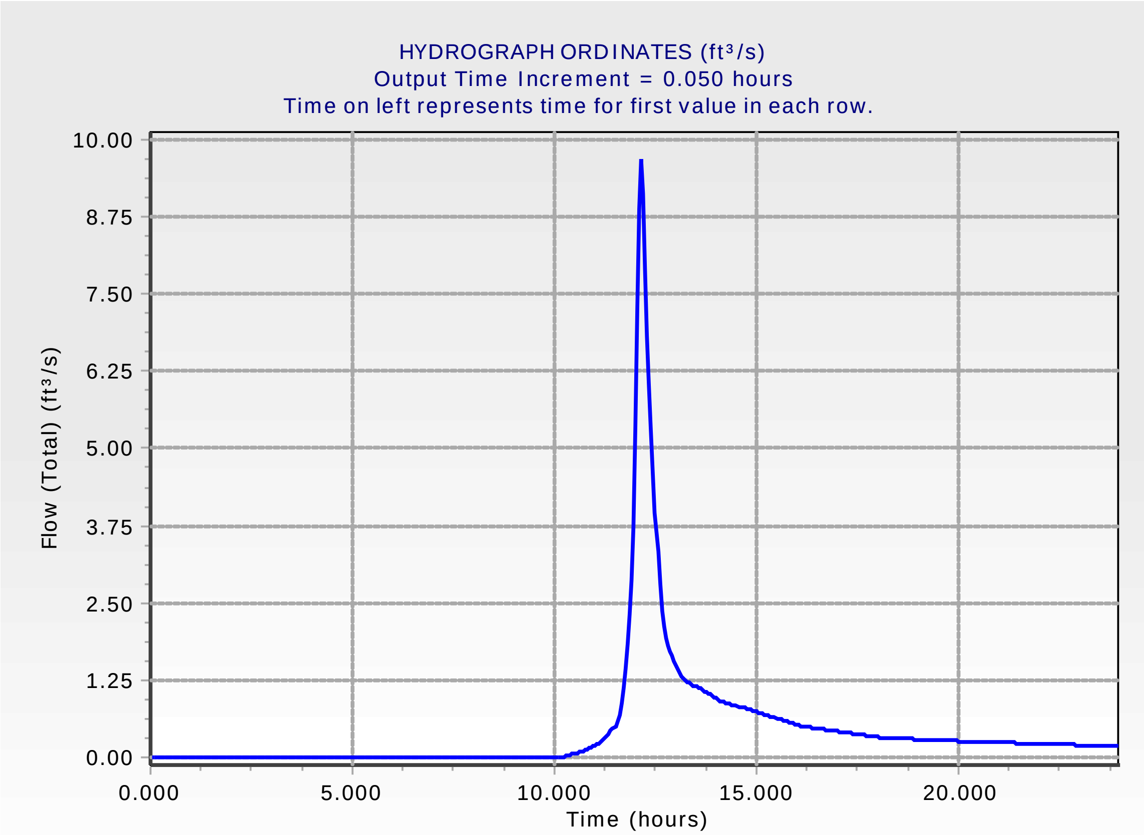
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
10.100	0.00	0.00	0.01	0.01	0.02
10.350	0.03	0.04	0.05	0.06	0.07
10.600	0.08	0.09	0.10	0.12	0.13
10.850	0.15	0.16	0.17	0.19	0.21
11.100	0.23	0.25	0.28	0.31	0.34
11.350	0.38	0.42	0.47	0.51	0.58
11.600	0.69	0.86	1.11	1.44	1.84
11.850	2.31	2.86	3.74	5.35	7.27
12.100	8.88	9.69	9.13	7.92	6.84
12.350	6.04	5.32	4.65	3.97	3.34
12.600	2.80	2.38	2.11	1.94	1.82
12.850	1.73	1.64	1.57	1.49	1.42
13.100	1.36	1.31	1.27	1.25	1.22
13.350	1.20	1.18	1.17	1.15	1.13
13.600	1.11	1.09	1.07	1.05	1.03
13.850	1.01	0.99	0.98	0.96	0.94
14.100	0.92	0.90	0.89	0.88	0.87
14.350	0.86	0.85	0.84	0.83	0.82
14.600	0.81	0.80	0.79	0.79	0.78
14.850	0.77	0.76	0.75	0.74	0.73
15.100	0.72	0.71	0.70	0.69	0.68
15.350	0.67	0.66	0.65	0.64	0.63
15.600	0.62	0.61	0.59	0.58	0.57
15.850	0.56	0.55	0.54	0.53	0.52
16.100	0.51	0.51	0.50	0.49	0.49
16.350	0.48	0.48	0.47	0.47	0.46
16.600	0.46	0.46	0.45	0.45	0.44
16.850	0.44	0.43	0.43	0.42	0.42
17.100	0.41	0.41	0.41	0.40	0.40
17.350	0.39	0.39	0.38	0.38	0.37
17.600	0.37	0.36	0.36	0.35	0.35
17.850	0.34	0.34	0.33	0.33	0.32
18.100	0.32	0.32	0.32	0.31	0.31
18.350	0.31	0.31	0.31	0.31	0.30
18.600	0.30	0.30	0.30	0.30	0.30
18.850	0.30	0.30	0.29	0.29	0.29
19.100	0.29	0.29	0.29	0.29	0.28
19.350	0.28	0.28	0.28	0.28	0.28
19.600	0.28	0.27	0.27	0.27	0.27
19.850	0.27	0.27	0.27	0.26	0.26
20.100	0.26	0.26	0.26	0.26	0.26
20.350	0.26	0.26	0.25	0.25	0.25
20.600	0.25	0.25	0.25	0.25	0.25

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.850	0.25	0.24	0.24	0.24	0.24
21.100	0.24	0.24	0.24	0.24	0.24
21.350	0.24	0.23	0.23	0.23	0.23
21.600	0.23	0.23	0.23	0.23	0.23
21.850	0.23	0.22	0.22	0.22	0.22
22.100	0.22	0.22	0.22	0.22	0.21
22.350	0.21	0.21	0.21	0.21	0.21
22.600	0.21	0.21	0.21	0.21	0.20
22.850	0.20	0.20	0.20	0.20	0.20
23.100	0.20	0.20	0.19	0.19	0.19
23.350	0.19	0.19	0.19	0.19	0.19
23.600	0.19	0.19	0.18	0.18	0.18
23.850	0.18	0.18	0.18	0.18	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
10.00
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

Computational Time Increment	0.024 hours
Time to Peak (Computed)	12.153 hours
Flow (Peak, Computed)	20.47 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	20.45 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	6.421 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.4 in
Runoff Volume (Pervious)	1.830 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.827 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.180 hours
Computational Time Increment	0.024 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.31 ft³/s
Unit peak time, Tp	0.120 hours
Unit receding limb, Tr	0.481 hours
Total unit time, Tb	0.602 hours

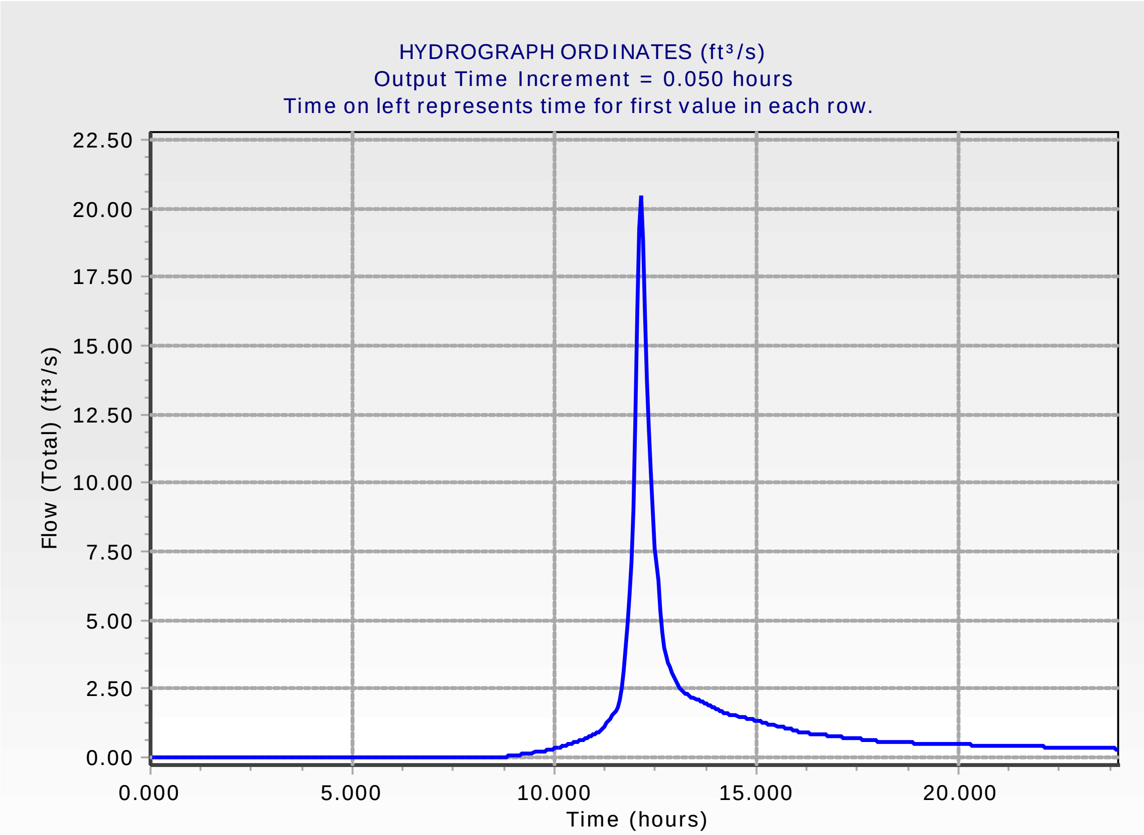
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
8.500	0.00	0.00	0.01	0.01	0.02
8.750	0.02	0.03	0.04	0.05	0.06
9.000	0.07	0.08	0.09	0.10	0.11
9.250	0.12	0.13	0.14	0.15	0.16
9.500	0.18	0.19	0.20	0.22	0.23
9.750	0.24	0.26	0.27	0.29	0.30
10.000	0.32	0.34	0.35	0.37	0.39
10.250	0.42	0.44	0.46	0.49	0.51
10.500	0.54	0.57	0.60	0.63	0.66
10.750	0.69	0.72	0.75	0.78	0.82
11.000	0.85	0.89	0.94	1.00	1.07
11.250	1.15	1.24	1.33	1.43	1.54
11.500	1.65	1.81	2.10	2.53	3.19
11.750	3.99	4.94	5.97	7.17	9.03
12.000	12.41	16.27	19.25	20.45	18.88
12.250	16.12	13.72	11.98	10.44	9.06
12.500	7.67	6.42	5.35	4.55	4.01
12.750	3.68	3.45	3.26	3.09	2.95
13.000	2.80	2.66	2.54	2.45	2.38
13.250	2.33	2.28	2.24	2.20	2.17
13.500	2.13	2.09	2.06	2.02	1.98
13.750	1.95	1.91	1.87	1.83	1.80
14.000	1.76	1.72	1.69	1.66	1.63
14.250	1.61	1.59	1.58	1.56	1.54
14.500	1.52	1.50	1.49	1.47	1.45
14.750	1.43	1.41	1.39	1.38	1.36
15.000	1.34	1.32	1.30	1.28	1.26
15.250	1.25	1.23	1.21	1.19	1.17
15.500	1.15	1.13	1.11	1.09	1.07
15.750	1.05	1.04	1.02	1.00	0.98
16.000	0.96	0.94	0.92	0.91	0.90
16.250	0.89	0.88	0.87	0.86	0.85
16.500	0.84	0.84	0.83	0.82	0.81
16.750	0.80	0.79	0.78	0.78	0.77
17.000	0.76	0.75	0.74	0.73	0.73
17.250	0.72	0.71	0.70	0.69	0.68
17.500	0.67	0.67	0.66	0.65	0.64
17.750	0.63	0.62	0.61	0.61	0.60
18.000	0.59	0.58	0.57	0.57	0.56
18.250	0.56	0.56	0.55	0.55	0.55
18.500	0.55	0.54	0.54	0.54	0.54
18.750	0.53	0.53	0.53	0.53	0.52
19.000	0.52	0.52	0.52	0.51	0.51

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.250	0.51	0.51	0.50	0.50	0.50
19.500	0.50	0.49	0.49	0.49	0.49
19.750	0.48	0.48	0.48	0.47	0.47
20.000	0.47	0.47	0.46	0.46	0.46
20.250	0.46	0.46	0.45	0.45	0.45
20.500	0.45	0.45	0.45	0.44	0.44
20.750	0.44	0.44	0.44	0.43	0.43
21.000	0.43	0.43	0.43	0.42	0.42
21.250	0.42	0.42	0.42	0.41	0.41
21.500	0.41	0.41	0.41	0.40	0.40
21.750	0.40	0.40	0.40	0.40	0.39
22.000	0.39	0.39	0.39	0.38	0.38
22.250	0.38	0.38	0.38	0.37	0.37
22.500	0.37	0.37	0.37	0.37	0.36
22.750	0.36	0.36	0.36	0.36	0.35
23.000	0.35	0.35	0.35	0.34	0.34
23.250	0.34	0.34	0.34	0.34	0.33
23.500	0.33	0.33	0.33	0.33	0.32
23.750	0.32	0.32	0.32	0.32	0.31
24.000	0.31	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

Computational Time Increment	0.024 hours
Time to Peak (Computed)	12.153 hours
Flow (Peak, Computed)	27.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	27.04 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	6.421 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	2.421 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.417 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.180 hours
Computational Time Increment	0.024 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	40.31 ft³/s
Unit peak time, Tp	0.120 hours
Unit receding limb, Tr	0.481 hours
Total unit time, Tb	0.602 hours

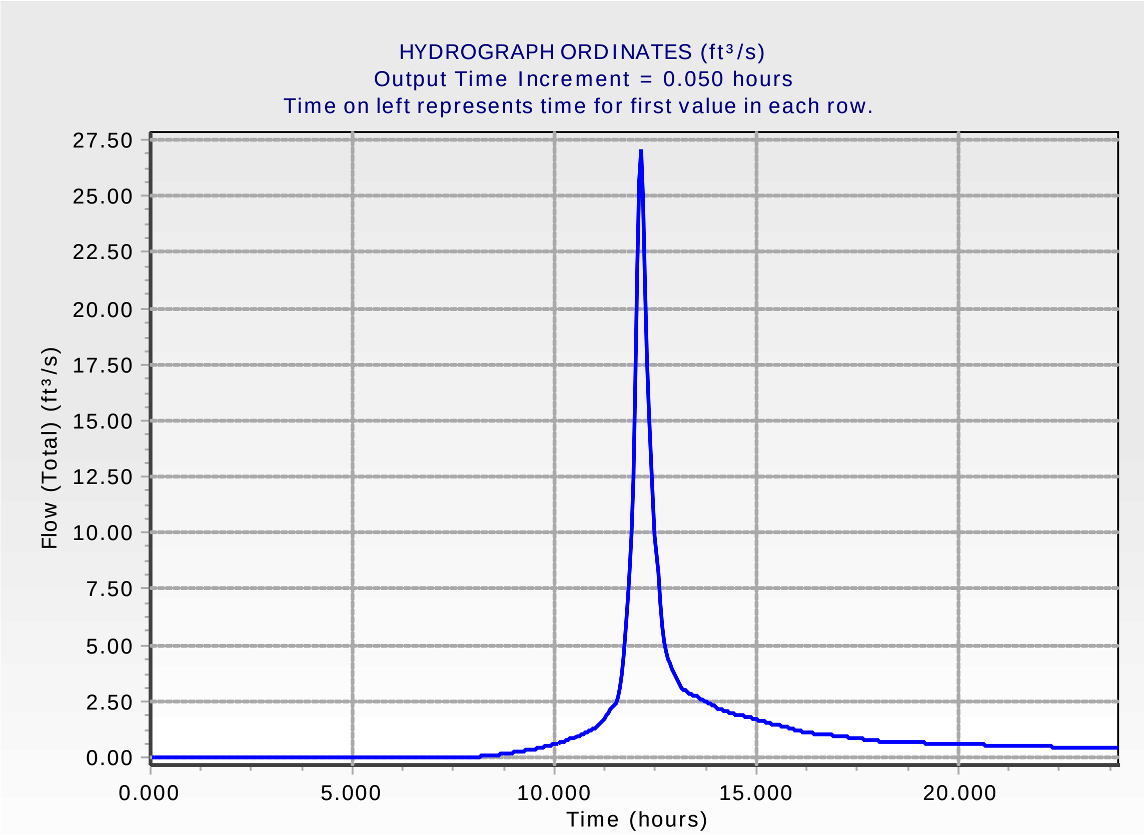
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.180 hours
Area (User Defined)	6.421 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
7.750	0.00	0.00	0.00	0.01	0.01
8.000	0.02	0.03	0.03	0.04	0.05
8.250	0.06	0.06	0.07	0.08	0.09
8.500	0.10	0.11	0.12	0.13	0.14
8.750	0.16	0.17	0.18	0.19	0.21
9.000	0.22	0.23	0.25	0.26	0.28
9.250	0.30	0.31	0.33	0.35	0.36
9.500	0.38	0.40	0.42	0.44	0.46
9.750	0.48	0.50	0.52	0.54	0.56
10.000	0.58	0.60	0.63	0.65	0.68
10.250	0.71	0.75	0.78	0.82	0.85
10.500	0.89	0.93	0.97	1.01	1.05
10.750	1.09	1.13	1.18	1.22	1.27
11.000	1.32	1.37	1.43	1.51	1.62
11.250	1.73	1.85	1.98	2.12	2.26
11.500	2.42	2.64	3.04	3.65	4.56
11.750	5.66	6.96	8.35	9.95	12.40
12.000	16.86	21.88	25.66	27.04	24.82
12.250	21.08	17.86	15.54	13.50	11.68
12.500	9.88	8.25	6.87	5.83	5.14
12.750	4.71	4.41	4.17	3.95	3.76
13.000	3.57	3.39	3.24	3.12	3.03
13.250	2.96	2.90	2.85	2.80	2.75
13.500	2.71	2.66	2.61	2.57	2.52
13.750	2.47	2.42	2.37	2.32	2.28
14.000	2.23	2.18	2.14	2.10	2.07
14.250	2.04	2.02	1.99	1.97	1.95
14.500	1.92	1.90	1.88	1.85	1.83
14.750	1.81	1.78	1.76	1.74	1.71
15.000	1.69	1.67	1.64	1.62	1.59
15.250	1.57	1.55	1.52	1.50	1.47
15.500	1.45	1.43	1.40	1.38	1.35
15.750	1.33	1.30	1.28	1.26	1.23
16.000	1.21	1.18	1.16	1.14	1.13
16.250	1.12	1.10	1.09	1.08	1.07
16.500	1.06	1.05	1.04	1.03	1.02
16.750	1.01	1.00	0.99	0.98	0.97
17.000	0.95	0.94	0.93	0.92	0.91
17.250	0.90	0.89	0.88	0.87	0.86
17.500	0.85	0.84	0.83	0.81	0.80
17.750	0.79	0.78	0.77	0.76	0.75
18.000	0.74	0.73	0.72	0.71	0.71
18.250	0.70	0.70	0.69	0.69	0.69

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.500	0.68	0.68	0.68	0.68	0.67
18.750	0.67	0.67	0.66	0.66	0.66
19.000	0.65	0.65	0.65	0.64	0.64
19.250	0.64	0.63	0.63	0.63	0.62
19.500	0.62	0.62	0.61	0.61	0.61
19.750	0.60	0.60	0.60	0.59	0.59
20.000	0.59	0.59	0.58	0.58	0.58
20.250	0.57	0.57	0.57	0.57	0.56
20.500	0.56	0.56	0.56	0.55	0.55
20.750	0.55	0.55	0.54	0.54	0.54
21.000	0.54	0.54	0.53	0.53	0.53
21.250	0.53	0.52	0.52	0.52	0.52
21.500	0.51	0.51	0.51	0.51	0.50
21.750	0.50	0.50	0.50	0.49	0.49
22.000	0.49	0.49	0.48	0.48	0.48
22.250	0.48	0.47	0.47	0.47	0.47
22.500	0.46	0.46	0.46	0.46	0.46
22.750	0.45	0.45	0.45	0.44	0.44
23.000	0.44	0.44	0.43	0.43	0.43
23.250	0.43	0.42	0.42	0.42	0.42
23.500	0.42	0.41	0.41	0.41	0.40
23.750	0.40	0.40	0.40	0.39	0.39
24.000	0.39	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
27.50
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

Computational Time Increment	0.042 hours
Time to Peak (Computed)	12.280 hours
Flow (Peak, Computed)	8.65 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	8.58 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	17.926 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	1.050 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.045 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.315 hours
Computational Time Increment	0.042 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	64.40 ft³/s
Unit peak time, Tp	0.210 hours
Unit receding limb, Tr	0.841 hours
Total unit time, Tb	1.051 hours

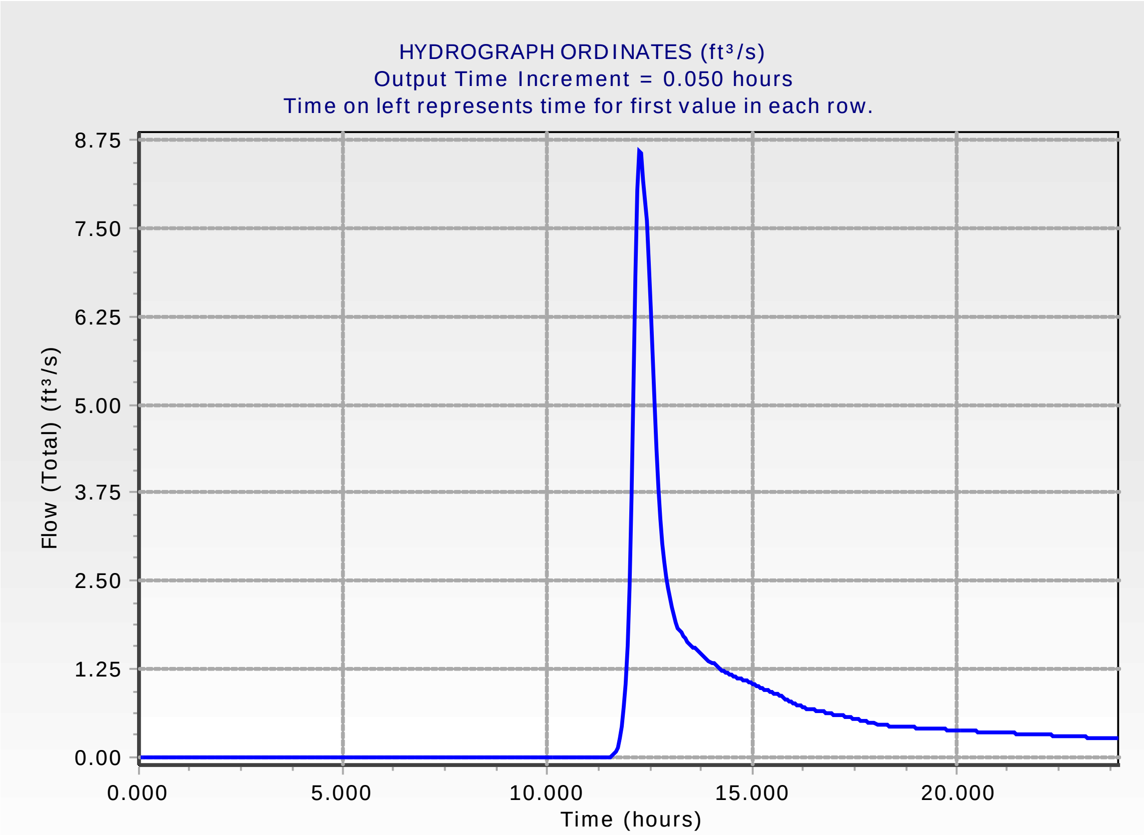
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.450	0.00	0.00	0.01	0.03	0.07
11.700	0.15	0.27	0.45	0.70	1.05
11.950	1.58	2.43	3.68	5.24	6.83
12.200	8.05	8.58	8.55	8.17	7.61
12.450	7.00	6.37	5.69	5.01	4.37
12.700	3.81	3.38	3.04	2.77	2.57
12.950	2.39	2.25	2.12	2.01	1.92
13.200	1.84	1.77	1.72	1.68	1.65
13.450	1.62	1.59	1.56	1.54	1.52
13.700	1.49	1.47	1.44	1.42	1.40
13.950	1.37	1.35	1.32	1.30	1.28
14.200	1.26	1.24	1.22	1.21	1.19
14.450	1.18	1.17	1.15	1.14	1.13
14.700	1.12	1.11	1.09	1.08	1.07
14.950	1.06	1.04	1.03	1.02	1.01
15.200	0.99	0.98	0.97	0.95	0.94
15.450	0.93	0.91	0.90	0.89	0.87
15.700	0.86	0.84	0.83	0.82	0.80
15.950	0.79	0.77	0.76	0.75	0.73
16.200	0.72	0.71	0.70	0.69	0.69
16.450	0.68	0.67	0.67	0.66	0.65
16.700	0.65	0.64	0.64	0.63	0.62
16.950	0.62	0.61	0.61	0.60	0.59
17.200	0.59	0.58	0.57	0.57	0.56
17.450	0.55	0.55	0.54	0.54	0.53
17.700	0.52	0.52	0.51	0.50	0.50
17.950	0.49	0.48	0.48	0.47	0.46
18.200	0.46	0.45	0.45	0.45	0.45
18.450	0.44	0.44	0.44	0.44	0.43
18.700	0.43	0.43	0.43	0.43	0.43
18.950	0.42	0.42	0.42	0.42	0.42
19.200	0.41	0.41	0.41	0.41	0.41
19.450	0.41	0.40	0.40	0.40	0.40
19.700	0.40	0.39	0.39	0.39	0.39
19.950	0.39	0.38	0.38	0.38	0.38
20.200	0.38	0.37	0.37	0.37	0.37
20.450	0.37	0.37	0.37	0.36	0.36
20.700	0.36	0.36	0.36	0.36	0.36
20.950	0.35	0.35	0.35	0.35	0.35
21.200	0.35	0.35	0.34	0.34	0.34
21.450	0.34	0.34	0.34	0.33	0.33
21.700	0.33	0.33	0.33	0.33	0.33
21.950	0.32	0.32	0.32	0.32	0.32

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.200	0.32	0.32	0.31	0.31	0.31
22.450	0.31	0.31	0.31	0.30	0.30
22.700	0.30	0.30	0.30	0.30	0.30
22.950	0.29	0.29	0.29	0.29	0.29
23.200	0.29	0.28	0.28	0.28	0.28
23.450	0.28	0.28	0.28	0.27	0.27
23.700	0.27	0.27	0.27	0.27	0.26
23.950	0.26	0.26	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
Flow (Total) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

Computational Time Increment	0.042 hours
Time to Peak (Computed)	12.238 hours
Flow (Peak, Computed)	22.76 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	22.65 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	17.926 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	2.479 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.469 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.315 hours
Computational Time Increment	0.042 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	64.40 ft³/s
Unit peak time, Tp	0.210 hours
Unit receding limb, Tr	0.841 hours
Total unit time, Tb	1.051 hours

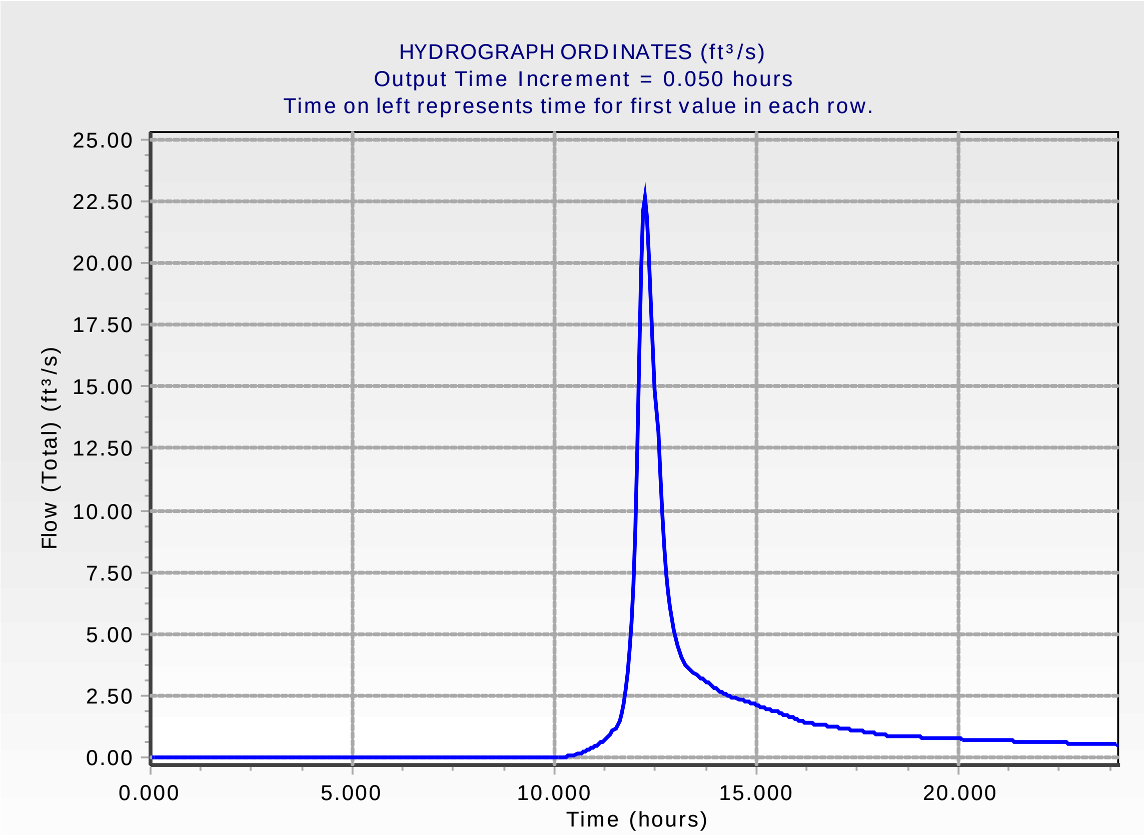
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
10.100	0.00	0.00	0.01	0.01	0.03
10.350	0.04	0.06	0.08	0.11	0.13
10.600	0.16	0.19	0.22	0.26	0.29
10.850	0.33	0.36	0.40	0.44	0.49
11.100	0.53	0.58	0.64	0.71	0.79
11.350	0.87	0.97	1.07	1.19	1.32
11.600	1.50	1.77	2.16	2.72	3.45
11.850	4.36	5.46	6.99	9.28	12.48
12.100	16.22	19.74	22.11	22.65	21.85
12.350	20.31	18.47	16.66	14.90	13.14
12.600	11.44	9.88	8.54	7.50	6.69
12.850	6.07	5.58	5.18	4.84	4.55
13.100	4.30	4.08	3.90	3.76	3.64
13.350	3.55	3.47	3.40	3.33	3.28
13.600	3.22	3.16	3.11	3.06	3.00
13.850	2.95	2.89	2.84	2.78	2.73
14.100	2.68	2.63	2.58	2.54	2.50
14.350	2.47	2.44	2.41	2.38	2.36
14.600	2.33	2.30	2.28	2.25	2.22
14.850	2.20	2.17	2.14	2.11	2.09
15.100	2.06	2.03	2.00	1.98	1.95
15.350	1.92	1.89	1.86	1.84	1.81
15.600	1.78	1.75	1.72	1.69	1.66
15.850	1.63	1.61	1.58	1.55	1.52
16.100	1.49	1.46	1.44	1.42	1.40
16.350	1.38	1.37	1.35	1.34	1.33
16.600	1.31	1.30	1.29	1.27	1.26
16.850	1.25	1.24	1.22	1.21	1.20
17.100	1.18	1.17	1.16	1.15	1.13
17.350	1.12	1.11	1.09	1.08	1.07
17.600	1.05	1.04	1.03	1.02	1.00
17.850	0.99	0.98	0.96	0.95	0.94
18.100	0.92	0.91	0.90	0.89	0.89
18.350	0.88	0.87	0.87	0.86	0.86
18.600	0.86	0.85	0.85	0.84	0.84
18.850	0.84	0.83	0.83	0.83	0.82
19.100	0.82	0.81	0.81	0.81	0.80
19.350	0.80	0.79	0.79	0.79	0.78
19.600	0.78	0.78	0.77	0.77	0.76
19.850	0.76	0.76	0.75	0.75	0.74
20.100	0.74	0.74	0.73	0.73	0.73
20.350	0.72	0.72	0.72	0.71	0.71
20.600	0.71	0.70	0.70	0.70	0.70

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.850	0.69	0.69	0.69	0.68	0.68
21.100	0.68	0.68	0.67	0.67	0.67
21.350	0.66	0.66	0.66	0.65	0.65
21.600	0.65	0.64	0.64	0.64	0.64
21.850	0.63	0.63	0.63	0.62	0.62
22.100	0.62	0.62	0.61	0.61	0.61
22.350	0.60	0.60	0.60	0.59	0.59
22.600	0.59	0.59	0.58	0.58	0.58
22.850	0.57	0.57	0.57	0.56	0.56
23.100	0.56	0.55	0.55	0.55	0.54
23.350	0.54	0.54	0.54	0.53	0.53
23.600	0.53	0.52	0.52	0.52	0.51
23.850	0.51	0.51	0.50	0.50	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

Computational Time Increment	0.042 hours
Time to Peak (Computed)	12.238 hours
Flow (Peak, Computed)	48.30 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	47.88 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	17.926 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.4 in
Runoff Volume (Pervious)	5.109 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5.091 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.315 hours
Computational Time Increment	0.042 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	64.40 ft³/s
Unit peak time, Tp	0.210 hours
Unit receding limb, Tr	0.841 hours
Total unit time, Tb	1.051 hours

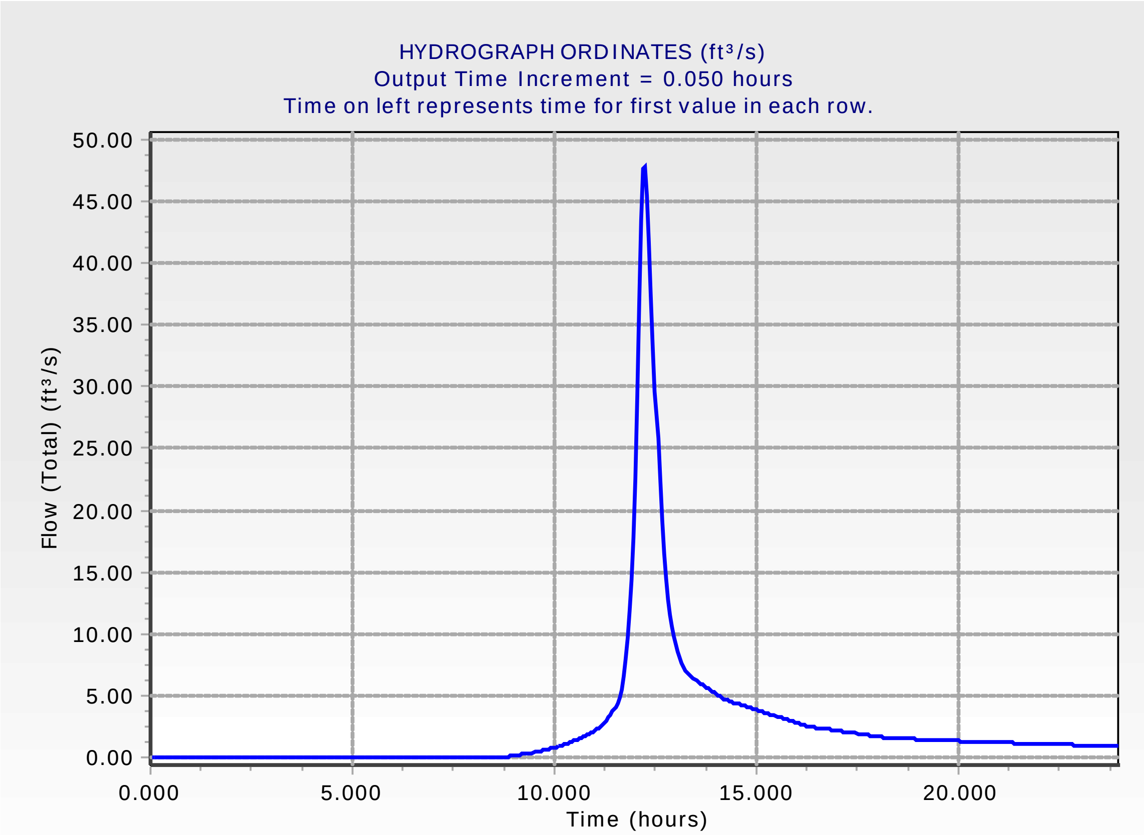
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
8.500	0.00	0.00	0.00	0.01	0.02
8.750	0.04	0.05	0.07	0.09	0.11
9.000	0.13	0.16	0.18	0.21	0.24
9.250	0.27	0.30	0.33	0.36	0.39
9.500	0.42	0.46	0.49	0.53	0.56
9.750	0.60	0.64	0.68	0.72	0.76
10.000	0.80	0.84	0.89	0.94	0.99
10.250	1.04	1.10	1.16	1.22	1.29
10.500	1.36	1.43	1.51	1.58	1.66
10.750	1.74	1.83	1.91	2.00	2.09
11.000	2.18	2.28	2.39	2.51	2.65
11.250	2.83	3.02	3.24	3.48	3.74
11.500	4.02	4.35	4.80	5.47	6.47
11.750	7.87	9.65	11.82	14.32	17.69
12.000	22.55	29.21	36.73	43.49	47.61
12.250	47.88	45.47	41.67	37.44	33.40
12.500	29.60	25.90	22.39	19.23	16.53
12.750	14.44	12.83	11.59	10.62	9.82
13.000	9.16	8.59	8.09	7.67	7.32
13.250	7.04	6.81	6.62	6.47	6.33
13.500	6.20	6.09	5.98	5.87	5.76
13.750	5.66	5.55	5.45	5.34	5.24
14.000	5.13	5.03	4.93	4.83	4.75
14.250	4.67	4.60	4.53	4.47	4.42
14.500	4.36	4.31	4.26	4.21	4.16
14.750	4.10	4.05	4.00	3.95	3.90
15.000	3.85	3.80	3.74	3.69	3.64
15.250	3.59	3.54	3.48	3.43	3.38
15.500	3.33	3.27	3.22	3.17	3.11
15.750	3.06	3.01	2.95	2.90	2.84
16.000	2.79	2.74	2.69	2.64	2.59
16.250	2.56	2.52	2.49	2.46	2.43
16.500	2.41	2.38	2.36	2.34	2.31
16.750	2.29	2.26	2.24	2.22	2.19
17.000	2.17	2.15	2.12	2.10	2.08
17.250	2.05	2.03	2.00	1.98	1.96
17.500	1.93	1.91	1.89	1.86	1.84
17.750	1.81	1.79	1.77	1.74	1.72
18.000	1.69	1.67	1.65	1.63	1.61
18.250	1.59	1.58	1.57	1.56	1.55
18.500	1.54	1.53	1.53	1.52	1.51
18.750	1.50	1.50	1.49	1.48	1.48
19.000	1.47	1.46	1.45	1.45	1.44

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.250	1.43	1.43	1.42	1.41	1.40
19.500	1.40	1.39	1.38	1.38	1.37
19.750	1.36	1.36	1.35	1.34	1.33
20.000	1.33	1.32	1.31	1.31	1.30
20.250	1.29	1.29	1.28	1.28	1.27
20.500	1.26	1.26	1.25	1.25	1.24
20.750	1.24	1.23	1.23	1.22	1.22
21.000	1.21	1.21	1.20	1.20	1.19
21.250	1.18	1.18	1.17	1.17	1.16
21.500	1.16	1.15	1.14	1.14	1.13
21.750	1.13	1.12	1.12	1.11	1.11
22.000	1.10	1.10	1.09	1.09	1.08
22.250	1.08	1.07	1.06	1.06	1.05
22.500	1.05	1.04	1.04	1.03	1.03
22.750	1.02	1.02	1.01	1.00	1.00
23.000	0.99	0.99	0.98	0.98	0.97
23.250	0.96	0.96	0.95	0.95	0.94
23.500	0.94	0.93	0.93	0.92	0.92
23.750	0.91	0.91	0.90	0.89	0.89
24.000	0.88	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

Computational Time Increment	0.042 hours
Time to Peak (Computed)	12.238 hours
Flow (Peak, Computed)	63.99 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	63.35 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	17.926 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	6.759 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	6.737 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.315 hours
Computational Time Increment	0.042 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	64.40 ft³/s
Unit peak time, Tp	0.210 hours
Unit receding limb, Tr	0.841 hours
Total unit time, Tb	1.051 hours

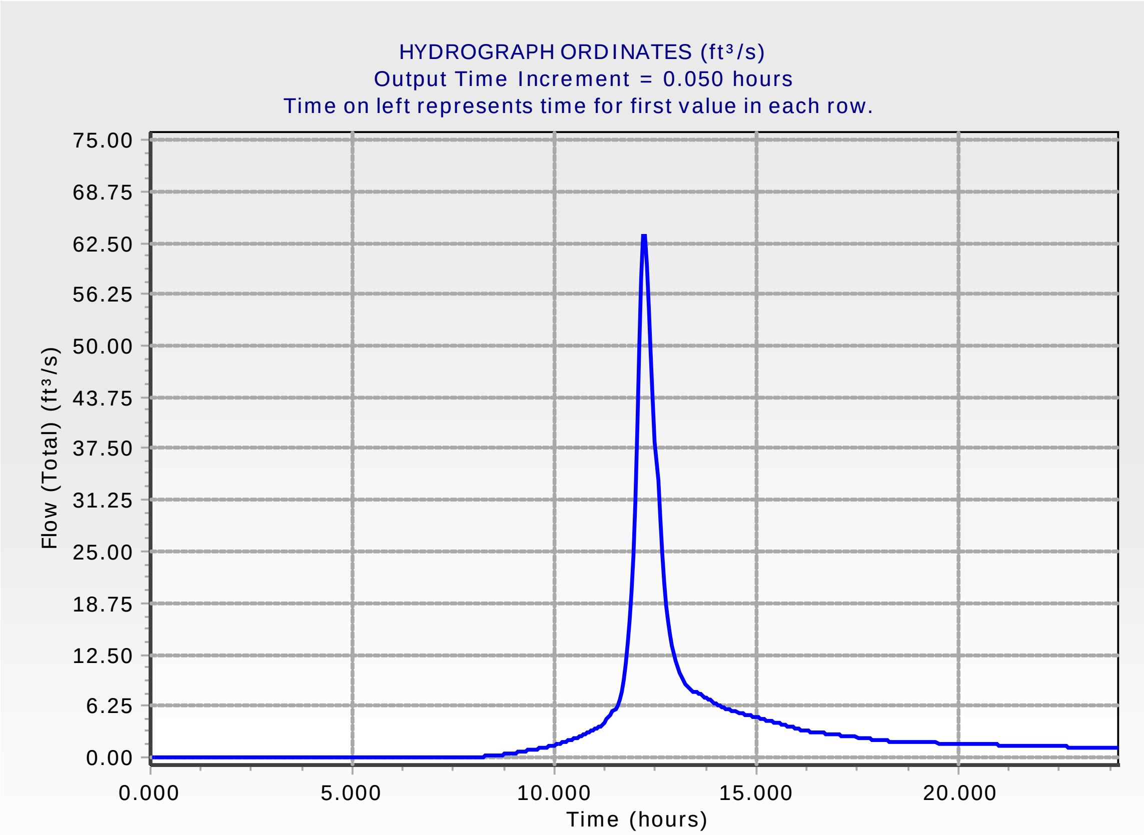
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.315 hours
Area (User Defined)	17.926 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
7.750	0.00	0.00	0.00	0.01	0.02
8.000	0.03	0.05	0.06	0.08	0.09
8.250	0.11	0.13	0.16	0.18	0.20
8.500	0.23	0.25	0.28	0.31	0.34
8.750	0.37	0.40	0.43	0.47	0.50
9.000	0.54	0.58	0.61	0.65	0.69
9.250	0.74	0.78	0.82	0.87	0.91
9.500	0.96	1.01	1.06	1.11	1.16
9.750	1.22	1.27	1.32	1.38	1.44
10.000	1.50	1.56	1.62	1.68	1.75
10.250	1.83	1.91	2.00	2.09	2.18
10.500	2.28	2.38	2.48	2.59	2.70
10.750	2.81	2.92	3.04	3.16	3.28
11.000	3.40	3.54	3.68	3.85	4.05
11.250	4.29	4.56	4.87	5.20	5.55
11.500	5.94	6.40	7.02	7.95	9.34
11.750	11.28	13.74	16.70	20.08	24.58
12.000	31.03	39.78	49.58	58.25	63.35
12.250	63.35	59.88	54.65	48.92	43.49
12.500	38.43	33.54	28.94	24.81	21.28
12.750	18.57	16.47	14.86	13.60	12.56
13.000	11.70	10.97	10.33	9.79	9.33
13.250	8.96	8.67	8.43	8.23	8.05
13.500	7.89	7.74	7.60	7.46	7.32
13.750	7.18	7.05	6.91	6.78	6.64
14.000	6.51	6.37	6.25	6.12	6.01
14.250	5.91	5.82	5.74	5.66	5.59
14.500	5.52	5.45	5.38	5.32	5.25
14.750	5.19	5.12	5.06	4.99	4.92
15.000	4.86	4.79	4.73	4.66	4.59
15.250	4.53	4.46	4.39	4.33	4.26
15.500	4.19	4.12	4.06	3.99	3.92
15.750	3.85	3.79	3.72	3.65	3.58
16.000	3.51	3.45	3.38	3.32	3.27
16.250	3.22	3.17	3.13	3.10	3.06
16.500	3.03	3.00	2.97	2.94	2.91
16.750	2.88	2.85	2.82	2.79	2.76
17.000	2.73	2.70	2.67	2.64	2.61
17.250	2.58	2.55	2.52	2.49	2.46
17.500	2.43	2.40	2.37	2.34	2.31
17.750	2.28	2.25	2.22	2.19	2.16
18.000	2.13	2.10	2.07	2.04	2.02
18.250	2.00	1.98	1.97	1.95	1.94

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.500	1.93	1.92	1.91	1.90	1.90
18.750	1.89	1.88	1.87	1.86	1.85
19.000	1.84	1.83	1.82	1.81	1.81
19.250	1.80	1.79	1.78	1.77	1.76
19.500	1.75	1.74	1.73	1.72	1.72
19.750	1.71	1.70	1.69	1.68	1.67
20.000	1.66	1.65	1.64	1.63	1.63
20.250	1.62	1.61	1.61	1.60	1.59
20.500	1.58	1.58	1.57	1.56	1.56
20.750	1.55	1.54	1.53	1.53	1.52
21.000	1.51	1.51	1.50	1.50	1.49
21.250	1.48	1.47	1.47	1.46	1.45
21.500	1.45	1.44	1.43	1.43	1.42
21.750	1.41	1.41	1.40	1.39	1.39
22.000	1.38	1.37	1.37	1.36	1.35
22.250	1.34	1.34	1.33	1.32	1.32
22.500	1.31	1.30	1.30	1.29	1.28
22.750	1.28	1.27	1.26	1.26	1.25
23.000	1.24	1.23	1.23	1.22	1.21
23.250	1.21	1.20	1.19	1.19	1.18
23.500	1.17	1.17	1.16	1.15	1.14
23.750	1.14	1.13	1.12	1.12	1.11
24.000	1.10	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
75.00
68.75
62.50
56.25
50.00
43.75
37.50
31.25
25.00
18.75
12.50
6.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

Computational Time Increment	0.040 hours
Time to Peak (Computed)	12.256 hours
Flow (Peak, Computed)	4.70 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	4.69 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	8.831 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.7 in
Runoff Volume (Pervious)	0.551 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.549 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.302 hours
Computational Time Increment	0.040 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.09 ft³/s
Unit peak time, Tp	0.202 hours
Unit receding limb, Tr	0.806 hours
Total unit time, Tb	1.008 hours

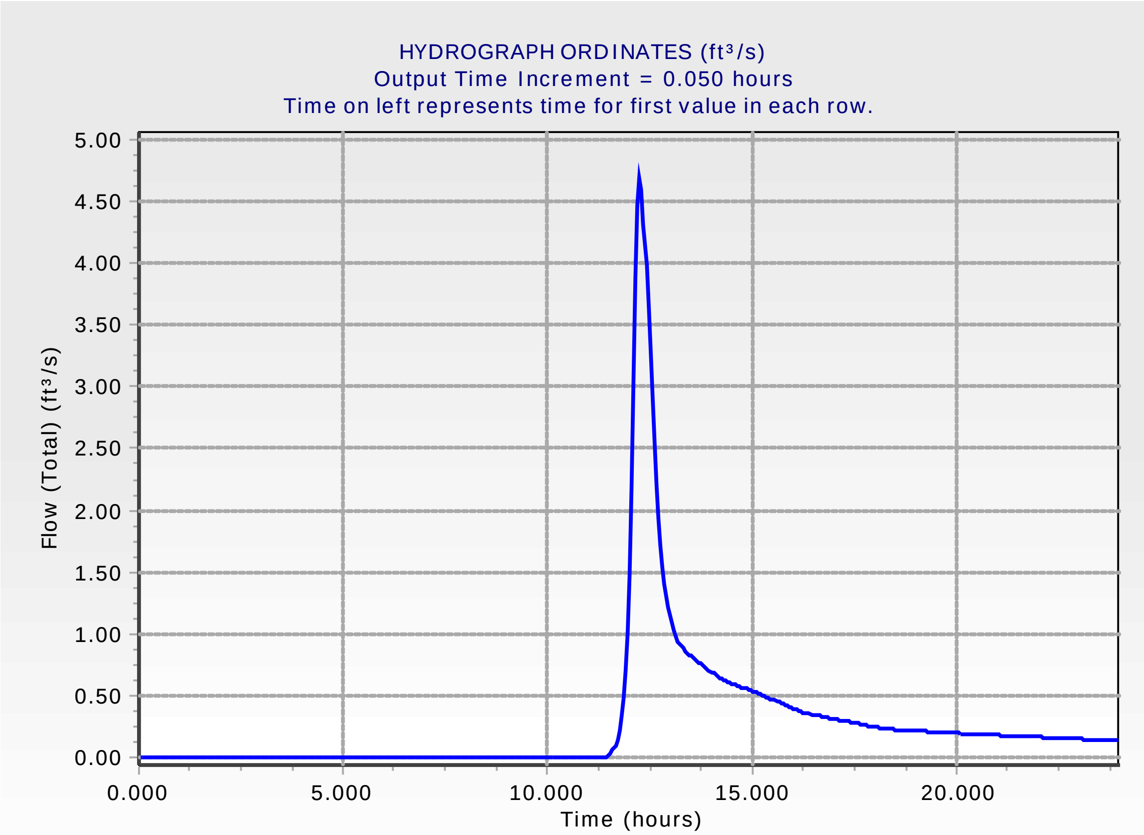
Storm Event	2-yr
Return Event	2 years
Duration	24.000 hours
Depth	3.0 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.350	0.00	0.00	0.01	0.02	0.03
11.600	0.06	0.09	0.14	0.22	0.34
11.850	0.49	0.70	1.01	1.49	2.18
12.100	3.05	3.88	4.47	4.69	4.60
12.350	4.32	3.99	3.64	3.29	2.92
12.600	2.56	2.22	1.93	1.71	1.54
12.850	1.41	1.30	1.22	1.15	1.08
13.100	1.03	0.98	0.94	0.91	0.88
13.350	0.86	0.85	0.83	0.82	0.81
13.600	0.79	0.78	0.77	0.76	0.74
13.850	0.73	0.72	0.71	0.69	0.68
14.100	0.67	0.66	0.64	0.64	0.63
14.350	0.62	0.61	0.61	0.60	0.59
14.600	0.59	0.58	0.57	0.57	0.56
14.850	0.56	0.55	0.54	0.54	0.53
15.100	0.52	0.52	0.51	0.50	0.50
15.350	0.49	0.48	0.47	0.47	0.46
15.600	0.45	0.45	0.44	0.43	0.43
15.850	0.42	0.41	0.40	0.40	0.39
16.100	0.38	0.38	0.37	0.36	0.36
16.350	0.36	0.35	0.35	0.34	0.34
16.600	0.34	0.33	0.33	0.33	0.33
16.850	0.32	0.32	0.32	0.31	0.31
17.100	0.31	0.30	0.30	0.30	0.29
17.350	0.29	0.29	0.28	0.28	0.28
17.600	0.27	0.27	0.27	0.26	0.26
17.850	0.26	0.25	0.25	0.25	0.24
18.100	0.24	0.24	0.23	0.23	0.23
18.350	0.23	0.23	0.23	0.23	0.22
18.600	0.22	0.22	0.22	0.22	0.22
18.850	0.22	0.22	0.22	0.22	0.21
19.100	0.21	0.21	0.21	0.21	0.21
19.350	0.21	0.21	0.21	0.21	0.20
19.600	0.20	0.20	0.20	0.20	0.20
19.850	0.20	0.20	0.20	0.20	0.20
20.100	0.19	0.19	0.19	0.19	0.19
20.350	0.19	0.19	0.19	0.19	0.19
20.600	0.19	0.19	0.18	0.18	0.18
20.850	0.18	0.18	0.18	0.18	0.18
21.100	0.18	0.18	0.18	0.18	0.18
21.350	0.17	0.17	0.17	0.17	0.17
21.600	0.17	0.17	0.17	0.17	0.17
21.850	0.17	0.17	0.17	0.16	0.16

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.100	0.16	0.16	0.16	0.16	0.16
22.350	0.16	0.16	0.16	0.16	0.16
22.600	0.16	0.15	0.15	0.15	0.15
22.850	0.15	0.15	0.15	0.15	0.15
23.100	0.15	0.15	0.15	0.14	0.14
23.350	0.14	0.14	0.14	0.14	0.14
23.600	0.14	0.14	0.14	0.14	0.14
23.850	0.14	0.13	0.13	0.13	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

Computational Time Increment	0.040 hours
Time to Peak (Computed)	12.216 hours
Flow (Peak, Computed)	11.91 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.250 hours
Flow (Peak Interpolated Output)	11.84 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	8.831 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.7 in
Runoff Volume (Pervious)	1.275 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.270 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.302 hours
Computational Time Increment	0.040 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.09 ft³/s
Unit peak time, Tp	0.202 hours
Unit receding limb, Tr	0.806 hours
Total unit time, Tb	1.008 hours

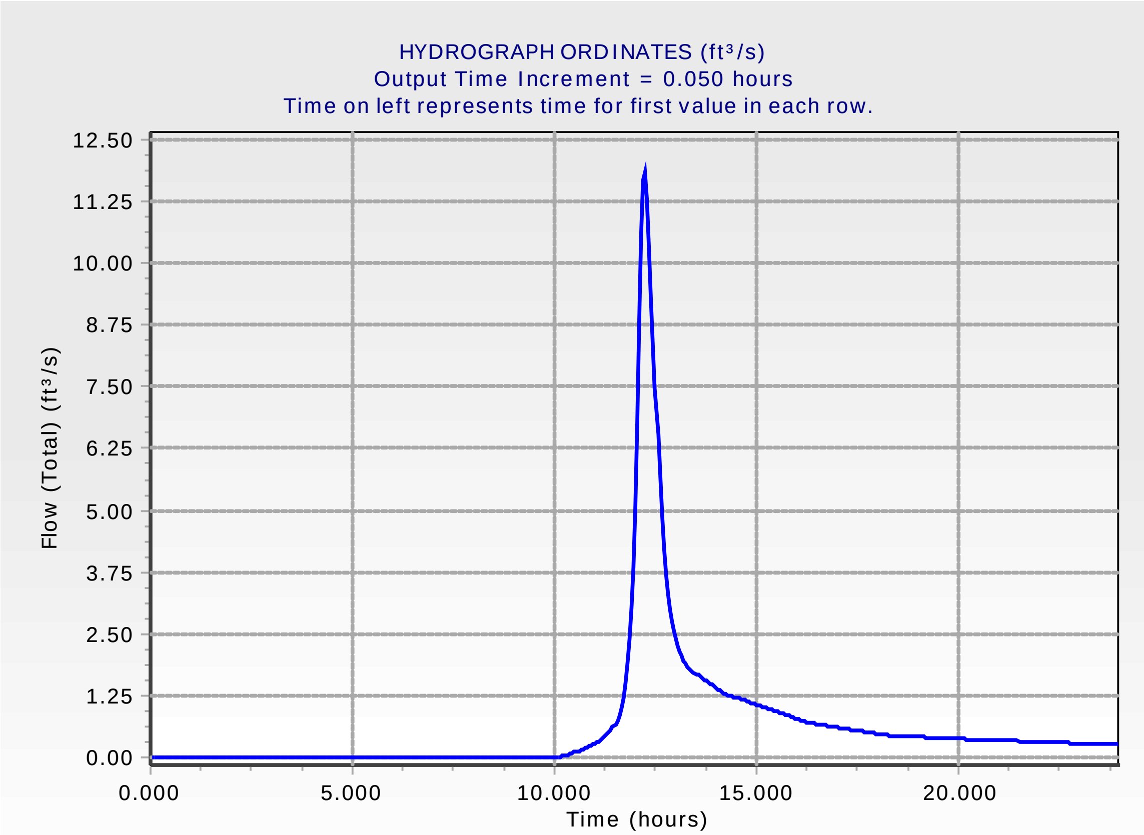
Storm Event	10-yr
Return Event	10 years
Duration	24.000 hours
Depth	4.5 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
9.950	0.00	0.00	0.01	0.01	0.02
10.200	0.03	0.04	0.05	0.06	0.07
10.450	0.08	0.10	0.11	0.13	0.14
10.700	0.16	0.18	0.20	0.22	0.24
10.950	0.26	0.28	0.30	0.33	0.35
11.200	0.39	0.42	0.46	0.51	0.56
11.450	0.62	0.68	0.75	0.85	1.00
11.700	1.22	1.53	1.93	2.43	3.04
11.950	3.87	5.11	6.83	8.83	10.61
12.200	11.70	11.84	11.28	10.35	9.35
12.450	8.40	7.46	6.54	5.67	4.88
12.700	4.21	3.70	3.30	3.00	2.77
12.950	2.58	2.42	2.27	2.15	2.05
13.200	1.96	1.89	1.83	1.79	1.75
13.450	1.72	1.68	1.66	1.63	1.60
13.700	1.57	1.54	1.52	1.49	1.46
13.950	1.43	1.41	1.38	1.35	1.33
14.200	1.30	1.28	1.26	1.25	1.23
14.450	1.22	1.20	1.19	1.18	1.16
14.700	1.15	1.14	1.12	1.11	1.09
14.950	1.08	1.07	1.05	1.04	1.03
15.200	1.01	1.00	0.98	0.97	0.95
15.450	0.94	0.93	0.91	0.90	0.88
15.700	0.87	0.85	0.84	0.82	0.81
15.950	0.79	0.78	0.76	0.75	0.74
16.200	0.73	0.71	0.71	0.70	0.69
16.450	0.68	0.68	0.67	0.66	0.66
16.700	0.65	0.64	0.64	0.63	0.62
16.950	0.62	0.61	0.60	0.60	0.59
17.200	0.58	0.58	0.57	0.56	0.56
17.450	0.55	0.54	0.54	0.53	0.52
17.700	0.52	0.51	0.50	0.50	0.49
17.950	0.48	0.48	0.47	0.46	0.46
18.200	0.45	0.45	0.45	0.44	0.44
18.450	0.44	0.44	0.43	0.43	0.43
18.700	0.43	0.43	0.42	0.42	0.42
18.950	0.42	0.42	0.41	0.41	0.41
19.200	0.41	0.41	0.40	0.40	0.40
19.450	0.40	0.40	0.39	0.39	0.39
19.700	0.39	0.39	0.38	0.38	0.38
19.950	0.38	0.38	0.37	0.37	0.37
20.200	0.37	0.37	0.37	0.36	0.36
20.450	0.36	0.36	0.36	0.36	0.36

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.700	0.35	0.35	0.35	0.35	0.35
20.950	0.35	0.34	0.34	0.34	0.34
21.200	0.34	0.34	0.34	0.33	0.33
21.450	0.33	0.33	0.33	0.33	0.32
21.700	0.32	0.32	0.32	0.32	0.32
21.950	0.32	0.31	0.31	0.31	0.31
22.200	0.31	0.31	0.31	0.30	0.30
22.450	0.30	0.30	0.30	0.30	0.29
22.700	0.29	0.29	0.29	0.29	0.29
22.950	0.29	0.28	0.28	0.28	0.28
23.200	0.28	0.28	0.27	0.27	0.27
23.450	0.27	0.27	0.27	0.27	0.26
23.700	0.26	0.26	0.26	0.26	0.26
23.950	0.25	0.25	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
12.50
11.25
10.00
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

Computational Time Increment	0.040 hours
Time to Peak (Computed)	12.216 hours
Flow (Peak, Computed)	24.92 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	24.62 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	8.831 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.5 in
Runoff Volume (Pervious)	2.592 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.583 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.302 hours
Computational Time Increment	0.040 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.09 ft³/s
Unit peak time, Tp	0.202 hours
Unit receding limb, Tr	0.806 hours
Total unit time, Tb	1.008 hours

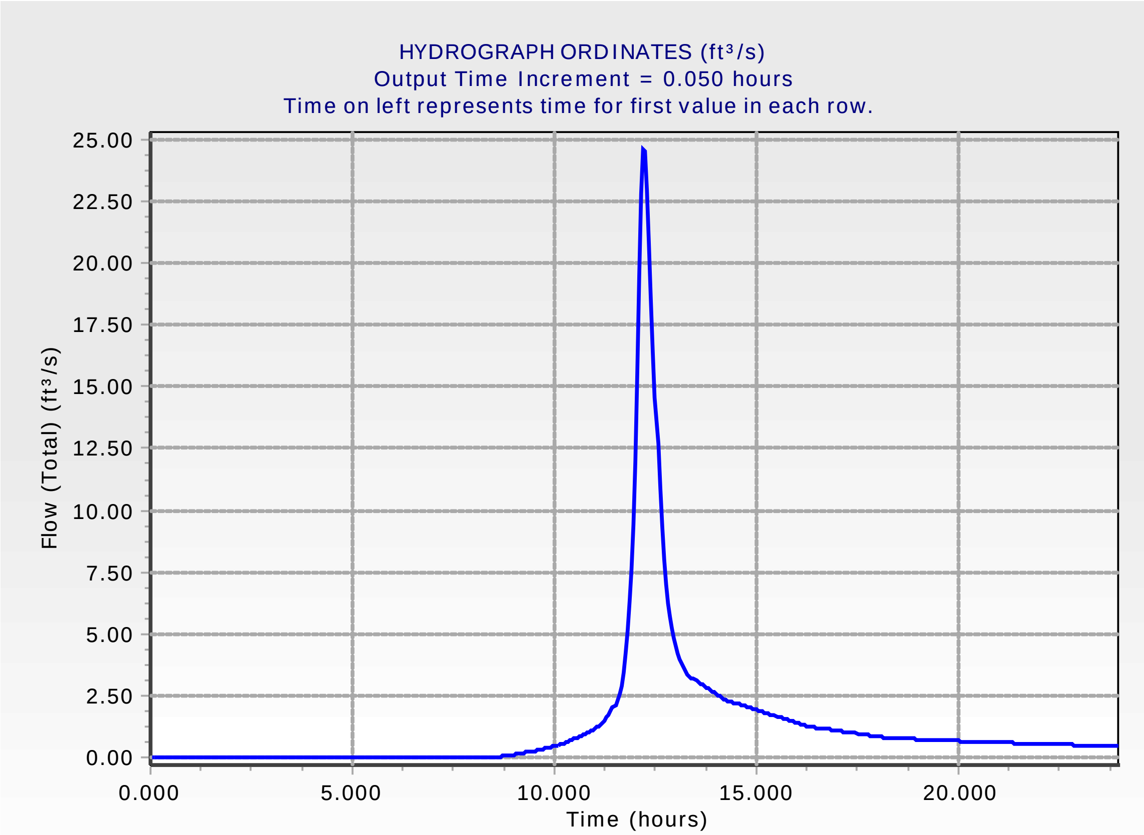
Storm Event	50-yr
Return Event	50 years
Duration	24.000 hours
Depth	6.8 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
8.350	0.00	0.00	0.01	0.01	0.02
8.600	0.02	0.03	0.04	0.05	0.06
8.850	0.07	0.09	0.10	0.11	0.12
9.100	0.14	0.15	0.17	0.18	0.20
9.350	0.21	0.23	0.24	0.26	0.28
9.600	0.30	0.32	0.34	0.35	0.37
9.850	0.40	0.42	0.44	0.46	0.48
10.100	0.50	0.53	0.56	0.58	0.61
10.350	0.65	0.68	0.71	0.75	0.79
10.600	0.83	0.87	0.91	0.95	0.99
10.850	1.03	1.08	1.13	1.17	1.22
11.100	1.28	1.34	1.42	1.51	1.61
11.350	1.73	1.86	1.99	2.13	2.31
11.600	2.55	2.91	3.46	4.21	5.16
11.850	6.31	7.65	9.44	12.03	15.54
12.100	19.48	22.81	24.62	24.50	22.99
12.350	20.84	18.61	16.54	14.57	12.69
12.600	10.93	9.35	8.02	7.02	6.24
12.850	5.66	5.19	4.82	4.51	4.23
13.100	4.00	3.80	3.63	3.50	3.39
13.350	3.30	3.23	3.16	3.10	3.04
13.600	2.99	2.93	2.88	2.83	2.77
13.850	2.72	2.67	2.62	2.56	2.51
14.100	2.46	2.41	2.37	2.33	2.30
14.350	2.26	2.24	2.21	2.18	2.15
14.600	2.13	2.10	2.08	2.05	2.02
14.850	2.00	1.97	1.95	1.92	1.90
15.100	1.87	1.84	1.82	1.79	1.77
15.350	1.74	1.71	1.69	1.66	1.63
15.600	1.61	1.58	1.55	1.53	1.50
15.850	1.47	1.44	1.42	1.39	1.36
16.100	1.34	1.32	1.29	1.27	1.26
16.350	1.24	1.23	1.21	1.20	1.19
16.600	1.18	1.17	1.15	1.14	1.13
16.850	1.12	1.11	1.09	1.08	1.07
17.100	1.06	1.05	1.04	1.02	1.01
17.350	1.00	0.99	0.98	0.96	0.95
17.600	0.94	0.93	0.92	0.90	0.89
17.850	0.88	0.87	0.86	0.84	0.83
18.100	0.82	0.81	0.80	0.79	0.79
18.350	0.78	0.78	0.77	0.77	0.77
18.600	0.76	0.76	0.75	0.75	0.75
18.850	0.74	0.74	0.74	0.73	0.73

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.100	0.73	0.72	0.72	0.72	0.71
19.350	0.71	0.70	0.70	0.70	0.69
19.600	0.69	0.69	0.68	0.68	0.68
19.850	0.67	0.67	0.67	0.66	0.66
20.100	0.65	0.65	0.65	0.65	0.64
20.350	0.64	0.64	0.63	0.63	0.63
20.600	0.63	0.62	0.62	0.62	0.61
20.850	0.61	0.61	0.61	0.60	0.60
21.100	0.60	0.60	0.59	0.59	0.59
21.350	0.59	0.58	0.58	0.58	0.57
21.600	0.57	0.57	0.57	0.56	0.56
21.850	0.56	0.56	0.55	0.55	0.55
22.100	0.54	0.54	0.54	0.54	0.53
22.350	0.53	0.53	0.52	0.52	0.52
22.600	0.52	0.51	0.51	0.51	0.51
22.850	0.50	0.50	0.50	0.50	0.49
23.100	0.49	0.49	0.48	0.48	0.48
23.350	0.48	0.47	0.47	0.47	0.47
23.600	0.46	0.46	0.46	0.45	0.45
23.850	0.45	0.45	0.44	0.44	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
25.00
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

Computational Time Increment	0.040 hours
Time to Peak (Computed)	12.216 hours
Flow (Peak, Computed)	32.88 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	32.54 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	8.831 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	4.6 in
Runoff Volume (Pervious)	3.415 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	3.404 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.302 hours
Computational Time Increment	0.040 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	33.09 ft³/s
Unit peak time, Tp	0.202 hours
Unit receding limb, Tr	0.806 hours
Total unit time, Tb	1.008 hours

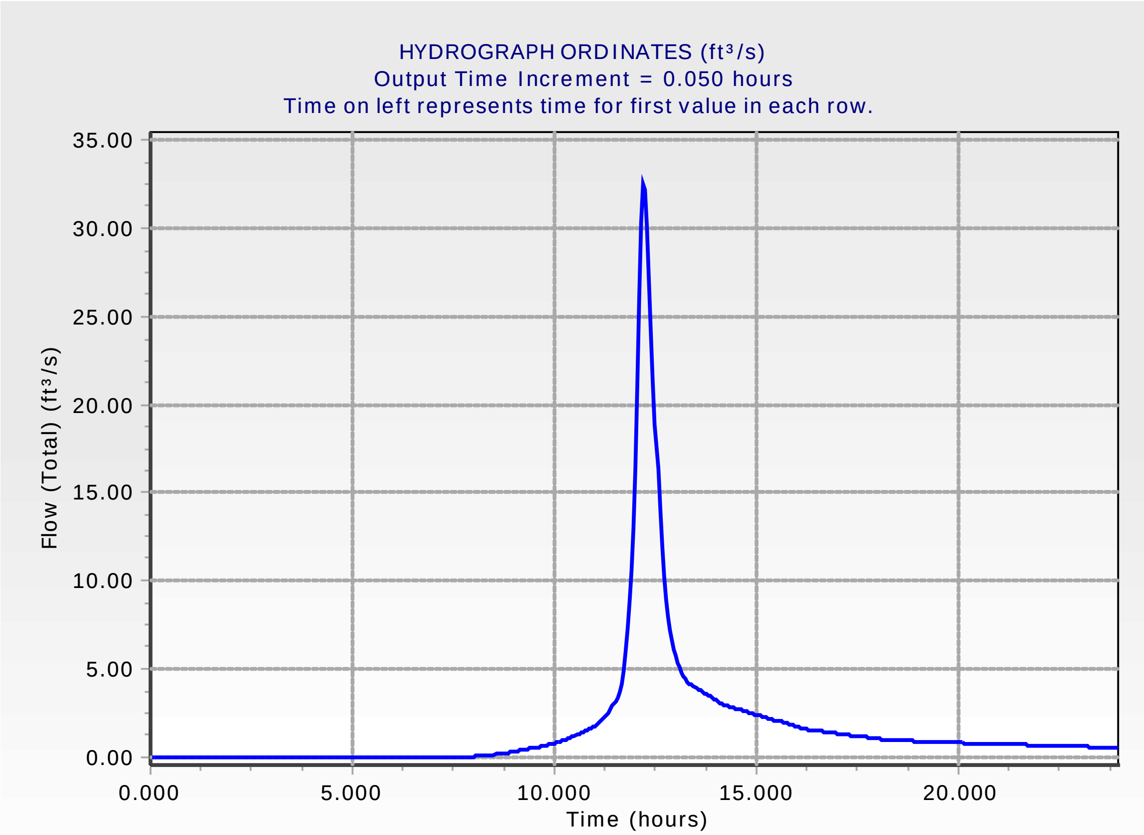
Storm Event	100-yr
Return Event	100 years
Duration	24.000 hours
Depth	8.1 in
Time of Concentration (Composite)	0.302 hours
Area (User Defined)	8.831 acres

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
7.600	0.00	0.00	0.01	0.01	0.02
7.850	0.02	0.03	0.04	0.05	0.06
8.100	0.07	0.07	0.08	0.10	0.11
8.350	0.12	0.13	0.14	0.16	0.17
8.600	0.19	0.20	0.22	0.23	0.25
8.850	0.27	0.28	0.30	0.32	0.34
9.100	0.36	0.38	0.40	0.42	0.45
9.350	0.47	0.49	0.52	0.54	0.57
9.600	0.59	0.62	0.64	0.67	0.70
9.850	0.73	0.76	0.79	0.82	0.85
10.100	0.88	0.91	0.95	0.99	1.03
10.350	1.07	1.12	1.17	1.22	1.27
10.600	1.32	1.38	1.43	1.49	1.55
10.850	1.61	1.67	1.73	1.80	1.86
11.100	1.94	2.03	2.13	2.26	2.40
11.350	2.56	2.73	2.91	3.11	3.35
11.600	3.68	4.18	4.94	5.97	7.27
11.850	8.82	10.62	13.00	16.41	21.00
12.100	26.10	30.33	32.54	32.21	30.09
12.350	27.16	24.18	21.41	18.82	16.35
12.600	14.05	12.00	10.28	8.98	7.98
12.850	7.22	6.62	6.14	5.74	5.39
13.100	5.08	4.82	4.61	4.44	4.30
13.350	4.18	4.09	4.00	3.93	3.85
13.600	3.78	3.71	3.64	3.58	3.51
13.850	3.44	3.37	3.31	3.24	3.17
14.100	3.11	3.04	2.99	2.94	2.90
14.350	2.86	2.82	2.78	2.75	2.71
14.600	2.68	2.65	2.62	2.58	2.55
14.850	2.52	2.48	2.45	2.42	2.39
15.100	2.35	2.32	2.29	2.25	2.22
15.350	2.19	2.15	2.12	2.09	2.05
15.600	2.02	1.98	1.95	1.92	1.88
15.850	1.85	1.81	1.78	1.75	1.71
16.100	1.68	1.65	1.62	1.60	1.58
16.350	1.56	1.54	1.52	1.51	1.49
16.600	1.48	1.46	1.45	1.43	1.42
16.850	1.40	1.39	1.37	1.36	1.34
17.100	1.33	1.31	1.30	1.28	1.27
17.350	1.25	1.24	1.22	1.21	1.19
17.600	1.18	1.16	1.15	1.13	1.12
17.850	1.10	1.09	1.07	1.06	1.04
18.100	1.03	1.01	1.00	0.99	0.99

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.350	0.98	0.97	0.97	0.96	0.96
18.600	0.95	0.95	0.94	0.94	0.93
18.850	0.93	0.93	0.92	0.92	0.91
19.100	0.91	0.90	0.90	0.89	0.89
19.350	0.89	0.88	0.88	0.87	0.87
19.600	0.86	0.86	0.85	0.85	0.84
19.850	0.84	0.84	0.83	0.83	0.82
20.100	0.82	0.81	0.81	0.81	0.80
20.350	0.80	0.80	0.79	0.79	0.78
20.600	0.78	0.78	0.77	0.77	0.77
20.850	0.76	0.76	0.76	0.75	0.75
21.100	0.75	0.74	0.74	0.74	0.73
21.350	0.73	0.73	0.72	0.72	0.72
21.600	0.71	0.71	0.71	0.70	0.70
21.850	0.70	0.69	0.69	0.69	0.68
22.100	0.68	0.68	0.67	0.67	0.67
22.350	0.66	0.66	0.65	0.65	0.65
22.600	0.64	0.64	0.64	0.64	0.63
22.850	0.63	0.62	0.62	0.62	0.61
23.100	0.61	0.61	0.60	0.60	0.60
23.350	0.59	0.59	0.59	0.58	0.58
23.600	0.58	0.57	0.57	0.57	0.56
23.850	0.56	0.56	0.55	0.55	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Total) (ft³/s)
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Summary for Hydrograph Addition at 'Post Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1F-Post
OCS-1	DT-1
OCS-2	IF-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-1F-Post	0.375	12.150	3.68
Flow (From)	OCS-1	0.185	19.100	0.19
Flow (From)	OCS-2	0.213	12.550	1.61
Flow (In)	Post Outlet O-1	0.774	12.250	3.98

Summary for Hydrograph Addition at 'Post Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1F-Post
OCS-1	DT-1
OCS-2	IF-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Area-1F-Post	0.886	12.150	9.69
Flow (From)	OCS-1	0.386	16.550	0.60
Flow (From)	OCS-2	0.716	12.350	6.84
Flow (In)	Post Outlet O-1	1.988	12.200	15.38

Summary for Hydrograph Addition at 'Post Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1F-Post
OCS-1	DT-1
OCS-2	IF-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Area-1F-Post	1.827	12.150	20.45
Flow (From)	OCS-1	1.549	12.850	4.76
Flow (From)	OCS-2	1.583	12.250	14.81
Flow (In)	Post Outlet O-1	4.959	12.150	34.39

Summary for Hydrograph Addition at 'Post Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1F-Post
OCS-1	DT-1
OCS-2	IF-1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Area-1F-Post	2.417	12.150	27.04
Flow (From)	OCS-1	2.277	12.700	9.47
Flow (From)	OCS-2	2.112	12.250	18.87
Flow (In)	Post Outlet O-1	6.805	12.150	44.30

Summary for Hydrograph Addition at 'Post Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area 2- Post

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area 2- Post	0.441	12.250	3.88
Flow (In)	Post Outlet O-2	0.441	12.250	3.88

Summary for Hydrograph Addition at 'Post Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area 2- Post

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Area 2- Post	1.020	12.200	9.89
Flow (In)	Post Outlet O-2	1.020	12.200	9.89

Summary for Hydrograph Addition at 'Post Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area 2- Post

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Area 2- Post	2.076	12.200	20.66
Flow (In)	Post Outlet O-2	2.076	12.200	20.66

Summary for Hydrograph Addition at 'Post Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area 2- Post

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area 2- Post	2.735	12.200	27.24
Flow (In)	Post Outlet O-2	2.735	12.200	27.24

Summary for Hydrograph Addition at 'Pre Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1-Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-1-Pre	1.045	12.250	8.58
Flow (In)	Pre Outlet O-1	1.045	12.250	8.58

Summary for Hydrograph Addition at 'Pre Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1-Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-1-Pre	2.469	12.250	22.65
Flow (In)	Pre Outlet O-1	2.469	12.250	22.65

Summary for Hydrograph Addition at 'Pre Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1-Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-1-Pre	5.091	12.250	47.88
Flow (In)	Pre Outlet O-1	5.091	12.250	47.88

Summary for Hydrograph Addition at 'Pre Outlet O-1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-1-Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-1-Pre	6.737	12.250	63.35
Flow (In)	Pre Outlet O-1	6.737	12.250	63.35

Summary for Hydrograph Addition at 'Pre Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-2- Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-2- Pre	0.549	12.250	4.69
Flow (In)	Pre Outlet O-2	0.549	12.250	4.69

Summary for Hydrograph Addition at 'Pre Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-2- Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-2- Pre	1.270	12.250	11.84
Flow (In)	Pre Outlet O-2	1.270	12.250	11.84

Summary for Hydrograph Addition at 'Pre Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-2- Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-2- Pre	2.583	12.200	24.62
Flow (In)	Pre Outlet O-2	2.583	12.200	24.62

Summary for Hydrograph Addition at 'Pre Outlet O-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area-2- Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area-2- Pre	3.404	12.200	32.54
Flow (In)	Pre Outlet O-2	3.404	12.200	32.54

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
379.00	0.0	0.000	0.000	0.000	0.000
380.00	0.0	0.390	0.390	0.130	0.130
381.00	0.0	0.428	1.226	0.409	0.539
382.00	0.0	0.468	1.344	0.448	0.987
383.00	0.0	0.510	1.467	0.489	1.476
384.00	0.0	0.555	1.597	0.532	2.008

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
369.00	0.0	0.210	0.000	0.000	0.000
370.00	0.0	0.240	0.674	0.225	0.225
371.00	0.0	0.276	0.773	0.258	0.483
372.00	0.0	0.318	0.890	0.297	0.779
373.00	0.0	0.364	1.022	0.341	1.120

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
376.00	0.0	0.017	0.000	0.000	0.000
377.00	0.0	0.027	0.065	0.022	0.022
378.00	0.0	0.040	0.100	0.033	0.055
379.00	0.0	0.056	0.143	0.048	0.103

Requested Pond Water Surface Elevations	
Minimum (Headwater)	369.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	373.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	371.50	373.00
Rectangular Weir	Weir - 1	Forward	Culvert - 1	370.00	373.00
Culvert-Circular	Culvert - 1	Forward	TW	367.50	373.00
Rectangular Weir	Weir - 2	Forward	TW	372.00	373.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert - 1 Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	18.0 in
Length	36.00 ft
Length (Computed Barrel)	36.00 ft
Slope (Computed)	0.007 ft/ft

Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.092
T2 ratio (HW/D)	1.194
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	369.14 ft	T1 Flow	7.58 ft³/s
T2 Elevation	369.29 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	370.00 ft
Weir Length	2.50 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	371.50 ft
Orifice Area	5.1 ft²
Orifice Coefficient	0.600
Weir Length	9.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	372.00 ft
Weir Length	32.00 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

Requested Pond Water Surface Elevations	
Minimum (Headwater)	379.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	384.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 1	Forward	TW	379.00	384.00
Inlet Box	Riser - 1	Forward	Culvert-1	383.00	384.00
Rectangular Weir	Weir - 1	Forward	Culvert-1	381.50	384.00
Culvert-Circular	Culvert-1	Forward	TW	379.00	384.00
Rectangular Weir	Weir - 2	Forward	TW	383.00	384.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Culvert-1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	18.0 in
Length	53.00 ft
Length (Computed Barrel)	53.01 ft
Slope (Computed)	0.019 ft/ft

Outlet Control Data

Manning's n	0.013
Ke	0.200
Kb	0.018
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data

Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	1.086
T2 ratio (HW/D)	1.188
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.
Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...

T1 Elevation	380.63 ft	T1 Flow	7.58 ft³/s
T2 Elevation	380.78 ft	T2 Flow	8.66 ft³/s

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	381.50 ft
Weir Length	2.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	383.00 ft
Orifice Area	5.1 ft²
Orifice Coefficient	0.600
Weir Length	9.00 ft
Weir Coefficient	3.00 (ft^0.5)/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Weir - 2 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	383.00 ft
Weir Length	33.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: Orifice - 1 Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	379.00 ft
Orifice Diameter	2.5 in
Orifice Coefficient	0.600

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

Requested Pond Water Surface Elevations	
Minimum (Headwater)	376.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	379.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	378.00	379.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	378.00 ft
Weir Length	13.00 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 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	379.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	4.33 ft³/s	Time to Peak (Flow, In)	12.250 hours
Flow (Peak Outlet)	0.19 ft³/s	Time to Peak (Flow, Outlet)	19.100 hours

Elevation (Water Surface, Peak)	380.49 ft
Volume (Peak)	0.324 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.495 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.185 ac-ft
Volume (Retained)	0.308 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.2 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	379.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	10.90 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	0.60 ft³/s	Time to Peak (Flow, Outlet)	16.550 hours

Elevation (Water Surface, Peak)	381.58 ft
Volume (Peak)	0.794 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.145 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.386 ac-ft
Volume (Retained)	0.758 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	379.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft^3/s
Flow (Initial Infiltration)	0.00 ft^3/s
Flow (Initial, Total)	0.00 ft^3/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	22.83 ft^3/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	4.76 ft^3/s	Time to Peak (Flow, Outlet)	12.850 hours

Elevation (Water Surface, Peak)	382.30 ft
Volume (Peak)	1.130 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.329 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.549 ac-ft
Volume (Retained)	0.778 ac-ft
Volume (Unrouted)	-0.002 ac-ft
Error (Mass Balance)	0.1 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	379.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	30.13 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	9.47 ft³/s	Time to Peak (Flow, Outlet)	12.700 hours

Elevation (Water Surface, Peak)	382.81 ft
Volume (Peak)	1.381 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	3.069 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.277 ac-ft
Volume (Retained)	0.789 ac-ft
Volume (Unrouted)	-0.003 ac-ft
Error (Mass Balance)	0.1 %

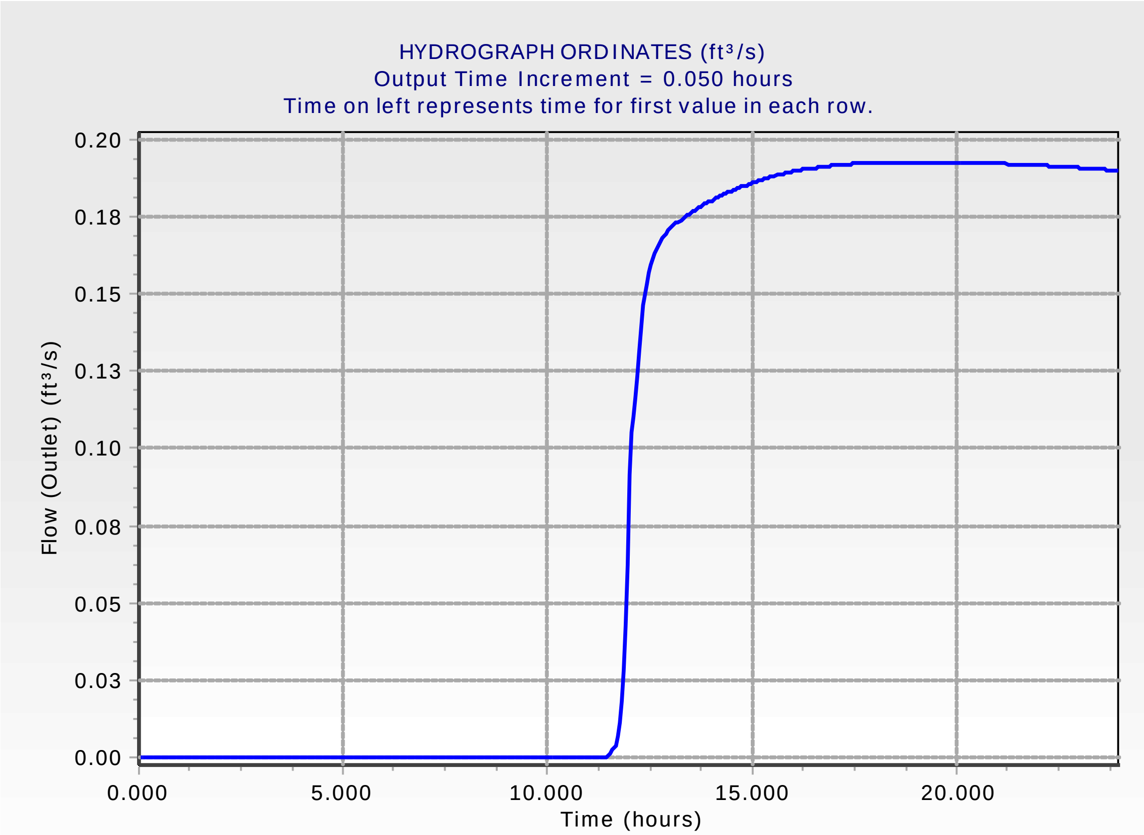
Peak Discharge	0.19 ft³/s
Time to Peak	19.100 hours
Hydrograph Volume	0.185 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.500	0.00	0.00	0.00	0.00	0.01
11.750	0.01	0.02	0.03	0.04	0.06
12.000	0.09	0.11	0.11	0.12	0.12
12.250	0.13	0.14	0.15	0.15	0.16
12.500	0.16	0.16	0.16	0.16	0.17
12.750	0.17	0.17	0.17	0.17	0.17
13.000	0.17	0.17	0.17	0.17	0.17
13.250	0.17	0.17	0.17	0.18	0.18
13.500	0.18	0.18	0.18	0.18	0.18
13.750	0.18	0.18	0.18	0.18	0.18
14.000	0.18	0.18	0.18	0.18	0.18
14.250	0.18	0.18	0.18	0.18	0.18
14.500	0.18	0.18	0.18	0.18	0.18
14.750	0.18	0.19	0.19	0.19	0.19
15.000	0.19	0.19	0.19	0.19	0.19
15.250	0.19	0.19	0.19	0.19	0.19
15.500	0.19	0.19	0.19	0.19	0.19
15.750	0.19	0.19	0.19	0.19	0.19
16.000	0.19	0.19	0.19	0.19	0.19
16.250	0.19	0.19	0.19	0.19	0.19
16.500	0.19	0.19	0.19	0.19	0.19
16.750	0.19	0.19	0.19	0.19	0.19
17.000	0.19	0.19	0.19	0.19	0.19
17.250	0.19	0.19	0.19	0.19	0.19
17.500	0.19	0.19	0.19	0.19	0.19
17.750	0.19	0.19	0.19	0.19	0.19
18.000	0.19	0.19	0.19	0.19	0.19
18.250	0.19	0.19	0.19	0.19	0.19
18.500	0.19	0.19	0.19	0.19	0.19
18.750	0.19	0.19	0.19	0.19	0.19
19.000	0.19	0.19	0.19	0.19	0.19
19.250	0.19	0.19	0.19	0.19	0.19
19.500	0.19	0.19	0.19	0.19	0.19
19.750	0.19	0.19	0.19	0.19	0.19
20.000	0.19	0.19	0.19	0.19	0.19
20.250	0.19	0.19	0.19	0.19	0.19
20.500	0.19	0.19	0.19	0.19	0.19
20.750	0.19	0.19	0.19	0.19	0.19
21.000	0.19	0.19	0.19	0.19	0.19
21.250	0.19	0.19	0.19	0.19	0.19
21.500	0.19	0.19	0.19	0.19	0.19
21.750	0.19	0.19	0.19	0.19	0.19
22.000	0.19	0.19	0.19	0.19	0.19
22.250	0.19	0.19	0.19	0.19	0.19
22.500	0.19	0.19	0.19	0.19	0.19
22.750	0.19	0.19	0.19	0.19	0.19
23.000	0.19	0.19	0.19	0.19	0.19
23.250	0.19	0.19	0.19	0.19	0.19

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.500	0.19	0.19	0.19	0.19	0.19
23.750	0.19	0.19	0.19	0.19	0.19
24.000	0.19	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
0.20
0.18
0.15
0.13
0.10
0.08
0.05
0.03
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

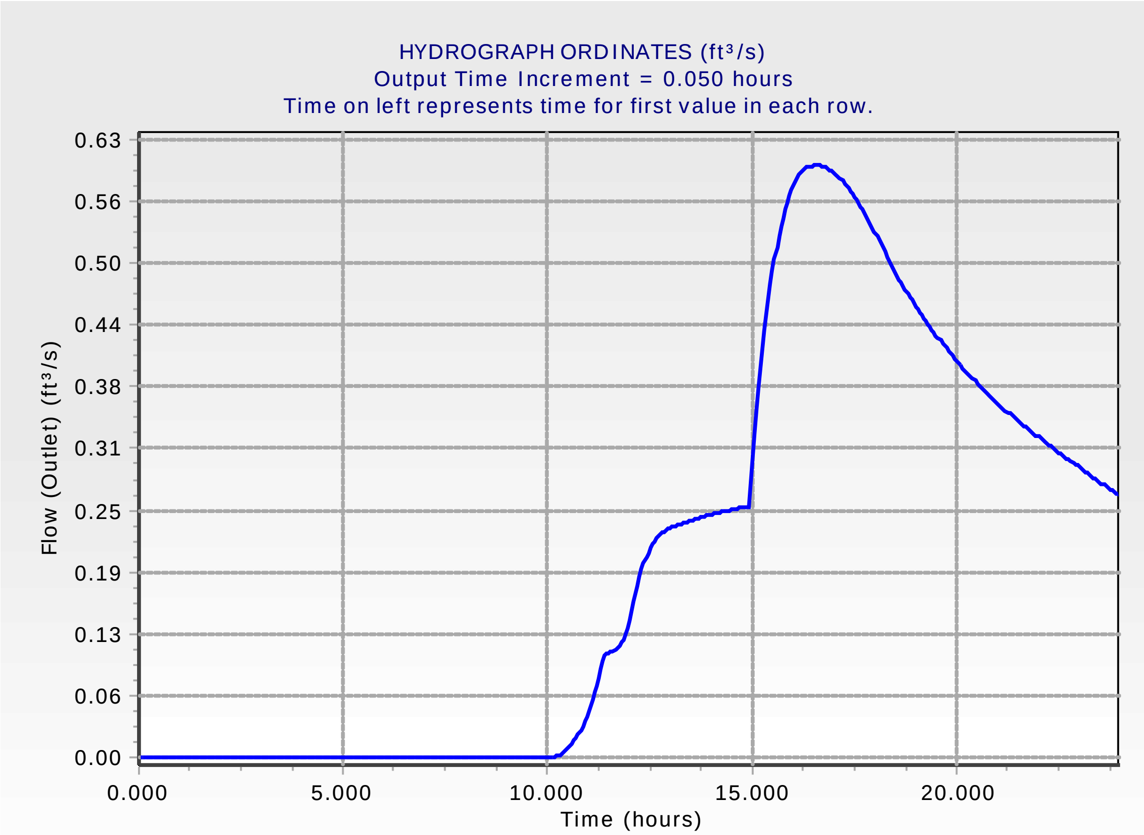
Peak Discharge	0.60 ft³/s
Time to Peak	16.550 hours
Hydrograph Volume	0.386 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
10.150	0.00	0.00	0.00	0.00	0.00
10.400	0.01	0.01	0.01	0.01	0.01
10.650	0.02	0.02	0.02	0.03	0.03
10.900	0.04	0.04	0.05	0.05	0.06
11.150	0.07	0.07	0.08	0.09	0.10
11.400	0.10	0.10	0.11	0.11	0.11
11.650	0.11	0.11	0.11	0.12	0.12
11.900	0.12	0.13	0.14	0.15	0.16
12.150	0.17	0.17	0.18	0.19	0.20
12.400	0.20	0.21	0.21	0.22	0.22
12.650	0.22	0.22	0.23	0.23	0.23
12.900	0.23	0.23	0.23	0.23	0.23
13.150	0.23	0.24	0.24	0.24	0.24
13.400	0.24	0.24	0.24	0.24	0.24
13.650	0.24	0.24	0.24	0.24	0.24
13.900	0.24	0.25	0.25	0.25	0.25
14.150	0.25	0.25	0.25	0.25	0.25
14.400	0.25	0.25	0.25	0.25	0.25
14.650	0.25	0.25	0.25	0.25	0.25
14.900	0.25	0.28	0.30	0.33	0.35
15.150	0.37	0.39	0.41	0.43	0.45
15.400	0.46	0.48	0.49	0.51	0.52
15.650	0.53	0.54	0.55	0.55	0.56
15.900	0.57	0.57	0.58	0.58	0.59
16.150	0.59	0.59	0.59	0.60	0.60
16.400	0.60	0.60	0.60	0.60	0.60
16.650	0.60	0.60	0.60	0.60	0.60
16.900	0.59	0.59	0.59	0.59	0.59
17.150	0.59	0.58	0.58	0.58	0.58
17.400	0.57	0.57	0.57	0.56	0.56
17.650	0.56	0.55	0.55	0.55	0.54
17.900	0.54	0.54	0.53	0.53	0.52
18.150	0.52	0.52	0.51	0.51	0.50
18.400	0.50	0.50	0.49	0.49	0.48
18.650	0.48	0.48	0.47	0.47	0.47
18.900	0.46	0.46	0.46	0.45	0.45
19.150	0.45	0.44	0.44	0.44	0.44
19.400	0.43	0.43	0.43	0.42	0.42
19.650	0.42	0.42	0.41	0.41	0.41
19.900	0.41	0.40	0.40	0.40	0.40
20.150	0.39	0.39	0.39	0.39	0.39
20.400	0.38	0.38	0.38	0.38	0.37
20.650	0.37	0.37	0.37	0.37	0.36
20.900	0.36	0.36	0.36	0.36	0.35
21.150	0.35	0.35	0.35	0.35	0.35
21.400	0.34	0.34	0.34	0.34	0.34
21.650	0.34	0.33	0.33	0.33	0.33
21.900	0.33	0.33	0.32	0.32	0.32

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.150	0.32	0.32	0.32	0.31	0.31
22.400	0.31	0.31	0.31	0.31	0.31
22.650	0.30	0.30	0.30	0.30	0.30
22.900	0.30	0.30	0.29	0.29	0.29
23.150	0.29	0.29	0.29	0.28	0.28
23.400	0.28	0.28	0.28	0.28	0.28
23.650	0.27	0.27	0.27	0.27	0.27
23.900	0.27	0.27	0.26	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
0.63
0.56
0.50
0.44
0.38
0.31
0.25
0.19
0.13
0.06
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

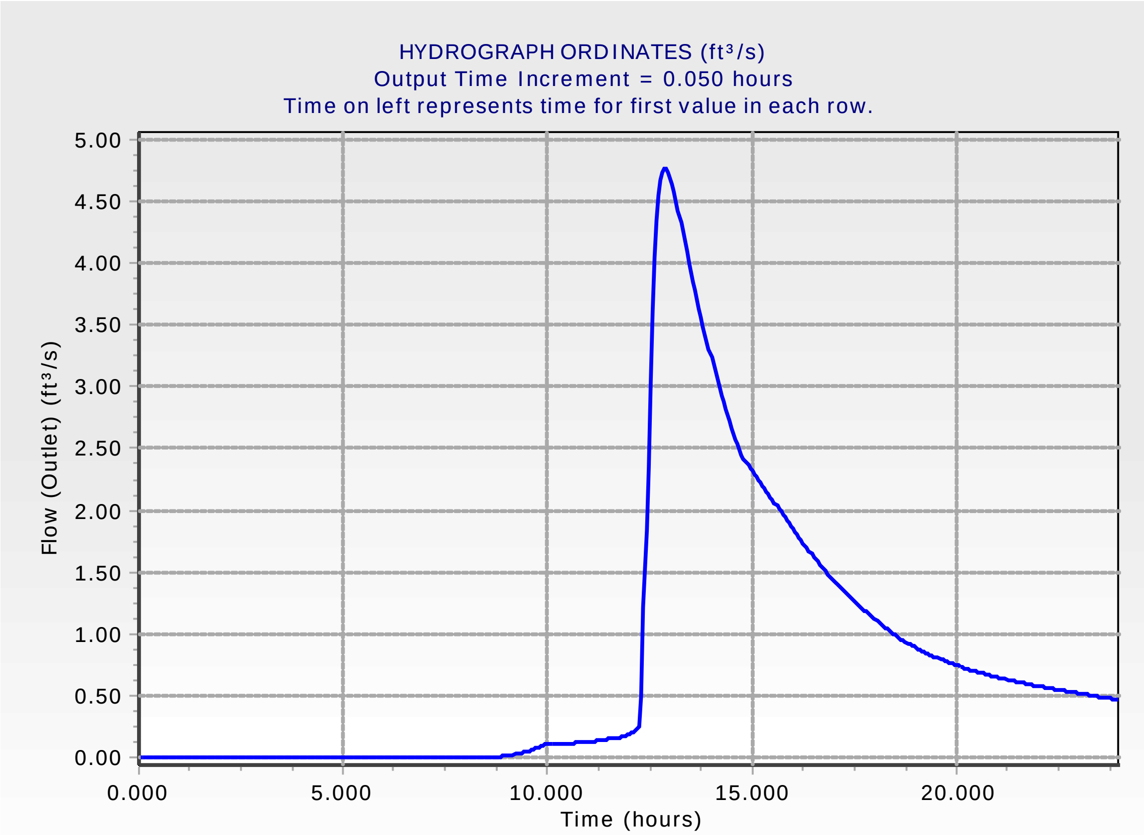
Peak Discharge	4.76 ft³/s
Time to Peak	12.850 hours
Hydrograph Volume	1.549 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.550	0.00	0.00	0.00	0.00	0.00
8.800	0.01	0.01	0.01	0.01	0.01
9.050	0.02	0.02	0.02	0.02	0.03
9.300	0.03	0.04	0.04	0.04	0.05
9.550	0.05	0.06	0.07	0.07	0.08
9.800	0.08	0.09	0.10	0.10	0.10
10.050	0.10	0.11	0.11	0.11	0.11
10.300	0.11	0.11	0.11	0.11	0.11
10.550	0.11	0.11	0.12	0.12	0.12
10.800	0.12	0.12	0.12	0.12	0.13
11.050	0.13	0.13	0.13	0.13	0.14
11.300	0.14	0.14	0.14	0.15	0.15
11.550	0.15	0.16	0.16	0.16	0.16
11.800	0.17	0.17	0.18	0.18	0.19
12.050	0.20	0.21	0.22	0.23	0.25
12.300	0.50	1.22	1.83	2.35	3.04
12.550	3.62	4.04	4.35	4.55	4.67
12.800	4.74	4.76	4.76	4.74	4.69
13.050	4.64	4.57	4.50	4.42	4.34
13.300	4.25	4.17	4.09	4.01	3.93
13.550	3.85	3.78	3.71	3.63	3.56
13.800	3.50	3.43	3.36	3.30	3.23
14.050	3.17	3.11	3.05	2.99	2.93
14.300	2.88	2.82	2.77	2.72	2.67
14.550	2.62	2.58	2.53	2.49	2.45
14.800	2.41	2.38	2.36	2.34	2.31
15.050	2.29	2.27	2.25	2.22	2.20
15.300	2.18	2.15	2.13	2.11	2.08
15.550	2.06	2.04	2.02	1.99	1.97
15.800	1.95	1.92	1.90	1.88	1.85
16.050	1.83	1.81	1.78	1.76	1.74
16.300	1.71	1.69	1.67	1.65	1.63
16.550	1.60	1.58	1.56	1.54	1.52
16.800	1.51	1.49	1.47	1.45	1.43
17.050	1.41	1.40	1.38	1.36	1.35
17.300	1.33	1.31	1.30	1.28	1.27
17.550	1.25	1.24	1.22	1.21	1.19
17.800	1.18	1.16	1.15	1.13	1.12
18.050	1.11	1.09	1.08	1.06	1.05
18.300	1.04	1.03	1.01	1.00	0.99
18.550	0.98	0.97	0.96	0.95	0.94
18.800	0.93	0.92	0.91	0.90	0.89
19.050	0.88	0.87	0.86	0.85	0.85
19.300	0.84	0.83	0.82	0.82	0.81
19.550	0.80	0.80	0.79	0.78	0.78
19.800	0.77	0.76	0.76	0.75	0.75
20.050	0.74	0.73	0.73	0.72	0.72
20.300	0.71	0.71	0.70	0.70	0.69

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.550	0.69	0.68	0.68	0.67	0.67
20.800	0.67	0.66	0.66	0.65	0.65
21.050	0.64	0.64	0.64	0.63	0.63
21.300	0.63	0.62	0.62	0.61	0.61
21.550	0.61	0.60	0.60	0.60	0.59
21.800	0.59	0.59	0.58	0.58	0.58
22.050	0.57	0.57	0.57	0.56	0.56
22.300	0.56	0.56	0.55	0.55	0.55
22.550	0.54	0.54	0.54	0.53	0.53
22.800	0.53	0.53	0.52	0.52	0.52
23.050	0.52	0.51	0.51	0.51	0.50
23.300	0.50	0.50	0.50	0.49	0.49
23.550	0.49	0.49	0.48	0.48	0.48
23.800	0.47	0.47	0.47	0.47	0.46


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	9.47 ft³/s
Time to Peak	12.700 hours
Hydrograph Volume	2.277 ac-ft

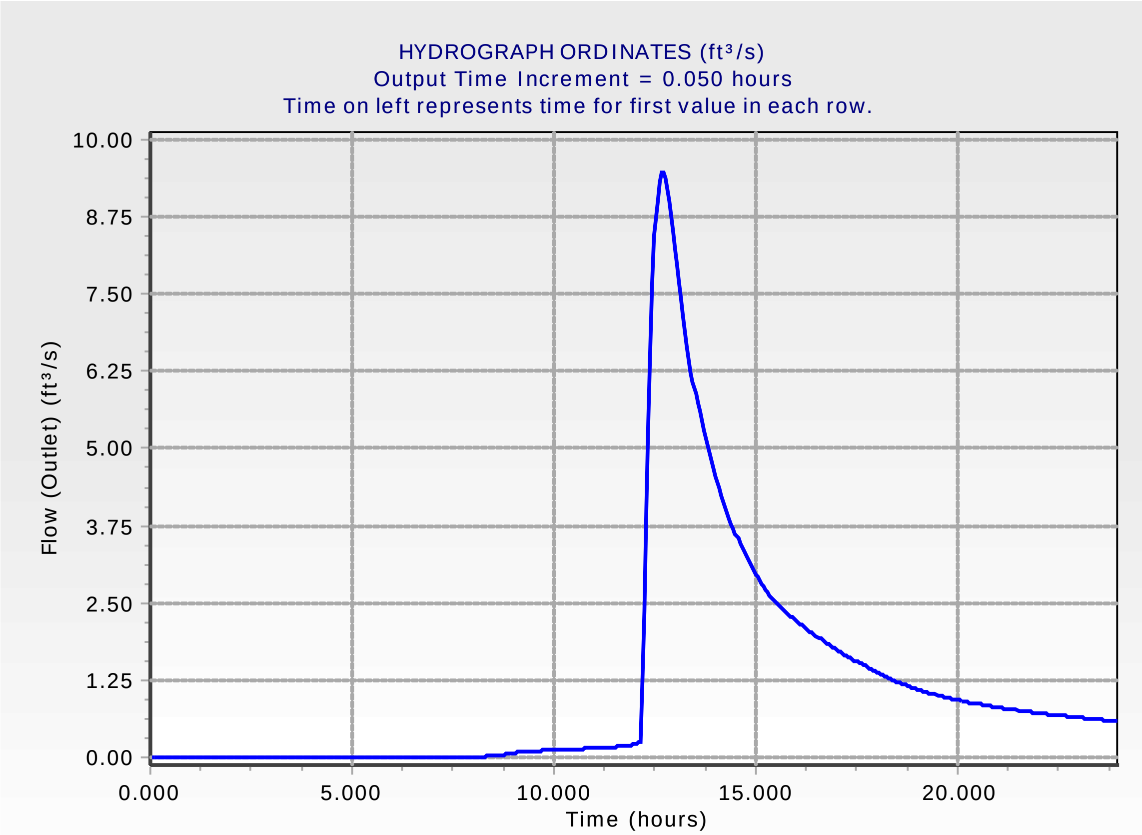
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.800	0.00	0.00	0.00	0.00	0.00
8.050	0.00	0.01	0.01	0.01	0.01
8.300	0.01	0.02	0.02	0.02	0.02
8.550	0.03	0.03	0.03	0.04	0.04
8.800	0.05	0.05	0.06	0.06	0.07
9.050	0.08	0.08	0.09	0.10	0.10
9.300	0.10	0.10	0.10	0.11	0.11
9.550	0.11	0.11	0.11	0.11	0.11
9.800	0.11	0.11	0.11	0.11	0.12
10.050	0.12	0.12	0.12	0.12	0.12
10.300	0.12	0.13	0.13	0.13	0.13
10.550	0.13	0.13	0.14	0.14	0.14
10.800	0.14	0.15	0.15	0.15	0.15
11.050	0.16	0.16	0.16	0.16	0.16
11.300	0.16	0.16	0.17	0.17	0.17
11.550	0.17	0.18	0.18	0.18	0.19
11.800	0.19	0.20	0.20	0.21	0.22
12.050	0.23	0.24	0.25	1.29	2.37
12.300	4.02	5.41	6.58	7.65	8.45
12.550	8.99	9.32	9.47	9.47	9.37
12.800	9.20	8.99	8.75	8.50	8.23
13.050	7.96	7.70	7.43	7.17	6.92
13.300	6.67	6.44	6.24	6.07	5.90
13.550	5.74	5.59	5.45	5.31	5.17
13.800	5.04	4.92	4.80	4.68	4.56
14.050	4.45	4.35	4.24	4.14	4.05
14.300	3.95	3.86	3.78	3.70	3.62
14.550	3.54	3.47	3.40	3.33	3.27
14.800	3.20	3.14	3.08	3.03	2.97
15.050	2.92	2.87	2.82	2.77	2.72
15.300	2.67	2.63	2.58	2.54	2.50
15.550	2.46	2.41	2.39	2.36	2.34
15.800	2.31	2.29	2.26	2.24	2.22
16.050	2.19	2.16	2.14	2.11	2.09
16.300	2.06	2.04	2.01	1.99	1.97
16.550	1.94	1.92	1.90	1.87	1.85
16.800	1.83	1.81	1.79	1.77	1.75
17.050	1.73	1.71	1.69	1.67	1.65
17.300	1.63	1.61	1.59	1.57	1.55
17.550	1.54	1.52	1.50	1.48	1.46
17.800	1.45	1.43	1.41	1.40	1.38
18.050	1.36	1.35	1.33	1.31	1.30
18.300	1.28	1.27	1.25	1.24	1.22
18.550	1.21	1.20	1.18	1.17	1.16
18.800	1.15	1.14	1.12	1.11	1.10
19.050	1.09	1.08	1.07	1.06	1.05
19.300	1.04	1.03	1.02	1.01	1.01
19.550	1.00	0.99	0.98	0.97	0.97

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.800	0.96	0.95	0.94	0.94	0.93
20.050	0.92	0.91	0.91	0.90	0.89
20.300	0.89	0.88	0.87	0.87	0.86
20.550	0.86	0.85	0.85	0.84	0.83
20.800	0.83	0.82	0.82	0.81	0.81
21.050	0.80	0.80	0.79	0.79	0.78
21.300	0.78	0.77	0.77	0.77	0.76
21.550	0.76	0.75	0.75	0.74	0.74
21.800	0.74	0.73	0.73	0.72	0.72
22.050	0.72	0.71	0.71	0.70	0.70
22.300	0.70	0.69	0.69	0.69	0.68
22.550	0.68	0.67	0.67	0.67	0.66
22.800	0.66	0.66	0.65	0.65	0.65
23.050	0.64	0.64	0.64	0.63	0.63
23.300	0.62	0.62	0.62	0.61	0.61
23.550	0.61	0.60	0.60	0.60	0.59
23.800	0.59	0.59	0.58	0.58	0.58

Subsection: Pond Routed Hydrograph (total out) Return Event: 100 years
Label: DT-1 (OUT) Storm Event: 100-yr



Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	1.2500 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	369.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	8.77 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.32 ft³/s	Time to Peak (Infiltration)	12.550 hours
Flow (Peak Outlet)	1.61 ft³/s	Time to Peak (Flow, Outlet)	12.550 hours

Elevation (Water Surface, Peak)	370.30 ft
Volume (Peak)	0.299 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.660 ac-ft
Volume (Total Infiltration)	0.305 ac-ft
Volume (Total Outlet Outflow)	0.213 ac-ft
Volume (Retained)	0.141 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

Infiltration

Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	1.2500 in/h

Initial Conditions

Elevation (Water Surface, Initial)	369.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	15.55 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.34 ft³/s	Time to Peak (Infiltration)	12.350 hours
Flow (Peak Outlet)	6.84 ft³/s	Time to Peak (Flow, Outlet)	12.350 hours

Elevation (Water Surface, Peak)	370.93 ft
Volume (Peak)	0.464 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.243 ac-ft
Volume (Total Infiltration)	0.332 ac-ft
Volume (Total Outlet Outflow)	0.716 ac-ft
Volume (Retained)	0.194 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	1.2500 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	369.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	26.05 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.38 ft³/s	Time to Peak (Infiltration)	12.250 hours
Flow (Peak Outlet)	14.81 ft³/s	Time to Peak (Flow, Outlet)	12.250 hours

Elevation (Water Surface, Peak)	371.66 ft
Volume (Peak)	0.673 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.181 ac-ft
Volume (Total Infiltration)	0.374 ac-ft
Volume (Total Outlet Outflow)	1.583 ac-ft
Volume (Retained)	0.223 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration

Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	1.2500 in/h

Initial Conditions

Elevation (Water Surface, Initial)	369.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	32.11 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.40 ft³/s	Time to Peak (Infiltration)	12.250 hours
Flow (Peak Outlet)	18.87 ft³/s	Time to Peak (Flow, Outlet)	12.250 hours

Elevation (Water Surface, Peak)	372.01 ft
Volume (Peak)	0.783 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.733 ac-ft
Volume (Total Infiltration)	0.395 ac-ft
Volume (Total Outlet Outflow)	2.112 ac-ft
Volume (Retained)	0.226 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Peak Discharge	0.32 ft³/s
Time to Peak	12.550 hours
Hydrograph Volume	0.303 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

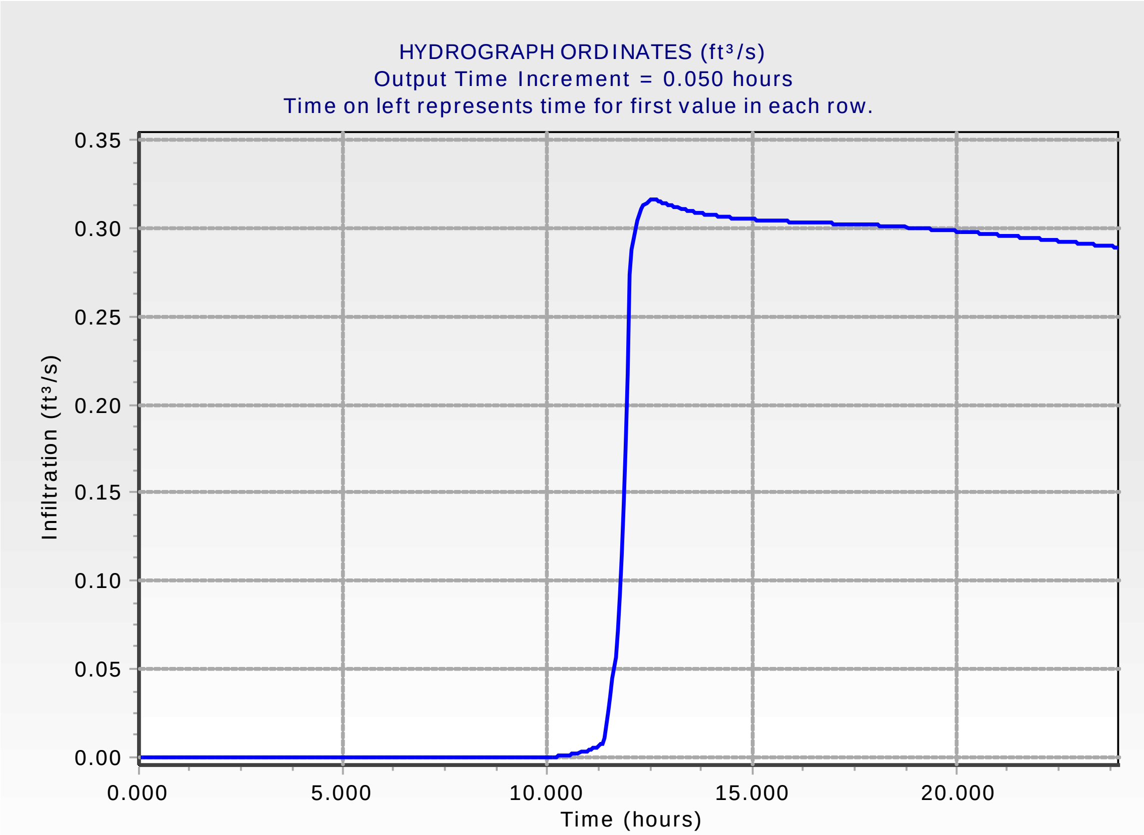
Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
10.400	0.00	0.00	0.00	0.00	0.00
10.650	0.00	0.00	0.00	0.00	0.00
10.900	0.00	0.00	0.00	0.00	0.00
11.150	0.01	0.01	0.01	0.01	0.01
11.400	0.01	0.02	0.03	0.03	0.04
11.650	0.06	0.07	0.09	0.11	0.14
11.900	0.18	0.22	0.27	0.29	0.29
12.150	0.30	0.30	0.31	0.31	0.31
12.400	0.31	0.32	0.32	0.32	0.32
12.650	0.32	0.32	0.31	0.31	0.31
12.900	0.31	0.31	0.31	0.31	0.31
13.150	0.31	0.31	0.31	0.31	0.31
13.400	0.31	0.31	0.31	0.31	0.31
13.650	0.31	0.31	0.31	0.31	0.31
13.900	0.31	0.31	0.31	0.31	0.31
14.150	0.31	0.31	0.31	0.31	0.31
14.400	0.31	0.31	0.31	0.31	0.31
14.650	0.31	0.31	0.31	0.31	0.31
14.900	0.31	0.30	0.30	0.30	0.30
15.150	0.30	0.30	0.30	0.30	0.30
15.400	0.30	0.30	0.30	0.30	0.30
15.650	0.30	0.30	0.30	0.30	0.30
15.900	0.30	0.30	0.30	0.30	0.30
16.150	0.30	0.30	0.30	0.30	0.30
16.400	0.30	0.30	0.30	0.30	0.30
16.650	0.30	0.30	0.30	0.30	0.30
16.900	0.30	0.30	0.30	0.30	0.30
17.150	0.30	0.30	0.30	0.30	0.30
17.400	0.30	0.30	0.30	0.30	0.30
17.650	0.30	0.30	0.30	0.30	0.30
17.900	0.30	0.30	0.30	0.30	0.30
18.150	0.30	0.30	0.30	0.30	0.30
18.400	0.30	0.30	0.30	0.30	0.30
18.650	0.30	0.30	0.30	0.30	0.30
18.900	0.30	0.30	0.30	0.30	0.30
19.150	0.30	0.30	0.30	0.30	0.30
19.400	0.30	0.30	0.30	0.30	0.30
19.650	0.30	0.30	0.30	0.30	0.30
19.900	0.30	0.30	0.30	0.30	0.30
20.150	0.30	0.30	0.30	0.30	0.30
20.400	0.30	0.30	0.30	0.30	0.30
20.650	0.30	0.30	0.30	0.30	0.30
20.900	0.30	0.30	0.30	0.30	0.30
21.150	0.30	0.30	0.30	0.30	0.30
21.400	0.30	0.30	0.30	0.29	0.29
21.650	0.29	0.29	0.29	0.29	0.29
21.900	0.29	0.29	0.29	0.29	0.29
22.150	0.29	0.29	0.29	0.29	0.29

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.400	0.29	0.29	0.29	0.29	0.29
22.650	0.29	0.29	0.29	0.29	0.29
22.900	0.29	0.29	0.29	0.29	0.29
23.150	0.29	0.29	0.29	0.29	0.29
23.400	0.29	0.29	0.29	0.29	0.29
23.650	0.29	0.29	0.29	0.29	0.29
23.900	0.29	0.29	0.29	(N/A)	(N/A)

Subsection: Pond Infiltration Hydrograph
Label: IF-1 (INF)

Return Event: 2 years
Storm Event: 2-yr



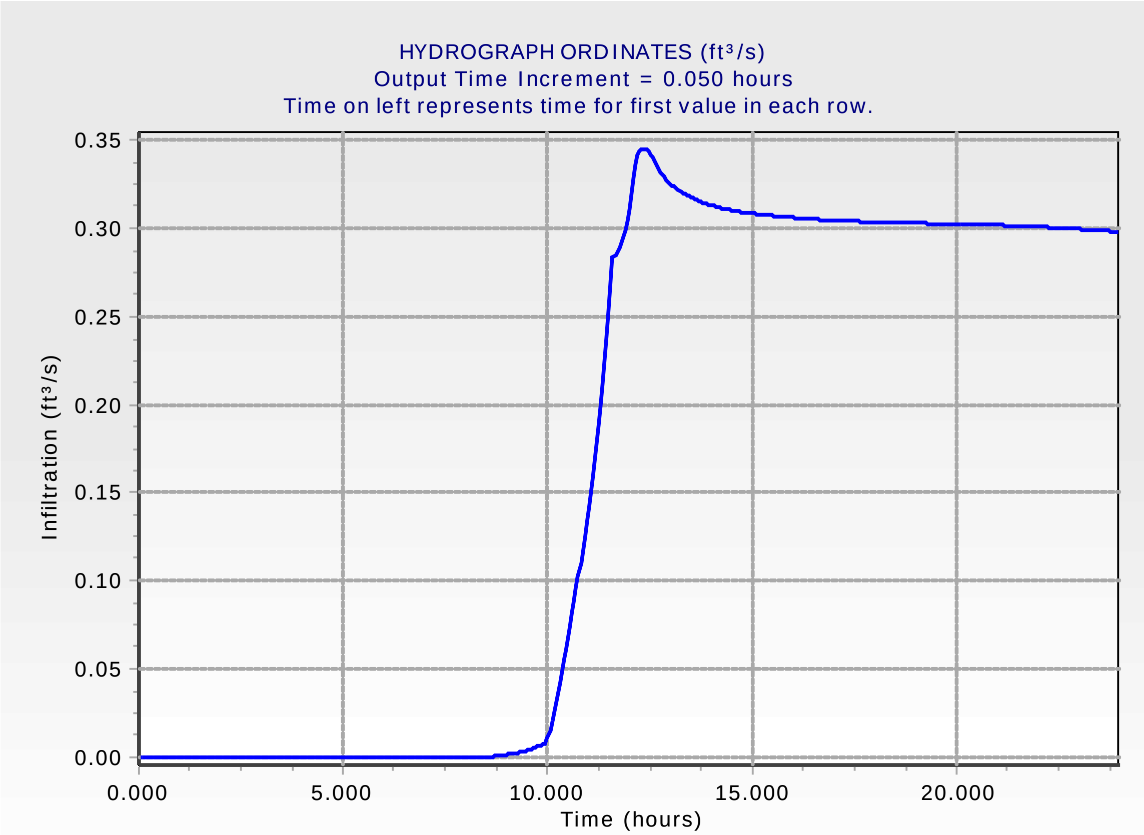
Peak Discharge	0.34 ft³/s
Time to Peak	12.350 hours
Hydrograph Volume	0.331 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.850	0.00	0.00	0.00	0.00	0.00
9.100	0.00	0.00	0.00	0.00	0.00
9.350	0.00	0.00	0.00	0.00	0.00
9.600	0.00	0.01	0.01	0.01	0.01
9.850	0.01	0.01	0.01	0.01	0.02
10.100	0.02	0.03	0.03	0.04	0.04
10.350	0.05	0.06	0.06	0.07	0.07
10.600	0.08	0.09	0.10	0.10	0.11
10.850	0.12	0.13	0.13	0.14	0.15
11.100	0.16	0.17	0.18	0.19	0.20
11.350	0.21	0.22	0.24	0.25	0.27
11.600	0.28	0.28	0.29	0.29	0.29
11.850	0.30	0.30	0.30	0.31	0.32
12.100	0.33	0.34	0.34	0.34	0.34
12.350	0.34	0.34	0.34	0.34	0.34
12.600	0.34	0.34	0.33	0.33	0.33
12.850	0.33	0.33	0.33	0.33	0.32
13.100	0.32	0.32	0.32	0.32	0.32
13.350	0.32	0.32	0.32	0.32	0.32
13.600	0.32	0.32	0.32	0.31	0.31
13.850	0.31	0.31	0.31	0.31	0.31
14.100	0.31	0.31	0.31	0.31	0.31
14.350	0.31	0.31	0.31	0.31	0.31
14.600	0.31	0.31	0.31	0.31	0.31
14.850	0.31	0.31	0.31	0.31	0.31
15.100	0.31	0.31	0.31	0.31	0.31
15.350	0.31	0.31	0.31	0.31	0.31
15.600	0.31	0.31	0.31	0.31	0.31
15.850	0.31	0.31	0.31	0.31	0.31
16.100	0.31	0.31	0.31	0.31	0.31
16.350	0.31	0.31	0.31	0.30	0.30
16.600	0.30	0.30	0.30	0.30	0.30
16.850	0.30	0.30	0.30	0.30	0.30
17.100	0.30	0.30	0.30	0.30	0.30
17.350	0.30	0.30	0.30	0.30	0.30
17.600	0.30	0.30	0.30	0.30	0.30
17.850	0.30	0.30	0.30	0.30	0.30
18.100	0.30	0.30	0.30	0.30	0.30
18.350	0.30	0.30	0.30	0.30	0.30
18.600	0.30	0.30	0.30	0.30	0.30
18.850	0.30	0.30	0.30	0.30	0.30
19.100	0.30	0.30	0.30	0.30	0.30
19.350	0.30	0.30	0.30	0.30	0.30
19.600	0.30	0.30	0.30	0.30	0.30
19.850	0.30	0.30	0.30	0.30	0.30
20.100	0.30	0.30	0.30	0.30	0.30
20.350	0.30	0.30	0.30	0.30	0.30
20.600	0.30	0.30	0.30	0.30	0.30

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.850	0.30	0.30	0.30	0.30	0.30
21.100	0.30	0.30	0.30	0.30	0.30
21.350	0.30	0.30	0.30	0.30	0.30
21.600	0.30	0.30	0.30	0.30	0.30
21.850	0.30	0.30	0.30	0.30	0.30
22.100	0.30	0.30	0.30	0.30	0.30
22.350	0.30	0.30	0.30	0.30	0.30
22.600	0.30	0.30	0.30	0.30	0.30
22.850	0.30	0.30	0.30	0.30	0.30
23.100	0.30	0.30	0.30	0.30	0.30
23.350	0.30	0.30	0.30	0.30	0.30
23.600	0.30	0.30	0.30	0.30	0.30
23.850	0.30	0.30	0.30	0.30	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Infiltration (ft³/s)
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

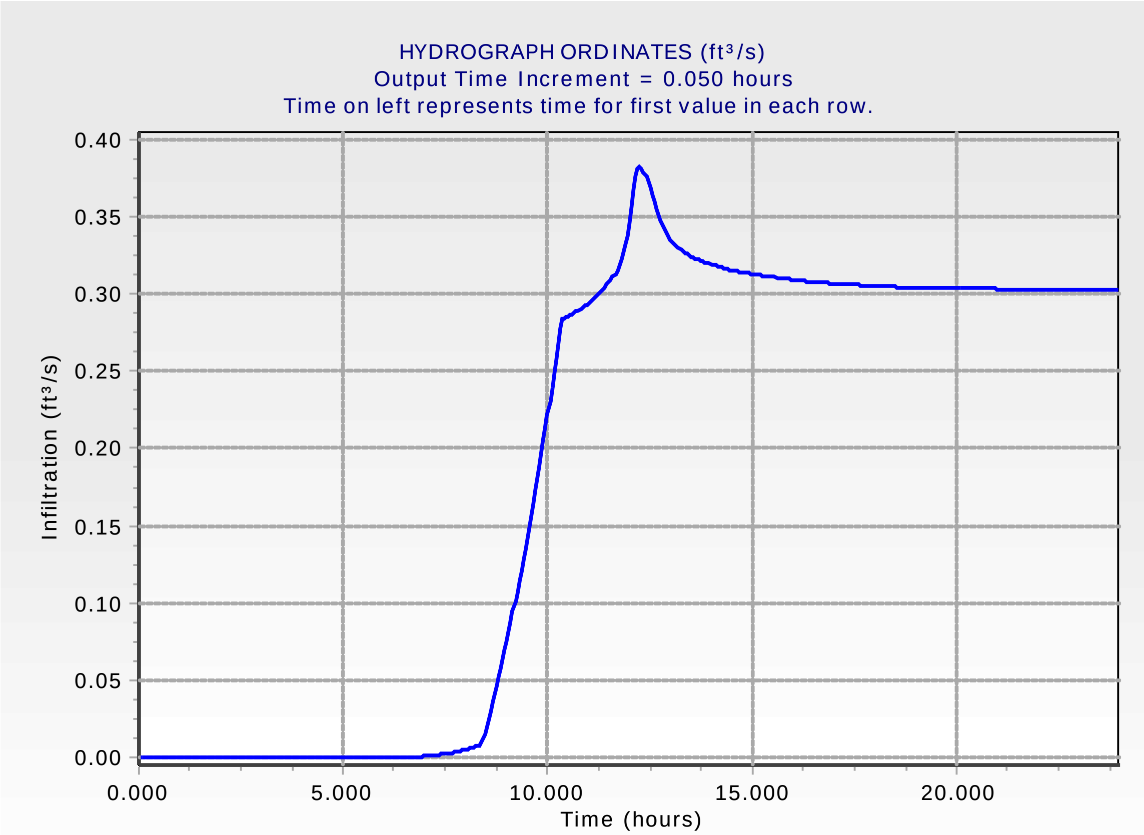
Peak Discharge	0.38 ft³/s
Time to Peak	12.250 hours
Hydrograph Volume	0.373 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.100	0.00	0.00	0.00	0.00	0.00
7.350	0.00	0.00	0.00	0.00	0.00
7.600	0.00	0.00	0.00	0.00	0.00
7.850	0.00	0.00	0.00	0.01	0.01
8.100	0.01	0.01	0.01	0.01	0.01
8.350	0.01	0.01	0.02	0.02	0.03
8.600	0.03	0.04	0.04	0.05	0.05
8.850	0.06	0.06	0.07	0.08	0.08
9.100	0.09	0.09	0.10	0.11	0.11
9.350	0.12	0.13	0.14	0.14	0.15
9.600	0.16	0.16	0.17	0.18	0.19
9.850	0.20	0.21	0.21	0.22	0.23
10.100	0.24	0.25	0.26	0.27	0.28
10.350	0.28	0.28	0.28	0.29	0.29
10.600	0.29	0.29	0.29	0.29	0.29
10.850	0.29	0.29	0.29	0.29	0.30
11.100	0.30	0.30	0.30	0.30	0.30
11.350	0.30	0.30	0.31	0.31	0.31
11.600	0.31	0.31	0.32	0.32	0.32
11.850	0.33	0.33	0.34	0.35	0.36
12.100	0.37	0.38	0.38	0.38	0.38
12.350	0.38	0.38	0.37	0.37	0.36
12.600	0.36	0.36	0.35	0.35	0.34
12.850	0.34	0.34	0.34	0.34	0.33
13.100	0.33	0.33	0.33	0.33	0.33
13.350	0.33	0.33	0.33	0.32	0.32
13.600	0.32	0.32	0.32	0.32	0.32
13.850	0.32	0.32	0.32	0.32	0.32
14.100	0.32	0.32	0.32	0.32	0.32
14.350	0.32	0.32	0.32	0.32	0.32
14.600	0.32	0.31	0.31	0.31	0.31
14.850	0.31	0.31	0.31	0.31	0.31
15.100	0.31	0.31	0.31	0.31	0.31
15.350	0.31	0.31	0.31	0.31	0.31
15.600	0.31	0.31	0.31	0.31	0.31
15.850	0.31	0.31	0.31	0.31	0.31
16.100	0.31	0.31	0.31	0.31	0.31
16.350	0.31	0.31	0.31	0.31	0.31
16.600	0.31	0.31	0.31	0.31	0.31
16.850	0.31	0.31	0.31	0.31	0.31
17.100	0.31	0.31	0.31	0.31	0.31
17.350	0.31	0.31	0.31	0.31	0.31
17.600	0.31	0.31	0.31	0.31	0.31
17.850	0.31	0.31	0.31	0.31	0.31
18.100	0.31	0.31	0.31	0.30	0.30
18.350	0.30	0.30	0.30	0.30	0.30
18.600	0.30	0.30	0.30	0.30	0.30
18.850	0.30	0.30	0.30	0.30	0.30

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.100	0.30	0.30	0.30	0.30	0.30
19.350	0.30	0.30	0.30	0.30	0.30
19.600	0.30	0.30	0.30	0.30	0.30
19.850	0.30	0.30	0.30	0.30	0.30
20.100	0.30	0.30	0.30	0.30	0.30
20.350	0.30	0.30	0.30	0.30	0.30
20.600	0.30	0.30	0.30	0.30	0.30
20.850	0.30	0.30	0.30	0.30	0.30
21.100	0.30	0.30	0.30	0.30	0.30
21.350	0.30	0.30	0.30	0.30	0.30
21.600	0.30	0.30	0.30	0.30	0.30
21.850	0.30	0.30	0.30	0.30	0.30
22.100	0.30	0.30	0.30	0.30	0.30
22.350	0.30	0.30	0.30	0.30	0.30
22.600	0.30	0.30	0.30	0.30	0.30
22.850	0.30	0.30	0.30	0.30	0.30
23.100	0.30	0.30	0.30	0.30	0.30
23.350	0.30	0.30	0.30	0.30	0.30
23.600	0.30	0.30	0.30	0.30	0.30
23.850	0.30	0.30	0.30	0.30	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Infiltration (ft³/s)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

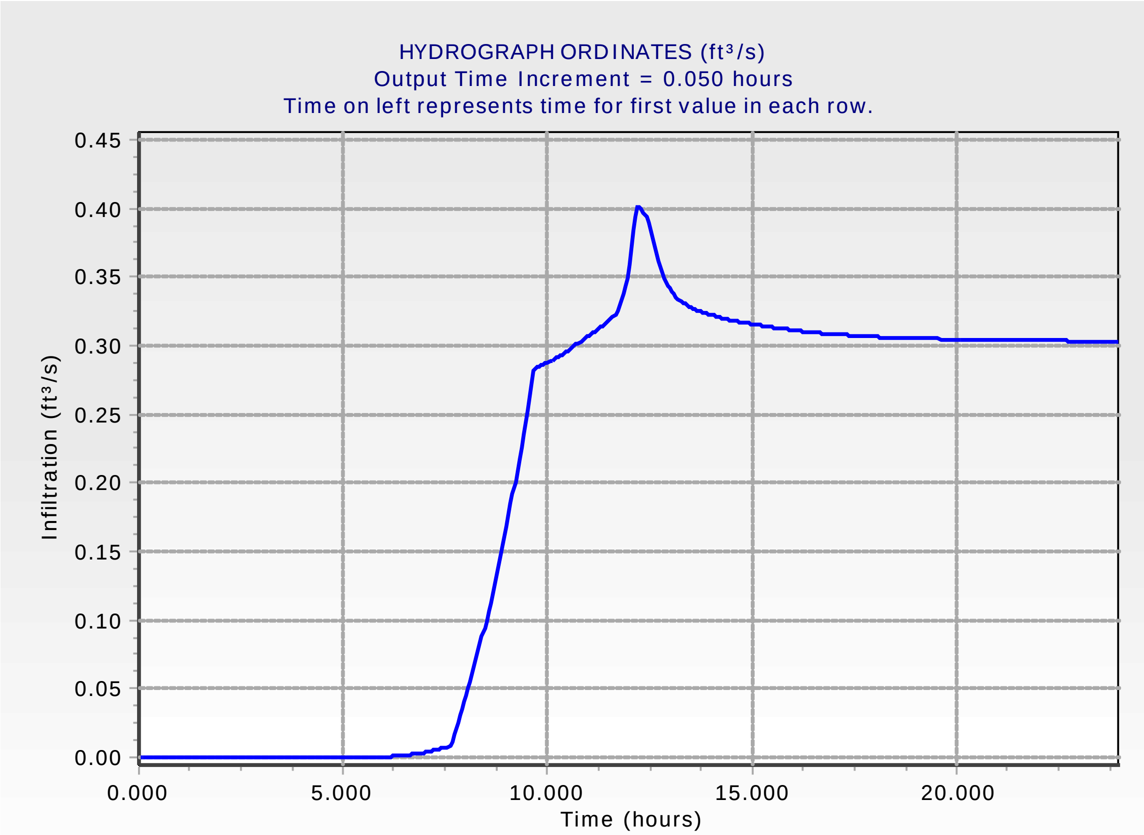
Peak Discharge	0.40 ft³/s
Time to Peak	12.250 hours
Hydrograph Volume	0.393 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
6.350	0.00	0.00	0.00	0.00	0.00
6.600	0.00	0.00	0.00	0.00	0.00
6.850	0.00	0.00	0.00	0.00	0.00
7.100	0.00	0.00	0.00	0.01	0.01
7.350	0.01	0.01	0.01	0.01	0.01
7.600	0.01	0.01	0.02	0.02	0.03
7.850	0.03	0.04	0.04	0.05	0.05
8.100	0.06	0.06	0.07	0.07	0.08
8.350	0.08	0.09	0.09	0.10	0.11
8.600	0.11	0.12	0.13	0.13	0.14
8.850	0.15	0.15	0.16	0.17	0.18
9.100	0.18	0.19	0.20	0.21	0.22
9.350	0.23	0.23	0.24	0.25	0.26
9.600	0.27	0.28	0.28	0.28	0.29
9.850	0.29	0.29	0.29	0.29	0.29
10.100	0.29	0.29	0.29	0.29	0.29
10.350	0.29	0.29	0.30	0.30	0.30
10.600	0.30	0.30	0.30	0.30	0.30
10.850	0.30	0.31	0.31	0.31	0.31
11.100	0.31	0.31	0.31	0.31	0.31
11.350	0.31	0.32	0.32	0.32	0.32
11.600	0.32	0.32	0.33	0.33	0.33
11.850	0.34	0.34	0.35	0.36	0.37
12.100	0.38	0.39	0.40	0.40	0.40
12.350	0.40	0.39	0.39	0.38	0.38
12.600	0.37	0.37	0.36	0.36	0.35
12.850	0.35	0.35	0.34	0.34	0.34
13.100	0.34	0.34	0.33	0.33	0.33
13.350	0.33	0.33	0.33	0.33	0.33
13.600	0.33	0.33	0.33	0.32	0.32
13.850	0.32	0.32	0.32	0.32	0.32
14.100	0.32	0.32	0.32	0.32	0.32
14.350	0.32	0.32	0.32	0.32	0.32
14.600	0.32	0.32	0.32	0.32	0.32
14.850	0.32	0.32	0.32	0.32	0.32
15.100	0.32	0.32	0.31	0.31	0.31
15.350	0.31	0.31	0.31	0.31	0.31
15.600	0.31	0.31	0.31	0.31	0.31
15.850	0.31	0.31	0.31	0.31	0.31
16.100	0.31	0.31	0.31	0.31	0.31
16.350	0.31	0.31	0.31	0.31	0.31
16.600	0.31	0.31	0.31	0.31	0.31
16.850	0.31	0.31	0.31	0.31	0.31
17.100	0.31	0.31	0.31	0.31	0.31
17.350	0.31	0.31	0.31	0.31	0.31
17.600	0.31	0.31	0.31	0.31	0.31
17.850	0.31	0.31	0.31	0.31	0.31
18.100	0.31	0.31	0.31	0.31	0.31

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

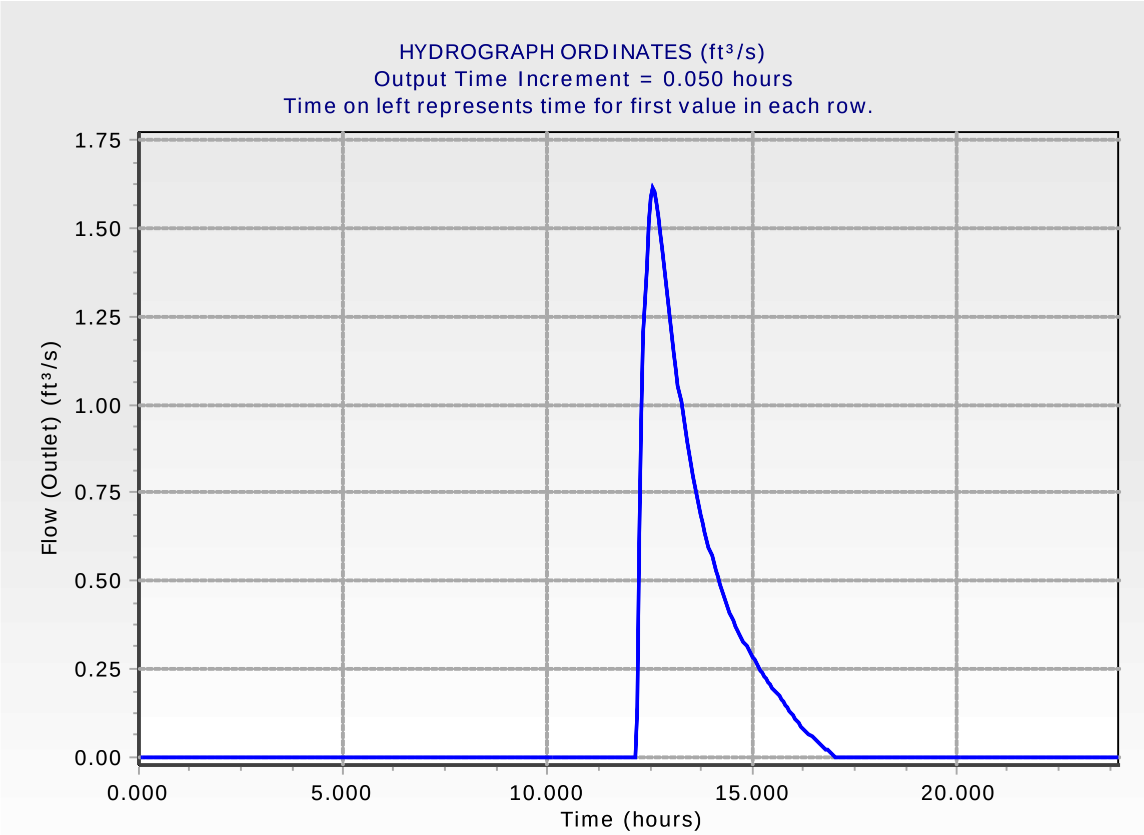
Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
18.350	0.31	0.31	0.31	0.31	0.31
18.600	0.31	0.31	0.31	0.31	0.31
18.850	0.31	0.31	0.31	0.31	0.31
19.100	0.31	0.31	0.31	0.31	0.31
19.350	0.31	0.31	0.30	0.30	0.30
19.600	0.30	0.30	0.30	0.30	0.30
19.850	0.30	0.30	0.30	0.30	0.30
20.100	0.30	0.30	0.30	0.30	0.30
20.350	0.30	0.30	0.30	0.30	0.30
20.600	0.30	0.30	0.30	0.30	0.30
20.850	0.30	0.30	0.30	0.30	0.30
21.100	0.30	0.30	0.30	0.30	0.30
21.350	0.30	0.30	0.30	0.30	0.30
21.600	0.30	0.30	0.30	0.30	0.30
21.850	0.30	0.30	0.30	0.30	0.30
22.100	0.30	0.30	0.30	0.30	0.30
22.350	0.30	0.30	0.30	0.30	0.30
22.600	0.30	0.30	0.30	0.30	0.30
22.850	0.30	0.30	0.30	0.30	0.30
23.100	0.30	0.30	0.30	0.30	0.30
23.350	0.30	0.30	0.30	0.30	0.30
23.600	0.30	0.30	0.30	0.30	0.30
23.850	0.30	0.30	0.30	0.30	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Infiltration (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	1.61 ft^3/s
Time to Peak	12.550 hours
Hydrograph Volume	0.213 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

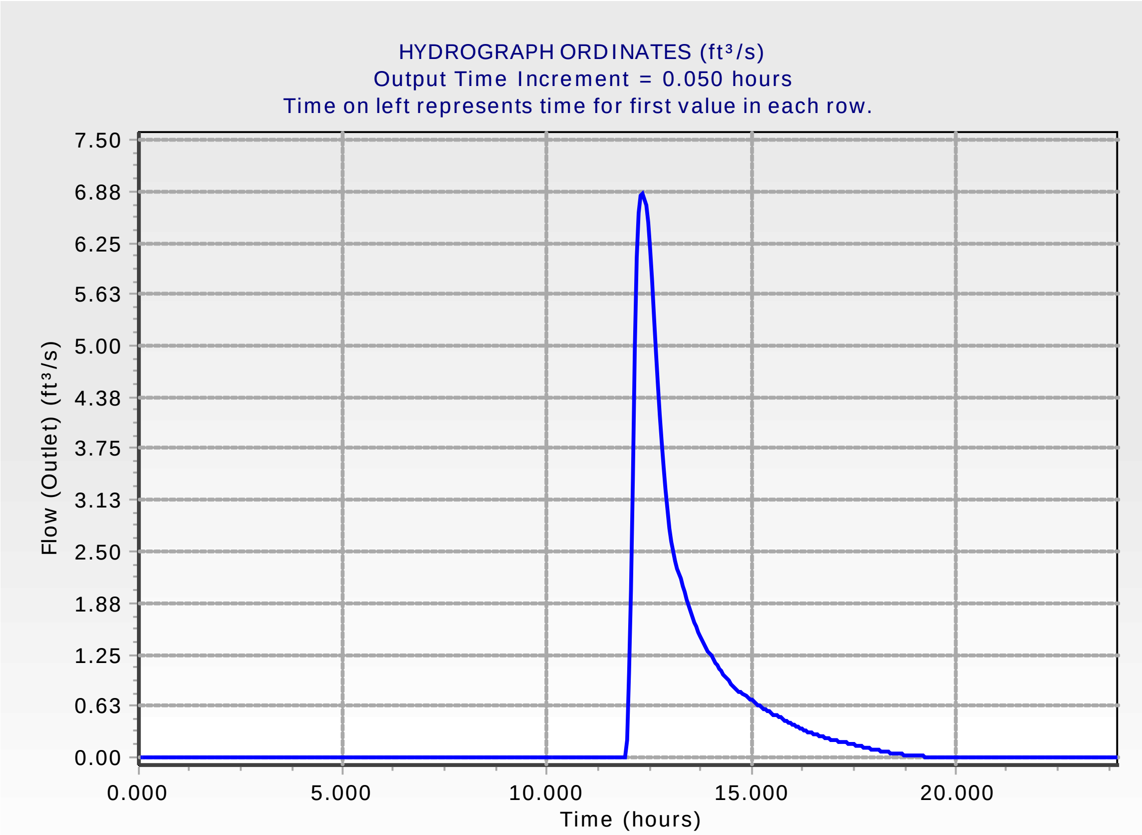
Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
12.150	0.00	0.14	0.61	0.95	1.20
12.400	1.39	1.51	1.59	1.61	1.60
12.650	1.57	1.53	1.49	1.44	1.39
12.900	1.34	1.29	1.24	1.20	1.15
13.150	1.10	1.05	1.01	0.97	0.93
13.400	0.90	0.86	0.83	0.80	0.77
13.650	0.74	0.71	0.69	0.66	0.64
13.900	0.62	0.59	0.57	0.55	0.53
14.150	0.51	0.49	0.47	0.46	0.44
14.400	0.43	0.41	0.40	0.38	0.37
14.650	0.36	0.35	0.34	0.33	0.32
14.900	0.30	0.29	0.28	0.28	0.27
15.150	0.26	0.25	0.24	0.23	0.22
15.400	0.21	0.21	0.20	0.19	0.18
15.650	0.17	0.16	0.16	0.15	0.14
15.900	0.13	0.13	0.12	0.11	0.10
16.150	0.10	0.09	0.08	0.08	0.07
16.400	0.06	0.06	0.05	0.05	0.04
16.650	0.04	0.03	0.03	0.02	0.02
16.900	0.01	0.01	0.01	0.00	0.00


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	6.84 ft^3/s
Time to Peak	12.350 hours
Hydrograph Volume	0.716 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.900	0.00	0.21	1.03	2.03	3.40
12.150	4.99	6.08	6.62	6.82	6.84
12.400	6.72	6.49	6.17	5.78	5.36
12.650	4.93	4.52	4.15	3.82	3.52
12.900	3.25	3.01	2.78	2.61	2.49
13.150	2.38	2.28	2.18	2.09	2.00
13.400	1.92	1.85	1.77	1.71	1.64
13.650	1.58	1.53	1.47	1.42	1.37
13.900	1.32	1.28	1.23	1.19	1.15
14.150	1.11	1.08	1.04	1.01	0.98
14.400	0.95	0.92	0.90	0.87	0.85
14.650	0.83	0.81	0.78	0.76	0.75
14.900	0.73	0.71	0.69	0.67	0.66
15.150	0.64	0.62	0.61	0.59	0.58
15.400	0.56	0.55	0.54	0.52	0.51
15.650	0.49	0.48	0.47	0.45	0.44
15.900	0.43	0.41	0.40	0.39	0.38
16.150	0.36	0.35	0.34	0.33	0.32
16.400	0.31	0.30	0.29	0.28	0.27
16.650	0.27	0.26	0.25	0.24	0.24
16.900	0.23	0.22	0.21	0.21	0.20
17.150	0.19	0.19	0.18	0.18	0.17
17.400	0.16	0.16	0.15	0.15	0.14
17.650	0.13	0.13	0.12	0.12	0.11
17.900	0.11	0.10	0.10	0.09	0.08
18.150	0.08	0.07	0.07	0.06	0.06
18.400	0.06	0.05	0.05	0.05	0.04
18.650	0.04	0.04	0.03	0.03	0.03
18.900	0.03	0.02	0.02	0.02	0.02
19.150	0.01	0.01	0.01	0.01	0.01
19.400	0.00	0.00	0.00	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
7.50
6.88
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Flow (Outlet) (ft³/s)
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	14.81 ft³/s
Time to Peak	12.250 hours
Hydrograph Volume	1.583 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

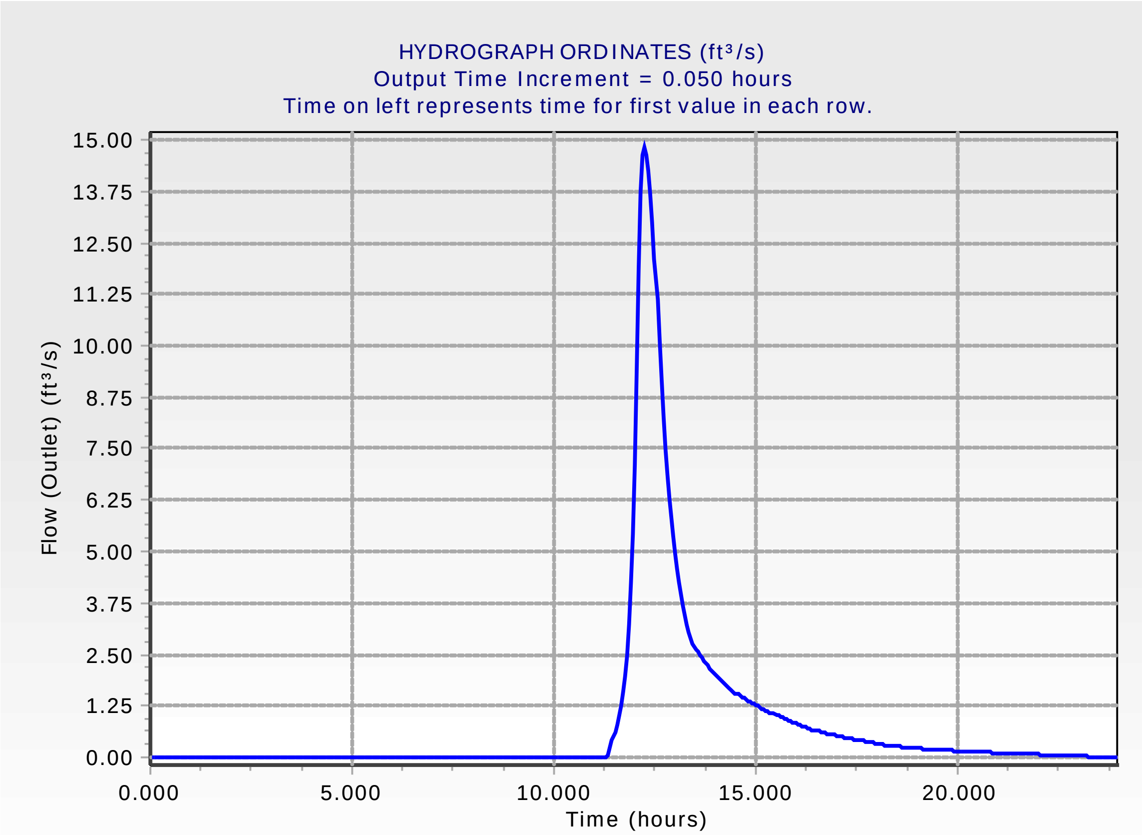
Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.300	0.00	0.05	0.24	0.43	0.61
11.550	0.80	1.01	1.26	1.58	1.98
11.800	2.46	3.23	4.23	5.42	7.09
12.050	9.43	11.86	13.72	14.61	14.81
12.300	14.63	14.24	13.71	13.01	12.09
12.550	11.10	10.11	9.15	8.27	7.50
12.800	6.88	6.32	5.82	5.37	4.96
13.050	4.59	4.26	3.96	3.69	3.45
13.300	3.24	3.06	2.89	2.75	2.63
13.550	2.56	2.49	2.42	2.35	2.29
13.800	2.23	2.17	2.11	2.06	2.00
14.050	1.95	1.90	1.85	1.80	1.75
14.300	1.71	1.67	1.63	1.59	1.56
14.550	1.52	1.49	1.46	1.43	1.40
14.800	1.37	1.34	1.32	1.29	1.26
15.050	1.24	1.21	1.19	1.17	1.14
15.300	1.12	1.10	1.07	1.05	1.03
15.550	1.01	0.99	0.97	0.95	0.92
15.800	0.90	0.88	0.86	0.84	0.82
16.050	0.80	0.78	0.76	0.74	0.73
16.300	0.71	0.69	0.68	0.66	0.65
16.550	0.63	0.62	0.61	0.60	0.58
16.800	0.57	0.56	0.55	0.54	0.53
17.050	0.52	0.51	0.50	0.49	0.48
17.300	0.47	0.46	0.45	0.44	0.43
17.550	0.42	0.41	0.40	0.39	0.38
17.800	0.37	0.36	0.35	0.35	0.34
18.050	0.33	0.32	0.31	0.30	0.30
18.300	0.29	0.28	0.28	0.27	0.26
18.550	0.26	0.25	0.25	0.24	0.24
18.800	0.23	0.23	0.23	0.22	0.22
19.050	0.22	0.21	0.21	0.20	0.20
19.300	0.20	0.19	0.19	0.19	0.19
19.550	0.18	0.18	0.18	0.17	0.17
19.800	0.17	0.17	0.16	0.16	0.16
20.050	0.15	0.15	0.15	0.15	0.14
20.300	0.14	0.14	0.14	0.13	0.13
20.550	0.13	0.13	0.13	0.12	0.12
20.800	0.12	0.12	0.11	0.11	0.11
21.050	0.11	0.11	0.10	0.10	0.10
21.300	0.10	0.10	0.09	0.09	0.09
21.550	0.09	0.09	0.08	0.08	0.08
21.800	0.08	0.08	0.08	0.07	0.07
22.050	0.07	0.07	0.07	0.06	0.06
22.300	0.06	0.06	0.06	0.05	0.05
22.550	0.05	0.05	0.05	0.04	0.04
22.800	0.04	0.04	0.04	0.03	0.03
23.050	0.03	0.03	0.03	0.03	0.02

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.300	0.02	0.02	0.02	0.02	0.01
23.550	0.01	0.01	0.01	0.01	0.00
23.800	0.00	0.00	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out) Return Event: 50 years

Label: IF-1 (OUT) Storm Event: 50-yr



Peak Discharge	18.87 ft³/s
Time to Peak	12.250 hours
Hydrograph Volume	2.112 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

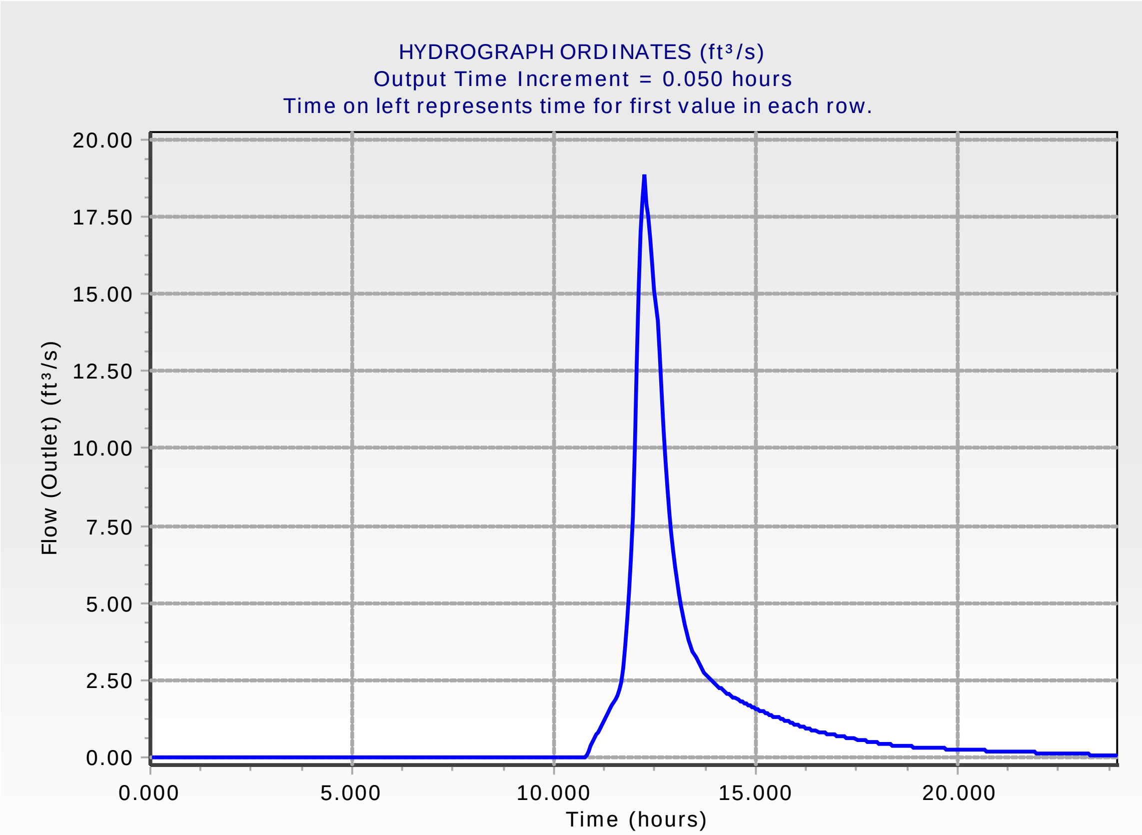
Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
10.750	0.00	0.07	0.22	0.35	0.48
11.000	0.61	0.72	0.84	0.95	1.07
11.250	1.19	1.31	1.44	1.57	1.71
11.500	1.85	2.00	2.19	2.44	2.86
11.750	3.57	4.42	5.38	6.45	7.80
12.000	9.98	12.78	15.12	17.01	18.08
12.250	18.87	17.96	17.48	16.83	16.03
12.500	15.12	14.12	13.04	11.77	10.62
12.750	9.60	8.70	7.92	7.25	6.69
13.000	6.18	5.72	5.30	4.93	4.60
13.250	4.30	4.05	3.82	3.61	3.43
13.500	3.27	3.12	2.98	2.86	2.75
13.750	2.65	2.60	2.54	2.48	2.43
14.000	2.37	2.32	2.27	2.21	2.16
14.250	2.12	2.07	2.03	1.99	1.95
14.500	1.91	1.87	1.84	1.80	1.77
14.750	1.73	1.70	1.67	1.64	1.61
15.000	1.58	1.55	1.52	1.49	1.47
15.250	1.44	1.41	1.39	1.36	1.33
15.500	1.31	1.28	1.26	1.23	1.21
15.750	1.18	1.16	1.13	1.11	1.08
16.000	1.06	1.04	1.01	0.99	0.97
16.250	0.94	0.92	0.91	0.89	0.87
16.500	0.85	0.83	0.82	0.80	0.79
16.750	0.77	0.76	0.74	0.73	0.72
17.000	0.70	0.69	0.68	0.67	0.65
17.250	0.64	0.63	0.62	0.61	0.60
17.500	0.58	0.57	0.56	0.55	0.54
17.750	0.53	0.52	0.51	0.50	0.49
18.000	0.47	0.46	0.45	0.44	0.43
18.250	0.42	0.42	0.41	0.40	0.39
18.500	0.39	0.38	0.37	0.37	0.36
18.750	0.36	0.35	0.35	0.34	0.34
19.000	0.33	0.33	0.32	0.32	0.31
19.250	0.31	0.31	0.30	0.30	0.30
19.500	0.29	0.29	0.28	0.28	0.28
19.750	0.27	0.27	0.27	0.26	0.26
20.000	0.26	0.25	0.25	0.25	0.24
20.250	0.24	0.24	0.24	0.23	0.23
20.500	0.23	0.22	0.22	0.22	0.22
20.750	0.21	0.21	0.21	0.21	0.20
21.000	0.20	0.20	0.20	0.19	0.19
21.250	0.19	0.19	0.18	0.18	0.18
21.500	0.18	0.17	0.17	0.17	0.17
21.750	0.16	0.16	0.16	0.16	0.16
22.000	0.15	0.15	0.15	0.15	0.14
22.250	0.14	0.14	0.14	0.13	0.13
22.500	0.13	0.13	0.12	0.12	0.12

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
22.750	0.12	0.12	0.11	0.11	0.11
23.000	0.11	0.10	0.10	0.10	0.10
23.250	0.09	0.09	0.09	0.09	0.09
23.500	0.08	0.08	0.08	0.08	0.07
23.750	0.07	0.07	0.07	0.06	0.06
24.000	0.06	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Pond Routed Hydrograph (total out)
Label: IF-1 (OUT)

Return Event: 100 years
Storm Event: 100-yr



Infiltration

Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	0.5000 in/h

Initial Conditions

Elevation (Water Surface, Initial)	376.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary

Flow (Peak In)	7.37 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.02 ft³/s	Time to Peak (Infiltration)	12.100 hours
Flow (Peak Outlet)	7.20 ft³/s	Time to Peak (Flow, Outlet)	12.100 hours

Elevation (Water Surface, Peak)	378.26 ft
Volume (Peak)	0.066 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.610 ac-ft
Volume (Total Infiltration)	0.024 ac-ft
Volume (Total Outlet Outflow)	0.530 ac-ft
Volume (Retained)	0.055 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	0.5000 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	376.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft^3/s
Flow (Initial Infiltration)	0.00 ft^3/s
Flow (Initial, Total)	0.00 ft^3/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	12.59 ft^3/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.02 ft^3/s	Time to Peak (Infiltration)	12.100 hours
Flow (Peak Outlet)	12.38 ft^3/s	Time to Peak (Flow, Outlet)	12.100 hours

Elevation (Water Surface, Peak)	378.45 ft
Volume (Peak)	0.075 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.066 ac-ft
Volume (Total Infiltration)	0.027 ac-ft
Volume (Total Outlet Outflow)	0.984 ac-ft
Volume (Retained)	0.055 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	0.5000 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	376.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	20.52 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.03 ft³/s	Time to Peak (Infiltration)	12.100 hours
Flow (Peak Outlet)	20.29 ft³/s	Time to Peak (Flow, Outlet)	12.100 hours

Elevation (Water Surface, Peak)	378.63 ft
Volume (Peak)	0.083 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.789 ac-ft
Volume (Total Infiltration)	0.030 ac-ft
Volume (Total Outlet Outflow)	1.703 ac-ft
Volume (Retained)	0.055 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	Average Infiltration Rate
Infiltration Rate (Average)	0.5000 in/h

Initial Conditions	
Elevation (Water Surface, Initial)	376.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	25.05 ft³/s	Time to Peak (Flow, In)	12.100 hours
Infiltration (Peak)	0.03 ft³/s	Time to Peak (Infiltration)	12.100 hours
Flow (Peak Outlet)	24.84 ft³/s	Time to Peak (Flow, Outlet)	12.100 hours

Elevation (Water Surface, Peak)	378.72 ft
Volume (Peak)	0.088 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.211 ac-ft
Volume (Total Infiltration)	0.032 ac-ft
Volume (Total Outlet Outflow)	2.124 ac-ft
Volume (Retained)	0.055 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.0 %

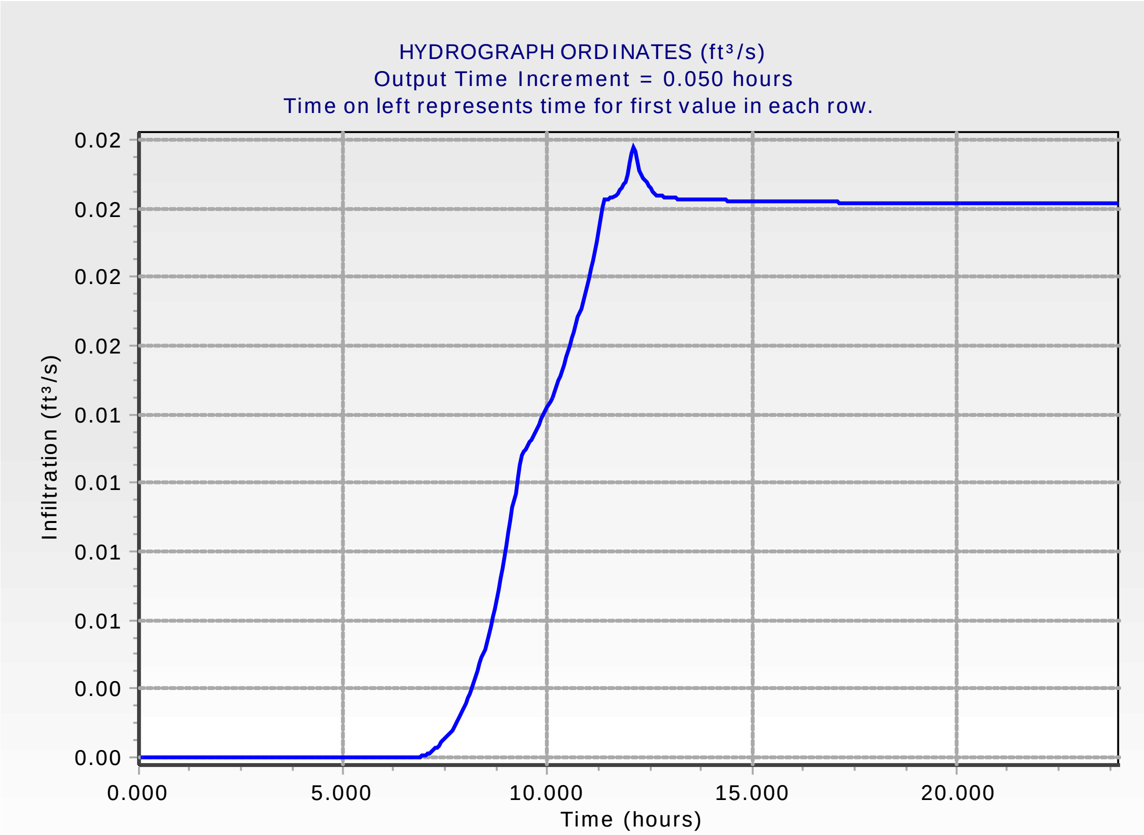
Peak Discharge	0.02 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.024 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.650	0.00	0.00	0.00	0.00	0.00
7.900	0.00	0.00	0.00	0.00	0.00
8.150	0.00	0.00	0.00	0.00	0.00
8.400	0.00	0.00	0.00	0.00	0.00
8.650	0.01	0.01	0.01	0.01	0.01
8.900	0.01	0.01	0.01	0.01	0.01
9.150	0.01	0.01	0.01	0.01	0.01
9.400	0.01	0.01	0.01	0.01	0.01
9.650	0.01	0.01	0.01	0.01	0.01
9.900	0.01	0.01	0.01	0.01	0.01
10.150	0.01	0.01	0.01	0.01	0.01
10.400	0.01	0.01	0.01	0.02	0.02
10.650	0.02	0.02	0.02	0.02	0.02
10.900	0.02	0.02	0.02	0.02	0.02
11.150	0.02	0.02	0.02	0.02	0.02
11.400	0.02	0.02	0.02	0.02	0.02
11.650	0.02	0.02	0.02	0.02	0.02
11.900	0.02	0.02	0.02	0.02	0.02
12.150	0.02	0.02	0.02	0.02	0.02
12.400	0.02	0.02	0.02	0.02	0.02
12.650	0.02	0.02	0.02	0.02	0.02
12.900	0.02	0.02	0.02	0.02	0.02
13.150	0.02	0.02	0.02	0.02	0.02
13.400	0.02	0.02	0.02	0.02	0.02
13.650	0.02	0.02	0.02	0.02	0.02
13.900	0.02	0.02	0.02	0.02	0.02
14.150	0.02	0.02	0.02	0.02	0.02
14.400	0.02	0.02	0.02	0.02	0.02
14.650	0.02	0.02	0.02	0.02	0.02
14.900	0.02	0.02	0.02	0.02	0.02
15.150	0.02	0.02	0.02	0.02	0.02
15.400	0.02	0.02	0.02	0.02	0.02
15.650	0.02	0.02	0.02	0.02	0.02
15.900	0.02	0.02	0.02	0.02	0.02
16.150	0.02	0.02	0.02	0.02	0.02
16.400	0.02	0.02	0.02	0.02	0.02
16.650	0.02	0.02	0.02	0.02	0.02
16.900	0.02	0.02	0.02	0.02	0.02
17.150	0.02	0.02	0.02	0.02	0.02
17.400	0.02	0.02	0.02	0.02	0.02
17.650	0.02	0.02	0.02	0.02	0.02
17.900	0.02	0.02	0.02	0.02	0.02
18.150	0.02	0.02	0.02	0.02	0.02
18.400	0.02	0.02	0.02	0.02	0.02
18.650	0.02	0.02	0.02	0.02	0.02
18.900	0.02	0.02	0.02	0.02	0.02
19.150	0.02	0.02	0.02	0.02	0.02
19.400	0.02	0.02	0.02	0.02	0.02

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
19.650	0.02	0.02	0.02	0.02	0.02
19.900	0.02	0.02	0.02	0.02	0.02
20.150	0.02	0.02	0.02	0.02	0.02
20.400	0.02	0.02	0.02	0.02	0.02
20.650	0.02	0.02	0.02	0.02	0.02
20.900	0.02	0.02	0.02	0.02	0.02
21.150	0.02	0.02	0.02	0.02	0.02
21.400	0.02	0.02	0.02	0.02	0.02
21.650	0.02	0.02	0.02	0.02	0.02
21.900	0.02	0.02	0.02	0.02	0.02
22.150	0.02	0.02	0.02	0.02	0.02
22.400	0.02	0.02	0.02	0.02	0.02
22.650	0.02	0.02	0.02	0.02	0.02
22.900	0.02	0.02	0.02	0.02	0.02
23.150	0.02	0.02	0.02	0.02	0.02
23.400	0.02	0.02	0.02	0.02	0.02
23.650	0.02	0.02	0.02	0.02	0.02
23.900	0.02	0.02	0.02	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Infiltration (ft³/s)
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.00
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

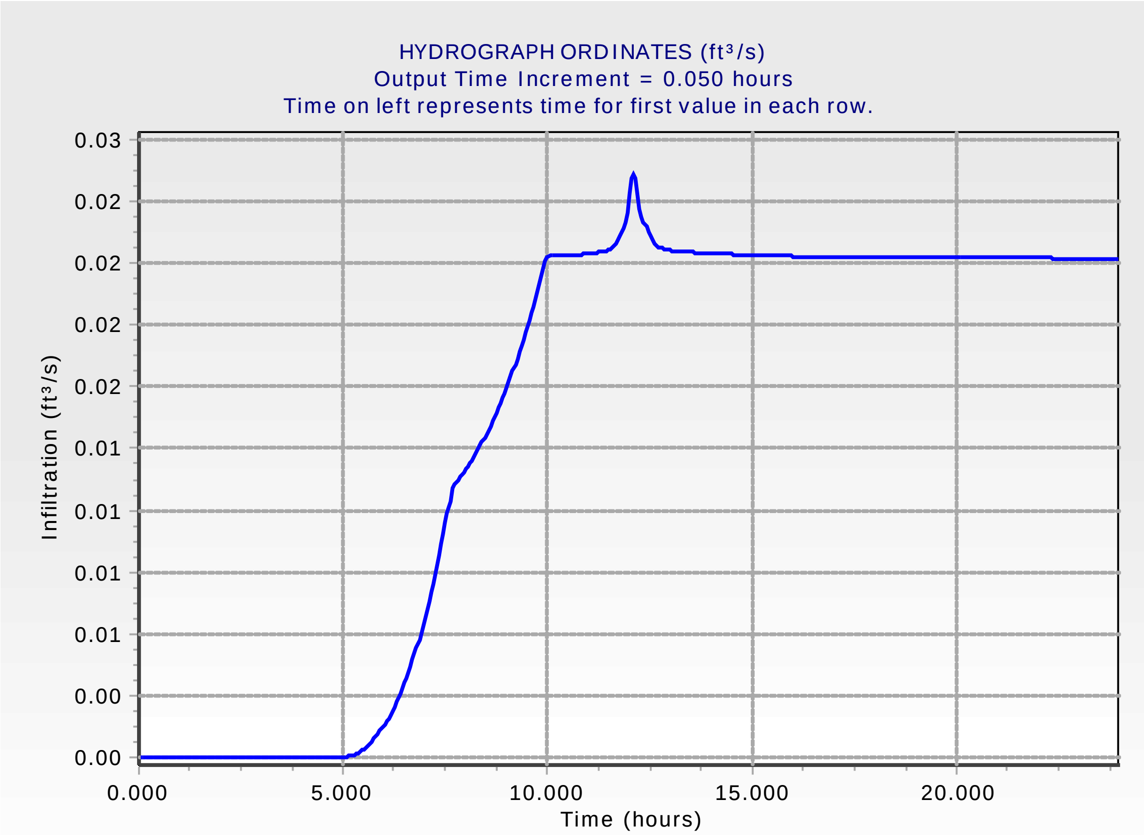
Peak Discharge	0.02 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.027 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.850	0.00	0.00	0.00	0.00	0.00
6.100	0.00	0.00	0.00	0.00	0.00
6.350	0.00	0.00	0.00	0.00	0.00
6.600	0.00	0.00	0.00	0.00	0.00
6.850	0.00	0.01	0.01	0.01	0.01
7.100	0.01	0.01	0.01	0.01	0.01
7.350	0.01	0.01	0.01	0.01	0.01
7.600	0.01	0.01	0.01	0.01	0.01
7.850	0.01	0.01	0.01	0.01	0.01
8.100	0.01	0.01	0.01	0.01	0.01
8.350	0.01	0.01	0.01	0.01	0.01
8.600	0.01	0.01	0.01	0.01	0.01
8.850	0.01	0.01	0.01	0.01	0.02
9.100	0.02	0.02	0.02	0.02	0.02
9.350	0.02	0.02	0.02	0.02	0.02
9.600	0.02	0.02	0.02	0.02	0.02
9.850	0.02	0.02	0.02	0.02	0.02
10.100	0.02	0.02	0.02	0.02	0.02
10.350	0.02	0.02	0.02	0.02	0.02
10.600	0.02	0.02	0.02	0.02	0.02
10.850	0.02	0.02	0.02	0.02	0.02
11.100	0.02	0.02	0.02	0.02	0.02
11.350	0.02	0.02	0.02	0.02	0.02
11.600	0.02	0.02	0.02	0.02	0.02
11.850	0.02	0.02	0.02	0.02	0.02
12.100	0.02	0.02	0.02	0.02	0.02
12.350	0.02	0.02	0.02	0.02	0.02
12.600	0.02	0.02	0.02	0.02	0.02
12.850	0.02	0.02	0.02	0.02	0.02
13.100	0.02	0.02	0.02	0.02	0.02
13.350	0.02	0.02	0.02	0.02	0.02
13.600	0.02	0.02	0.02	0.02	0.02
13.850	0.02	0.02	0.02	0.02	0.02
14.100	0.02	0.02	0.02	0.02	0.02
14.350	0.02	0.02	0.02	0.02	0.02
14.600	0.02	0.02	0.02	0.02	0.02
14.850	0.02	0.02	0.02	0.02	0.02
15.100	0.02	0.02	0.02	0.02	0.02
15.350	0.02	0.02	0.02	0.02	0.02
15.600	0.02	0.02	0.02	0.02	0.02
15.850	0.02	0.02	0.02	0.02	0.02
16.100	0.02	0.02	0.02	0.02	0.02
16.350	0.02	0.02	0.02	0.02	0.02
16.600	0.02	0.02	0.02	0.02	0.02
16.850	0.02	0.02	0.02	0.02	0.02
17.100	0.02	0.02	0.02	0.02	0.02
17.350	0.02	0.02	0.02	0.02	0.02
17.600	0.02	0.02	0.02	0.02	0.02

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
17.850	0.02	0.02	0.02	0.02	0.02
18.100	0.02	0.02	0.02	0.02	0.02
18.350	0.02	0.02	0.02	0.02	0.02
18.600	0.02	0.02	0.02	0.02	0.02
18.850	0.02	0.02	0.02	0.02	0.02
19.100	0.02	0.02	0.02	0.02	0.02
19.350	0.02	0.02	0.02	0.02	0.02
19.600	0.02	0.02	0.02	0.02	0.02
19.850	0.02	0.02	0.02	0.02	0.02
20.100	0.02	0.02	0.02	0.02	0.02
20.350	0.02	0.02	0.02	0.02	0.02
20.600	0.02	0.02	0.02	0.02	0.02
20.850	0.02	0.02	0.02	0.02	0.02
21.100	0.02	0.02	0.02	0.02	0.02
21.350	0.02	0.02	0.02	0.02	0.02
21.600	0.02	0.02	0.02	0.02	0.02
21.850	0.02	0.02	0.02	0.02	0.02
22.100	0.02	0.02	0.02	0.02	0.02
22.350	0.02	0.02	0.02	0.02	0.02
22.600	0.02	0.02	0.02	0.02	0.02
22.850	0.02	0.02	0.02	0.02	0.02
23.100	0.02	0.02	0.02	0.02	0.02
23.350	0.02	0.02	0.02	0.02	0.02
23.600	0.02	0.02	0.02	0.02	0.02
23.850	0.02	0.02	0.02	0.02	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Infiltration (ft³/s)
0.03
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.00
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

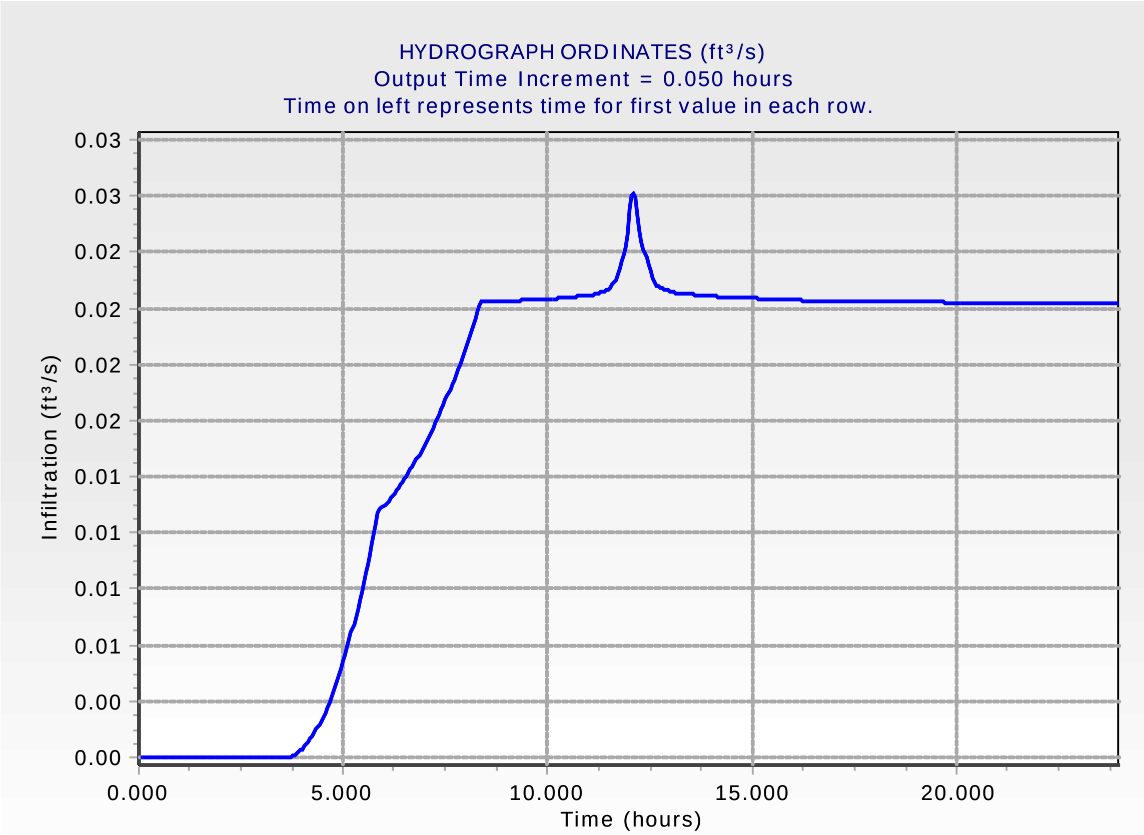
Peak Discharge	0.03 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.030 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
4.250	0.00	0.00	0.00	0.00	0.00
4.500	0.00	0.00	0.00	0.00	0.00
4.750	0.00	0.00	0.00	0.00	0.00
5.000	0.00	0.00	0.00	0.01	0.01
5.250	0.01	0.01	0.01	0.01	0.01
5.500	0.01	0.01	0.01	0.01	0.01
5.750	0.01	0.01	0.01	0.01	0.01
6.000	0.01	0.01	0.01	0.01	0.01
6.250	0.01	0.01	0.01	0.01	0.01
6.500	0.01	0.01	0.01	0.01	0.01
6.750	0.01	0.01	0.01	0.01	0.01
7.000	0.01	0.01	0.01	0.01	0.01
7.250	0.01	0.02	0.02	0.02	0.02
7.500	0.02	0.02	0.02	0.02	0.02
7.750	0.02	0.02	0.02	0.02	0.02
8.000	0.02	0.02	0.02	0.02	0.02
8.250	0.02	0.02	0.02	0.02	0.02
8.500	0.02	0.02	0.02	0.02	0.02
8.750	0.02	0.02	0.02	0.02	0.02
9.000	0.02	0.02	0.02	0.02	0.02
9.250	0.02	0.02	0.02	0.02	0.02
9.500	0.02	0.02	0.02	0.02	0.02
9.750	0.02	0.02	0.02	0.02	0.02
10.000	0.02	0.02	0.02	0.02	0.02
10.250	0.02	0.02	0.02	0.02	0.02
10.500	0.02	0.02	0.02	0.02	0.02
10.750	0.02	0.02	0.02	0.02	0.02
11.000	0.02	0.02	0.02	0.02	0.02
11.250	0.02	0.02	0.02	0.02	0.02
11.500	0.02	0.02	0.02	0.02	0.02
11.750	0.02	0.02	0.02	0.02	0.02
12.000	0.02	0.03	0.03	0.02	0.02
12.250	0.02	0.02	0.02	0.02	0.02
12.500	0.02	0.02	0.02	0.02	0.02
12.750	0.02	0.02	0.02	0.02	0.02
13.000	0.02	0.02	0.02	0.02	0.02
13.250	0.02	0.02	0.02	0.02	0.02
13.500	0.02	0.02	0.02	0.02	0.02
13.750	0.02	0.02	0.02	0.02	0.02
14.000	0.02	0.02	0.02	0.02	0.02
14.250	0.02	0.02	0.02	0.02	0.02
14.500	0.02	0.02	0.02	0.02	0.02
14.750	0.02	0.02	0.02	0.02	0.02
15.000	0.02	0.02	0.02	0.02	0.02
15.250	0.02	0.02	0.02	0.02	0.02
15.500	0.02	0.02	0.02	0.02	0.02
15.750	0.02	0.02	0.02	0.02	0.02
16.000	0.02	0.02	0.02	0.02	0.02

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
16.250	0.02	0.02	0.02	0.02	0.02
16.500	0.02	0.02	0.02	0.02	0.02
16.750	0.02	0.02	0.02	0.02	0.02
17.000	0.02	0.02	0.02	0.02	0.02
17.250	0.02	0.02	0.02	0.02	0.02
17.500	0.02	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02	0.02
22.000	0.02	0.02	0.02	0.02	0.02
22.250	0.02	0.02	0.02	0.02	0.02
22.500	0.02	0.02	0.02	0.02	0.02
22.750	0.02	0.02	0.02	0.02	0.02
23.000	0.02	0.02	0.02	0.02	0.02
23.250	0.02	0.02	0.02	0.02	0.02
23.500	0.02	0.02	0.02	0.02	0.02
23.750	0.02	0.02	0.02	0.02	0.02
24.000	0.02	(N/A)	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Infiltration (ft³/s)
0.03
0.03
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.00
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	0.03 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.032 ac-ft

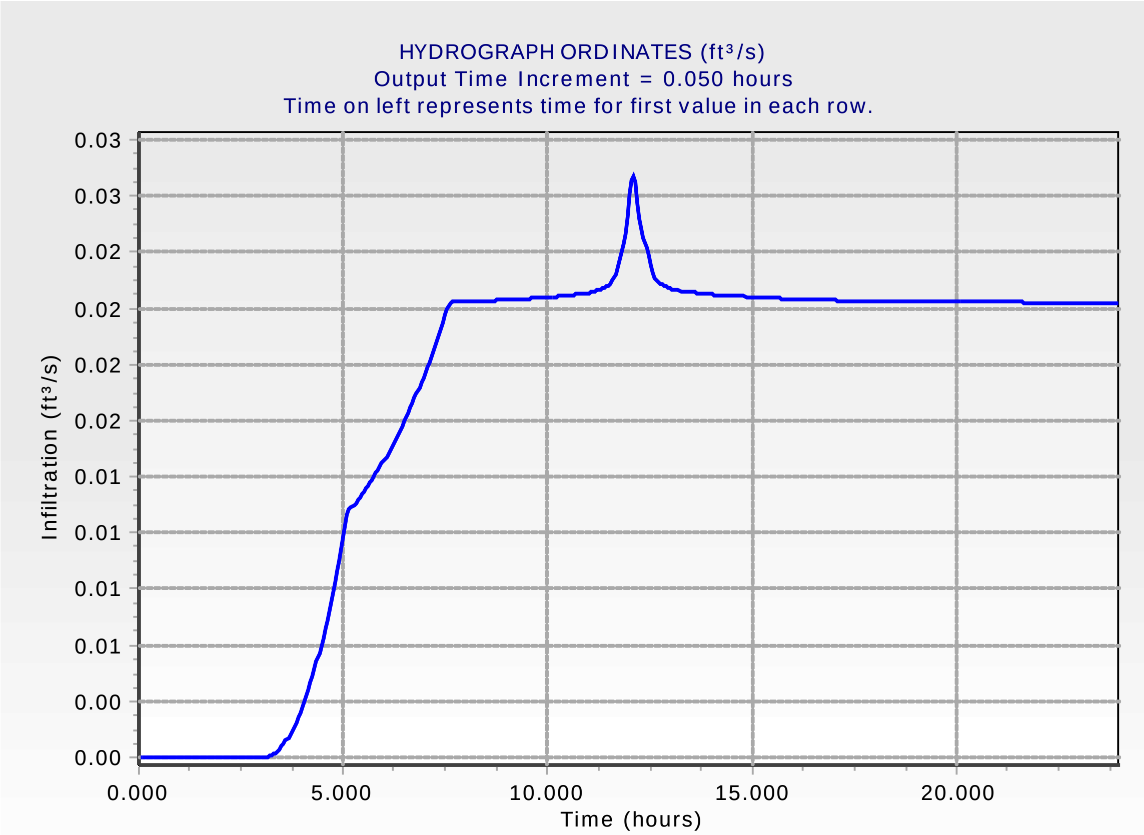
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
3.700	0.00	0.00	0.00	0.00	0.00
3.950	0.00	0.00	0.00	0.00	0.00
4.200	0.00	0.00	0.00	0.00	0.00
4.450	0.00	0.01	0.01	0.01	0.01
4.700	0.01	0.01	0.01	0.01	0.01
4.950	0.01	0.01	0.01	0.01	0.01
5.200	0.01	0.01	0.01	0.01	0.01
5.450	0.01	0.01	0.01	0.01	0.01
5.700	0.01	0.01	0.01	0.01	0.01
5.950	0.01	0.01	0.01	0.01	0.01
6.200	0.01	0.01	0.01	0.01	0.01
6.450	0.01	0.01	0.02	0.02	0.02
6.700	0.02	0.02	0.02	0.02	0.02
6.950	0.02	0.02	0.02	0.02	0.02
7.200	0.02	0.02	0.02	0.02	0.02
7.450	0.02	0.02	0.02	0.02	0.02
7.700	0.02	0.02	0.02	0.02	0.02
7.950	0.02	0.02	0.02	0.02	0.02
8.200	0.02	0.02	0.02	0.02	0.02
8.450	0.02	0.02	0.02	0.02	0.02
8.700	0.02	0.02	0.02	0.02	0.02
8.950	0.02	0.02	0.02	0.02	0.02
9.200	0.02	0.02	0.02	0.02	0.02
9.450	0.02	0.02	0.02	0.02	0.02
9.700	0.02	0.02	0.02	0.02	0.02
9.950	0.02	0.02	0.02	0.02	0.02
10.200	0.02	0.02	0.02	0.02	0.02
10.450	0.02	0.02	0.02	0.02	0.02
10.700	0.02	0.02	0.02	0.02	0.02
10.950	0.02	0.02	0.02	0.02	0.02
11.200	0.02	0.02	0.02	0.02	0.02
11.450	0.02	0.02	0.02	0.02	0.02
11.700	0.02	0.02	0.02	0.02	0.02
11.950	0.02	0.03	0.03	0.03	0.03
12.200	0.02	0.02	0.02	0.02	0.02
12.450	0.02	0.02	0.02	0.02	0.02
12.700	0.02	0.02	0.02	0.02	0.02
12.950	0.02	0.02	0.02	0.02	0.02
13.200	0.02	0.02	0.02	0.02	0.02
13.450	0.02	0.02	0.02	0.02	0.02
13.700	0.02	0.02	0.02	0.02	0.02
13.950	0.02	0.02	0.02	0.02	0.02
14.200	0.02	0.02	0.02	0.02	0.02
14.450	0.02	0.02	0.02	0.02	0.02
14.700	0.02	0.02	0.02	0.02	0.02
14.950	0.02	0.02	0.02	0.02	0.02
15.200	0.02	0.02	0.02	0.02	0.02
15.450	0.02	0.02	0.02	0.02	0.02

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
15.700	0.02	0.02	0.02	0.02	0.02
15.950	0.02	0.02	0.02	0.02	0.02
16.200	0.02	0.02	0.02	0.02	0.02
16.450	0.02	0.02	0.02	0.02	0.02
16.700	0.02	0.02	0.02	0.02	0.02
16.950	0.02	0.02	0.02	0.02	0.02
17.200	0.02	0.02	0.02	0.02	0.02
17.450	0.02	0.02	0.02	0.02	0.02
17.700	0.02	0.02	0.02	0.02	0.02
17.950	0.02	0.02	0.02	0.02	0.02
18.200	0.02	0.02	0.02	0.02	0.02
18.450	0.02	0.02	0.02	0.02	0.02
18.700	0.02	0.02	0.02	0.02	0.02
18.950	0.02	0.02	0.02	0.02	0.02
19.200	0.02	0.02	0.02	0.02	0.02
19.450	0.02	0.02	0.02	0.02	0.02
19.700	0.02	0.02	0.02	0.02	0.02
19.950	0.02	0.02	0.02	0.02	0.02
20.200	0.02	0.02	0.02	0.02	0.02
20.450	0.02	0.02	0.02	0.02	0.02
20.700	0.02	0.02	0.02	0.02	0.02
20.950	0.02	0.02	0.02	0.02	0.02
21.200	0.02	0.02	0.02	0.02	0.02
21.450	0.02	0.02	0.02	0.02	0.02
21.700	0.02	0.02	0.02	0.02	0.02
21.950	0.02	0.02	0.02	0.02	0.02
22.200	0.02	0.02	0.02	0.02	0.02
22.450	0.02	0.02	0.02	0.02	0.02
22.700	0.02	0.02	0.02	0.02	0.02
22.950	0.02	0.02	0.02	0.02	0.02
23.200	0.02	0.02	0.02	0.02	0.02
23.450	0.02	0.02	0.02	0.02	0.02
23.700	0.02	0.02	0.02	0.02	0.02
23.950	0.02	0.02	(N/A)	(N/A)	(N/A)

Subsection: Pond Infiltration Hydrograph | Return Event: 100 years
Label: SF-1 (INF) | Storm Event: 100-yr



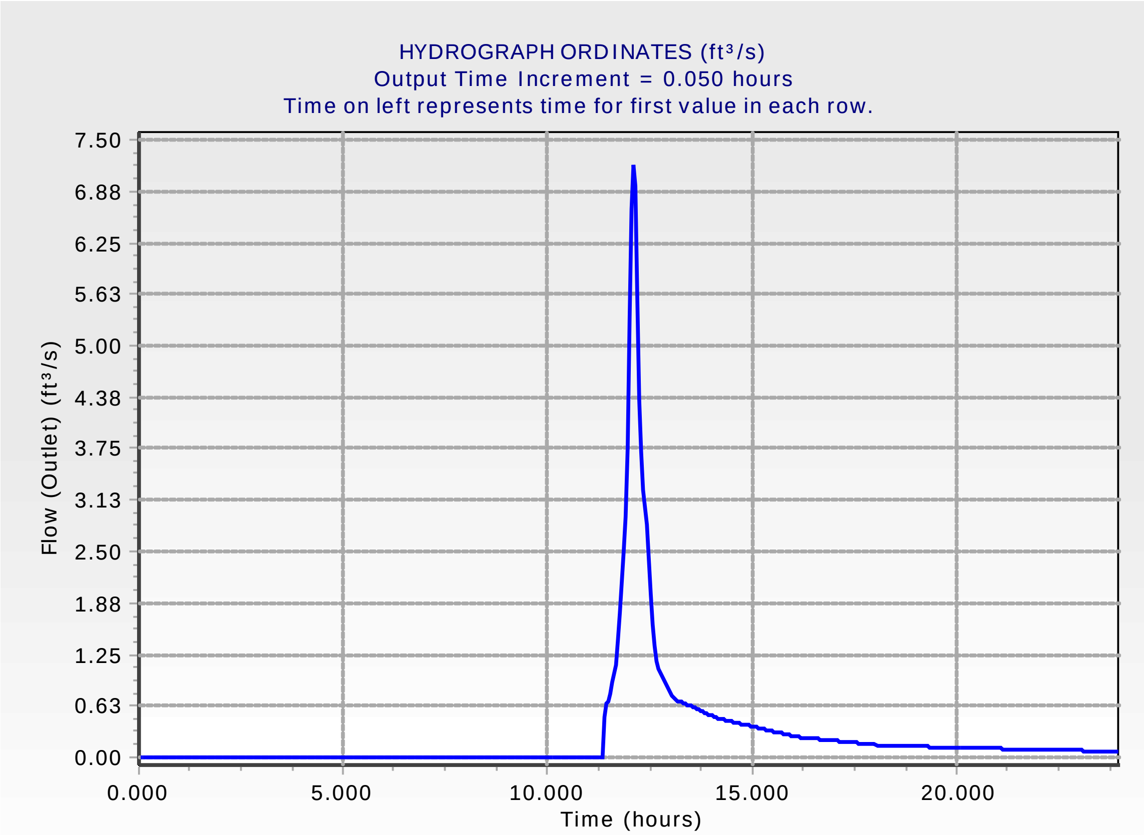
Peak Discharge	7.20 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.530 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.350	0.00	0.49	0.66	0.68	0.76
11.600	0.91	1.12	1.42	1.76	2.12
11.850	2.51	2.92	3.75	5.32	6.65
12.100	7.20	6.94	5.59	4.33	3.71
12.350	3.24	2.82	2.40	1.99	1.62
12.600	1.35	1.16	1.08	1.02	0.98
12.850	0.93	0.89	0.84	0.80	0.76
13.100	0.73	0.70	0.69	0.68	0.67
13.350	0.65	0.64	0.63	0.62	0.61
13.600	0.60	0.58	0.57	0.56	0.55
13.850	0.54	0.53	0.51	0.50	0.49
14.100	0.48	0.47	0.47	0.46	0.46
14.350	0.45	0.45	0.44	0.43	0.43
14.600	0.42	0.42	0.41	0.41	0.40
14.850	0.40	0.39	0.38	0.38	0.37
15.100	0.37	0.36	0.35	0.35	0.34
15.350	0.34	0.33	0.33	0.32	0.31
15.600	0.31	0.30	0.30	0.29	0.29
15.850	0.28	0.27	0.27	0.26	0.26
16.100	0.25	0.25	0.25	0.24	0.24
16.350	0.24	0.23	0.23	0.23	0.23
16.600	0.22	0.22	0.22	0.22	0.21
16.850	0.21	0.21	0.21	0.20	0.20
17.100	0.20	0.20	0.19	0.19	0.19
17.350	0.19	0.18	0.18	0.18	0.18
17.600	0.17	0.17	0.17	0.17	0.16
17.850	0.16	0.16	0.16	0.15	0.15
18.100	0.15	0.15	0.15	0.15	0.14
18.350	0.14	0.14	0.14	0.14	0.14
18.600	0.14	0.14	0.14	0.14	0.14
18.850	0.14	0.14	0.13	0.13	0.13
19.100	0.13	0.13	0.13	0.13	0.13
19.350	0.13	0.13	0.13	0.13	0.13
19.600	0.12	0.12	0.12	0.12	0.12
19.850	0.12	0.12	0.12	0.12	0.12
20.100	0.12	0.12	0.12	0.12	0.11
20.350	0.11	0.11	0.11	0.11	0.11
20.600	0.11	0.11	0.11	0.11	0.11
20.850	0.11	0.11	0.11	0.11	0.11
21.100	0.11	0.10	0.10	0.10	0.10
21.350	0.10	0.10	0.10	0.10	0.10
21.600	0.10	0.10	0.10	0.10	0.10
21.850	0.10	0.10	0.10	0.09	0.09
22.100	0.09	0.09	0.09	0.09	0.09
22.350	0.09	0.09	0.09	0.09	0.09
22.600	0.09	0.09	0.09	0.09	0.09
22.850	0.08	0.08	0.08	0.08	0.08
23.100	0.08	0.08	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.350	0.08	0.08	0.08	0.08	0.08
23.600	0.08	0.08	0.07	0.07	0.07
23.850	0.07	0.07	0.07	0.07	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
7.50
6.88
6.25
5.63
5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

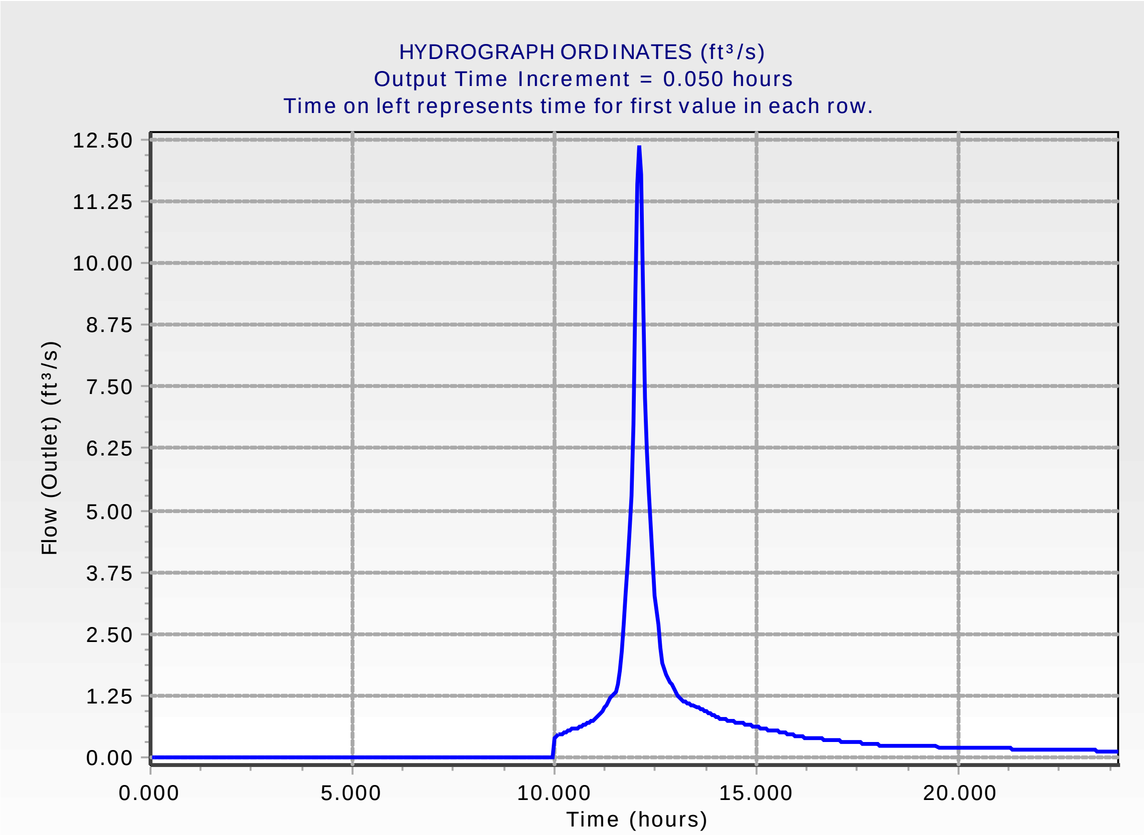
Peak Discharge	12.38 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	0.984 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
9.950	0.00	0.38	0.44	0.45	0.47
10.200	0.48	0.50	0.51	0.53	0.55
10.450	0.57	0.58	0.60	0.62	0.64
10.700	0.66	0.68	0.70	0.72	0.74
10.950	0.76	0.78	0.80	0.84	0.88
11.200	0.94	1.00	1.07	1.13	1.20
11.450	1.27	1.34	1.48	1.75	2.15
11.700	2.69	3.30	3.93	4.60	5.30
11.950	6.73	9.40	11.59	12.38	11.81
12.200	9.44	7.27	6.19	5.39	4.67
12.450	3.98	3.28	2.67	2.23	1.92
12.700	1.78	1.69	1.61	1.54	1.46
12.950	1.39	1.32	1.25	1.20	1.16
13.200	1.13	1.11	1.09	1.07	1.06
13.450	1.04	1.02	1.00	0.98	0.96
13.700	0.94	0.92	0.90	0.88	0.86
13.950	0.84	0.83	0.81	0.79	0.78
14.200	0.77	0.76	0.75	0.74	0.73
14.450	0.72	0.71	0.70	0.69	0.69
14.700	0.68	0.67	0.66	0.65	0.64
14.950	0.63	0.62	0.61	0.60	0.59
15.200	0.58	0.57	0.56	0.55	0.55
15.450	0.54	0.53	0.52	0.51	0.50
15.700	0.49	0.48	0.47	0.46	0.45
15.950	0.44	0.43	0.42	0.42	0.41
16.200	0.40	0.40	0.40	0.39	0.39
16.450	0.38	0.38	0.38	0.37	0.37
16.700	0.36	0.36	0.36	0.35	0.35
16.950	0.34	0.34	0.33	0.33	0.33
17.200	0.32	0.32	0.31	0.31	0.31
17.450	0.30	0.30	0.29	0.29	0.28
17.700	0.28	0.28	0.27	0.27	0.26
17.950	0.26	0.26	0.25	0.25	0.25
18.200	0.25	0.24	0.24	0.24	0.24
18.450	0.24	0.24	0.24	0.24	0.23
18.700	0.23	0.23	0.23	0.23	0.23
18.950	0.23	0.23	0.22	0.22	0.22
19.200	0.22	0.22	0.22	0.22	0.22
19.450	0.21	0.21	0.21	0.21	0.21
19.700	0.21	0.21	0.21	0.20	0.20
19.950	0.20	0.20	0.20	0.20	0.20
20.200	0.20	0.20	0.19	0.19	0.19
20.450	0.19	0.19	0.19	0.19	0.19
20.700	0.19	0.19	0.19	0.18	0.18
20.950	0.18	0.18	0.18	0.18	0.18
21.200	0.18	0.18	0.18	0.18	0.17
21.450	0.17	0.17	0.17	0.17	0.17
21.700	0.17	0.17	0.17	0.17	0.16

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
21.950	0.16	0.16	0.16	0.16	0.16
22.200	0.16	0.16	0.16	0.16	0.16
22.450	0.15	0.15	0.15	0.15	0.15
22.700	0.15	0.15	0.15	0.15	0.15
22.950	0.15	0.14	0.14	0.14	0.14
23.200	0.14	0.14	0.14	0.14	0.14
23.450	0.14	0.13	0.13	0.13	0.13
23.700	0.13	0.13	0.13	0.13	0.13
23.950	0.13	0.13	(N/A)	(N/A)	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
12.50
11.25
10.00
8.75
7.50
6.25
5.00
3.75
2.50
1.25
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

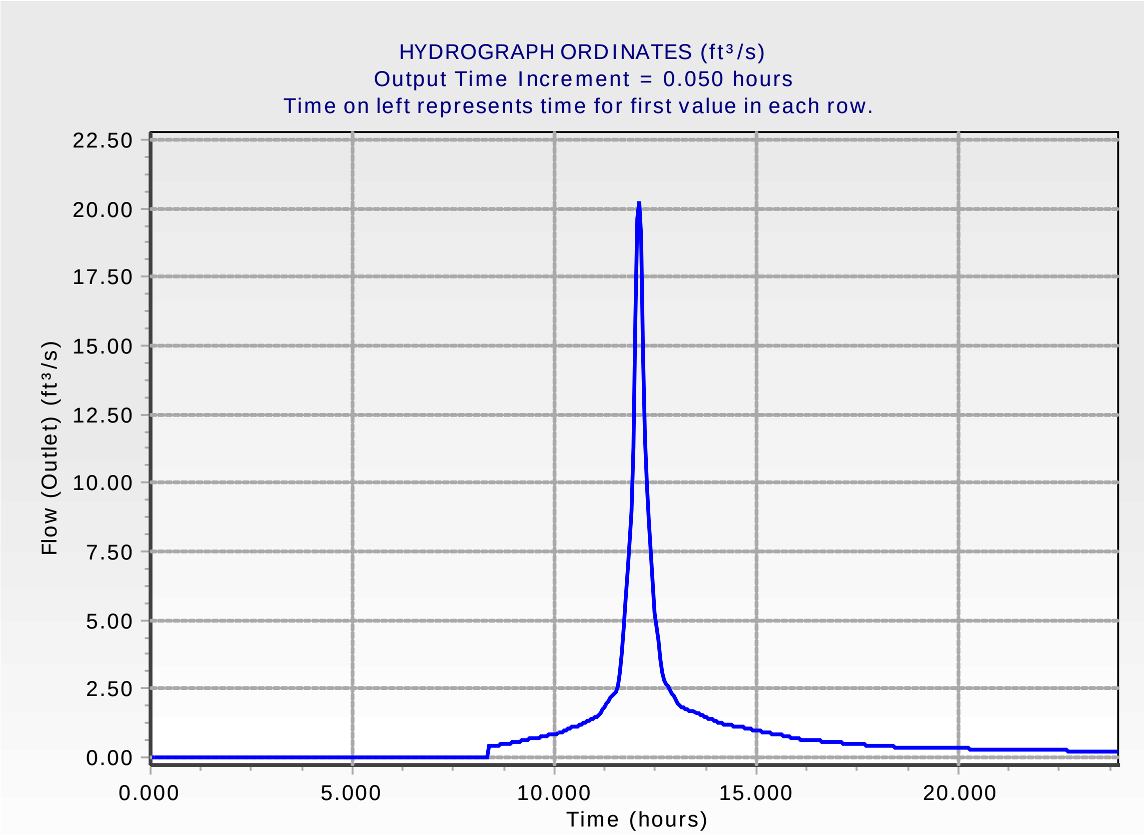
Peak Discharge	20.29 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	1.703 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
8.350	0.00	0.40	0.41	0.42	0.43
8.600	0.45	0.46	0.47	0.49	0.50
8.850	0.51	0.53	0.54	0.55	0.57
9.100	0.58	0.60	0.61	0.62	0.64
9.350	0.65	0.67	0.68	0.70	0.71
9.600	0.73	0.74	0.76	0.78	0.79
9.850	0.81	0.82	0.84	0.86	0.87
10.100	0.89	0.92	0.95	0.97	1.00
10.350	1.03	1.06	1.09	1.12	1.15
10.600	1.18	1.21	1.25	1.28	1.31
10.850	1.34	1.37	1.41	1.44	1.48
11.100	1.54	1.62	1.72	1.82	1.93
11.350	2.04	2.15	2.27	2.38	2.63
11.600	3.10	3.77	4.70	5.72	6.77
11.850	7.86	8.99	11.31	15.99	19.64
12.100	20.29	18.99	14.62	11.66	9.94
12.350	8.63	7.47	6.35	5.23	4.26
12.600	3.55	3.06	2.83	2.69	2.56
12.850	2.44	2.33	2.21	2.09	1.99
13.100	1.91	1.84	1.80	1.77	1.74
13.350	1.71	1.68	1.65	1.62	1.59
13.600	1.56	1.53	1.49	1.46	1.43
13.850	1.40	1.37	1.34	1.31	1.28
14.100	1.26	1.24	1.22	1.21	1.19
14.350	1.18	1.16	1.15	1.13	1.12
14.600	1.10	1.09	1.07	1.06	1.04
14.850	1.03	1.01	1.00	0.98	0.97
15.100	0.95	0.94	0.93	0.91	0.90
15.350	0.88	0.87	0.85	0.84	0.82
15.600	0.81	0.79	0.78	0.76	0.75
15.850	0.73	0.72	0.70	0.69	0.67
16.100	0.66	0.65	0.65	0.64	0.63
16.350	0.63	0.62	0.61	0.61	0.60
16.600	0.59	0.59	0.58	0.57	0.57
16.850	0.56	0.55	0.55	0.54	0.53
17.100	0.53	0.52	0.52	0.51	0.50
17.350	0.50	0.49	0.48	0.48	0.47
17.600	0.46	0.46	0.45	0.44	0.44
17.850	0.43	0.42	0.42	0.41	0.40
18.100	0.40	0.40	0.39	0.39	0.39
18.350	0.39	0.39	0.39	0.38	0.38
18.600	0.38	0.38	0.37	0.37	0.37
18.850	0.37	0.37	0.36	0.36	0.36
19.100	0.36	0.36	0.36	0.35	0.35
19.350	0.35	0.35	0.35	0.34	0.34
19.600	0.34	0.34	0.34	0.33	0.33
19.850	0.33	0.33	0.33	0.32	0.32
20.100	0.32	0.32	0.32	0.32	0.32

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
20.350	0.31	0.31	0.31	0.31	0.31
20.600	0.31	0.30	0.30	0.30	0.30
20.850	0.30	0.30	0.30	0.29	0.29
21.100	0.29	0.29	0.29	0.29	0.29
21.350	0.28	0.28	0.28	0.28	0.28
21.600	0.28	0.28	0.27	0.27	0.27
21.850	0.27	0.27	0.27	0.26	0.26
22.100	0.26	0.26	0.26	0.26	0.26
22.350	0.25	0.25	0.25	0.25	0.25
22.600	0.25	0.25	0.24	0.24	0.24
22.850	0.24	0.24	0.24	0.24	0.23
23.100	0.23	0.23	0.23	0.23	0.23
23.350	0.22	0.22	0.22	0.22	0.22
23.600	0.22	0.22	0.21	0.21	0.21
23.850	0.21	0.21	0.21	0.21	(N/A)


HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.
Flow (Outlet) (ft³/s)
22.50
20.00
17.50
15.00
12.50
10.00
7.50
5.00
2.50
0.00
0.000
5.000
10.000
15.000
20.000
Time (hours)

Peak Discharge	24.84 ft³/s
Time to Peak	12.100 hours
Hydrograph Volume	2.124 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
7.550	0.00	0.11	0.42	0.39	0.40
7.800	0.41	0.41	0.42	0.43	0.44
8.050	0.45	0.46	0.47	0.48	0.50
8.300	0.51	0.53	0.54	0.56	0.58
8.550	0.59	0.61	0.62	0.64	0.66
8.800	0.67	0.69	0.71	0.72	0.74
9.050	0.76	0.78	0.79	0.81	0.83
9.300	0.85	0.87	0.88	0.90	0.92
9.550	0.94	0.96	0.98	1.00	1.02
9.800	1.04	1.06	1.08	1.09	1.11
10.050	1.14	1.16	1.19	1.23	1.26
10.300	1.30	1.33	1.37	1.41	1.44
10.550	1.48	1.52	1.56	1.59	1.63
10.800	1.67	1.71	1.75	1.79	1.83
11.050	1.88	1.96	2.05	2.17	2.30
11.300	2.44	2.57	2.71	2.85	2.99
11.550	3.29	3.87	4.70	5.86	7.11
11.800	8.40	9.73	11.11	13.96	20.18
12.050	23.88	24.84	23.13	17.80	13.72
12.300	12.13	10.46	9.06	7.70	6.35
12.550	5.17	4.30	3.70	3.44	3.26
12.800	3.10	2.96	2.82	2.68	2.53
13.050	2.41	2.31	2.23	2.18	2.14
13.300	2.11	2.07	2.03	2.00	1.96
13.550	1.92	1.88	1.85	1.81	1.77
13.800	1.74	1.70	1.66	1.62	1.59
14.050	1.55	1.52	1.50	1.48	1.46
14.300	1.44	1.42	1.41	1.39	1.37
14.550	1.35	1.34	1.32	1.30	1.28
14.800	1.26	1.25	1.23	1.21	1.19
15.050	1.17	1.16	1.14	1.12	1.10
15.300	1.08	1.07	1.05	1.03	1.01
15.550	0.99	0.98	0.96	0.94	0.92
15.800	0.91	0.89	0.87	0.85	0.83
16.050	0.82	0.80	0.79	0.78	0.77
16.300	0.77	0.76	0.75	0.74	0.74
16.550	0.73	0.72	0.71	0.70	0.70
16.800	0.69	0.68	0.67	0.67	0.66
17.050	0.65	0.64	0.63	0.62	0.62
17.300	0.61	0.60	0.59	0.59	0.58
17.550	0.57	0.56	0.55	0.55	0.54
17.800	0.53	0.52	0.52	0.51	0.50
18.050	0.49	0.49	0.48	0.48	0.48
18.300	0.47	0.47	0.47	0.47	0.47
18.550	0.46	0.46	0.46	0.46	0.45
18.800	0.45	0.45	0.45	0.44	0.44
19.050	0.44	0.44	0.43	0.43	0.43
19.300	0.43	0.43	0.42	0.42	0.42

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

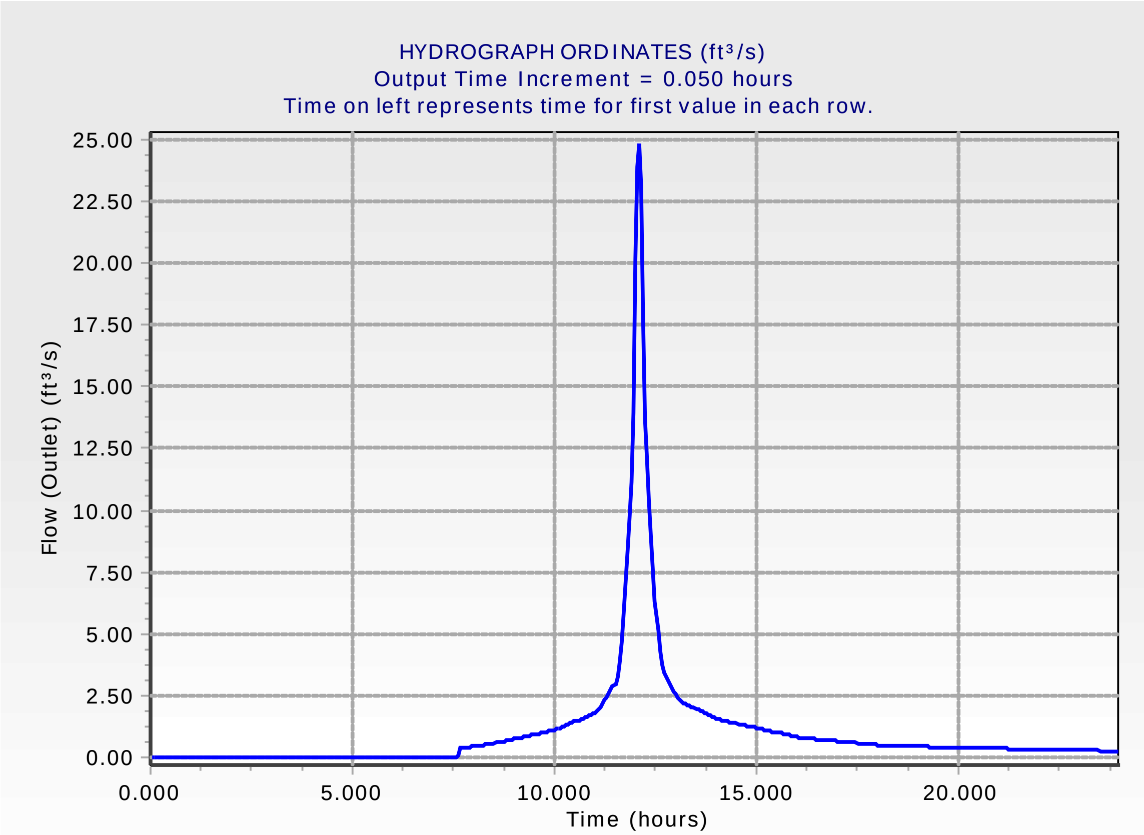
Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
19.550	0.42	0.41	0.41	0.41	0.41
19.800	0.40	0.40	0.40	0.40	0.39
20.050	0.39	0.39	0.39	0.39	0.39
20.300	0.38	0.38	0.38	0.38	0.38
20.550	0.37	0.37	0.37	0.37	0.37
20.800	0.37	0.36	0.36	0.36	0.36
21.050	0.36	0.36	0.35	0.35	0.35
21.300	0.35	0.35	0.34	0.34	0.34
21.550	0.34	0.34	0.34	0.33	0.33
21.800	0.33	0.33	0.33	0.32	0.32
22.050	0.32	0.32	0.32	0.32	0.31
22.300	0.31	0.31	0.31	0.31	0.31
22.550	0.30	0.30	0.30	0.30	0.30
22.800	0.29	0.29	0.29	0.29	0.29
23.050	0.29	0.28	0.28	0.28	0.28
23.300	0.28	0.27	0.27	0.27	0.27
23.550	0.27	0.27	0.26	0.26	0.26
23.800	0.26	0.26	0.25	0.25	0.25

Subsection: Pond Routed Hydrograph (total out)

Label: SF-1 (OUT)

Return Event: 100 years

Storm Event: 100-yr



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APPENDIX C – HYDRAULIC AND STABILITY CALCULATIONS

Worksheet for P1- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	11.560	ft³/s

Results

Normal Depth	0.97	ft
Flow Area	1.50	ft²
Wetted Perimeter	3.08	ft
Hydraulic Radius	0.49	ft
Top Width	2.00	ft
Critical Depth	1.22	ft
Percent Full	48.3	%
Critical Slope	0.00468	ft/ft
Velocity	7.68	ft/s
Velocity Head	0.92	ft
Specific Energy	1.88	ft
Froude Number	1.56	
Maximum Discharge	26.36	ft³/s
Discharge Full	24.51	ft³/s
Slope Full	0.00223	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.34	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.97	ft
Critical Depth	1.22	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00468	ft/ft

Worksheet for P2- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Diameter	2.00	ft
Discharge	11.540	ft³/s

Results

Normal Depth	0.86	ft
Flow Area	1.29	ft²
Wetted Perimeter	2.86	ft
Hydraulic Radius	0.45	ft
Top Width	1.98	ft
Critical Depth	1.22	ft
Percent Full	43.0	%
Critical Slope	0.00468	ft/ft
Velocity	8.93	ft/s
Velocity Head	1.24	ft
Specific Energy	2.10	ft
Froude Number	1.95	
Maximum Discharge	32.29	ft³/s
Discharge Full	30.01	ft³/s
Slope Full	0.00222	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.03	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.86	ft
Critical Depth	1.22	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00468	ft/ft

Worksheet for P3- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	11.540	ft³/s

Results

Normal Depth	0.97	ft
Flow Area	1.50	ft²
Wetted Perimeter	3.07	ft
Hydraulic Radius	0.49	ft
Top Width	2.00	ft
Critical Depth	1.22	ft
Percent Full	48.3	%
Critical Slope	0.00467	ft/ft
Velocity	7.68	ft/s
Velocity Head	0.92	ft
Specific Energy	1.88	ft
Froude Number	1.56	
Maximum Discharge	26.36	ft³/s
Discharge Full	24.51	ft³/s
Slope Full	0.00222	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.29	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.97	ft
Critical Depth	1.22	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00467	ft/ft

Worksheet for P4- WQ event

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.011	
Channel Slope	0.06500	ft/ft
Diameter	0.33	ft
Discharge	0.266	ft³/s

Results

Normal Depth	0.16	ft
Flow Area	0.04	ft²
Wetted Perimeter	0.51	ft
Hydraulic Radius	0.08	ft
Top Width	0.33	ft
Critical Depth	0.29	ft
Percent Full	48.6	%
Critical Slope	0.01348	ft/ft
Velocity	6.45	ft/s
Velocity Head	0.65	ft
Specific Energy	0.81	ft
Froude Number	3.22	
Maximum Discharge	0.60	ft³/s
Discharge Full	0.56	ft³/s
Slope Full	0.01476	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.60	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.16	ft
Critical Depth	0.29	ft
Channel Slope	0.06500	ft/ft
Critical Slope	0.01348	ft/ft

Worksheet for P5- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01900	ft/ft
Diameter	1.50	ft
Discharge	0.720	ft³/s

Results

Normal Depth	0.23	ft
Flow Area	0.17	ft²
Wetted Perimeter	1.20	ft
Hydraulic Radius	0.14	ft
Top Width	1.08	ft
Critical Depth	0.32	ft
Percent Full	15.2	%
Critical Slope	0.00501	ft/ft
Velocity	4.26	ft/s
Velocity Head	0.28	ft
Specific Energy	0.51	ft
Froude Number	1.90	
Maximum Discharge	15.57	ft³/s
Discharge Full	14.48	ft³/s
Slope Full	0.00005	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	15.17	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.23	ft
Critical Depth	0.32	ft
Channel Slope	0.01900	ft/ft
Critical Slope	0.00501	ft/ft

Worksheet for P6- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	1.00	ft
Discharge	0.410	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.16	ft²
Wetted Perimeter	1.07	ft
Hydraulic Radius	0.15	ft
Top Width	0.88	ft
Critical Depth	0.26	ft
Percent Full	26.2	%
Critical Slope	0.00481	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	0.36	ft
Froude Number	1.02	
Maximum Discharge	2.94	ft³/s
Discharge Full	2.73	ft³/s
Slope Full	0.00011	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	26.19	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.26	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00481	ft/ft

Worksheet for P7- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	1.00	ft
Discharge	0.410	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.16	ft²
Wetted Perimeter	1.07	ft
Hydraulic Radius	0.15	ft
Top Width	0.88	ft
Critical Depth	0.26	ft
Percent Full	26.2	%
Critical Slope	0.00481	ft/ft
Velocity	2.50	ft/s
Velocity Head	0.10	ft
Specific Energy	0.36	ft
Froude Number	1.02	
Maximum Discharge	2.94	ft³/s
Discharge Full	2.73	ft³/s
Slope Full	0.00011	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	26.19	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.26	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00481	ft/ft

Worksheet for P9- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.05800	ft/ft
Diameter	0.50	ft
Discharge	0.010	ft³/s

Results

Normal Depth	0.03	ft
Flow Area	0.00	ft²
Wetted Perimeter	0.25	ft
Hydraulic Radius	0.02	ft
Top Width	0.24	ft
Critical Depth	0.05	ft
Percent Full	5.9	%
Critical Slope	0.00730	ft/ft
Velocity	2.12	ft/s
Velocity Head	0.07	ft
Specific Energy	0.10	ft
Froude Number	2.65	
Maximum Discharge	1.57	ft³/s
Discharge Full	1.46	ft³/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	5.92	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.03	ft
Critical Depth	0.05	ft
Channel Slope	0.05800	ft/ft
Critical Slope	0.00730	ft/ft

Worksheet for P10- 10 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00800	ft/ft
Diameter	2.00	ft
Discharge	2.700	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.60	ft²
Wetted Perimeter	2.08	ft
Hydraulic Radius	0.29	ft
Top Width	1.72	ft
Critical Depth	0.57	ft
Percent Full	24.7	%
Critical Slope	0.00446	ft/ft
Velocity	4.48	ft/s
Velocity Head	0.31	ft
Specific Energy	0.81	ft
Froude Number	1.34	
Maximum Discharge	21.76	ft³/s
Discharge Full	20.23	ft³/s
Slope Full	0.00014	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	24.67	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.49	ft
Critical Depth	0.57	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.00446	ft/ft

Worksheet for FES 1 - P5, 25 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01900	ft/ft
Diameter	1.50	ft
Discharge	1.790	ft³/s

Results

Normal Depth	0.36	ft
Flow Area	0.32	ft²
Wetted Perimeter	1.53	ft
Hydraulic Radius	0.21	ft
Top Width	1.28	ft
Critical Depth	0.50	ft
Percent Full	23.8	%
Critical Slope	0.00492	ft/ft
Velocity	5.57	ft/s
Velocity Head	0.48	ft
Specific Energy	0.84	ft
Froude Number	1.96	
Maximum Discharge	15.57	ft³/s
Discharge Full	14.48	ft³/s
Slope Full	0.00029	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	23.75	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.36	ft
Critical Depth	0.50	ft
Channel Slope	0.01900	ft/ft
Critical Slope	0.00492	ft/ft

Worksheet for FES 2 - P7, 25 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	1.00	ft
Discharge	0.460	ft³/s

Results

Normal Depth	0.28	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.11	ft
Hydraulic Radius	0.16	ft
Top Width	0.90	ft
Critical Depth	0.28	ft
Percent Full	27.8	%
Critical Slope	0.00479	ft/ft
Velocity	2.58	ft/s
Velocity Head	0.10	ft
Specific Energy	0.38	ft
Froude Number	1.02	
Maximum Discharge	2.94	ft³/s
Discharge Full	2.73	ft³/s
Slope Full	0.00014	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	27.80	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.28	ft
Critical Depth	0.28	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00479	ft/ft

Worksheet for FES 3 - P10, 25 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00800	ft/ft
Diameter	2.00	ft
Discharge	8.770	ft³/s

Results

Normal Depth	0.92	ft
Flow Area	1.41	ft²
Wetted Perimeter	2.98	ft
Hydraulic Radius	0.47	ft
Top Width	1.99	ft
Critical Depth	1.06	ft
Percent Full	46.0	%
Critical Slope	0.00500	ft/ft
Velocity	6.21	ft/s
Velocity Head	0.60	ft
Specific Energy	1.52	ft
Froude Number	1.30	
Maximum Discharge	21.76	ft³/s
Discharge Full	20.23	ft³/s
Slope Full	0.00150	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	46.04	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.92	ft
Critical Depth	1.06	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.00500	ft/ft

Worksheet for FES 4 - P3, 25 year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.470	ft³/s

Results

Normal Depth	1.20	ft
Flow Area	1.97	ft²
Wetted Perimeter	3.55	ft
Hydraulic Radius	0.56	ft
Top Width	1.96	ft
Critical Depth	1.46	ft
Percent Full	60.0	%
Critical Slope	0.00576	ft/ft
Velocity	8.37	ft/s
Velocity Head	1.09	ft
Specific Energy	2.29	ft
Froude Number	1.47	
Maximum Discharge	26.36	ft³/s
Discharge Full	24.51	ft³/s
Slope Full	0.00452	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	60.02	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.20	ft
Critical Depth	1.46	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00576	ft/ft

Worksheet for SW-1A-10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	11.970	ft³/s

Results

Normal Depth	1.18	ft
Flow Area	6.55	ft²
Wetted Perimeter	9.47	ft
Hydraulic Radius	0.69	ft
Top Width	9.09	ft
Critical Depth	0.73	ft
Critical Slope	0.03960	ft/ft
Velocity	1.83	ft/s
Velocity Head	0.05	ft
Specific Energy	1.23	ft
Froude Number	0.38	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.18	ft
Critical Depth	0.73	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.03960	ft/ft

Worksheet for SW-1A-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	31.610	ft³/s

Results

Normal Depth	1.82	ft
Flow Area	13.52	ft²
Wetted Perimeter	13.48	ft
Hydraulic Radius	1.00	ft
Top Width	12.89	ft
Critical Depth	1.18	ft
Critical Slope	0.03477	ft/ft
Velocity	2.34	ft/s
Velocity Head	0.08	ft
Specific Energy	1.90	ft
Froude Number	0.40	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.82	ft
Critical Depth	1.18	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.03477	ft/ft

Worksheet for SW-1A-R-10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	11.970	ft³/s

Results

Normal Depth	0.76	ft
Flow Area	3.25	ft²
Wetted Perimeter	6.81	ft
Hydraulic Radius	0.48	ft
Top Width	6.56	ft
Critical Depth	0.73	ft
Critical Slope	0.11897	ft/ft
Velocity	3.68	ft/s
Velocity Head	0.21	ft
Specific Energy	0.97	ft
Froude Number	0.92	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.76	ft
Critical Depth	0.73	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.11897	ft/ft

Worksheet for SW-1A-R-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.10000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	31.610	ft^3/s

Results

Normal Depth	1.19	ft
Flow Area	6.67	ft^2
Wetted Perimeter	9.55	ft
Hydraulic Radius	0.70	ft
Top Width	9.17	ft
Critical Depth	1.18	ft
Critical Slope	0.10445	ft/ft
Velocity	4.74	ft/s
Velocity Head	0.35	ft
Specific Energy	1.54	ft
Froude Number	0.98	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.19	ft
Critical Depth	1.18	ft
Channel Slope	0.10000	ft/ft
Critical Slope	0.10445	ft/ft

Worksheet for SW-1B-10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.02800	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	12.460	ft^3/s

Results

Normal Depth	0.63	ft
Flow Area	3.75	ft^2
Wetted Perimeter	8.01	ft
Hydraulic Radius	0.47	ft
Top Width	7.81	ft
Critical Depth	0.58	ft
Critical Slope	0.04002	ft/ft
Velocity	3.33	ft/s
Velocity Head	0.17	ft
Specific Energy	0.81	ft
Froude Number	0.85	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.63	ft
Critical Depth	0.58	ft
Channel Slope	0.02800	ft/ft
Critical Slope	0.04002	ft/ft

Worksheet for SW-1B-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.02800	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	24.590	ft^3/s

Results

Normal Depth	0.91	ft
Flow Area	6.08	ft^2
Wetted Perimeter	9.73	ft
Hydraulic Radius	0.63	ft
Top Width	9.43	ft
Critical Depth	0.85	ft
Critical Slope	0.03619	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	1.16	ft
Froude Number	0.89	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	0.85	ft
Channel Slope	0.02800	ft/ft
Critical Slope	0.03619	ft/ft

Worksheet for SW-1C-10yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.03000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	15.550	ft³/s

Results

Normal Depth	0.70	ft
Flow Area	4.28	ft²
Wetted Perimeter	8.43	ft
Hydraulic Radius	0.51	ft
Top Width	8.20	ft
Critical Depth	0.65	ft
Critical Slope	0.03870	ft/ft
Velocity	3.64	ft/s
Velocity Head	0.21	ft
Specific Energy	0.91	ft
Froude Number	0.89	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.70	ft
Critical Depth	0.65	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.03870	ft/ft

Worksheet for SW-1C-100yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.03000	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	32.110	ft^3/s

Results

Normal Depth	1.02	ft
Flow Area	7.20	ft^2
Wetted Perimeter	10.45	ft
Hydraulic Radius	0.69	ft
Top Width	10.12	ft
Critical Depth	0.98	ft
Critical Slope	0.03485	ft/ft
Velocity	4.46	ft/s
Velocity Head	0.31	ft
Specific Energy	1.33	ft
Froude Number	0.93	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.02	ft
Critical Depth	0.98	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.03485	ft/ft

Worksheet for UD-1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft^3/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft^2
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft^3/s
Discharge Full	0.94	ft^3/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	255.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.27	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-1

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.00	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-10

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-11

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.00	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-11

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-12

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.00	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-12

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-13

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.34	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.06	ft
Hydraulic Radius	0.17	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	50.6	%
Critical Slope	0.00706	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	0.67	ft
Froude Number	1.58	
Maximum Discharge	1.75	ft³/s
Discharge Full	1.62	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	255.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	3.77	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	50.63	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-13

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.34	ft
Critical Depth	0.43	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-14

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01900	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.32	ft
Flow Area	0.16	ft²
Wetted Perimeter	1.02	ft
Hydraulic Radius	0.16	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	47.3	%
Critical Slope	0.00706	ft/ft
Velocity	5.06	ft/s
Velocity Head	0.40	ft
Specific Energy	0.71	ft
Froude Number	1.80	
Maximum Discharge	1.97	ft³/s
Discharge Full	1.83	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	175.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	3.27	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	47.26	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-14

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.32	ft
Critical Depth	0.43	ft
Channel Slope	0.01900	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	255.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.27	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-2

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	370.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.85	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-3

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01600	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.33	ft
Flow Area	0.17	ft²
Wetted Perimeter	1.05	ft
Hydraulic Radius	0.17	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	49.7	%
Critical Slope	0.00706	ft/ft
Velocity	4.75	ft/s
Velocity Head	0.35	ft
Specific Energy	0.68	ft
Froude Number	1.64	
Maximum Discharge	1.81	ft³/s
Discharge Full	1.68	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	192.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	3.01	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	49.67	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-4

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Channel Slope	0.01600	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.34	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.06	ft
Hydraulic Radius	0.17	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	50.6	%
Critical Slope	0.00706	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	0.67	ft
Froude Number	1.58	
Maximum Discharge	1.75	ft³/s
Discharge Full	1.62	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	218.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	3.21	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	50.63	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-5

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.34	ft
Critical Depth	0.43	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-6

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.00500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.49	ft
Flow Area	0.28	ft²
Wetted Perimeter	1.37	ft
Hydraulic Radius	0.20	ft
Top Width	0.59	ft
Critical Depth	0.43	ft
Percent Full	73.1	%
Critical Slope	0.00706	ft/ft
Velocity	3.01	ft/s
Velocity Head	0.14	ft
Specific Energy	0.63	ft
Froude Number	0.78	
Maximum Discharge	1.01	ft³/s
Discharge Full	0.94	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	370.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.49	ft
Profile Description	M1	
Profile Headloss	1.85	ft
Average End Depth Over Rise	73.12	%
Normal Depth Over Rise	73.11	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-6

GVF Output Data

Upstream Velocity	3.01	ft/s
Normal Depth	0.49	ft
Critical Depth	0.43	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.34	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.06	ft
Hydraulic Radius	0.17	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	50.6	%
Critical Slope	0.00706	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	0.67	ft
Froude Number	1.58	
Maximum Discharge	1.75	ft³/s
Discharge Full	1.62	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	2.94	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	50.63	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-7

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.34	ft
Critical Depth	0.43	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-8

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.34	ft
Flow Area	0.18	ft²
Wetted Perimeter	1.06	ft
Hydraulic Radius	0.17	ft
Top Width	0.67	ft
Critical Depth	0.43	ft
Percent Full	50.6	%
Critical Slope	0.00706	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	0.67	ft
Froude Number	1.58	
Maximum Discharge	1.75	ft³/s
Discharge Full	1.62	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	2.94	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	50.63	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-8

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.34	ft
Critical Depth	0.43	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00706	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for UD-9

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01000	ft/ft
Diameter	0.67	ft
Discharge	0.830	ft³/s

Results

Normal Depth	0.38	ft
Flow Area	0.21	ft²
Wetted Perimeter	1.15	ft
Hydraulic Radius	0.18	ft
Top Width	0.66	ft
Critical Depth	0.43	ft
Percent Full	57.3	%
Critical Slope	0.00705	ft/ft
Velocity	3.97	ft/s
Velocity Head	0.25	ft
Specific Energy	0.63	ft
Froude Number	1.25	
Maximum Discharge	1.43	ft³/s
Discharge Full	1.33	ft³/s
Slope Full	0.00391	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.49	ft
Length	200.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.43	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	1.94	ft
Average End Depth Over Rise	68.72	%
Normal Depth Over Rise	57.32	%
Downstream Velocity	3.00	ft/s

Worksheet for UD-9

GVF Output Data

Upstream Velocity	3.46	ft/s
Normal Depth	0.38	ft
Critical Depth	0.43	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00705	ft/ft

Messages

Notes

10 Year Peak Flow for Sub-Area 1B = 11.56
With 14 underdrains it is assumed that this flow can be divided between the conduits.

11.56 cfs / 14 cfs = 0.83 CFS

Worksheet for Emergency Spillway Channel- DT1 - 100 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.33300	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	33.00	ft
Discharge	9.470	ft^3/s

Results

Normal Depth	0.11	ft
Flow Area	3.73	ft^2
Wetted Perimeter	33.71	ft
Hydraulic Radius	0.11	ft
Top Width	33.67	ft
Critical Depth	0.14	ft
Critical Slope	0.17330	ft/ft
Velocity	2.54	ft/s
Velocity Head	0.10	ft
Specific Energy	0.21	ft
Froude Number	1.34	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.11	ft
Critical Depth	0.14	ft
Channel Slope	0.33300	ft/ft
Critical Slope	0.17330	ft/ft

Worksheet for Emergency Spillway Weir - DT1 - 100 yr

Project Description

Solve For	Headwater Elevation

Input Data

Discharge		9.470	ft^3/s
Crest Elevation		383.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Gravel		
Crest Breadth		12.00	ft
Crest Length		33.00	ft

Results

Headwater Elevation	383.23	ft
Headwater Height Above Crest	0.23	ft
Tailwater Height Above Crest	-383.00	ft
Weir Coefficient	2.60	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	2.60	US
Flow Area	7.60	ft^2
Velocity	1.25	ft/s
Wetted Perimeter	33.46	ft
Top Width	33.00	ft

Worksheet for Emergency Spillway Channel- IF1 - 100 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.33333	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	32.00	ft
Discharge	18.870	ft³/s

Results

Normal Depth	0.17	ft
Flow Area	5.60	ft²
Wetted Perimeter	33.09	ft
Hydraulic Radius	0.17	ft
Top Width	33.03	ft
Critical Depth	0.22	ft
Critical Slope	0.14830	ft/ft
Velocity	3.37	ft/s
Velocity Head	0.18	ft
Specific Energy	0.35	ft
Froude Number	1.44	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.23	ft
Length	15.00	ft
Number Of Steps	5	

GVF Output Data

Upstream Depth	0.22	ft
Profile Description	Composite S1 -> S2	
Profile Headloss	4.99	ft
Downstream Velocity	2.51	ft/s
Upstream Velocity	2.63	ft/s
Normal Depth	0.17	ft
Critical Depth	0.22	ft
Channel Slope	0.33333	ft/ft
Critical Slope	0.14830	ft/ft

Worksheet for Emergency Spillway Weir- IF1 -100 yr

Project Description

Solve For	Headwater Elevation

Input Data

Discharge		18.870	ft³/s
Crest Elevation		372.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Gravel		
Crest Breadth		12.00	ft
Crest Length		32.00	ft

Results

Headwater Elevation	372.37	ft
Headwater Height Above Crest	0.37	ft
Tailwater Height Above Crest	-372.00	ft
Weir Coefficient	2.65	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	2.65	US
Flow Area	11.76	ft²
Velocity	1.61	ft/s
Wetted Perimeter	32.73	ft
Top Width	32.00	ft

Worksheet for Emergency Spillway Channel- SF - 10 yr

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.33300	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	13.00	ft
Discharge	11.710	ft³/s

Results

Normal Depth	0.22	ft
Flow Area	3.02	ft²
Wetted Perimeter	14.40	ft
Hydraulic Radius	0.21	ft
Top Width	14.33	ft
Critical Depth	0.29	ft
Critical Slope	0.13833	ft/ft
Velocity	3.88	ft/s
Velocity Head	0.23	ft
Specific Energy	0.45	ft
Froude Number	1.49	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.22	ft
Critical Depth	0.29	ft
Channel Slope	0.33300	ft/ft
Critical Slope	0.13833	ft/ft

Worksheet for Emergency Spillway Weir - SF- 10 yr

Project Description

Solve For	Headwater Elevation

Input Data

Discharge		11.710	ft³/s
Crest Elevation		378.00	ft
Tailwater Elevation		0.00	ft
Crest Surface Type	Gravel		
Crest Breadth		13.00	ft
Crest Length		13.00	ft

Results

Headwater Elevation	378.48	ft
Headwater Height Above Crest	0.48	ft
Tailwater Height Above Crest	-378.00	ft
Weir Coefficient	2.69	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	2.69	US
Flow Area	6.27	ft²
Velocity	1.87	ft/s
Wetted Perimeter	13.97	ft
Top Width	13.00	ft

Client *Eversource*		Page 1	of
Project *Northern Pass*	Date 12/30/16	Made By *C. Kane*	
Deerfield Substation		Checked By *R. Reed*	
Swale Shear Stress		Preliminary	Final x

Shear Stress Calculations for Swales

Swale	10 yr * Flow (cfs)	10 yr flow* depth (ft)	Channel * Slope (ft/ft)	Channel Lining	Allowable Shear Stress (lb/ft)	Calculated ** Shear Stress (lb/ft)
SW-1A	11.97	1.18	0.005	NAG/SC250	8	0.37
SW-1A-R	11.97	0.76	0.1	12" Riprap	4.8	4.74
SW-1B	12.46	0.63	0.028	NAG/SC250	8	1.1
SW-1C	15.55	0.7	0.03	NAG/SC250	8	1.31

Shear Stress Calculation for Basin Spillway

Basin	* Storm Event Flow (cfs)	Flow depth (ft)	Channel Slope (ft/ft)	Channel Lining	Allowable Shear Stress (lb/ft)	Calculated ** Shear Stress (lb/ft)
DT-1	9.47	0.11	0.333	12" RipRap	4.8	2.29
IF-1	18.87	0.17	0.333	12" RipRap	4.8	3.53
SF-1	11.71	0.22	0.333	12" RipRap	4.8	4.57

* Values taken from Flowmaster Results - 100 year storm event used for detention basins
10 year storm even used for sand filter spillway

** Shear stress = 62.4 lb/cf x (flow depth) x (channel slope)

*** Allowable shear Stress are taken from Manufacturer's product information if manufactured lining, otherwise these are taken from table 2.3 of FHA HEC 15, Third Edition.

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www.nagreen.com

Erosion Control Materials Design Software
Version 5.0

Project Name: Deerfield
Project Number: 107457
Project Location: Deerfield, NH
Channel Name: SW-1A

Discharge	11.97
Peak Flow Period	24
Channel Slope	0.005
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Sandy Loam

SC250 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC250 Unvegetated	Straight	11.97 cfs	2.44 ft/s	0.99 ft	0.031	2.5 lbs/ft2	0.31 lbs/ft2	8.1	STABLE	E
SC250 Reinforced Vegetation	Straight	11.97 cfs	1.12 ft/s	1.58 ft	0.086	8 lbs/ft2	0.49 lbs/ft2	16.22	STABLE	E
Underlying Substrate	Straight	11.97 cfs	1.12 ft/s	1.58 ft	--	0.8 lbs/ft2	0.012 lbs/ft2	66.49	STABLE	--

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Erosion Control Materials Design Software
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Project Name: Deerfield
Project Number: 107457
Project Location: Deerfield, NH
Channel Name: SW-1A-R

Discharge	11.97
Peak Flow Period	24
Channel Slope	0.1
Channel Bottom Width	2
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	Good 75-95%
Soil Type	Sandy Loam

Rock Riprap

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	11.97 cfs	7.06 ft/s	0.49 ft	0.032	4 lbs/ft2	3.05 lbs/ft2	1.31	STABLE	--

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Version 5.0

Project Name: Deerfield
Project Number: 107457
Project Location: Deerfield, NH
Channel Name: SW-1B

Discharge	12.46
Peak Flow Period	24
Channel Slope	0.028
Channel Bottom Width	4
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Sandy Loam

SC250 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC250 Unvegetated	Straight	12.46 cfs	3.72 ft/s	0.58 ft	0.038	2.5 lbs/ft2	1.02 lbs/ft2	2.46	STABLE	E
SC250 Reinforced Vegetation	Straight	12.46 cfs	2.33 ft/s	0.83 ft	0.074	8 lbs/ft2	1.44 lbs/ft2	5.55	STABLE	E
Underlying Substrate	Straight	12.46 cfs	2.33 ft/s	0.83 ft	--	0.8 lbs/ft2	0.149 lbs/ft2	5.36	STABLE	--

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Erosion Control Materials Design Software
Version 5.0

Project Name: Deerfield
Project Number: 108839
Project Location: Deerfield, NH
Channel Name: SW-1C

Discharge	15.55
Peak Flow Period	24
Channel Slope	.03
Channel Bottom Width	4
Left Side Slope	3
Right Side Slope	3
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Sandy Loam

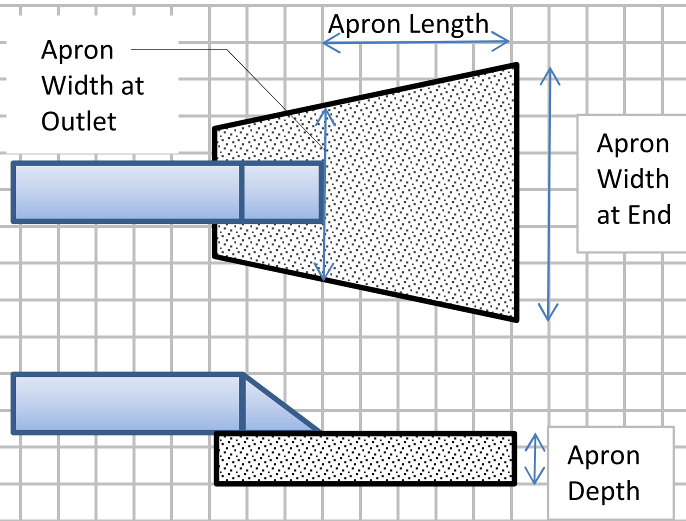
SC250 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC250 Unvegetated	Straight	15.55 cfs	4.15 ft/s	0.64 ft	0.037	2.5 lbs/ft2	1.19 lbs/ft2	2.1	STABLE	E
SC250 Reinforced Vegetation	Straight	15.55 cfs	2.7 ft/s	0.87 ft	0.068	8 lbs/ft2	1.63 lbs/ft2	4.91	STABLE	E
Underlying Substrate	Straight	15.55 cfs	2.7 ft/s	0.87 ft	--	0.8 lbs/ft2	0.189 lbs/ft2	4.24	STABLE	--

Client *Eversource*		Page *1*	of
Project *Northern Pass*	Date 12/30/16	Made By *C. Kane*	
Deerfield Substation		Checked By *R. Reed*	
Outlet Protection - Riprap Sizing		Preliminary	Final

Source:

New Hampshire Stormwater Manual, Volume 2
Post-Construction Best Management Practices
Selection & Design, Dec 2008, Section 4.6.6



Apron Width at Outlet:	Width =	3 x Pipe Dia. (or width of channel)	
Apron Length:	Length=	(1.8 x Q) / (Dia. ^1.5) + 7 x Dia.	if Tw depth is < 1/2 dia.
	Length=	(3.0 x Q) / (Dia. ^1.5) + 7 x Dia.	if Tw depth is >= 1/2 dia.
Apron Width at End:	Width = 3 x Dia + Apron Length		if Tw depth is < 1/2 dia.
	Width = 3 x Dia + 0.4 x Apron Length		if Tw depth is >= 1/2 dia.
	or apron width = channel width if a well defined channel exists		
Rock Riprap:	Median Diameter =	(0.2 x Q ^4/3) / Tw x Dia	
	Depth = 18" or 1.5 x largest stone dia.		

Design Element	Low Flow	FES-1	FES-2	FES-3	FES-4
Design Storm (YR)	WQF	25-yr	25-yr	25-yr	25-yr
Defined Channel (yes/no)	No	No	Yes	No	Yes
Channel Width (ft)	N/A	N/A	4	N/A	4
Pipe Dia (in)	4	18	12	24	24
Tail Water (ft)	1	0.1	0.48	0.1	0.44
	TW>=0.5D	TW<0.5D	TW<0.5D	TW<0.5D	TW<0.5D
Flow (Q), cfs	0.23	1.79	0.46	8.77	16.47
Apron Width (outlet) ft	1	4.5	4	6	4
Apron Length, ft	5.92	12.25	7.83	19.58	24.48
Apron Width (end) ft	3.37	16.75	10.83	25.58	30.48
Apron Width, (channel), ft	N/A	N/A	4	N/A	4
Median Stone dia. (D50), inches	6	6	6	20.2	10.4
Apron Depth, inches	18	18	18	60.6	31.2

APPENDIX D – NH DES WORKSHEETS

FILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.06)

Type/Node Name: **Surface Sand Filter SF-1**

Enter the type of filtration practice (e.g., bioretention system) and the node name in the drainage analysis, if applicable

Yes		Have you reviewed the restrictions on unlined systems outlined in Env-Wq 1508.06(b)?	
3.98	ac	A = Area draining to the practice[1]	
0.32	ac	A_I = Impervious area draining to the practice	
0.08	decimal	I = percent impervious area draining to the practice, in decimal form	
0.12	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.49	ac-in	WQV= 1" x Rv x A	
1,768	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
442	cf	25% x WQV (check calc for sediment forebay volume)	
1,326	cf	75% x WQV (check calc for surface sand filter volume)	
Sediment Forebay		Method of Pretreatment? (not required for clean or roof runoff)	
452	cf	V_{SED} = sediment forebay volume, if used for pretreatment	**← ≥ 25%WQV**
603	sf	A_{SA} = surface area of the practice	
0.50	iph	I_{DESIGN} = design infiltration rate[2]	
Yes	Yes/No	If I_{DESIGN} is < 0.50 iph, has an underdrain been provided?	
70.4	hours	T_{DRAIN} = drain time = V / (A_{SA} * I_{DESIGN})	**← ≤ 72-hrs**
373.75	feet	E_{FC} = elevation of the bottom of the filter course material	
372.00	feet	E_{UD} = invert elevation of the underdrain (UD), if applicable	
371.90	feet	E_{BTM} = elevation of the bottom of the practice (i.e., bottom of the stone reservoir).	
N/A*	feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
N/A*	feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
1.75	feet	$D_{FC\ to\ UD}$ = depth to UD from the bottom of the filter course[3]	**← ≥ 1'**
#VALUE!	feet	$D_{FC\ to\ ROCK}$ = depth to bedrock from the bottom of the filter course[3]	**← ≥ 1'**
#VALUE!	feet	$D_{FC\ to\ SHWT}$ = depth to SHWT from the bottom of the filter course[3]	**← ≥ 1'**
#VALUE!	feet	$D_{BTM\ to\ SHWT}$ = depth to SHWT from the bottom of the practice[3]	**← ≥ 2'**
378.45	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
379.00	ft	Elevation of the top of the practice	
YES		10 peak elevation ≤ Elevation of the top of the practice	**← yes**

If a surface sand filter is proposed:

YES	ac	Drainage Area check.	**← < 10 ac**
2,859	cf	V = volume of storage[4, 5] (attach a stage-storage table)	**← ≥ 75%WQV**
24.0	inches	D_{FC} = filter course thickness	**← 18"**
Sheet	C509	Note what sheet in the plan set contains the filter course specification	
Yes	Yes/No	Access grate provided?	**← yes**
Stone Fill		The filter shall not be covered in grass. What is covering the filter?	

If an underground sand filter is proposed:

YES	ac	Drainage Area check.	**← < 10 ac**
	cf	V = volume of storage[4, 5] (attach a stage-storage table)	**← ≥ 75%WQV**
	inches	D_{FC} = filter course thickness	**← 24"**
Sheet		Note what sheet in the plan set contains the filter course specification	
	Yes/No	Access grate provided?	**← yes**

If a bioretention area is proposed:

YES	ac	Drainage Area no larger than 5 ac?	← **yes**
	cf	V = volume of storage[4, 5] (attach a stage-storage table)	← **≥ WQV**
	inches	D_{FC} = filter course thickness	← **18"**
Sheet		Note what sheet in the plan set contains the filter course specification	
	:1	Pond side slopes	← **≥2:1**
Sheet		Note what sheet in the plan set contains the planting plans and surface cover	

If porous pavement is proposed:

		Type of pavement proposed (concrete? Asphalt? Pavers? Etc)	
	acres	A_{SA} = surface area of the pervious pavement	
-	:1	ratio of the contributing area to the pervious surface area	← **5:1**
3.0	inches	D_{FC} = filter course thickness	← **12"**
Sheet		Note what sheet in the plan set contains the filter course spec.	← **304.1 sand**

1. If the practice is a tree box filter, the drainage area shall be < 0.1 acre

2. Rate of the limiting layer (either the filter course or the underlying soil). See Vol. 2 of the NH Stormwater Manual, Ch. 2-4, for guidance on determining the infiltration rate.

3. If not within a GPA or WSIPA: SHWT/Bedrock must be at least 1 foot below the filter course material (or an underdrain must drain the SHWT to at least one foot below the filter course material). If within a GPA or WSIPA: SHWT must be at least two feet below the bottom of the practice OR the filter course material must be at least twice as thick as required and the SHWT must be at least one foot below the filter course material.

4. Volume without depending on infiltration. The storage above the filter media shall not include the volume above the outlet structure, if any.

5. The volume includes the storage above the filter but below the invert of the outlet structure (if any), the filter media voids, and the pretreatment area.

Designer's Notes:

* Elevation of bottom of filter course (Efc) is approximately 1.75-ft above existing grade, therefore minimum 1-ft separation to both the SHWT and bedrock are met.

Elevation of bottom of the practice (Ebtm) is equal to existing grade.

BURNS McDONNELL

Client	Eversource	Page	of
Project	Northern Pass	Date 10/13/15	Made By R.Reed
	Deerfield Substation		Checked By
	Surface Sand Filter SF-1 - Stage-Storage Table	Preliminary	Final x

Stage/Storage Calculations

Volume Below Filter Bed

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method) INCREMENTAL	x 0.40 *	TOTAL (CF)	Total Ac-Ft
373.75	603	0.014		0	0	0	0
374.00	603	0.014	0.25	151	60	60	0.001
375.00	603	0.014	1.00	603	241	302	0.007
375.90	603	0.014	0.90	543	217	519	0.012

* 0.4 = void factor of filter material

Volume Above Filter Bed

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method) INCREMENTAL	TOTAL (CF)	Total Ac-Ft	
375.90	576	0.013		0	0	0	
376.00	603	0.014	0.10	59	59	0.001	
377.00	906	0.021	1.00	749	808	0.019	
378.00	1265	0.029	1.00	1081	1889	0.043	<-- Spillway Elevation

Volume of Forebay

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method) INCREMENTAL	TOTAL (CF)	Total Ac-Ft
376.00	116	0.003		0	0	0
377.00	266	0.006	1.00	127	127	0.003
378.00	473	0.011	1.00	324	452	0.010

WQV = 1354 CF   Spillway set to Elevation 378.0

75% of WQV= 1015.5 CF

25% of WQV= 338.5 CF

Volume in the filter chamber :

	519	CF below the filter bed
+	1889	CF Above the filter bed but below the spillway
=	2407	CF total volume provided in the filter chamber
+	452	CF in forebay
=	2859	CF of Storage provided by Sand Filter

General Calculations - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided. For example, if proposing a new technology, which is not a stormwater wetland, infiltration practice, etc., then this worksheet may be useful.

Water Quality Volume (WQV)

3.98	ac	A = Area draining to the practice
0.32	ac	A_I = Impervious area draining to the practice
0.08	decimal	I = percent impervious area draining to the practice, in decimal form
0.12	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
0.49	ac-in	WQV= 1" x Rv x A
1,768	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")

Water Quality Flow (WQF)

1	inches	P = amount of rainfall. For WQF in NH, P = 1".
0.12	inches	Q = water quality depth. Q = WQV/A
82	unitless	CN = unit peak discharge curve number. CN $=1000/(10+5P+10Q-10*[Q^2 + 1.25*Q*P]^{0.5})$
2.1	inches	S = potential maximum retention. S = (1000/CN) - 10
0.425	inches	Ia = initial abstraction. Ia = 0.2S
6.0	minutes	T_c = Time of Concentration
350.0	$cfs/mi^2/in$	qu is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III
0.266	cfs	WQF = q_u x WQV. Conversion: to convert "$cfs/mi^2/in$ * ac-in" to "cfs" multiply by $1mi^2/640ac$

Designer's Notes:

BURNS McDONNELL	Client *Eversource*		Page *1* of
	Project *Northern Pass*	Date 10/17/16	Made By *R. Reed*
	Deerfield Substation		Checked By
	Water Quality Bypass		Preliminary Final

Calculate Weir Height and Orifice Size for By-Pass Structure

Known Data: Reference

Water Quality Peak Flow

WQF = 0.266 cfs

WQF = Water Quality Flow to be diverted trough a diversion structure (check dam)

Size the Low flow orifice to pass the Water Quality Peak Flow

Orifice Flow Q = CA(2gh)^1/2

where: C= 0.6

A= orifice area ft

g= acceleration due to gravity = 32.2 ft/sec^2

h= head ft

Let H = 1.0 ft (The height of the Check Dam Weir Wall)

solve for the area of the orifice (A)

A= Q/ C (2gh)^1/2

A= 0.266cfs/ (0.6 x (2x 32.2 ft/sec^2 x1ft) ^ 1/2

A= 0.06 sf

Solve for the Diameter of the Orifice

D= (4xA/3.14)^1/2

D= (4 x 0.055sf /3.14)^1/2

D= 0.26 ft

D= **3.18** inch ---> Say 4 Inches (Orifice Diameter)

INFILTRATION PRACTICE DESIGN CRITERIA (Env-Wq 1508.05)

Type/Node Name: **Infiltration Basin IF-1**

Enter the type of infiltration practice (e.g., trench) and the node name in the drainage analysis, if applicable

Yes		Have you reviewed Env-Wq 1508.05(a) to ensure that infiltration is allowed?	
5.29	ac	A = Area draining to the practice	
0.32	ac	A_I = Impervious area draining to the practice	
0.06	decimal	I = percent impervious area draining to the practice, in decimal form	
0.10	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.55	ac-in	WQV= 1” x Rv x A	
2,005	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	
501	cf	25% x WQV (check calc for sediment forebay volume)	
Sediment Forebay		Method of pretreatment? (not required for clean or roof runoff)	
525	cf	V_{SED} = sediment forebay volume, if used for pretreatment	← **≥ 25%WQV**
9,796	cf	V = volume[1] (attach a stage-storage table)	← **≥ WQV**
9,139	sf	A_{SA} = surface area of the bottom of the pond	
1.25	iph	I_{DESIGN} = design infiltration rate[2]	
10.3	hours	T_{DRAIN} = drain time = V / (A_{SA} * I_{DESIGN})	← **≤ 72-hrs**
369.00	feet	E_{BTM} = elevation of the bottom of the practice	
366.00	feet	E_{SHWT} = elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
362.00	feet	E_{ROCK} = elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
3.00	feet	D_{SHWT} = separation from SHWT[3]	← **≥ *** [3]
7.0	feet	D_{ROCK} = separation from bedrock[3]	← **≥ *** [3]
N/A	ft	D_T = depth of trench, if trench proposed	← **4 - 10 ft**
N/A	Yes/No	If a trench or underground system is proposed, observation well provided	
N/A		If a trench is proposed, material in trench	
Sand or Pea Gravel		If a basin is proposed, basin floor material	
Yes	Yes/No	If a basin is proposed, the perimeter should be curvilinear.	
3.0	:1	If a basin is proposed, pond side slopes	← **≥3:1**
370.93	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
371.66	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
373.00	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?	← **yes**
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	← **yes**

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. See NH Stormwater Manual, Vol.2, Ch.2-4, for guidance on determining the infiltration rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.

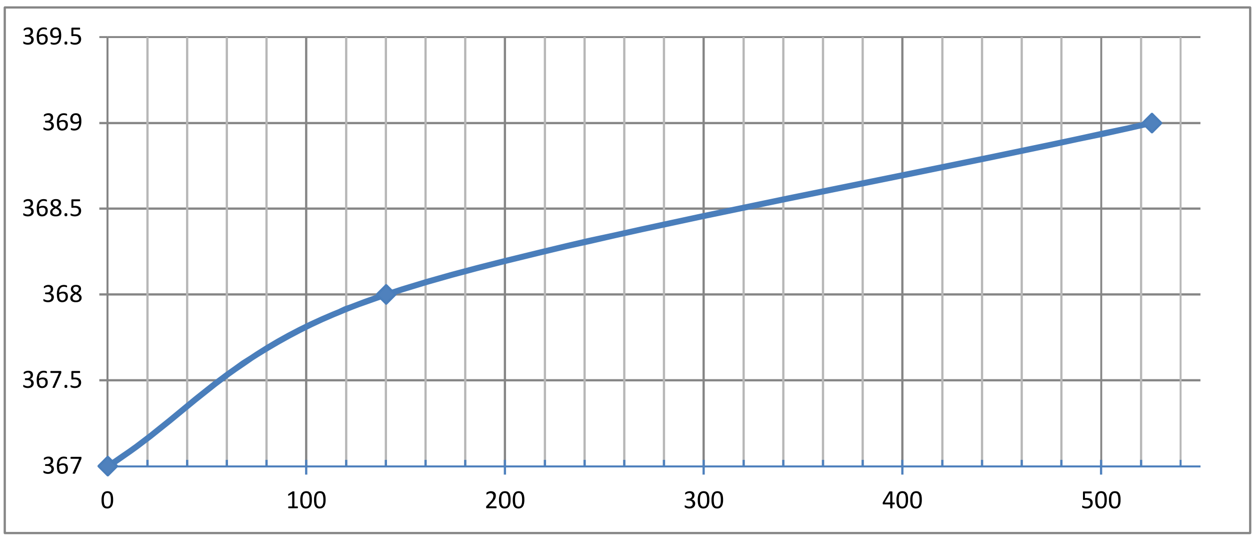
Designer's Notes:

Client	*Eversource*	Page	of
Project	*Northern Pass* Date 12/29/16	Made By	*C. Kane*
	Deerfield Substation	Checked By	*R. Reed*
	IF-1 Forebay - Stage-Storage Table	Preliminary	Final **x**

Stage/Storage Table

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method)		
				INCREMENTAL	TOTAL (CF)	Total Ac-Ft
367	50	0.001			0	0.000
368	257	0.006	1	140	140	0.003
369	530	0.012	1	385	525	0.012

Stage Storage Curve

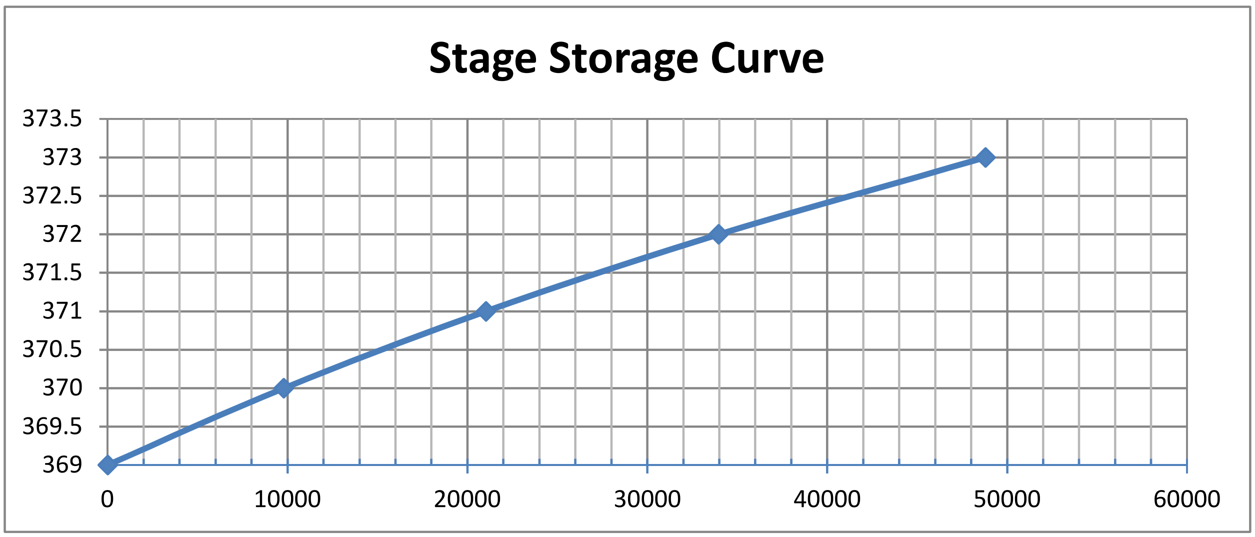


Client	*Eversource*		Page		of
Project	*Northern Pass*	Date 12/29/16	Made By	*C. Kane*	
	Deerfield Substation		Checked By	*R. Reed*	
	Infiltration Basin IF-1 - Stage-Storage Table		Preliminary		Final x

Stage/Storage Table

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method)		
				INCREMENTAL	TOTAL (CF)	Total Ac-Ft
369	9139	0.210			0	0.000
370	10468	0.240	1	9796	9796	0.225
371	12036	0.276	1	11243	21039	0.483
372	13838	0.318	1	12927	33965	0.780
373	15860	0.364	1	14838	48803	1.120

Stage Storage Curve



Groundwater Recharge Volume (GRV) Calculation

-	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
-	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
0.32	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
-	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.10	inches	Rd = weighted groundwater recharge depth	
0.032	ac-in	GRV = AI * Rd	
116	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12")	

Provide calculations below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

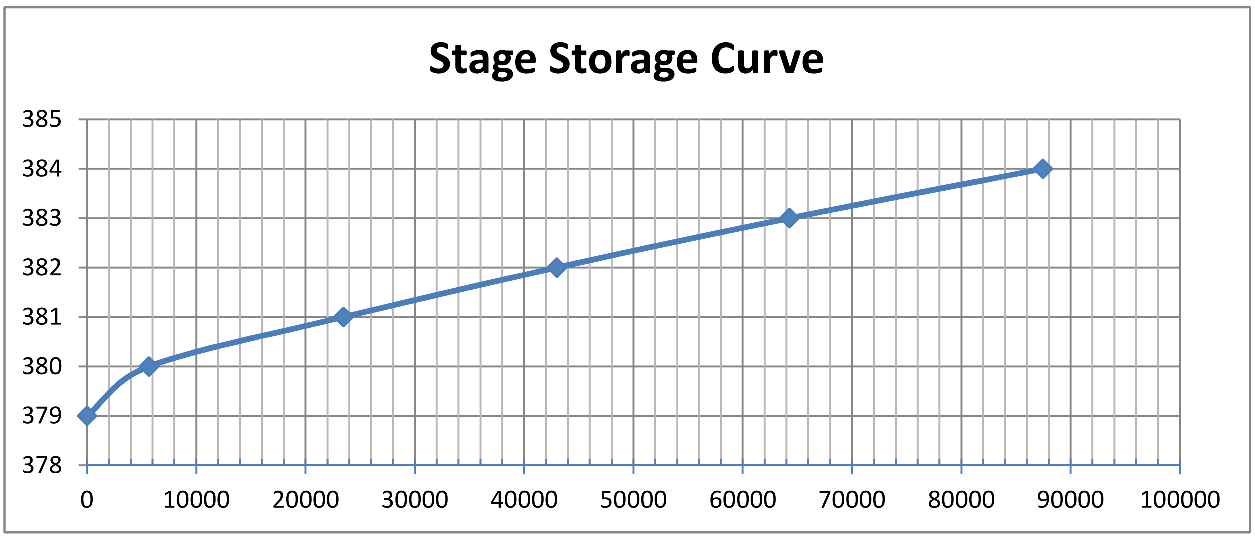
Groundwater recharge is being provided by the infiltration basin. The proposed storage volume below the lowest invert is 9796 cubic feet which is greater than 116 cubic feet.

Client	Eversource	Page	of
Project	Northern Pass — Date 06/26/15	Made By	L. Monzon
	Deerfield Substation	Checked By	
	Detention Basin DT-1 - Stage-Storage Table	Preliminary	Final

Stage/Storage Table

ELEV (FT.)	AREA (S.F.)	AREA (Ac)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME (Conic Method)		
				INCREMENTAL	TOTAL (CF)	Total Ac-Ft
379	0	0		0	0	0
380	16981	0.39	1	5660.33	5660.33	0.130
381	18645	0.428	1	17806.52	23466.85	0.539
382	20395	0.468	1	19513.46	42980.31	0.987
383	22233	0.51	1	21307.39	64287.71	1.476
384	24161	0.555	1	23190.32	87478.03	2.008

Stage Storage Curve



BURNS McDONNELL	Client *Eversource*	Page *1* of	
	Project *Northern Pass*	Date	Made By
	Deerfield		Checked By
	Impervious Area Summary	Preliminary	Final

BMP: Surface Sand Filter

A_I = Impervious area draining to the practice = 0.32 ac

(Contributing watersheds: Post-Area 1B, Post-Area 1C)

0.32 ac Station (roof tops and concrete foundation)

0.32 ac **TOTAL Impervious Area Contributing to BMP: Surface Sand Filter**

APPENDIX E – OPERATIONS AND MAINTENANCE PLAN

Northern Pass Transmission Project
Deerfield Substation

Stormwater System Operations and Maintenance Plan

General Overview
Eversource has established an operations and maintenance (O&M) plan for the station post-construction stormwater management system in accordance with the New Hampshire Department of Environmental Services Stormwater Manual (2008) and will be implemented upon completion of construction as outlined below. Any required post construction stormwater management permits will be obtained and implemented by Eversource.

The new substation expansion located on Eversource owned property off Cate Road (43.140316 latitude and –71.186953 longitude) in Deerfield, Rockingham County, New Hampshire (Site)

<u>Purpose & Goals</u>
The purpose of this O&M Plan is to provide guidance for the implementation and documentation process of the station site stormwater management system to help conform with the corresponding regulatory agency approvals and permits. The guidance provided herein is the minimum required. The primary goal is to inform all the property managers about how the system operates and what maintenance items are necessary to protect the downstream storm drain system and waters. The secondary goal is to provide a practical, efficient means of maintenance planning and record keeping to verify permit compliance.

<u>Responsible Parties</u>
Eversource will be responsible for implementing the O&M Plan.

Eversource
13 Legends Drive
Hooksett, NH 03106

<u>Maintenance Logs and Checklists</u>
Eversource will keep a record of all maintenance procedures performed, date of inspection/ cleanings, etc. Copies of inspection reports and maintenance records shall be kept on site.

<u>Forms</u>
The following forms will be developed for annual maintenance. Copies of the forms will be kept on-site as part of the Post-Construction Stormwater Management Plan.

- Annual Checklist
- Quarterly Checklist
- Monthly Checklist

<u>Training</u>
Responsible operations and maintenance workers and contractors will be trained with a basic description of the purpose and function of the onsite stormwater management system as well as

safety protocol and procedures, with annual up-dates, to provide that the workers tasked with maintaining the station site do so in accordance with the approved permit conditions. All workers that have maintenance duties will be adequately informed of their responsibilities. All sub-contractors (Vactor, landscaping, snowplowing, etc.) will be informed of special requirements and responsibilities.

Stormwater Management System

The onsite stormwater management system has several components that are shown on the Site Development Plans and they perform various functions in conveying and treating stormwater runoff. Refer to the Site Development Plans for locations and details for each of the stormwater system components. Regular operations and maintenance is critical to the long term success of the stormwater management system components. The stormwater system components are:

Stormwater Swales:

Onsite stormwater swales collect and convey stormwater runoff and are either lined with vegetation or riprap. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Inspect for erosion, sediment accumulation, vegetation loss, and presence of invasive species.
- Perform periodic mowing; frequency depends on location and type of grass. Do not cut shorter than Water Quality Flow depth (maximum 4-inches).
- Remove debris and accumulated sediment, based on inspection.
- Removal of woody vegetation from embankments.
- Repair eroded areas, remove invasive species and dead vegetation, and reseed with applicable grass mix as warranted by inspection.
- For riprap lined swales, inspect and repair for erosion, displaced riprap, and remove accumulated sediment.
- Periodic mowing of vegetated swales.

Culverts:

Culverts convey stormwater runoff under driveways and consists of an open pipe end upstream and a flared end section downstream. It is typical that stormwater swales are located both upstream and downstream of the culvert and may have riprap outlet protection. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any accumulated sediment and debris in the culvert and also at the upstream and downstream ends that may be restricting flow though.
- Inspect and repair any damage and deterioration to the upstream and downstream swales and outlet protection.

Underdrains:

Onsite underdrains are located under cable trench and within yard along perimeter fence. The underdrains will act as curtain drains and aid in surface drainage. These underdrains are connected to a stormwater swale (SW-1B) and the onsite storm drainage system which conveys the flow into the basin system. Cleanouts are provided on the underdrains to provide access. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any accumulated sediment and debris in the underdrains through the cleanouts and outlets.
- Inspect and Repair any damage and deterioration to the outlet protection and downstream areas.

<u>Storm Drainage System:</u>
Onsite storm drainage system including conveyance pipes, flared end sections, storm manholes and catch basins convey stormwater. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any accumulated sediment or debris at the outfalls.
- Inspect and repair any damage and deterioration to the conveyance pipes, manholes, catch basins and riprap outlet protection.

<u>Outfalls:</u>
Storm drainage outfalls are the point stormwater discharges from pipe outlets and consist of a flared end section and riprap outlet protection. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any accumulated sediment or debris at the outfalls.
- Inspect and repair any damage and deterioration to riprap outlet protection.

<u>Detention Basin:</u>
The detention basin attenuates stormwater and consists of numerous components including an outlet control structure, trash rack, outlet pipe, emergency spillway, anti-seep collar, low flow channel, etc. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any trash and debris.
- Periodic mowing of embankments.
- Removal of woody vegetation from embankments.
- Removal of debris from outlet structures. Removal of accumulated sediment.
- Inspection and repair of inlet pipes, outlet structures, and appurtenances.
- Inspect for erosion, sediment accumulation, vegetation loss, and presence of invasive species
- Inspection of embankments by a qualified professional for settlement, erosion, seepage, animal burrows, woody vegetation and other conditions that could degrade the embankment and reduce its stability for impounding water.

Infiltration Basin:

The infiltration basin attenuates stormwater, provides water quality and groundwater recharge and consists of numerous components including embankments and a riprap spillway. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Remove any trash or debris from any pretreatment devices and basin bottom
- Periodic mowing of embankments
- Removal of woody vegetation from embankments
- Removal of debris from spillway.
- Removal of accumulated sediment
- Inspection and repair of embankments and spillway
- Inspect for erosion, sediment accumulation, vegetation loss, and presence of invasive species.
- Inspection of infiltration components at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- Inspection of pretreatment measures (vegetated swale) at least twice annually and removal of accumulated sediment as warranted by inspection, but no less than once annually.
- If infiltration system does not drain within 72 hour following a rainfall event, then a qualified professional should assess the condition of the facility and determine measures required to restore the condition of the facility and restore infiltration function, including but not limited to removal of accumulated sediments or reconstruction.

Surface Sand Filter

The surface sand filter provides water quality and groundwater recharge and consists of numerous components including a diversion check dam, sediment forebay, basin spillway, outlet pipe, underdrain, perforated standpipe, stone fill cover, etc. the following is recommended for regular maintenance twice annually unless otherwise noted.

- Remove any trash and debris.
- Removal of woody vegetation from embankments.
- Removal of debris from low flow pipe inlet and outlet structures.
- Removal of accumulated sediment.
- Inspection and repair of check dam, embankments, outlet structures, and appurtenances.
- Inspect for erosion, sediment accumulation, vegetation loss, and presence of invasive species
- Inspection of infiltration components at least twice annually, and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection.
- Inspection of pretreatment measures at least twice annually and removal of accumulated sediment as warranted by inspection, but no less than once annually.
- If an infiltration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore the condition of the facility to determine measures requires to restore

infiltration function, including but not limited to removal of accumulates sediments or reconstruction.

- Manufactured filter media should be replaces periodically per manufacturer's specifications.

Substation Yard Stone:

The substation yard stone within the substation yard, on access roads, and in parking areas can become compacted and eroded over time. The following is recommended for regular maintenance twice annually unless otherwise noted:

- Inspect for and repair any erosion in the yard, on access roads, and at the perimeter of the gravel areas.
- As the gravel areas become compacted, scrape off top layer to subgrade elevation and install new gravel surfacing layer at design elevation and pitch.

Spill Control

Eversource will have a spill control program. That program will be updated annually and incorporated into the employee-training program.

Disposal:

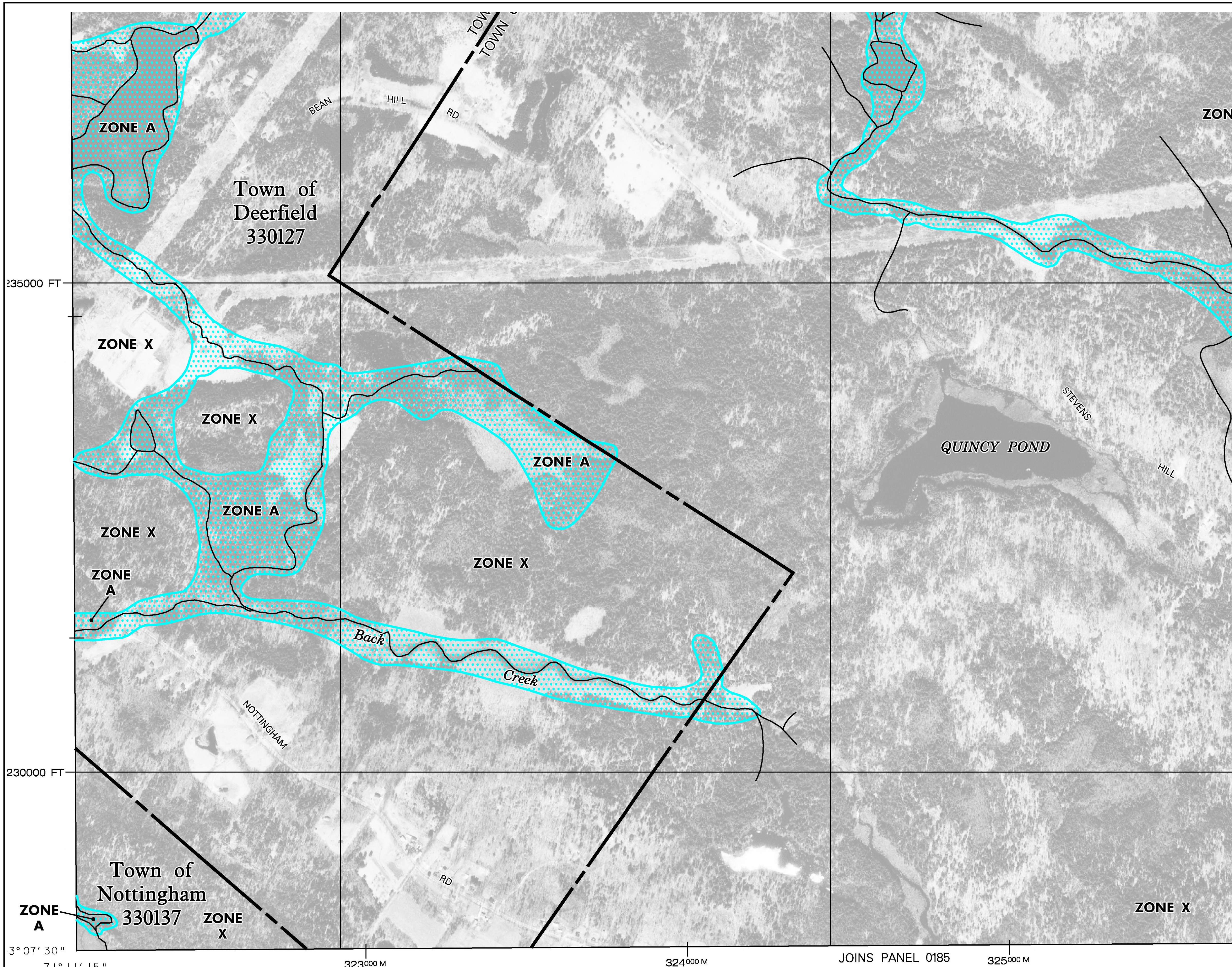
For all removed sediment, debris, trash, etc. from the stormwater management system during operations and maintenance shall be disposed of properly and legally by a New Hampshire Licensed hauler. Road sand may be reused for winter sanding, but may not be stored on-site.

Pesticides:

Northern Pass anticipates that vegetation management activities will be performed by Eversource. Work will be performed in accordance with Eversource's vegetation management program, which currently employs only mechanical means for controlling vegetation within the Eversource rights of way. Eversource does not currently plan to use herbicides as part of its vegetation management program, and as indicated in the Northern Pass application for a Presidential Permit (at page 52), all vegetation management and maintenance will be carried out in accordance with the New Hampshire Division of Forest and Lands Best Management Practice for utility maintenance. Herbicides will not be used before or during construction of the Northern Pass.

* * * * *

APPENDIX F – FEMA FLOOD INSURANCE RATE MAP



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

0 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0095E

FIRM
FLOOD INSURANCE RATE MAP
ROCKINGHAM COUNTY,
NEW HAMPSHIRE
(ALL JURISDICTIONS)

PANEL 95 OF 681

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DEERFIELD, TOWN OF	330127	0095	E
NORTHWOOD, TOWN OF	330855	0095	E
NOTTINGHAM, TOWN OF	330137	0095	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
33015C0095E

EFFECTIVE DATE
MAY 17, 2005

U.S. DEPARTMENT OF HOMELAND SECURITY

Federal Emergency Management Agency

APPENDIX G – SOIL SURVEY REPORTS (BY OTHERS)

Northern Pass Transmission Project

Soil Survey Report for Transition Stations, Substation Expansions, and Converter Terminal

Prepared For:
Northern Pass Transmission, LLC

Submitted On:
February 6, 2015

Prepared By:
Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110

www.normandeau.com

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List of Figures

List of Tables

1. Society of Soil Scientists of Northern New England. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNNE Special Publication No. 3. Durham, NH.

1.0 Introduction

Normandeau Associates, Inc. (Normandeau) has reviewed and mapped the soils in areas under consideration for four proposed Transition Stations located in Pittsburgh, Clarksville (two), and Stewartstown (Figure 1) associated with the Northern Pass Transmission (NPT) project.

In addition, Normandeau also conducted a soil survey on a potential new converter terminal site in Franklin (Figure 2), and two substation expansions areas; one in Deerfield and one in Londonderry (Figure 3). The report is summarizes the soil surveys completed at each site.

All sites were previously surveyed for wetlands by Normandeau wetland scientists in 2012-2013. Information obtained during the soil surveys indicates that wetland boundaries were consistent with hydric soil boundaries.

Table 4-5B. Converter Terminal, Franklin, Summary of Udorthents and Udipsamments (Made Land) Estimated Physical Characteristics[1].

Characteristic	299A/cbaaa	300A/dbcbb
Drainage Class	c-well drained	d-moderately well drained
Parent Material	b-glaciofluvial deposits	b-glaciofluvial deposits
Restrictive/Impervious layer	a- none	c- mineral restrictive layer, < 40"
Estimated ksat	a-high	b-moderate
Hydrologic Group	a-Goup A	b- Group B

1. Society of Soil Scientists of Northern New England. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNNE Special Publication No. 3. Durham, NH.

4.6 Deerfield Substation Expansion- Deerfield

Overview

The Deerfield Substation is located south of Cate Road in Deerfield. The proposed expansion site is located to the south of the existing substation and east of a power line right-of-way. The site is wooded with shrubs and saplings in the understory. Several erratic boulders are scattered across the site. The site slopes to the east and south. Moderately steep (15 to 25%) to steep (25 to 45%) slopes occur within the southern portion of the site. The remainder of the site is gently sloping (3 to 8%) to strongly sloping (8 to 15%). Several stream corridors with bordering wetlands occur within the northern half of the site, draining east to a large wetland. A stream corridor with associated wetlands occurs along the southern boundary.

Soil Mapping Results

Normandeau completed a total of 14 test pits evenly distributed across the site on September 25, 2014. The final survey area is 9 acres. The wetland boundaries had been previously flagged and located in the field by Normandeau. Eight soil map units were mapped within the project site. The soils within the site are formed from lodgement till overlain by windblown material. Well drained Montauk sandy loam is found within the southern half of the site. Moderately well drained Scituate fine sandy loam and moderately well drained Chatfield Variant, deep, are found within the northern half of the site. Somewhat poorly drained Ridgebury sandy loam is found in the northwest corner bordering wetlands. Poorly drained Ridgebury sandy loam is found within wetland drainages. A small inclusion of Rubble land, in which boulders have been piled, occurs along the northern boundary adjacent to the existing substation. The soils mapped within the existing facility were identified by the NRCS as Urban land-Canton Complex (799) (Soil Survey Staff 2014).

Slope phases are not provided in Table 4-6 but are included in the detailed summary on each map unit provided in Appendix A. Table 4-6B provides an overview of the made land map unit based on NRCS mapping (SSSNNE 2011).

Table 4-6A. Deerfield Substation Expansion, Summary of Soil Physical Characteristics

Map Unit	Hydrologic Group	Seasonal Water Table (SWT) Depth[1] (Inches)	Depth to Bedrock (Inches)	Drainage Class[2]	Ksat (in/hr)	Limitations
44-Montauk	C	>40	>60	W	0.06-6.0	
189-Chatfield Variant (MW)	B	>40	40-60	MW	0.6-6.0	Bedrock
295-Greenwood	A/D	Surface	>60	VP	unk	VP[2]
656-Ridgebury (P)	C	Surface to 12	>60	P	0-6.0	P[2]
727-Rubble land	Unkown	Unknown	Unknown	Unknown	Unknown	
926-Ridgebury (SW)	C	<15	>60	SP	0-6.0	
799-Urban land-Canton Complex[3]	B	>40	>60	W	2.0-20	

1. Seasonal water table ranges are provided from the NRCS. On-site conditions are expected to fall within these ranges based on test pit observations.
2. Drainage Classes:
   VP- very poorly drained; P- poorly drained; SP- somewhat poorly drained;
   MW- moderately well drained; W- well drained; SE- somewhat excessively drained.
3. Physical characteristics of disturbed soil are estimated based on Canton series.

Summary

The major limitations to development within the Deerfield Substation expansion site are wetlands and steep slopes. A stream corridor with associated wetlands separates the existing facility from the expansion site. A stream corridor and associated wetlands are located at the base of a steep slope at the southern end of the site. Steep slopes border the existing facility site north of the expansion area.

Table 4-6B. Deerfield Substation Expansion, Summary of Udorthents (Made Land) Estimated Physical Characteristics[1] .

Characteristic	799A/ccaab
Drainage Class	c- estimated to be well drained.
Parent Material	c-glacial till
Restrictive/Impervious layer	a- none
Estimated ksat	a-high
Hydrologic Group	b- Group B (estimated based on Canton)

1. Society of Soil Scientists of Northern New England. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNNE Special Publication No. 3. Durham, NH.

2.0 Purpose

The purpose of the soil survey is to provide a soil map of each site showing limitations to development, including hydric soil boundaries where observed, for inclusion in an Alteration of Terrain Permit application that is anticipated to be filed for the project. This survey is appropriate for use in planning site design for stormwater runoff and erosion control. Information is also provided regarding limitations to the potential for site development including roads, shallow excavations, and stormwater detention. It is important to note that soils considered appropriate (non-limiting) for one use may be considered limiting for another use. Soil map units described in this report have been influenced by the intended use of the soil map; consequently, the information provided may not be adequate for uses other than for those for which the soil map was originally developed.

This soil narrative and accompanying soil survey map have been completed in accordance with the *Site Specific Standards for New Hampshire and Vermont* (SSSNNE 2011). No other warranty, expressed or implied, is made. This map product is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product, intended for the assessment of site limitations to development of the site. It was produced by professional soil scientists, and is not the product of the USDA Natural Resources Conservation Service (NRCS). There are maps for each site that accompany this report.

Data provided on soil series are based on interpretation of published information by the NRCS. Due to the complexity of the glaciated landscape in New Hampshire, variations in subsurface conditions may exist, which were not evident during the project review. Should significant variations in subsurface conditions become evident during site development, re-evaluation of site conditions may be warranted based on the present findings of this report.

3.0 Methodology

3.1 Field Procedures

Certified Soil Scientists conducted the field reviews at the various sites. Jennifer West and Ian Broadwater are Maine-Certified Soil Scientists, with reciprocity to practice in New Hampshire. John Hayes is a Certified New Hampshire Soil Scientist. Field observations were made using borings dug by hand with a dutch auger and tile spade and test pits dug with an excavator. Soil observations were made to either bedrock or to 60 inches, where feasible. The area of soils review at each site was generally larger than the final surveyed site, which was reduced during planning.

The general field procedures used to make this soil map follow those of the National Cooperative Soil Survey (Schoeneberger et al. 1998). The soils mapped are either established soil series used in the State of New Hampshire by the NRCS (USDA NRCS 2011) or are classified according to the NRCS classification system described in the *Disturbed Soil Mapping*

Unit Supplement for New Hampshire, DES AoT Site Specific Soil Maps (SSSNNE 2011). Map unit descriptions are provided in Appendix A.

Soil test pit logs were completed for each observation. Representative observations are provided in Appendix B. Test pits were located with a Trimble® GPS, which is capable of submeter accuracy. Soil map unit boundaries are approximate, as their placement is based on a combination of field observations and surveyed site topography.

3.2 Soil Map Units

The soil map units used for this survey are either consociations or complexes. Consociations are dominated by a single soil series and similar soils. Complexes consist of two or more dissimilar components that cannot be mapped separately and the named components are sufficiently different in either morphology or behavior that the unit cannot be considered a consociation. Map unit symbols in this survey are from the State Numerical Legend along with the soil series name. Slope phases are designated as a letter in the map unit symbol - A, B, C, D, E - refers to slope class (Table 3-1).

Table 3-1. Slope Class

Slope Symbol	Standard Range
A	0-3%
B	3-8%
C	8-15%
D	15-25%
E	25-50%

The soil interpretations provided are based on information in the soil series descriptions and technical information provided by the NRCS web soil survey (Soil Survey Staff 2014). All limitations and constraints invoked by the NRCS for such interpretations also apply to this soil survey.

The map units observed are summarized on an attached plan and described in Appendix A. These descriptions are within the NRCS range for each official Soil Series Description; however, they provide more detail as they are based on site-specific observations. Each map unit description includes information on soil taxonomic classification, general description, morphology, physical characteristics, inclusions, use, and management. The taxonomic classification follows Keys to Soil Taxonomy (Soil Survey Staff 2014). Information on soil morphology and physical characteristics were obtained from the NRCS (Soil Survey Staff 2014).

Disturbed soil map units were classified according to the New Hampshire State-Wide Numerical Soils Legend (USDA NRCS 2011). Additional information on each map unit is provided according to criteria outlined in the disturbed soil supplement created by SSSNNE (2011), which utilizes the definition of disturbed land, including excavated and filled land, as defined by RSA 485 485-A:6, VIII; RSA 485-A: 17; and NHDES Env-Wq 1500. The map symbol for disturbed soil consists of two parts separated by a forward slash (/). The first part consists of the NRCS Disturbed Map Unit symbol (USDA NRCS 2011) and a capital letter designating slope. The second part consists of symbols of the Disturbed Soil Supplement (SSSNNE 2011) and is composed of 5 lower case letters, which describe drainage class, parent material, restrictive/impervious layers, estimated Ksat, and estimated hydrologic soil group.

Consociation map units, in accordance with the standards, will have a minimum of 75% of the named soil or similar soils within that unit. The named soil will be the most common of all similar soils. The total number of dissimilar soils in any one mapping unit for either consociations or complexes should not exceed 25% of the map unit of which no more than 15% is limiting. Similar soils are alike in most properties and share similar limitations such as depth to water table or content of organic matter. Dissimilar soils do not share limits of some important diagnostic properties of the named soil and may have different use or management requirements for a particular land use. It is important to note that some dissimilar soils are more limiting in their use than the named soil. For instance, an inclusion of somewhat poorly drained soils can occur within a well-drained soil map unit. A summary of potential inclusions of similar and dissimilar soils is provided for each map unit.

The hydrologic group identifies soils having the same runoff potential under similar storm conditions. Soil properties that influence runoff are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. Infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. Transmission rate is the rate at which water moves in the soil and is controlled by soil properties.

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. Ksat values are based on soil characteristics in the field, particularly structure, consistence, porosity and texture (SSSNNE 2009). The Ksat values provided are from the Typical Pedon from the county that best reflected the soil and/or had the most acres of that soil. The data represents the range within the B and C horizons (SSSNNE 2009).

3.3 Hydric Soils

Hydric soils refer to those soil series the NRCS considers to be either poorly or very poorly drained. The NRCS (Soil Survey Staff 2014) defines hydric soil as "a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part". The hydric soil boundary corresponds with the wetland boundary in the areas observed for this project. The hydric soil boundary was located with a Trimble® GPS unit and post processed for submeter accuracy. Impacts to wetlands come under the jurisdiction of the U.S. Army Corps of Engineers and New Hampshire Department of Environmental Services.

4.0 Summary of Findings

The following summarizes the results of the soil surveys at the seven sites. Soil map unit descriptions are provided in Appendix A; representative soil logs in Appendix B; NRCS soil map unit descriptions for Station 3 underground segment in Appendix C, and soil maps in Appendix D. Soil logs that are provided in Appendix B but are not shown on the relevant map were outside the final project survey area.

Appendix B-6

Deerfield Substation Expansion, Deerfield, Soil Test Pit Logs

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Deerfield	Deerfield SubStation Expansion	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION (Location of Observation Holes Shown Above)

Observation Hole # 1 ☒ Test Pit ☐ Boring

1 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	VFSL	Friable	10YR3/3	
12			10YR4/4	
18			10YR4/3	
24–30	gravelly VFSL		10YR5/4	10YR5/3 f, f
48	EOE 60"	Firm	10YR4/4	7.5YR3/3 f, f

Soil Classification: Profile ___ Condition ___ | Slope: ___ Percent | Limiting Factor: ___ " Depth | ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Scituate | Hydrologic Group:

Observation Hole # 2 ☒ Test Pit ☐ Boring

5 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0			10YR3/2	
0–6	VFSL	friable		
6–12			10YR3/3	
12–18			2.5Y 5/4	
18–24		firm	10YR5/4	7.5YR4/4 10%
24–30	gravelly VFSL			
48	Bedrock at 49"			

Soil Classification: Profile ___ Condition ___ | Slope: ___ Percent | Limiting Factor: ___ " Depth | ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Chatfield Variant | Hydrologic Group:

Observation Hole # 3 ☒ Test Pit ☐ Boring

3 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	VFSL gravelly	Friable	7.5YR3/3	
6–12			10YR3/4	
12–24			10YR4/6	
24–30			10YR4/4	
30–36	V to ext. gravelly VFSL	firm	2.5Y5/4	Redox
42–48	Bedrock 42"			

Soil Classification: Profile ___ Condition ___ | Slope: ___ Percent | Limiting Factor: ___ " Depth | ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Chatfield Variant | Hydrologic Group:

Observation Hole # 4 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	VFSL	friable	7.5YR3/2	
6–12	some gravel		7.5YR3/4	
12–18			10YR4/4	
24			2.5Y4/4	
30		firm		
48	EOE 65"			

Soil Classification: Profile ___ Condition ___ | Slope: ___ Percent | Limiting Factor: ___ " Depth | ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Montauk | Hydrologic Group:

[signature] Soil Scientist/Site Evaluator Signature

ME-215 CSS/~~LSE~~#

9-25-14 Date

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Deerfield	Deerfield S.S. Ext	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 5 ☒ Test Pit ☐ Boring

3 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0	VFSL	friable	7.5YR3/3	
12			7.5YR4/4	
18			10YR3/6	
24			10YR5/4	
30	gravelly VFSL	firm		10YR3/2 few, faint
36				
42				
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor " Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name	Hydrologic Group
Montauk	

Observation Hole # 6 ☒ Test Pit ☐ Boring

1 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0	Loam	friable	10YR2/2	
6	gravelly loam		10YR3/2 7.5YR4/4	
12			10YR4/3	7.5YR4/4 5%
18		firm	2.5Y4/3	↓
24				
30				
36	EOE 70"			
42				
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor " Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name	Hydrologic Group
Ridgebury - 926 (SWP)	

Observation Hole # 7 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0	Loam	friable	10YR2/2	
6	gravelly loam		2.5Y4/2	10YR3/3 ↓
18	V. gravelly LS	firm	10YR4/2, 4/4 mixed	
24	V. gravelly VFSL			
30				
36				
42	EOE 65"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor " Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name	Hydrologic Group
Ridgebury - 656 - pd	

Observation Hole # 8 ☒ Test Pit ☐ Boring

1 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0	VFSL	friable	7.5YR2.5/2	
6			7.5YR3/2	
12	gravelly VFSL		10YR3/4	
18			2.5Y4/4	
24	Gravelly Lenses FS, VFSL		2.5Y5/3 5/4	
30				
36				
42	EOE 63"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor " Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name	Hydrologic Group
Scituate	

[signature]
Soil Scientist/Site Evaluator Signature

ME 215
CSS/~~LSE~~#

9-25-14
Date

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Deerfield	Deerfield SS Exp	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION

(Location of Observation Holes Shown Above)

Observation Hole # 9 ☒ Test Pit ☐ Boring

3 " Depth of organic horizon above mineral soil

Depth (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR2/2	
6			10YR3/3	
12			10YR4/3	
18				
24			7.5Y4/6	
30				
36	gravelly VFSL	Firm	2.5Y5/3	
42	EOE 64"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock
			"	

Soil Series Name: Montauk

Hydrologic Group:

Observation Hole # 10 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR3/3	
6			10YR4/4	
12				
18				
24	gravelly VFSL	Firm	2.5Y4/4	10YR4/3 Few
30				
36				
42	EOE 66"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock
			"	

Soil Series Name: Montauk

Hydrologic Group:

Observation Hole # 11 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR3/3	
6			10YR4/4	
12				
18				
24	lenses sand, VFSL		10YR5/4	10YR4/3 f, f
30	cobbles			
36		Firm		
42	EOE 65"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock
			"	

Soil Series Name: Montauk

Hydrologic Group:

Observation Hole # 12 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR2/2	
6			10YR3/3	
12	gravelly,		7.5YR4/4	
18	cobbly VFSL			
24		Firm	10YR4/4	
30				
36				
42	EOE 60"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock
			"	

Soil Series Name: Montauk

Hydrologic Group:

[signature]
Soil Scientist/Site Evaluator Signature

ME 215
CSS/LSE#

9-25-14
Date

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Deerfield	Deerfield SS Exp	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 13 ☒ Test Pit ☐ Boring

3" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	VFSL	friable	10YR 2/2	
6			10YR 3/3	
12			10YR 4/4	
18	gravelly LFS			
24			10YR 5/3	faint Redox
30				
36				
42	EOE 71"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
			"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Montauk

Hydrologic Group:

Observation Hole # 14 ☒ Test Pit ☐ Boring

2" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR 3/2	
6			10YR 3/3	
12			10YR 4/3	
18	pockets cobbles/ stones		10YR 4/4	
24	VFSL		2.5Y 5/3	7.5YR 3/4 2%
30	Veins of FS			
36				
42	EOE 60"			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
			"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Scituate

Hydrologic Group:

Observation Hole # ☐ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
6				
12				
18				
24				
30				
36				
42				
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
			"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name:

Hydrologic Group:

Observation Hole # ☐ Test Pit ☐ Boring

" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
6				
12				
18				
24				
30				
36				
42				
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
			"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

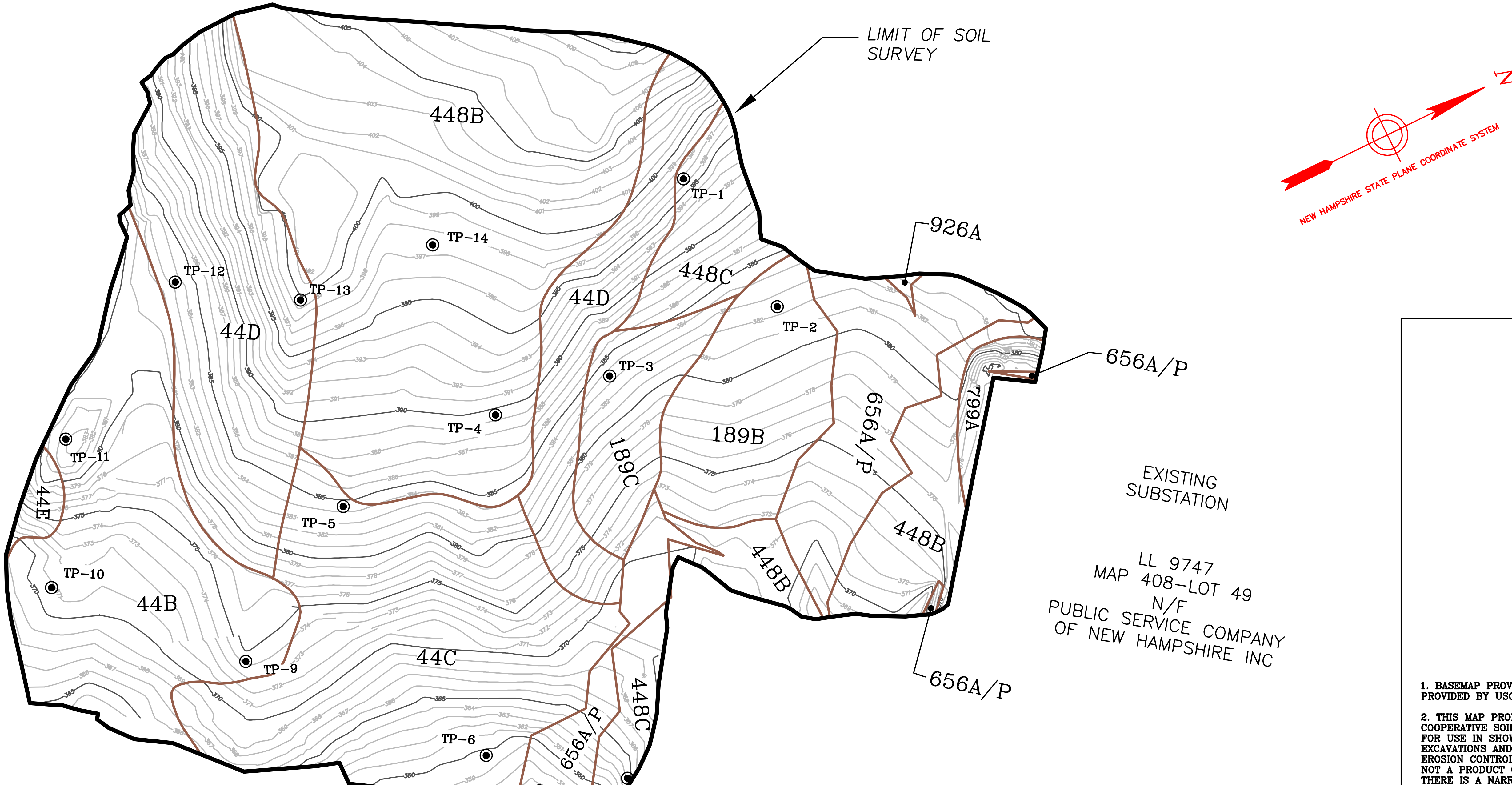
Soil Series Name:

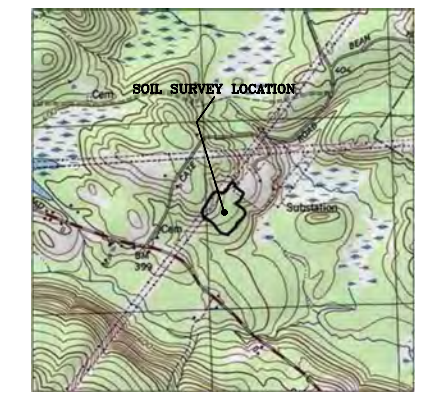
Hydrologic Group:

Jennifer Wort
Soil Scientist/Site Evaluator Signature

ME 215
CSS/~~LSE~~#

9-25-14
Date





LOCUS MAP
1:10,000

NH Numeric Soil Code	Soil Unit Name	Soil Slope %	Hyd. Group
44B	Montauk sandy loam	3-8	C
44C	Montauk sandy loam	8-15	C
44D	Montauk sandy loam	15-25	C
44E	Montauk sandy loam	25-50	C
189B	Chatfield Varient (MW, deep)	3-8	B
448B	Scituate fine sandy loam	3-8	C
448C	Scituate fine sandy loam	8-15	C
656A/P	Ridgebury sandy loam (poorly)	0-3	C
926A	Ridgebury sandy loam (somewhat poorly)	0-3	C
799A	Urban land-Canton Complex	0-3	B

NOTES

1. BASEMAP PROVIDED BY COLER & COLANTONIO INC.; LOCUS BASEMAP PROVIDED BY USGS & ESRI.

2. THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR USE IN SHOWING LIMITATIONS TO DEVELOPMENT OF ROADS, SHALLOW EXCAVATIONS AND PLANNING SITE DESIGN FOR STORMWATER RUNOFF & EROSION CONTROL. IT WAS PRODUCED BY A CERTIFIED SOIL SCIENTIST AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE. THERE IS A NARRATIVE REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

3. PREPARED FOR NORTHERN PASS TRANSMISSION PROJECT. PREPARED BY NORMANDEAU ASSOCIATES INC.

4. FIELD WORK COMPLETED BY NORMANDEAU ASSOCIATES INC., JENNIFER WEST (MECSS 215), CERTIFIED SOIL SCIENTIST, ON SEPTEMBER 25, 2014.

LEGEND

- Soil Survey Boundary
- Soil Boundary
- 345 — 345 -Index Contour
- 343 — 343 -Intermediate Contour

Deerfield Substation
Deerfield, NH

SOIL SURVEY OVERVIEW

Date: 02.02.15 Project No.: 21812.204 Scale: 1"=100'

NORMANDEAU
environmental consultants

THE NORTHERN PASS | NORTHERN PASS LLC

No.	Document/Draft Name	Ini.	Date
1	C:\Npass\DWG\NP_Frank_Scobie_Deer_SOIL_020215	JCB	02.02.15

SHEET 1 OF 1

United States Department of Agriculture

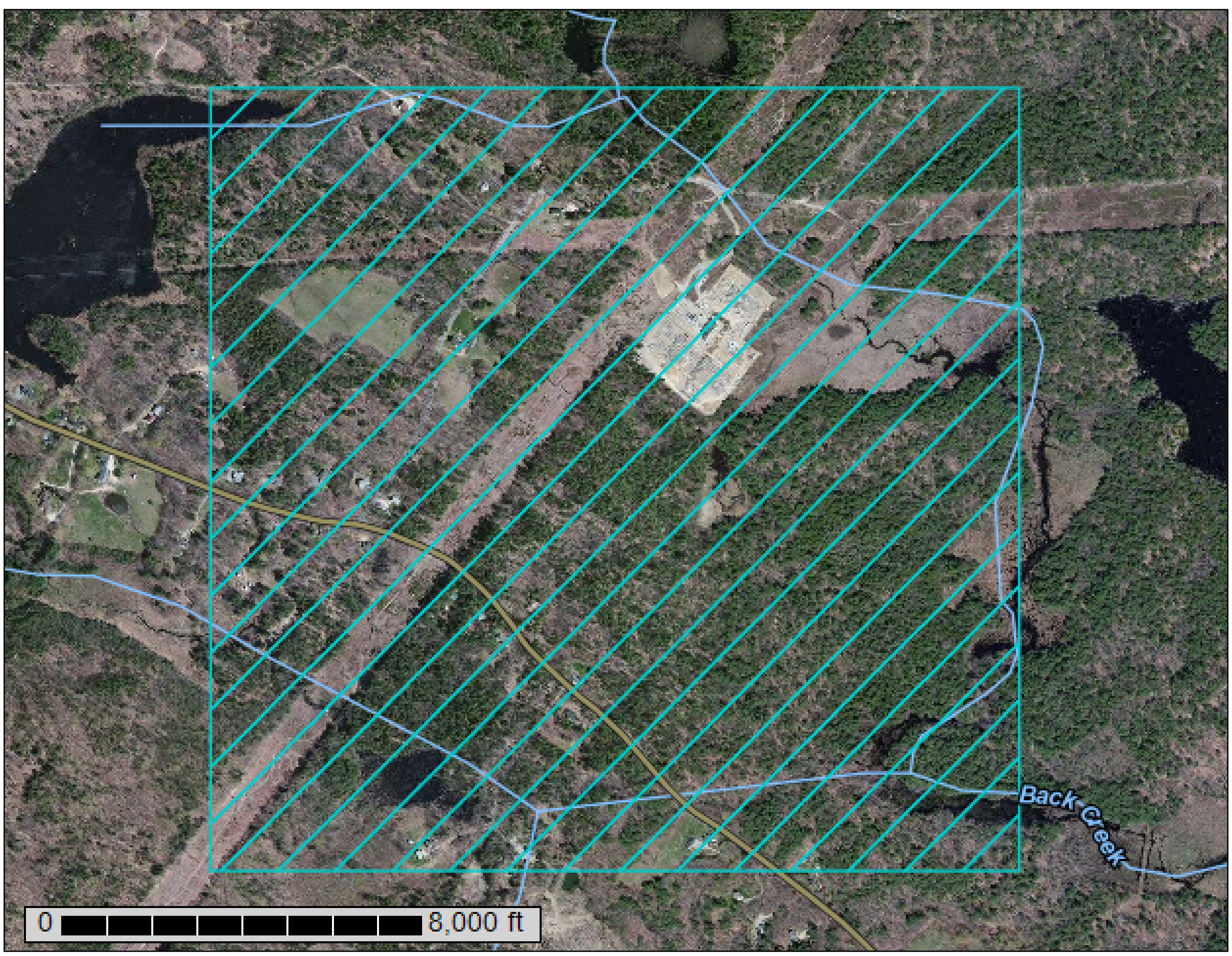
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Rockingham County, New Hampshire



January 15, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

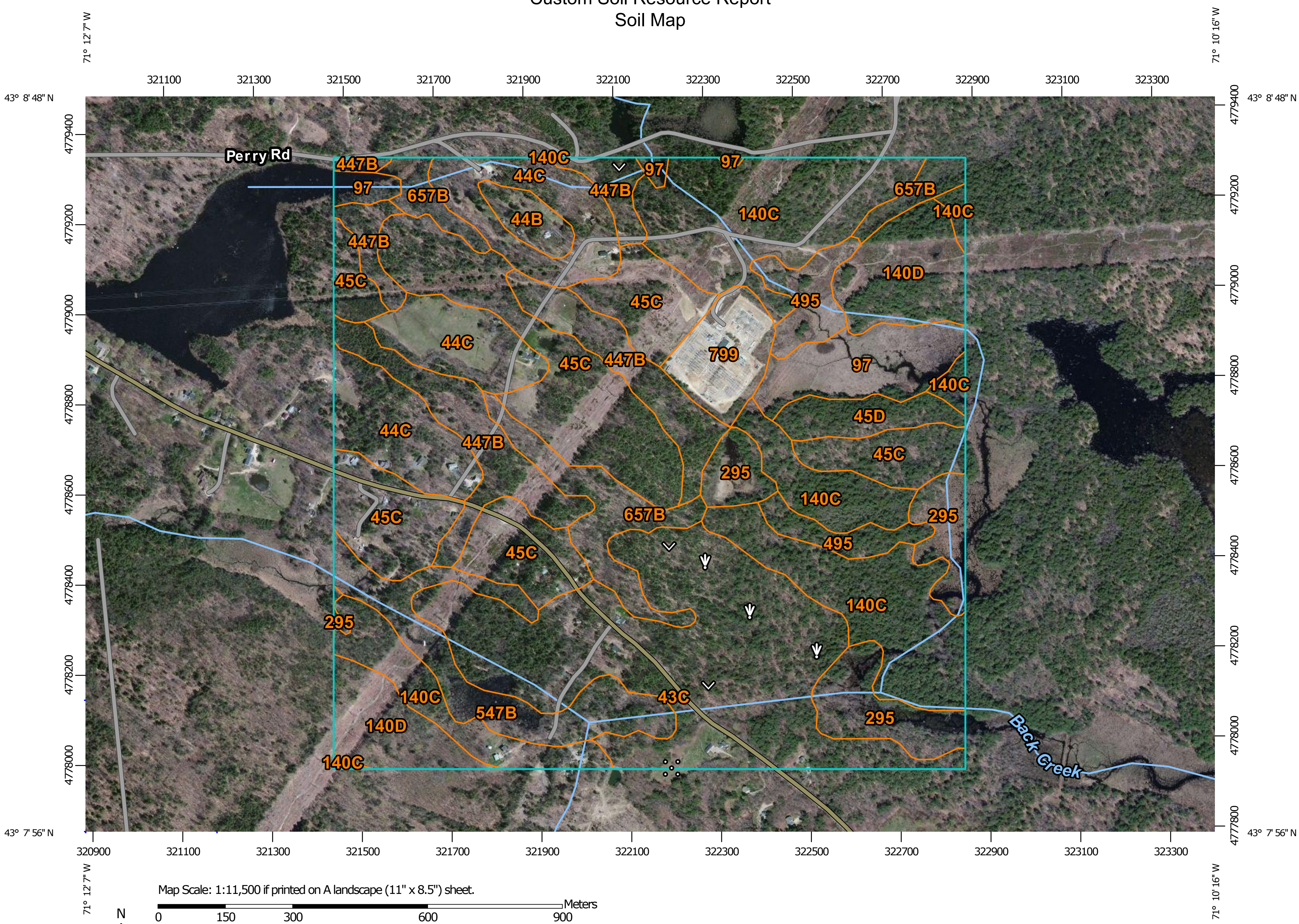
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:11,500 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 150, 300, 600, 900
Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N 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: http://websoilsurvey.nrcs.usda.gov
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: Rockingham County, New Hampshire
Survey Area Data: Version 15, Dec 31, 2013

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

Date(s) aerial images were photographed: Apr 8, 2011—May 1, 2011

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

Rockingham County, New Hampshire (NH015)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
43C	Canton gravelly fine sandy loam, 8 to 15 percent slopes, very stony	77.6	16.4%
44B	Montauk fine sandy loam, 3 to 8 percent slopes	4.7	1.0%
44C	Montauk fine sandy loam, 8 to 15 percent slopes	44.5	9.4%
45C	Montauk fine sandy loam, 8 to 15 percent slopes, very stony	79.3	16.7%
45D	Montauk fine sandy loam, 15 to 25 percent slopes, very stony	7.6	1.6%
97	Greenwood and Ossipee soils, ponded	18.6	3.9%
140C	Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony	85.2	18.0%
140D	Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony	27.5	5.8%
295	Greenwood mucky peat	23.2	4.9%
447B	Scituate-Newfields complex, 3 to 8 percent slopes, very stony	38.2	8.1%
495	Ossipee mucky peat	12.7	2.7%
547B	Walpole very fine sandy loam, 3 to 8 percent slopes, very stony	21.6	4.6%
657B	Ridgebury very fine sandy loam, 3 to 8 percent slopes, very stony	21.5	4.5%
799	Urban land-Canton complex, 3 to 15 percent slopes	11.5	2.4%
Totals for Area of Interest		**473.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockingham County, New Hampshire

43C—Canton gravelly fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Canton and similar soils: 80 percent
Minor components: 20 percent

Description of Canton

Setting

Parent material: Till

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Gravelly fine sandy loam
5 to 21 inches: Gravelly fine sandy loam
21 to 60 inches: Loamy sand

Minor Components

Montauk

Percent of map unit: 5 percent

Slope inclusion

Percent of map unit: 5 percent

Chatfield

Percent of map unit: 5 percent

Newfields

Percent of map unit: 5 percent

44B—Montauk fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 46 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days

Map Unit Composition

Montauk and similar soils: 80 percent
Minor components: 20 percent

Description of Montauk

Setting

Parent material: Basal melt-out till derived from granite and gneiss and/or basal melt-out till derived from schist

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: C

Typical profile

0 to 1 inches: Fine sandy loam
1 to 30 inches: Cobbly fine sandy loam
30 to 61 inches: Fine sandy loam

Minor Components

Canton

Percent of map unit: 10 percent

Scituate

Percent of map unit: 10 percent

44C—Montauk fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 46 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days

Map Unit Composition

Montauk and similar soils: 80 percent
Minor components: 20 percent

Description of Montauk

Setting

Parent material: Basal melt-out till derived from granite and gneiss and/or basal melt-out till derived from schist

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: C

Typical profile

0 to 1 inches: Fine sandy loam
1 to 30 inches: Cobbly fine sandy loam
30 to 61 inches: Fine sandy loam

Minor Components

Canton

Percent of map unit: 10 percent

Scituate

Percent of map unit: 8 percent

Not named

Percent of map unit: 2 percent

45C—Montauk fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Montauk and similar soils: 80 percent
Minor components: 20 percent

Description of Montauk

Setting

Parent material: Basal melt-out till derived from granite and gneiss and/or basal melt-out till derived from schist

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 1 inches: Fine sandy loam
1 to 30 inches: Cobbly fine sandy loam
30 to 61 inches: Fine sandy loam

Minor Components

Canton

Percent of map unit: 10 percent

Scituate

Percent of map unit: 8 percent

Not named

Percent of map unit: 2 percent

45D—Montauk fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Montauk and similar soils: 85 percent
Minor components: 15 percent

Description of Montauk

Setting

Parent material: Basal melt-out till derived from granite and gneiss and/or basal melt-out till derived from schist

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 1 inches: Fine sandy loam
1 to 30 inches: Cobbly fine sandy loam
30 to 61 inches: Fine sandy loam

Minor Components

Canton

Percent of map unit: 10 percent

Not named

Percent of map unit: 5 percent

97—Greenwood and Ossipee soils, ponded

Map Unit Setting

Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 45 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 60 to 195 days

Map Unit Composition

Greenwood and similar soils: 38 percent
Ossipee and similar soils: 37 percent
Minor components: 25 percent

Description of Greenwood

Setting

Landform: Marshes
Parent material: Herbaceous organic material and/or woody organic material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 31.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7w
Hydrologic Soil Group: D

Typical profile

0 to 60 inches: Mucky peat

Description of Ossipee

Setting

Landform: Marshes
Parent material: Organic material over till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 18.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8w
Hydrologic Soil Group: D

Typical profile

0 to 20 inches: Mucky peat
20 to 26 inches: Mucky peat
26 to 60 inches: Clay loam

Minor Components

Scarboro

Percent of map unit: 5 percent
Landform: Marshes

Maybid

Percent of map unit: 4 percent
Landform: Marshes

Ridgebury

Percent of map unit: 4 percent
Landform: Marshes

Scitico

Percent of map unit: 4 percent
Landform: Marshes

Squamscott

Percent of map unit: 4 percent
Landform: Marshes

Walpole

Percent of map unit: 4 percent
Landform: Marshes

140C—Chatfield-Hollis-Canton complex, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 46 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 60 to 195 days

Map Unit Composition

Chatfield and similar soils: 35 percent

Canton and similar soils: 20 percent
Hollis and similar soils: 20 percent
Minor components: 25 percent

Description of Chatfield

Setting

Parent material: Till

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 20 inches: Fine sandy loam
20 to 31 inches: Cobbly fine sandy loam
31 to 35 inches: Unweathered bedrock

Description of Hollis

Setting

Parent material: Till

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: D

Typical profile

0 to 2 inches: Fine sandy loam
2 to 13 inches: Cobbly fine sandy loam
13 to 17 inches: Unweathered bedrock

Description of Canton

Setting

Parent material: Till

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Gravelly fine sandy loam
5 to 21 inches: Gravelly fine sandy loam
21 to 60 inches: Loamy sand

Minor Components

Not named

Percent of map unit: 7 percent

Ossipee and greenwood

Percent of map unit: 5 percent
Landform: Bogs

Newfields

Percent of map unit: 5 percent

Scarboro

Percent of map unit: 3 percent
Landform: Depressions

Walpole

Percent of map unit: 3 percent
Landform: Depressions

Rock outcrop

Percent of map unit: 2 percent

140D—Chatfield-Hollis-Canton complex, 15 to 35 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 56 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 60 to 200 days

Map Unit Composition

Chatfield and similar soils: 35 percent
Canton and similar soils: 20 percent
Hollis and similar soils: 20 percent
Minor components: 25 percent

Description of Chatfield

Setting

Parent material: Till

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B

Typical profile

0 to 20 inches: Fine sandy loam
20 to 31 inches: Cobbly fine sandy loam
31 to 35 inches: Unweathered bedrock

Description of Hollis

Setting

Parent material: Till

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: D

Typical profile

0 to 2 inches: Fine sandy loam
2 to 13 inches: Cobbly fine sandy loam
13 to 17 inches: Unweathered bedrock

Description of Canton

Setting

Parent material: Till

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Gravelly fine sandy loam
5 to 21 inches: Gravelly fine sandy loam
21 to 60 inches: Loamy sand

Minor Components

Montauk

Percent of map unit: 7 percent

Not named

Percent of map unit: 5 percent

Ossipee and greenwood

Percent of map unit: 5 percent

Landform: Bogs

Scarboro

Percent of map unit: 3 percent
Landform: Depressions

Walpole

Percent of map unit: 3 percent
Landform: Depressions

Rock outcrop

Percent of map unit: 2 percent

295—Greenwood mucky peat

Map Unit Setting

Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 45 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 60 to 195 days

Map Unit Composition

Greenwood and similar soils: 80 percent
Minor components: 20 percent

Description of Greenwood

Setting

Landform: Bogs
Parent material: Herbaceous organic material and/or woody organic material

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 31.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7w
Hydrologic Soil Group: D

Typical profile

0 to 60 inches: Mucky peat

Minor Components

Chocorua
Percent of map unit: 8 percent
Landform: Bogs

Ossipee
Percent of map unit: 8 percent
Landform: Bogs

Scarboro
Percent of map unit: 4 percent
Landform: Swamps

447B—Scituate-Newfields complex, 3 to 8 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Scituate and similar soils: 50 percent
Newfields and similar soils: 25 percent
Minor components: 25 percent

Description of Scituate

Properties and qualities
Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile
0 to 8 inches: Fine sandy loam
8 to 32 inches: Cobbly fine sandy loam
32 to 60 inches: Gravelly loamy sand

Description of Newfields

Setting

Parent material: Till

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 9 inches: Fine sandy loam
9 to 35 inches: Fine sandy loam
35 to 64 inches: Gravelly loamy sand

Minor Components

Canton

Percent of map unit: 5 percent

Montauk

Percent of map unit: 5 percent

Not named

Percent of map unit: 5 percent

Ridgebury

Percent of map unit: 5 percent
Landform: Depressions

Walpole

Percent of map unit: 5 percent
Landform: Depressions

495—Ossipee mucky peat

Map Unit Setting

Elevation: 0 to 2,100 feet
Mean annual precipitation: 28 to 45 inches

Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 195 days

Map Unit Composition

Ossipee and similar soils: 90 percent
Minor components: 10 percent

Description of Ossipee

Setting

Landform: Bogs
Parent material: Organic material over till

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 18.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8w
Hydrologic Soil Group: D

Typical profile

0 to 20 inches: Mucky peat
20 to 26 inches: Mucky peat
26 to 60 inches: Clay loam

Minor Components

Scarboro

Percent of map unit: 4 percent
Landform: Depressions

Walpole

Percent of map unit: 4 percent
Landform: Ground moraines

Maybid

Percent of map unit: 2 percent
Landform: Marine terraces

547B—Walpole very fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

Elevation: 0 to 2,100 feet

Mean annual precipitation: 28 to 45 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 195 days

Map Unit Composition

Walpole and similar soils: 80 percent
Minor components: 20 percent

Description of Walpole

Setting

Landform: Depressions

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 7 inches: Very fine sandy loam
7 to 16 inches: Sandy loam
16 to 60 inches: Gravelly loamy sand

Minor Components

Scarboro

Percent of map unit: 10 percent
Landform: Depressions

Squamscott

Percent of map unit: 5 percent
Landform: Marine terraces

Newfields

Percent of map unit: 5 percent

657B—Ridgebury very fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Composition

Ridgebury and similar soils: 85 percent
Minor components: 15 percent

Description of Ridgebury

Setting

Landform: Depressions
Parent material: Basal lodgement till derived from granite and gneiss and/or basal lodgement till derived from schist

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 39 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C

Typical profile

0 to 8 inches: Very fine sandy loam
8 to 21 inches: Gravelly fine sandy loam
21 to 61 inches: Gravelly fine sandy loam

Minor Components

Woodbridge

Percent of map unit: 10 percent

Not named

Percent of map unit: 5 percent

799—Urban land-Canton complex, 3 to 15 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 42 to 46 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days

Map Unit Composition

Urban land: 55 percent
Canton and similar soils: 20 percent
Minor components: 25 percent

Description of Canton

Setting

Parent material: Till

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Gravelly fine sandy loam
5 to 21 inches: Gravelly fine sandy loam
21 to 60 inches: Loamy sand

Minor Components

Udorthents

Percent of map unit: 5 percent

Boxford and eldridge

Percent of map unit: 4 percent

Scituate and newfields

Percent of map unit: 4 percent

Squamscott and scitico

Percent of map unit: 4 percent
Landform: Marine terraces

Walpole

Percent of map unit: 4 percent
Landform: Depressions

Chatfield

Percent of map unit: 4 percent

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APPENDIX H – GEOTECHNICAL REPORT (BY OTHERS)

INFILTRATION FEASIBILITY REPORT

Deerfield Substation Expansion
Deerfield, NH
January 13, 2017

TABLE OF CONTENTS:

The project proposes one system that requires infiltration to function property. This system is identified on the plans as Infiltration Basin IF-1.

I. Location of the practice

Infiltration Basin IF-1 is located on the east side of the substation yard expansion.

II. Existing topography at the location of the practice

The existing topography within the area of the infiltration basin is relatively flat with forested cover. A portion of the basin (east side) is forested and sloped at approximately 3H:1V.

III. Test pit or boring locations

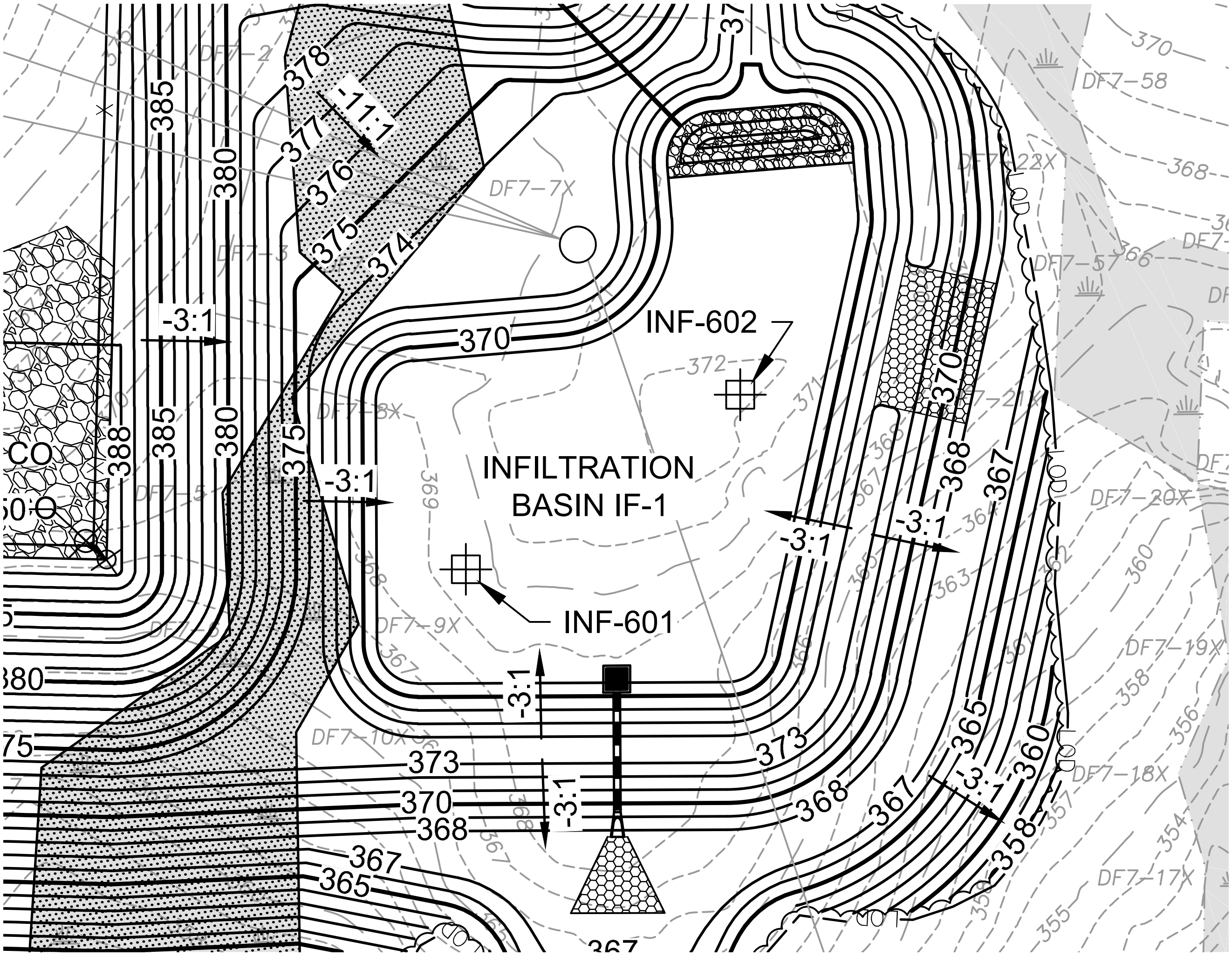
In accordance with Env-Wq 1504.13(c), NHDES requires that a minimum number of test pits or borings be dug or drilled in the location of the system, depending on the size of the proposed system.

Infiltration Basin IF-1 is 9,140 square feet in area. Two borehole infiltration tests were performed in the location of this practice. The test locations, identified as INF-601 and INF-602, are shown on the attached boring location plan.

THE NORTHERN PASS

DEERFIELD SUBSTATION INFILTRATION BASIN IF-1 BORING LOCATION PLAN

NORTH



PROPOSED LEGEND:

370 — MAJOR CONTOUR

368 — MINOR CONTOUR

BOREHOLE INFILTRATION TEST LOCATION

EXISTING LEGEND:

370 — MAJOR CONTOUR

371 — MINOR CONTOUR

0 20' 40' 80'

SCALE IN FEET

NOTES:

1. BACKGROUND INFORMATION TAKEN FROM "EXISTING CONDITIONS PLAN" FOR DEERFIELD STATION, OFF CATE ROAD, DEERFIELD, NH. PREPARED BY CHA, CONSULTING, INC. DATED DECEMBER 2, 2013. LAST REVISED SEPTEMBER 23, 2014. WETLAND FLAGS SHOWN ARE BASED ON LOCATIONS PROVIDED BY NORMANDEAU, WETLAND FLAGS WERE DELINEATED BY NORMANDEAU IN 2010.

2. NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM
   HORIZONTAL DATUM - NAD83
   VERTICAL DATUM - NAVD88

3. PROPOSED CONTOURS AND SPOT ELEVATIONS INDICATED REFER TO TOP OF FINISH SURFACE.

4. ALL FILL AND CUT SLOPES ARE 3-FT HORIZONTAL TO 1-FT VERTICAL (3:1) UNLESS NOTED OTHERWISE.

IV. Seasonal high water table (SHWT) and bedrock elevations

The following borehole test data was collected on November 16-17, 2016.

Infiltration Basin IF-1:

Bottom of Basin Elevation = 369.0

INF-601: Existing Surface Elevation of Borehole = 369.6
SHWT = 366.0
BEDROCK = not found
Deepest Elevation of Borehole = 361.6

INF-602: Existing Surface Elevation of Borehole = 372.0
SHWT = 366.0
BEDROCK = not found
Deepest Elevation of Borehole = 362.0

V. Profile descriptions

Refer to attached boring logs for soil profile descriptions at INF-601 and INF-602 boreholes.

BORING NUMBER INF 601

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 369.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14044444 **LONGITUDE** -71.18598611
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	38	2-4-4-9 (8)			TOPSOIL: Silty SAND (SM), little organics, trace fine gravel, dark reddish brown, moist, loose, fine to medium grained sand, subangular					Infiltration test casing installed in an adjacent borehole to a depth of approximately 4 feet.
		SPT 2	67	11-27-29-24 (56)			TILL: Silty SAND (SM), little fine to coarse gravel, moderate reddish brown, moist, medium dense to very dense, fine to medium grained sand, subangular, oxidized zones					The ESHWT is at an approximate depth of 4 feet.
365	5	SPT 3	67	20-26-25-28 (51)			Silty SAND (SM), little fine to coarse gravel, grayish orange, moist, very dense, fine grained sand, subangular	7.6			33.8	
		SPT 4	79	31-31-31-34 (62)			Silty SAND (SM), little fine to coarse gravel, pale reddish brown, moist, very dense, fine to medium grained sand, subangular, oxidized zones					

Bottom of Borehole at 8.0 feet

BORING NUMBER INF 602

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/16/16 **COMPLETED** 11/16/16
GROUND ELEVATION 372.0 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14064444 **LONGITUDE** -71.18597222
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	21	1-2-4-6 (6)			TOPSOIL: Silty SAND (SM), little organics, trace fine to coarse gravel, moderate reddish brown, moist, loose					Infiltration test casing installed in an adjacent borehole to a depth of approximately 7 feet.
370							TILL: Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, loose, fine to coarse grained sand, subangular					
		SPT 2	54	17-21-20-26 (41)			Silty SAND with gravel (SM), grayish pink, moist, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular - boulders encountered at 4 feet					Auger refusal was encountered at 4 feet. The bore hole was offset 4 feet to the East and redrilled.
	5	SPT 3	67	26-26-24-22 (50)			Silty SAND (SM), little fine to coarse gravel, light brown, moist, dense, fine to coarse grained sand, subangular					The ESHWT is at an approximate depth of 6 feet.
365		SPT 4	67	21-34-34-39 (68)			Silty SAND (SM), moderate reddish orange, moist, very dense, fine to medium grained sand, subangular, oxidized, stratified zones	10.2			40.6	
	10	SPT 5	63	26-34-35-61 (69)			- light brown and oxidized zones from 9 to 10 feet					

Bottom of Borehole at 10.0 feet

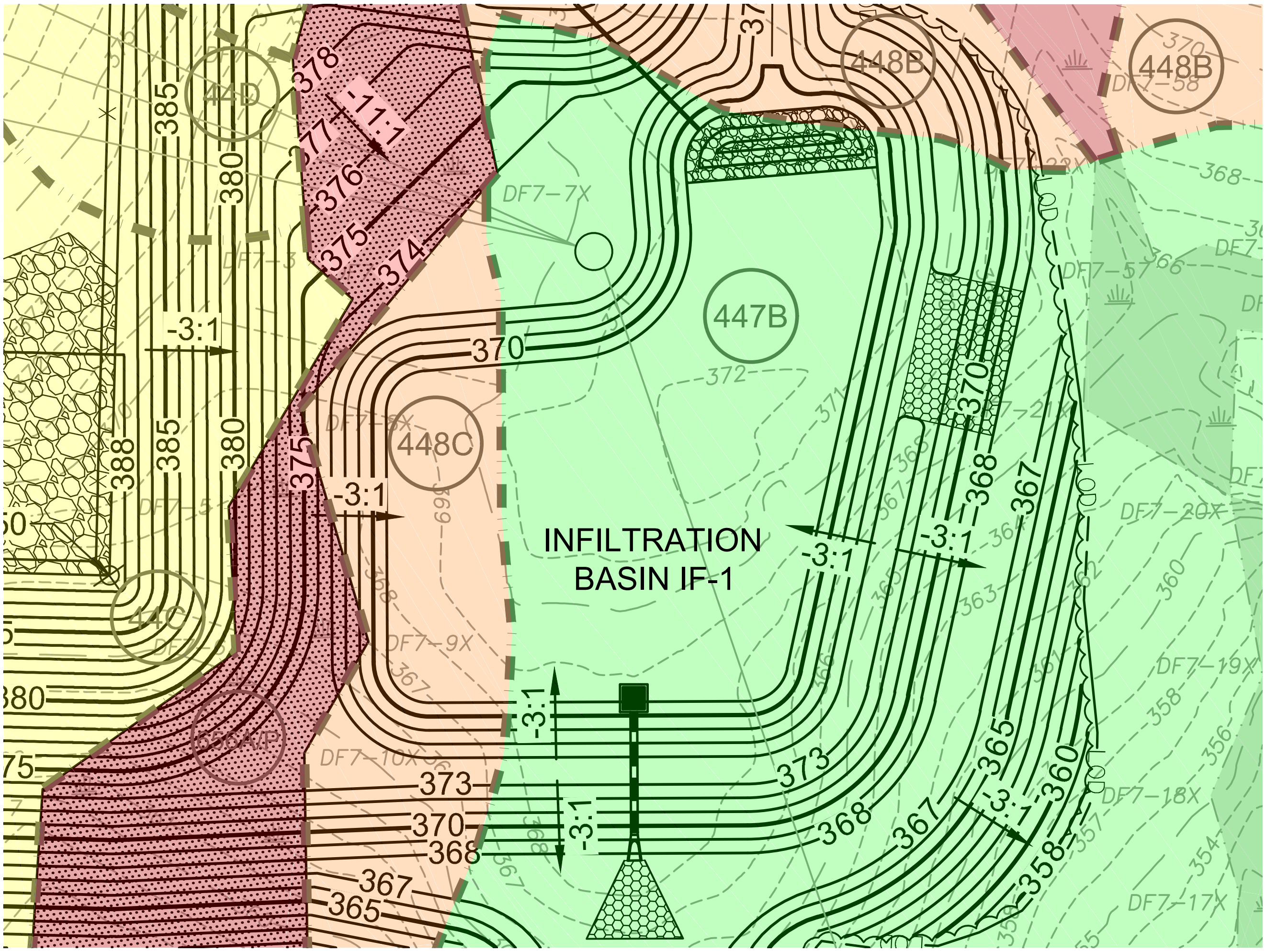
VI. Soil plan in the area of the proposed practice

Refer to attached plan for a delineation of soil series near Infiltration Basin IF-1, as determined by a soil survey report prepared by Normandeau Associates, Inc. The report is entitled “Northern Pass Transmission Project, Soil Survey Report for Transition Stations, Substation Expansions and Converter Terminal” dated February 6, 2015.

DEERFIELD SUBSTATION
INFILTRATION BASIN IF-1
SOIL SERIES PLAN

THE NORTHERN PASS

NORTH



SOIL LEGEND:

APPROXIMATE SOIL BOUNDARY

44C		MONTAUK FINE SANDY LOAM 8 TO 15 PERCENT SLOPES, HSG C
44D		MONTAUK FINE SANDY LOAM 15 TO 25 PERCENT SLOPES, HSG C
447B		SCITUATE-NEWFIELDS COMPLEX 3 TO 8 PERCENT SLOPES, HSG C
448B		SCITUATE FINE SANDY LOAM 3 TO 8 PERCENT SLOPES, HSG C
448C		SCITUATE FINE SANDY LOAM 8 TO 15 PERCENT SLOPES, HSG C
656A/P		RIDGEBURY SANDY LOAM 0 TO 3 PERCENT SLOPES, HSG C

NOTES:

1. SOIL INFORMATION TAKEN FROM "NORTHERN PASS TRANSMISSION PROJECT, SOIL SURVEY REPORT FOR TRANSITION STATIONS, SUBSTATION EXPANSIONS, AND CONVERTER TERMINAL" PREPARED BY NORMANDEAU ENVIRONMENTAL CONSULTANTS, DATED FEBRUARY 6, 2015.

2. NEW HAMPSHIRE STATE PLANE COORDINATE SYSTEM
   HORIZONTAL DATUM - NAD83
   VERTICAL DATUM - NAVD88

3. PROPOSED CONTOURS AND SPOT ELEVATIONS INDICATED REFER TO TOP OF FINISH SURFACE.

4. ALL FILL AND CUT SLOPES ARE 3-FT HORIZONTAL TO 1-FT VERTICAL (3:1) UNLESS NOTED OTHERWISE.

0 20' 40' 80'

SCALE IN FEET

VII. Summary of Field Testing data used to determine the infiltration rate

The infiltration rate for Infiltration Basin IF-1 was determined using the Field Measurement method described in Env-Wq 1504.13.

The Ksat was measured with a Borehole Infiltration Test.

INF-601: The average Ksat of the tests was 18.45 inches per hour.
INF-602: The average Ksat of the tests was 2.52 inches per hour.

After applying a factor of safety, the design rate used in the drainage analysis is 1.25 inches per hour.

Refer to attached field infiltration test results for additional information.

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/18/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 601		

FIELD TEST DATA

Run #1	Time: 11:05	Run #2	Time: 12:07	Run #3	Time: 13:17	Run #4	Time: 14:22
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	3.23	0	3.23	0	3.12	0	3.16
1	3.78	1	3.6	1	3.52	1	3.67
2	4.01	2	3.76	2	3.64	2	3.81
3	4.15	3	3.91	3		3	
4	4.29	4	4.02	4		4	
5	4.32	5	4.06	5		5	
6	4.35	6		6		6	
7	4.38	7		7		7	
8	4.42	8		8		8	
9	4.46	9		9		9	
10	4.48	10	4.25	10		10	
15	4.5	15	4.28	15	4.21	15	4.17
20	4.57	20		20		20	
25	4.62	25		25		25	
30	4.79	30	4.51	30	4.45	30	4.39
45	4.87	45		45		45	
60	4.96	60	4.71	60	4.67	60	4.55
(ft/hr)	1.73	(ft/hr)	1.48	(ft/hr)	1.55	(ft/hr)	1.39
(in/hr)	**20.76**	**(in/hr)**	**17.76**	**(in/hr)**	**18.60**	**(in/hr)**	**16.68**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**18.45**
Pre-Soak Performed on 11/17/2016 at 10:45	
Hole Depth from Top of Casing (ft)	5.2
Casing Stickup from Ground Surface (ft)	1.1
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

QUANTA SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/18/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 602		

FIELD TEST DATA

Run #1	Time: 11:26	Run #2	Time: 12:36	Run #3	Time: 13:45	Run #4	Time: 14:58
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	6.33	0	6.52	0	6.17	0	6.42
1	6.33	1	6.54	1	6.17	1	6.43
2	6.33	2	6.55	2	6.17	2	6.43
3	6.33	3	6.56	3		3	
4	6.33	4	6.56	4		4	
5	6.33	5	6.58	5		5	
6	6.34	6		6		6	
7	6.34	7		7		7	
8	6.34	8		8		8	
9	6.34	9		9		9	
10	6.35	10	6.60	10		10	
15	6.37	15	6.61	15	6.25	15	6.48
20	6.38	20		20		20	
25	6.40	25		25		25	
30	6.42	30	6.63	30	6.31	30	6.51
45	6.46	45		45		45	
60	6.51	60	6.74	60	6.41	60	6.62
(ft/hr)	0.18	(ft/hr)	0.22	(ft/hr)	0.24	(ft/hr)	0.20
(in/hr)	**2.16**	**(in/hr)**	**2.64**	**(in/hr)**	**2.88**	**(in/hr)**	**2.40**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**2.52**
Pre-Soak Performed on 11/17/2016 at 10:50	
Hole Depth from Top of Casing (ft)	8.3
Casing Stickup from Ground Surface (ft)	1.5
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

Geotechnical Engineering Report

Deerfield Substation Project
Northern Pass Transmission Line
Deerfield, New Hampshire

December 23, 2016
QS Project No. 16004

Prepared for:
PAR Electrical Contractors, Inc.
60 Fuller Road
Chicopee, Massachusetts 01020

Prepared by:
Quanta Subsurface
307 W. Main Street
Radford, Virginia 24141

QUANTA SUBSURFACE
Engineering + Construction

December 23, 2016

PAR Electrical Contractors, Inc.
60 Fuller Road
Chicopee, Massachusetts 01020

Attention: Ms. Stephanie Labbe
Project Manager

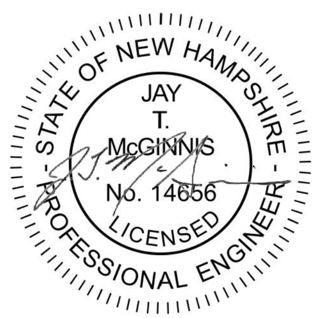
Re: Geotechnical Engineering Report
Deerfield Substation – Northern Pass Transmission Line
Deerfield, New Hampshire
QS Project No. 16004

Dear Ms. Labbe,

The purpose of this report is to present the results of the subsurface exploration program and geotechnical engineering analyses undertaken by Quanta Subsurface (QS) associated with the above referenced project. Our services were provided in general accordance with QS's proposal dated August 22, 2016 as approved by PAR Electrical Contractors' (PAR) Limited Notice to Proceed (LNTP) #4 dated August 26, 2016. The attached report presents our understanding of the project, the findings of the subsurface exploration program, and our geotechnical conclusions and recommendations.

Sincerely,

Quanta Subsurface



12/23/16

Sean Kearney, P.G.
Project Engineering Geologist

J.T. McGinnis, P.E.
Geotechnical Department Manager

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EXECUTIVE SUMMARY

This Executive Summary is provided as a brief overview of our geotechnical engineering conclusions and recommendations for the project and is not intended to replace more detailed information contained elsewhere in this report. As an overview, this summary inherently omits details that could be very important to the proper application of the provided geotechnical design recommendations. This report should be read in its entirety.

- QS's geotechnical field exploration program consisted of nineteen (19) Standard Penetration Test (SPT) borings, drilled to a maximum depth of approximately 50 feet, and associate laboratory testing at the Deerfield Substation site.
- Five infiltration (INF) test borings were conducted to characterize the subsurface conditions to a depth of approximately 5 feet below the planned basin bottom. Following completion of each INF test boring, field infiltration tests were performed at each location.
- The subsurface conditions encountered in the test borings generally included a layer of topsoil underlain by a layer of alluvium and/or glacial till over bedrock.
- Very dense till materials were encountered above the planned finished elevations. Thus, difficult excavation to achieve planned finished grades is anticipated; however, the need for blasting is not anticipated.
- Groundwater was only encountered in three borings within or directly above hard till. The encountered groundwater is representative of a perched condition within or directly above the hard till.
- Due to shallow, dense materials, drilled shafts are recommended for support of planned bus support and pole structures.
- Controlled structural fill and/or the onsite soils will provide suitable support for the transformer pads design to transmit an approximate uniform bearing pressure of up to 500 psf and structures supported by shallow foundation designed with a maximum allowable bearing pressure of 3,000 psf.
- Frost depth should be anticipated to be 4 feet below the lowest adjacent grade.
- A Seismic Site Class Definition of "D" is recommended for design.
- Laboratory corrosivity testing performed on samples collected from the site indicated that the soils are non-aggressive.
- We anticipate that the planned cut and fill slopes will exhibit a factor of safety (FoS) of 1.5 or greater for global stability.

1.0 PROJECT INFORMATION

The Northern Pass project consists of a 192-mile long transmission line that will convey 1,090 megawatts of energy from hydroelectric facilities in Canada to New England via a corridor than traverses north-to-south through New Hampshire (see Site Vicinity Map – Figure 1). In addition to construction of new transmission line, the project also includes the construction of three (3) new substations and six (6) new transition stations along the corridor. In general, the new transition stations (designated Transition Stations #1 through #6) are located along the northern and central portions of the corridor while the three new substations (designated Franklin Converter Station, Deerfield Substation and Scobie Pond Substation) located along the southern portion of the corridor. The information presented herein is for the Deerfield Substation located approximately 1.6 miles east-southeast of Deerfield, New Hampshire (see Site Location Map - Figure 2).

The Deerfield Substation site is currently an undeveloped and wooded parcel situated immediately southwest of an existing substation facility. The proposed substation pad will have an approximate 420-foot by 380-foot footprint. Within the substation footprint, the ground surface elevations generally range from approximately 369 feet to 403 feet. Maximum cuts and fills of about 20 feet and 30 feet, respectively, will be required to develop the planned finished grade of about 386 feet to 388 feet. Development will include construction of cut slopes along the west side of the site and a combination of cut and fill slopes along the south, east, and north sides of the site. Two detention basins are planned between the new substation pad and the existing substation. A gravel-covered access road will provide access to the substation pad from the existing substation. All slopes are currently designed with a 3 (Horizontal) to 1 (Vertical) configuration. No retaining walls are planned.

New structures within the substation footprint are anticipated to consist of various transformer pads, bus support structures, tubular steel poles and single-story structures designed to house electrical equipment. Quanta Subsurface (QS) has assumed the following regarding loading and foundation support of the new structures: 1) bus structure support and tubular steel poles will require deep foundation support to resist shear and overturning loads, 2) transformer pads will consist of slab-on-grade support designed for a maximum bearing pressure of 500 psf, and 3) single-story structures designed to house equipment will be lightly loaded with shallow foundation support.

2.0 PROVIDED DOCUMENTS AND PREVIOUS EXPLORATION DATA

Multiple documents were provided to QS by PAR Electrical Contractors (PAR) for consideration during our geotechnical exploration and engineering evaluation. The provided geotechnical report documents were developed by others and presented information at various locations along the transmission line corridor. Upon review of the provided data, one document provided GIS information containing general surficial and bedrock geology information in the area of the Deerfield Substation site. The specific documents included as reference by QS herein are listed below.

- Terracon Consultants Inc.; *Report of Expected Geotechnical Conditions*: Northern Pass Project; July 10, 2015.

Although not specifically used in development of the recommendations presented in Section 6.0 of this report, other selected information from the one document noted above was used as reference in support of the site specific data obtained by QS. Specific citations are noted below.

3.0 PURPOSE AND SCOPE OF SERVICE

QS's scope of work was developed based on information provided by PAR that included requested field investigations for civil works from Burns & McDonnell (*Subsurface Exploration and Geotechnical Engineering Report: Technical Guidelines*; Northern Pass Transmission Stations, New Hampshire, provided to QS on July 11, 2016) as well as requested investigations for planned structures from others. The purpose of our involvement on the Deerfield Substation phase of the project were as follows: 1) provide general descriptions of the subsurface conditions encountered at the substation site; 2) provide geotechnical design parameters for use by others in analysis and design of site grading and permanent slopes; 3) provide geotechnical foundation design recommendations for support of the substation structures; and 4) comment on geotechnical aspects of the proposed construction. In order to accomplish the above objectives, QS undertook the following scope of services:

1) reviewed available subsurface and geologic information relative to the project site;
2) supervised a subsurface exploration program consisting of nineteen (19) geotechnical test borings within the area of the proposed substation;
3) performed field infiltration testing at five (5) locations within the proposed basin areas;
4) supervised a laboratory testing program on selected soil and rock samples obtained during the drilling program;
5) evaluated the findings of the test borings and laboratory tests relative to foundation support of planned structures and other geotechnical aspects of the project;
6) and prepared this written report summarizing our services for the project, providing descriptions of the subsurface conditions encountered, laboratory test results, and design recommendations, as well as geotechnical considerations for construction. Copies of the test boring logs, rock core photographs, laboratory test results, infiltration test results, summary of geotechnical design parameters and results of the slope stability analysis are provided in Appendices A through F.

QS's scope of services did not include a survey of boring locations and elevations, quantity estimates, preparation of plans or specifications, pavement design, infiltration/retention basin design, blasting recommendations, identification of environmental impacts or aspects related to the project and/or site, or other services not specified above.

4.0 EXPLORATION AND TESTING PROCEDURES

4.1 SUBSURFACE EXPLORATION

QS's geotechnical field exploration program consisted of nineteen (19) Standard Penetration Test (SPT) borings performed at the approximate locations shown on the attached Boring Location Plan (see Figure 4) and summarized in Table 1 below. The test boring locations were staked in the field by others using surveying methods; ground surface elevations at the boring locations were derived from topographic data included within an ACAD site plan document (labeled *NPTT604-C101 Geotech.dwg*) using latitude and longitude data provided by PAR.

Table 1 - As-Drilled SPT Borehole Depths and Coordinates

Boring Designation	Total Depth (ft)	Ground Surface Elevation (ft)	Latitude	Longitude
BH 601	49.0	395.0	43.14011944	-71.18830278
BH 602	27.5	405.6	43.14068889	-71.18803333
BH 603	14.6	399.6	43.14096667	-71.18744444
BH 604	20.0	380.7	43.13978056	-71.18766111
BH 605	20.0	390.6	43.14015556	-71.18723611
BH 606	10.0	380.3	43.14092222	-71.18681944
BH 607	50.0	370.6	43.13942778	-71.18703056
BH 608	50.0	367.7	43.14026389	-71.18618889
BH 609	13.0	368.7	43.13959444	-71.18640833
BH 610	29.0	356.2	43.14012222	-71.18586111
BH 611	31.0	401.1	43.14021111	-71.18772500
BH 612	29.0	396.3	43.14050833	-71.18743333
BH 613	29.5	389.7	43.14057778	-71.18705556
BH 614	30.5	379.8	43.14035556	-71.18662222
INF 601	8.0	369.6	43.14044444	-71.18598611
INF 602	10.0	372.0	43.14064444	-71.18597222
INF 603	5.0	387.9	43.14108611	-71.18716667
INF 604	8.0	384.9	43.14119444	-71.18706667
INF 605	6.9	384.9	43.14140833	-71.18688333

Note: Elevations information is NAVD88

Test borings were performed by New England Boring Contractors utilizing a Mobile B-53 drill rig equipped with a 140-lb safety hammer falling 30 inches. The drilling methods utilized for this investigation consisted of hollow stem augers and rotary drive and wash (wet rotary). Standard penetration testing was performed in general accordance with ASTM D1586. The number of hammer blows required to advance the sampler for successive 6-inch intervals is recorded, and the total number of blows required to drive the sampler from 6 to 18 inches is referred to as the SPT "N-value". The N-value provides a general indication of in-situ soil density/consistency and has been correlated with certain engineering properties of soils. Soil samples were collected with a standard split-spoon sampler (2-in OD) and in bulk samples from auger cuttings for laboratory testing.

In some soils it is not always practical to drive a split-spoon sampler the full four consecutive 6-inch increments. Whenever more than 100 blows are required to drive the sampler over a 6-inch increment, or the sampler is observed not to penetrate after 100 blows, the condition is referred to as split-spoon refusal. The SPT N-value for split-spoon refusal conditions is typically estimated as greater than 100 blows per foot (bpf). Where the sampler is observed not to penetrate after 100 blows, the N-value is reported as 100/0. Otherwise, the depth of penetration after 100 blows is reported in inches (i.e. 100/5, 100/2, etc.).

The test borings were extended to the planned termination depth or auger refusal, whichever was encountered first. At select locations, the boring was advanced beyond auger refusal using double tube rock-coring techniques in accordance with ASTM D2113.

The subsurface materials encountered at each boring location were visually classified by QS personnel in the field. Soil samples were visually classified in accordance with ASTM D2488. Rock cores were visually classified for lithology and parameters were collected for weathering, intact rock strength, rock mass discontinuities, core recovery, and Rock Quality Designation (RQD) for each run. In addition to visual classification of the materials in the field, the boring logs incorporate both driller and field inspector observations and comments as well as modifications based on laboratory test results. QS's boring logs and associated rock core photographs are presented in Appendix A and B, respectively. SPT samples were collected in Ziploc bags and bulk samples were collected in 5-gallon buckets. The rock core samples were placed in wood core boxes and photographed.

4.2 LABORATORY TESTING

QS selected various bulk, SPT, and rock core samples for laboratory testing. Laboratory testing on soil samples was performed by S.W. Cole in their Deerfield and Manchester laboratories or via subcontract with Absolute Resource Associates (sulfate and chloride testing). Laboratory testing on rock core samples was performed by GeoTesting Express in their Acton, Massachusetts laboratory. Table 2 provides a summary of the laboratory testing performed for the Deerfield Substation site. A summary of the laboratory testing results and accompanying laboratory test data reports are provided in Appendix C.

Table 2 – Laboratory Test Summary

Test	ASTM	No. of Test Performed
Moisture Content	D2216	19
Sieve Analysis	D422	4
Percent Passing No. 200 Sieve	D1140	12
Atterberg Limits	D4318	4
Modified Proctor	D1557	3
Unconfined Comp. Strength of Rock	D7102	3
pH of Soil	G51	2
Soluble Chloride	--	2
Soluble Sulfate	--	2
Resistivity	G187	2

4.3 FIELD INFILTRATION TESTING

Five infiltration (INF) test borings were conducted (designated INF 601 through INF 605) to characterize the subsurface conditions to a depth of approximately 5 feet below the planned basin bottom. Each boring was sampled continuously (every 2 feet) from ground surface to termination depth. Following completion of each INF test boring, an offset borehole was drilled and PVC casing was installed to a depth of approximately 2 feet below the bottom of the basin for field infiltration testing. At some time following completion of drilling, field infiltration tests were performed by QS. The results the field infiltration tests are provided in Appendix D. The installation, preparation, and testing procedures followed were in general accordance with Table 2-3 of the *New Hampshire Department of Environmental Services Stormwater Manual*, Volume 2 (2008).

5.0 GEOLOGY AND SUBSURFACE CONDITIONS

5.1 GENERAL

The overburden soils at the project site are derived from several episodes of advancing and retreating glacial ice. Subsurface materials encountered within the borings are consistent with the geologic setting of the area. The following sections describe the regional geology and site specific subsurface conditions.

5.2 REGIONAL GEOLOGY

The surficial geology in New Hampshire is derived from the erosional and depositional processes of the continental and mountain glaciers of the Wisconsin Glacial Episode during the late Pleistocene Epoch. The dominant glacial soils that are found in this region are glacial till, glaciofluvial/outwash deposits, and glacio-lacustrine deposits. Younger post glacial deposits formed from the numerous rivers, streams, and lakes that dominate the landscape; these include alluvium and stream terrace deposits. The overburden soils at the site are derived from several episodes of advancing and retreating glacial ice. The surficial soil in the area of the Deerfield Substation is mapped as glacial ablation till as shown in Figure 4 (Surficial Geologic Map). Based on Terracon Exhibit A2-2 (Bedrock Geology Map), the bedrock underlying the Deerfield Substation site is mapped as migmatite (Terracon, 2015).

5.3 SITE SUBSURFACE CONDITIONS

The subsurface conditions encountered in the test borings generally included a layer of topsoil underlain by a layer of alluvium and/or glacial till over bedrock. A summary of the subsurface conditions encountered in the exploration described herein is provided below and in Table 3, and specific data are shown on the test boring logs provided in Appendix A.

<u>Topsoil</u>
Material described as topsoil was encountered at each of the test boring locations except for BH 602 and BH 603. The thickness of the topsoil ranged from 0.5 to 1.5 feet where encountered. The sampled topsoil was described as silty SAND (SM) with trace organics and varying amounts

of gravel. Laboratory testing was not performed to determine the organic content or horticultural properties of the topsoil. Therefore, the term "topsoil" is not intended to indicate suitability for landscaping and/or other purposes.

Alluvium

Alluvium is formed by eroded sediments, reshaped by water, and redeposited in a non-marine setting. The alluvium is often variable in both particle size and layer thickness. Alluvium materials were encountered in borings BH 604 through BH 614 and were generally described as poorly graded SAND with silt (SP-SM) and silty SAND (SM). Isolated lenses of SILT (ML) were also encountered. Field N-values obtained within the alluvium material ranged from 2 to greater than 50 blows per foot with a typical N-value of greater than 10 bpf.

Glacial Till

Glacial till deposits consist of material that has been transported and deposited by glacial ice. The glacial till encountered was characterized as ablation till (melt-out till) indicating the material was carried on or near the surface of the glacier. Till was encountered in each test boring and was generally encountered below a topsoil layer and/or alluvium. Boulders of varying size are common within till deposits. Sampled till was generally described as poorly graded SAND with silt (SP-SM), silty SAND (SM), or SILT (ML) with varying amounts of sand. Field N-values obtained within the glacial till material ranged from 4 bpf to greater than 100 blows per foot with a typical N-value of greater than 30 bpf.

Bedrock

Bedrock and/or auger refusal was encountered in fourteen (14) test boring locations; bedrock was not encountered in borings BH 604, BH 605, BH 611, INF 601, INF 602. Auger refusal occurs when materials are encountered that cannot be penetrated by a soil auger or roller bit and is normally indicative of hard or very dense material, such as debris within fill, boulders, rock lenses, pinnacles, or the bedrock surface. Where bedrock was not sampled but auger refusal was encountered (i.e. BH 603, BH 606, BH 609, INF 603, INF 604, and INF 605), QS anticipates that the refusal conditions are most likely due the bedrock.

The site is underlain by a suite of metamorphosed granitic rocks containing mafic intrusive bodies. Four different rock types were identified in the test borings: 1) medium to coarse grained PEGMATITE, 2) medium grained GRANITE, 3) fine to medium grained GNEISS, and 4) fine grained DIABASE DIKES. The first bedrock unit was described as slightly to completely weathered, medium to coarse grained, very weak to very strong, PEGMATITE. The second unit was described as fresh to highly weathered, medium grained, very weak to very strong, GRANITE. The third unit was described as fresh to highly weathered, fine to medium grained, very weak to very strong, GNEISS. The fourth unit was an intrusive described as slightly to moderately weathered, fine grained, strong, DIABASE DIKE. All four units exhibited a weathered zone transitioning from completely or highly weathered to fresh or slightly weathered. Where encountered, the thickness of the upper completely or highly weathered bedrock zone generally ranged from 1 to 5 feet thick.

Groundwater

Groundwater was only encountered in three borings (BH 610, BH 614 and INF 605) within or directly above hard till. We anticipate that the groundwater measured in these borings is representative of a perched condition directly above the hard till. Fluctuations in subsurface water levels and soil moisture should be anticipated with changes in precipitation, run-off and moisture.

Table 3 – Encountered Subsurface Conditions Summary

Boring No.	Ground Elevation (ft)	Depth to Groundwater[1] (ft)	Boring Termination Condition	Depth (ft)	Material Origin	Encountered Material	Field N-Value[2]
BH 601	395.0	N.E.	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Till	SM	11
				2 - 4		SP-SM	40
				4 - 39		SM, SP-SM	96 - 100/2”
				39 - 44	Bedrock	HW Pegmatite	-
				44 - 49		SW to MW Pegmatite	-
BH 602	405.6	N.E.	CT	0 - 2	Till	SM	8
				2 - 8		SM, ML	25 - 53
				8 - 17		SM	92 - 100/4”
				17 - 18	Bedrock	HW Granite	100/0”
				18 - 27.5		F Granite	-
BH 603	399.6	N.E.	AR	0 - 2	Till	SM	8
				2 - 6		SM	35 – 42
				6 - 14.6		SM	100+
BH 604	380.7	N.E.	BT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	3
				2 - 4		SM	33
				4 - 17	Till	SP, ML, SM	55 - 100+
				17 - 20		SM	100/4”
BH 605	390.6	N.E.	BT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	6
				2 - 4	Till	SP-SM	44
				4 - 20		SP-SM, SM, ML	75 - 100/4”
BH 606	380.3	N.E.	AR	0 – 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	6
				2 - 6		SM	47 - 55
				6 - 10	Till	SM	81 - 100/3”

Table 3 – Encountered Subsurface Conditions Summary (cont)

Boring No.	Ground Elevation (ft)	Depth to Groundwater[1] (ft)	Boring Termination Condition	Depth (ft)	Material Origin	Encountered Material	Field N-Value[2]
BH 607	370.6	N.E.	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	2
				2 - 6		SM	31 - 69
				6 - 44	Till	SM	100+ - 100/1”
				44 - 45	Bedrock	HW Gneiss	100/5”
				45 - 50		F Gneiss	-
BH 608	367.7	N.E.	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	6
				2 - 8		SP-SM, SM	53 - 67
				8 - 27.5	Till	SM	81 - 100/4”
				27.5 - 28.5	Bedrock	HW Granite	-
				28 - 37.5		F to SW Granite/ Pegmatite	-
BH 609	368.7	N.E.	AR	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	8
				2 - 8	Till	SM, SP-SM	46 - 78
				8 - 13		SP-SM	100/5”
BH 610	356.2	9.5	CT	0 - 1.5	Topsoil	ML	10
				1.5 - 11	Alluvium	SP-SM, SM	35 - 50
				11 - 18	Till	SM	100/0”
				18 - 20	Bedrock	HW to F Gneiss	-
				20 - 25		F Pegmatite	-
				25 - 29		F Gneiss	-
BH 611	401.1	N.E.	BT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Alluvium	SM	4
				2 - 4		SM	17
				4 - 8	Till	SM	61
				8 - 31		SP-SM, SM	100+ - 100/4”
BH 612	396.3	N.E.	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 3	Alluvium	SM	5
				3 - 6	Till	SP-SM	58
				6 - 18		SM	100+ - 100/5”
				18 - 22	Bedrock	HW to SW Granite	-
				22 - 29		SW to MW Diabase	-

Table 3 – Encountered Subsurface Conditions Summary (cont)

Boring No.	Ground Elevation (ft)	Depth to Groundwater[1] (ft)	Boring Termination Condition	Depth (ft)	Material Origin	Encountered Material	Field N-Value[2]
BH 613	389.7	N.E.	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 4	Alluvium	SM	7
				4 - 17	Till	SM	64 - 100+
				17 - 19.5	Bedrock	HW Granite	-
				19.5 - 29.5		SW to F Granite	-
BH 614	379.8	8.7	CT	0 - 0.5	Topsoil	SM	-
				0.5 - 4	Alluvium	SM	11
				4 - 7		SM	76
				7 - 20.5	Till	ML	100+ - 100/2”
				20.5 - 30.5	Bedrock	SW Diabase	-
INF 601	369.6	N.E.	BT	0 - 1.5	Topsoil	SM	11
				1.5 - 8	Till	SM	51 - 62
INF 602	372.0	N.E.	BT	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Till	SM	6
				2 - 10		SM	41 - 69
INF 603	387.9	N.E.	AR	0 - 1	Topsoil	SM	-
				1 - 2	Till	SM	6
				2 - 4		SM	68
				4 - 5		SP-SM	100/2”
INF 604	384.9	N.E.	AR	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Till	SM	6
				2 - 6		SM, ML	40 - 53
				6 - 8		SM	100/1”
INF 605	384.9	N.E.	AR	0 - 0.5	Topsoil	SM	-
				0.5 - 2	Till	SM	4
				2 - 6		SM	35 - 53
				6 - 6.9		SM	100/4”

[1] Reported groundwater levels were measured at completion of drilling.
[2] Field N-Value is an uncorrected blow count value measured in the field
BT = Boring Termination (at or near the planned depth)
AR = Auger or Roller Bit Refusal
CT = Rock Coring Termination

6.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

6.1 GENERAL

The following sections present our geotechnical recommendations for design and construction of the substation. In general, the subsurface conditions encountered at the site are suitable for the proposed construction with considerations presented in the following subsections.

6.2 SITE PREPARATION

Before proceeding with construction, any topsoil, roots, foundation remnants, pavements, and any other deleterious non-soil materials should be stripped or removed from the proposed construction area. During the clearing and stripping operations, positive surface drainage should be maintained to prevent the accumulation of water.

After stripping, areas intended to support new fill, gravel roadways, slabs, and foundations should be carefully evaluated by an experienced geotechnical engineer or engineering geologist. Based on the boring data, the top 2 feet of existing material (topsoil and loose soil) should be removed and replaced with controlled structural fill prior to at-grade construction in the area of the following test borings: BH 604 through BH 608, BH 611, and BH 612. Where noted on the borings logs and where located within 3 to 4 feet of new fill, roadways, slabs, and foundations, soils that exhibit SPT N-values of 6 bpf or less should be removed and replaced with controlled structural fill placed in accordance with recommendations presented in Section 6.3. The geotechnical engineer/geologist may also require scarification and compaction (per Section 6.3) of the upper 6 inches of the exposed surface and/or proofrolling of the subgrade with a 20- to 30-ton loaded dump truck or other pneumatic tired vehicle of similar size and weight. Proofrolling should be performed during a time of good weather and not while the site is wet, frozen, or severely desiccated. The purpose of the proofrolling is to locate soft, weak, or excessively wet soils present at the time of construction and provide an opportunity for the geotechnical engineer/geologist to locate inconsistencies intermediate of the boring locations.

Depending on how the near surface materials respond during proofrolling operations, some in-place densification, undercutting, or in-place stabilization may be required. The extent of densification, undercutting and/or in-place stabilization required across the site can best be determined by a geotechnical engineer/geologist at the time of construction. Once the areas where new fill placement is planned have been properly prepared, at-grade construction may proceed.

6.3 CONTROLLED STRUCTURAL FILL

Where required, controlled structural fill may consist of the non-organic, on-site soils (including alluvium and till soils). Based on laboratory testing on bulk samples obtained from other transition station and substation sites along the transmission line corridor, we anticipate that off-site borrow material will consist of sandy silt, silty sand or sand with a USCS classification of ML, SM, or SP. Other materials may be suitable for use as controlled structural fill and should be individually evaluated by the geotechnical engineer; in general the structural fill should have a USCS classification of CL, ML, SP, SM, or SC. Controlled structural fill should be free of boulders, organic matter, debris, or other deleterious materials and should have a maximum particle size no greater than 3 inches.

Fill materials should be placed in horizontal lifts with a maximum height of 8 inches loose measure. New fill should be adequately keyed into stripped and scarified subgrade soils and should, where applicable, be benched into the existing slopes. During fill operations, positive surface drainage should be maintained to prevent the accumulation of water. We recommend that structural fill (soil and crushed stone) be compacted to a minimum of 95 percent of the maximum dry density and within two (2) percentage points of the optimum moisture content determined by the modified Proctor density test (ASTM D1557). In confined areas such as utility trenches, portable compaction equipment and thin lifts of 3 to 4 inches may be required to achieve specified degrees of compaction. Each lift of fill should be tested in order to confirm that the recommended degree of compaction is attained.

6.4 SLOPE STABILITY

6.4.1 General

We recommend that cut and fill slopes have a minimum factor of safety of 1.3 for global stability. Proposed structures on the Deerfield site should be located a minimum distance of 10 feet and 15 feet from the crest and toe of slopes, respectively. In addition, we recommend that roadways be designed with a minimum setback of 5 feet from both the crest and toe of slopes.

Drainage from nearby structures and/or surface runoff should be directed away from the crest and toe of both planned cut and fill slopes. We note that diversion of surface water away from the slope crest and face is critical to reducing the potential of surface erosion and shallow failures. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible.

6.4.2 New Slope Stability

New slopes constructed to develop the planned finished grade of the substation will generally consist of cut and fill slopes up to 20 feet and 33 feet high, respectively. All slopes will have a configuration of 3 (Horizontal) to 1 (Vertical).

Using the computer program SLIDE 7.0 (RocScience), stability analysis was performed on a cut slope in the area of BH 601, BH 602, and BH 603 assuming a height of 20 feet. Additionally, stability analysis was performed on a fill slope in the area of BH 608 and BH 610 assuming a height of 33 feet. Based on the results of the SLIDE analyses (see Appendix F – Outputs 1 and 2), we anticipate that planned 3(H) to 1(V) cut and fill slopes will exhibit a factor of safety (FoS) of 1.5 or greater for global stability.

6.5 GROUNDWATER CONDITIONS

6.5.1 General

Based on the data obtained during our exploration program, we anticipate that groundwater will not be encountered in excavations that are less than 5 feet below the existing site grades. Excavation greater than 5 feet in depth are expected to encounter groundwater perched on hard/dense till soil.

6.5.2 Infiltration/Detention Basin Estimated Seasonal High Water Table (ESHWT)

Borings INF 601 through INF 605 were performed to characterize the subsurface conditions to a depth of approximately 5 feet below the planned infiltration basin bottom and provide information necessary to estimate the seasonal high water table within the basin footprint. Subsurface data recorded in the infiltration test borings are shown on the respective logs included in Appendix A, and the results of infiltration test performed immediately adjacent to each boring are provided in Appendix D. Table 4 below presents a summary of the interpreted ESHWT at each infiltration test location as well as pertinent information required for design of the basins.

Table 4 – Infiltration Basin Summary Information

Description	Boring INF 601	Boring INF 602	Boring INF 603	Boring INF 604	Boring INF 605
Infiltration Planned Bottom Elev. (ft)	368	368	380	380	380
Encountered Very Dense/Very Hard Soil Elev. (ft)	367	366	385	381	382
Encountered Bedrock Elev. (ft)	N.E.	N.E.	383	377	378
Encountered Groundwater Elev. (ft)	N.E.	N.E.	N.E.	N.E.	379
Elevation of Observed Redoximorphic Features	366	366	385	383	383
USDA Textural Class (with 5 ft of Basin Bottom)	Fine Sandy Loam	Fine Sandy Loam	Fine Sandy Loam	Fine Sandy Loam	Fine Sandy Loam
Estimated Seasonal High Water Table (ESHWT) Elev. (ft)	366	366	385	383	383
Infiltration Test Elevation (ft)	366	365	383	378	378
Average Infiltration Rate at Test Elevation (in/hr)	18.5	2.5	4.9	0.7	0.9

Notes:

1) Borings generally extended about 5 feet below the planned depth of each respective basin unless where refusal and/or bedrock was encountered.
2) N.E. = Not Encountered
3) Very Dense/Very Hard Soil is defined as material exhibiting an SPT N-Value of greater than 50 blows per foot (bpf).
4) Auger refusal that was encountered in INF 603 through INF 605 is anticipated on possible bedrock.
5) The infiltration test elevation at INF 603 corresponds to the depth where auger refusal was encountered.
6) Noted elevations are estimates and should be considered approximate.
7) The average infiltration rate presented is based on field measurements; a factor of safety has not been applied.

6.6 GEOTECHNICAL DESIGN STRENGTH PARAMETERS

Recommended geotechnical strength parameters are provided for the subsurface conditions encountered in each test boring (not including infiltration test borings) in Appendix E. The recommended strength parameters for soil and completely or highly weathered bedrock (CWR or HWR) were developed based on consideration of lab test results and established correlations with SPT data.

For bedrock described as moderately weathered or better, parameters in the form of equivalent Mohr-Coulomb parameters were developed and are recommended for strength properties of the rock mass. The equivalent Mohr-Coulomb strength properties were developed based on fitting an average linear relationship to the curve generated by solving for the Generalized Hoek-Brown failure criterion over an estimated range of minor principal stress values (Hoek et. al, 2002). The range of minor principal stresses was assumed as that common to a typical slope of up to 25 feet in height. The computer program RocLab (developed by Rocscience Inc.) was used to the estimate rock mass equivalent Mohr-Coulomb strength properties provided in Appendix E.

6.7 BUS SUPPORT STRUCTURE/POLE FOUNDATION DESIGN AND CONSTRUCTION

6.7.1 General

Foundation support for the bus support structures and tubular steel poles is anticipated to require deep foundations to resist shear and overturning loads. Driven pile, helical pile, and drilled shaft foundation options were considered for deep foundation support. However, we anticipate that very dense/hard soil and cobbles/boulders encountered at shallow depths at the site will result in inadequate pile embedment and possible damage during installation of both driven and helical piles; pre-drilling would be required to facilitate installation of driven and helical piles. Therefore, considering the planned excavation required to develop a pad elevation of 387 feet and relatively shallow very dense/hard soils encountered in borings BH 605 and BH 611 through BH 614, we recommend that support for the bus and pole structures consist of drilled shafts at the Deerfield Substation site.

6.7.2 Drilled Shaft Foundations

Based on the subsurface conditions encountered in the area of borings BH 605 and BH 611 through BH 614, a top of finished grade elevation of about 387 feet, and the general site preparation recommendations presented in previous sections of this report, we recommend the allowable axial values and the associated LPILE (lateral) parameters shown in Tables 5 through 8 be used for design of drilled shaft foundations. Tables 5 and 6 are applicable to foundations on the western portion of the pad where limited cuts with no new fill will be required to develop the planned finished grade. Tables 7 and 8 are applicable to foundations on the eastern portion of the pad where about 10 feet of new controlled fill is expected. Total settlement of drilled shaft foundations designed per the recommendations provided below is estimated to be less than 1 inch.

Table 5 – Recommended Drilled Shaft Axial Design Parameters (West Side)

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bottom	Material USCS Description	Allowable Skin Friction (Comp.) (psf)	Allowable Skin Friction (Uplift) (psf)	Allowable End Bearing (psf)
Till	0	4	IGNORE			
	4	10	SM	900	750	20,000
	10+	-	SM/HWR	1,650	1,375	20,000

Notes:
1) Cut of 3 to 11 feet is anticipated to developed the planned finished grade of 387 feet in the areas of borings bh 605 and BH 611 through BH 613. Subgrade in these areas is anticipated to consist of very dense till soils at or near elevation 387 feet.
2) Ultimate skin friction and end bearing capacities determined per methods prescribed in FHWA GEC 10: *Drilled Shaft: Construction Procedures and LRFD Design Methods* (2010).
3) Allowable capacities for skin (comp), skin (uplift), and end-bearing determined by applying a factor of safety of 2.5, 3.0 and 3.0, respectively.

Table 6 – Recommended Drilled Shaft Lateral (LPILE) Design Parameters (West Side)

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bot.	Material USCS Description	Effective Unit Weight (pcf)	Effective Friction Angle (deg)	Soil Modulus Constant (k) (pci)	Unconfined Comp. Strength (psi)	m_i	Poisson's Ratio	Geologic Strength Index (GSI)	Rock Mass Modulus (psi)
Till	0	10	SM	135	41	284	-	-	-	-	-
	10+	-	SM	140	43	338	-	-	-	-	-

Note:
1) Use of the Reese (Sand) constitutive model is recommended.

Table 7 – Recommended Drilled Shaft Axial Design Parameters (East Side-BH 614)

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bottom	Material USCS Description	Allowable Skin Friction (Comp.) (psf)	Allowable Skin Friction (Uplift) (psf)	Allowable End Bearing (psf)
Fill	0	4	IGNORE			
	4	10	SM	250	210	-
Alluvium	10	13	SM	300	250	-
Till	13	17	SP-SM	1,450	1,200	20,000
	17	31	SM	2,050	1,700	20,000
Bedrock	31+	-	SW Diabase	9,000	7,500	60,000

Notes:
1) About 10 feet of fill soil will be added in the south portion of the pad in the vicinity of boring BH 614.
2) Ultimate skin friction and end bearing capacities determined per methods prescribed in FHWA GEC 10: *Drilled Shaft: Construction Procedures and LRFD Design Methods* (2010).
3) Allowable capacities for skin (comp), skin (uplift), and end-bearing determined by applying a factor of safety of 2.5, 3.0 and 3.0, respectively.

Table 8 – Recommended Drilled Shaft Lateral (LPILE) Design Parameters (East Side-BH 614)

Sublayer Description	Sublayer Depth (ft)		Material USCS Description	Effective Unit Weight (pcf)	Effective Friction Angle (deg)	Soil Modulus Constant (k) (pci)	Unconfined Comp. Strength (psi)	m_i	Poisson's Ratio	Geologic Strength Index (GSI)	Rock Mass Modulus (psi)
	Top	Bot.									
Fill	0	10	SM	125	30	48	-	-	-	-	-
Alluvium	10	13	SM	110	30	48	-	-	-	-	-
Till	13	17	SP-SM	135	42	310	-	-	-	-	-
	17	31	SM	140	43	338	-	-	-	-	-
Bedrock	31+	-	SW Diabase	165	-	-	10,000	15	0.25	25	194,500

Note:
1) Use of the Reese (Sand) constitutive model is recommended.
2) Use of the Massive Rock constitutive model is recommended.

Additional Drilled Shaft Design Recommendations

- Due to strain incompatibilities, drilled shaft design based entirely on skin friction or end bearing is recommended.
- A minimum shaft length (below the ground surface) of 10 feet and 15 feet is recommended to adequately resist uplift created due to adfreeze forces within the frost zone for shafts on the west and east sides, respectively.
- A minimum shaft diameter of 30 inches is recommended.
- Should multiple shaft foundations be required, the minimum center-to-center spacing should be three (3) times the shaft diameter.

6.7.3 Drilled Shaft Construction

The use of temporary casing may be required to prevent loss of sidewall support. The use of slurry for side wall support is not recommended. We recommend that the proposed drilled shaft construction equipment, methods, procedures, and planned quality control testing, and inspection during construction be reviewed by a qualified geotechnical engineer prior to the start of shaft construction.

The ability of a drilled shaft to provide the end bearing resistances and associated settlements described herein is directly related to the construction methods and procedures used to provide a clean shaft bottom condition. Drilled shaft excavation and clean out methods shall result in bases/bottoms that are free of loose, soft, or disturbed material. Cleaning of the shaft excavations shall result in a maximum of 1 inch of loose, soft, or disturbed material on the shaft bottom at the time of concrete placement. Should concrete placement within the shaft not occur immediately following excavation and clean out, the condition of the excavation bottom shall be verified to confirm that no more than 1 inch of loose, soft, or disturbed material is present in the bottom of the excavation prior to concrete placement. Inspection of the installation methods and materials by an individual qualified and experienced in drilled shaft construction is recommended.

Placement of concrete via free-fall methods is acceptable assuming placement is directed vertically downward avoiding impact with reinforcement and that the height of groundwater on the bottom of the shaft does not exceed 3 inches at the time of placement. Should the level of water at the bottom of the excavation not be maintained at less than 3 inches, concrete placement via tremmie methods will be required.

6.8 SHALLOW FOUNDATION DESIGN AND CONSTRUCTION

6.8.1 Transformer Pads

We anticipate that transformer pads will be supported on very dense glacial till. An approved subgrade consisting of very dense glacial till will provide suitable support for transformer pads design to impart an approximate uniform bearing pressure of up to 500 pounds per square foot (psf). The soils encountered at the site should react elastically to structure loads; settlements induced by foundation loads should occur soon after the load is applied. Maximum total settlement induced by the transformer slab loads are anticipated to be negligible.

6.8.2 Single-Story Equipment Structures

Should single-story buildings be required to house equipment operated at the substation, they may be supported on shallow foundations bearing on approved very dense glacial till or on new controlled structural fill material placed in accordance with recommendations provided herein. We recommend that building foundations be designed for a maximum allowable bearing pressure of 3,000 psf for foundations bearing on approved subgrades. To reduce the possibility of localized shear failures, spread and strip footings should be a minimum of 3 feet and 1.5 feet wide, respectively.

For single-story structures designed for a maximum allowable bearing pressure of 3,000 psf on approved glacial till or new controlled structural fill, total settlements of about ½ inch with differential settlements of 1/2 to 2/3 the total estimated settlement are anticipated. As stated previously, settlements induced by foundation loads should occur soon after the load is applied.

6.8.3 Shrink-Swell and Frost Depth Considerations

Based on the soil materials observed in the test boring samples and the laboratory test results, the on-site soils will generally have a low shrink-swell potential. Accordingly, we do not recommend any foundation design modifications relative to the potential for shrink-swell soils.

Frost depth should be anticipated to be 4 feet below the lowest adjacent grade. Therefore, utilities that are susceptible to frost action and building foundations should bear a minimum of 4 feet below adjacent grades.

6.8.4 Shallow Foundation Construction

All foundation subgrades should be observed, evaluated, and verified for the design bearing pressure by a representative of the geotechnical engineer after excavation and prior to reinforcement steel placement. If low density/consistency soils are encountered at the foundation subgrade during construction, localized undercutting and/or in-place stabilization of foundation subgrades may be required. The actual need for, and extent of, undercutting or in-place stabilization should be based on field observations made by a representative of the geotechnical engineer at the time of construction.

Excavations for footings should be made in such a way as to provide bearing surfaces that are firm and free of loose, soft, wet, or otherwise disturbed soils. Foundation concrete should not be placed on frozen or saturated subgrades. If such materials are allowed to remain below foundations, settlements will increase. Foundation excavations should be concreted as soon as practical after they are excavated. If an excavation is left open for an extended period, a thin mat of lean concrete should be placed over the bottom of the excavation to minimize damage to the bearing surface from weather or construction activities. Water should not be allowed to pond in any excavation.

6.9 EARTHQUAKE CONSIDERATIONS

6.9.1 Seismic Site Class Definition

The following recommendations are based Chapter 20 of the ASCE 7-10. ASCE 7-10 provides a methodology for interpretation of SPT resistance values (N-values) to determine a Site Class Definition; however, this method requires averaging N-values over the top 100 feet of the subsurface profile. We note that the test borings for this project were extended to a maximum depth of about 50 feet below existing site grades.

The available subsurface data from our exploration indicates an N-value range of about 2 to greater than 100 bpf within the upper 50 feet below existing site grades. In general accordance with ASCE 7-10 and considering the boring data and planned grading, we recommend that a Site Class Definition “D” be used for design.

6.9.2 Liquefaction

Liquefaction of saturated, fine grained sands and silty sands is not anticipated to be a design concern for the Deerfield Substation site.

6.10 KARST GEOLOGY

Karst topography occurs from the dissolution of soluble bedrock (such as limestone, dolomite, or gypsum) which creates karst features (sinkholes and caves) within the subsurface. Karst conditions were not encountered during the exploration reported herein. Karst features/conditions are not anticipated to be a design or construction concern for the Deerfield Substation site.

6.11 CORROSION CONSIDERATIONS

Two bulk samples obtained in borings BH 603 and BH 605 were tested in the laboratory to determine pH, water soluble sulfate and chloride, and resistivity. The results of the lab tests are summarized in Table 9 below.

Table 9 – Laboratory Corrosivity Test Results

Boring No.	Sample Type & Depth (ft)	pH	Chloride (ug/g)	Sulfate (ug/g)	Electrical Resistivity (ohm-cm)
BH 603	BULK (2 - 10)	5.3	< 5.1	31	9,700
BH 605	BULK (2 - 10)	5.2	< 5.1	35	9,600

In general, soils that exhibit a resistivity of greater than 5,000 ohm-cm are considered non-aggressive (FHWA, 2010). Therefore, based on the results of the laboratory tests performed on samples collected from the Deerfield Substation site, the onsite soil should be considered as non-aggressive. The majority of laboratory tests performed on samples collected at other transition and substation sites to date have yielded similar non-aggressive results. However, a few tests at other sites have yielded results indicating materials with aggressive corrosion potential. Should the borrow material used to develop the Deerfield Substation site originate from an offsite location, corrosivity testing on representative soil samples from the source is recommended prior to onsite delivery to confirm that the soil is non-aggressive.

6.12 EXCAVATION CONDITIONS

Based on the test boring data and planned finished grades, difficult excavation conditions (i.e. excavation of very dense/very hard soil) will be encountered during the site development. Table 10 below provides a summary of locations where very dense till was encountered near or above the planned finished grades. Based on the summary information presented in Table 8, excavation into very dense till should be anticipated in the area of the following borings: BH 601, BH 603, BH 605, BH 611, BH 612 and BH 613. Bedrock was not encountered above the planned finished grades at any of the boring locations; therefore, the need for blasting to achieve planned finished grades is not anticipated.

Table 10 – Boring Locations Where Rock Was Encountered Near or Above the Planned Finished Elevation

Boring No.	Boring Elevation	Planned Finished Elevation (ft)	Min. Excavation Depth (ft)	Depth To Very Dense Till (ft)	Depth to Bedrock (ft)
BH 601	395.0	387	8	4	39
BH 602	405.6	404	2	6	17
BH 603	399.6	388	12	6	15
BH 605	390.6	387	4	4	-
BH 611	401.1	387	14	4	-
BH 612	396.3	387	9	3	18
BH 613	389.7	387	3	3	17

7.0 LIMITATIONS

This report has been prepared for the exclusive use of PAR Electrical Contractors, Inc. or their agent, for specific application to the Deerfield Substation site near Deerfield, New Hampshire. The conclusions and recommendations presented herein are based on design information furnished to us, the data obtained from the previously described subsurface exploration programs, and generally accepted geotechnical engineering practice. The conclusions and recommendations do not reflect variations in subsurface conditions which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon on-site observations of the conditions.

The soil and rock descriptions/classifications and the strata breaks shown on the boring logs attached to this report are based primarily on visual observation and should be considered approximate. Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers or engineering geologists should evaluate earthwork and foundation construction to verify that the conditions anticipated in design actually exist.

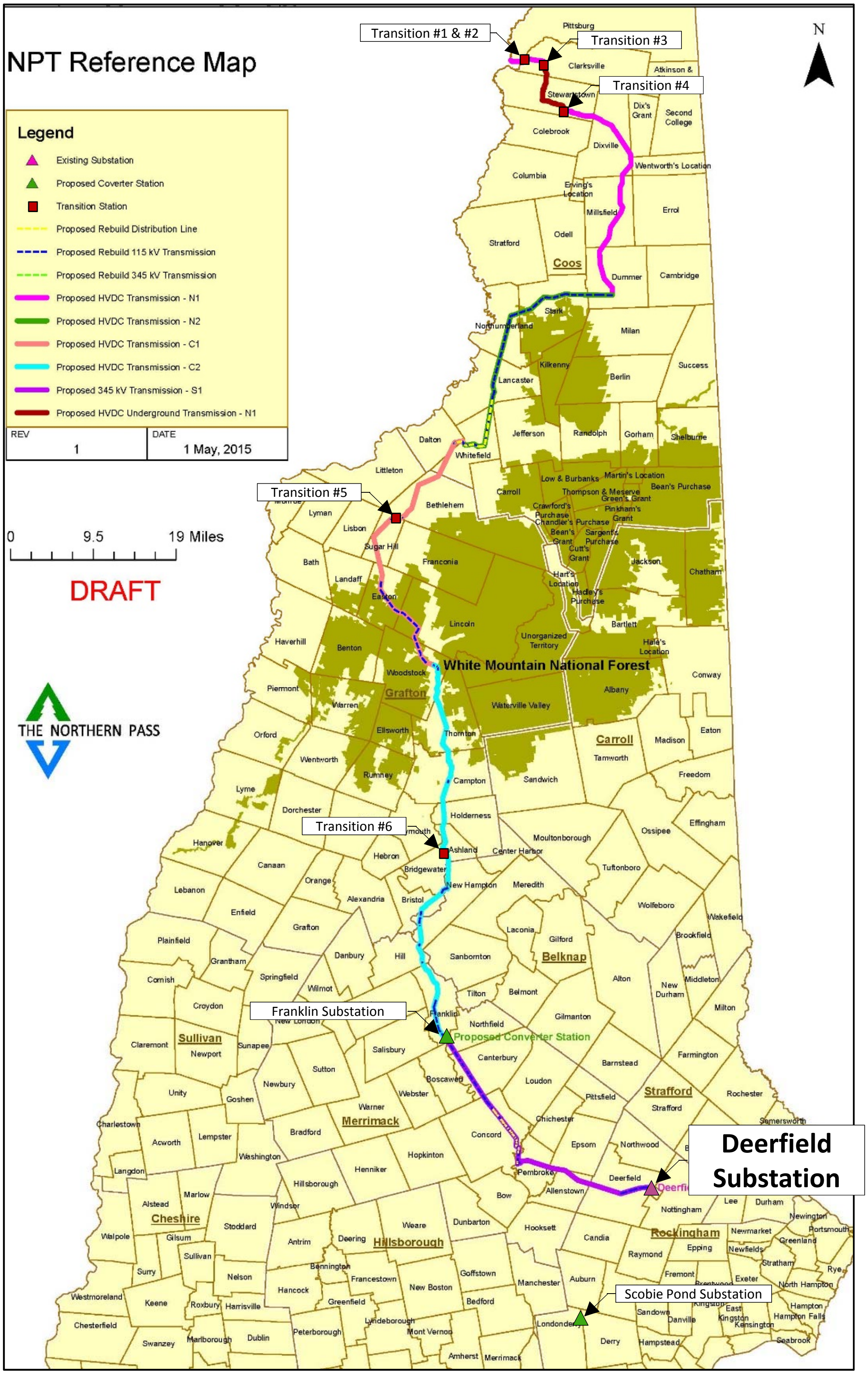
In the event that changes are made in the design or location of the project, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by Quanta Subsurface and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

8.0 REFERENCES

- American Society of Civil Engineers: *Minimum Design Loads for Buildings and Other Structures*; ASCE/SEI 7-10; 2010.
- Hoek, E, Carranza-Torres, C. and B. Corkum; Hoek-Brown Failure Criteria – 2002 Edition; 2002.
- New Hampshire Department of Environmental Services: New Hampshire Stormwater Manual; *Post-Construction Best Management Practices Selection & Design*; Volume 2; December 2008.
- New Hampshire Department of Resources and Economic Development, *Surficial Geologic Map of the Northwood Quadrangle, Rockingham and Strafford Counties, New Hampshire*, Plate 1; Scale 1:24,000; 2004.
- New Hampshire Department of Transportation; *Standard Specifications for Road and Bridge Construction*; Section 209 Granular Backfill; 2016
- Terracon Consultants' Inc.; *Report of Expected Geotechnical Conditions*: Northern Pass Project; July 10, 2015.

- U.S Department of Transportation Federal Highway Administration (FHWA); *Drilled Shafts: Construction Procedures and LRFD Design Methods*; FHWA-NHI-10-016; May 2010.
- McGregor, J and J.M. Duncan; Virginia Polytechnic Institute and State University - Center for Geotechnical Practice and Research; *Performance and Use of the Standard Penetration Test in Geotechnical Engineering Practice*; October 1998

Figures



Project No.: 16004 Date: December 2016

Figure 1
Site Vicinity Plan

Northern Pass TL – Deerfield Substation
Geotechnical Investigation

QUANTA SUBSURFACE
Engineering – Construction

Base Map: Google Earth, 2016.

Project No.: 16004

Date: December 2016

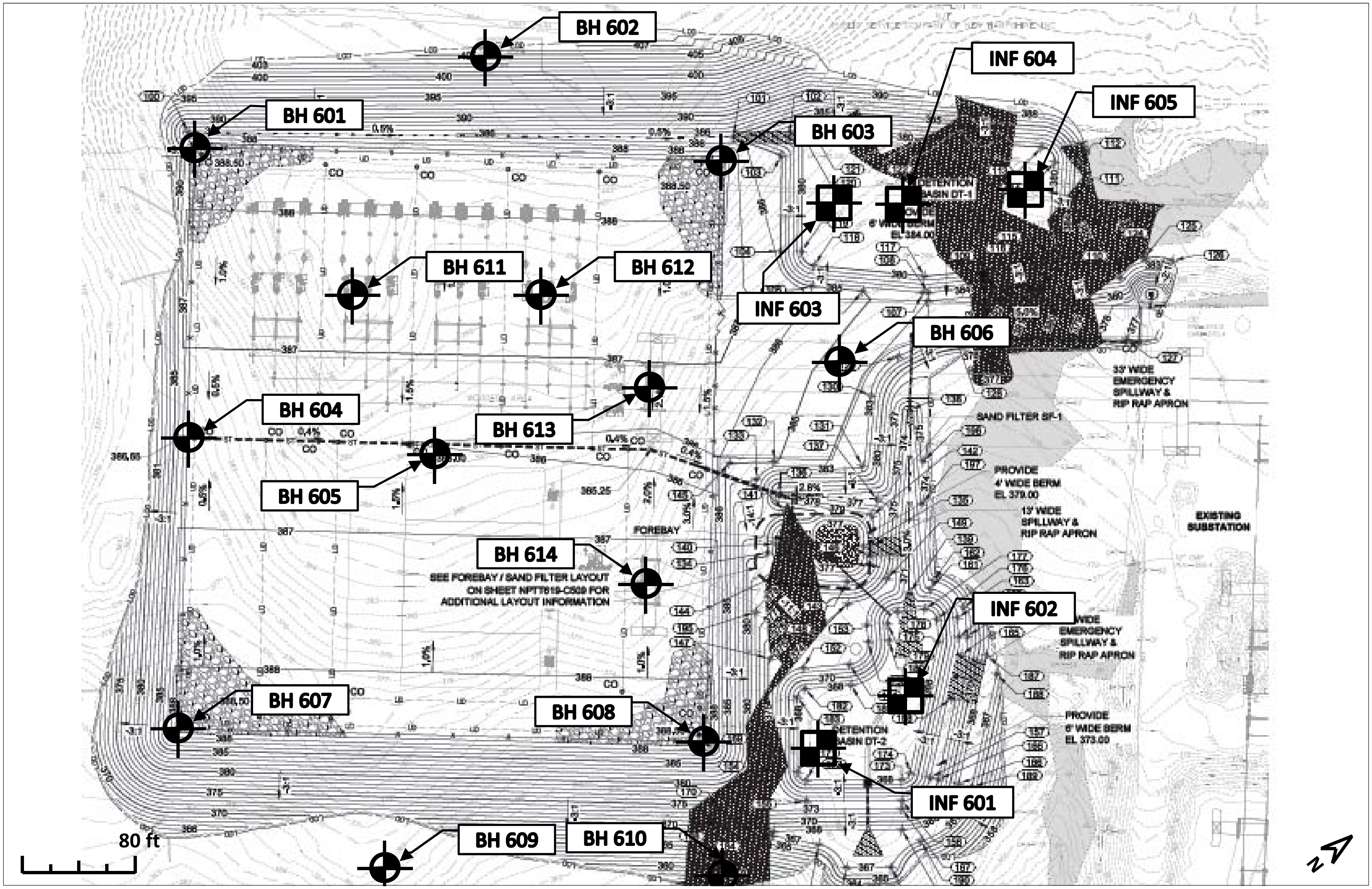
Figure 2

Site Location Map

QUANTA SUBSURFACE

Engineering – Construction

Northern Pass TL – Deerfield Substation
Geotechnical Investigation



Base Map: Deerfield Substation: NPTT604-C101-Geotech.dwg

Quanta Subsurface Boring Location, August/September 2016

Quanta Subsurface Infiltration Location, August/September 2016

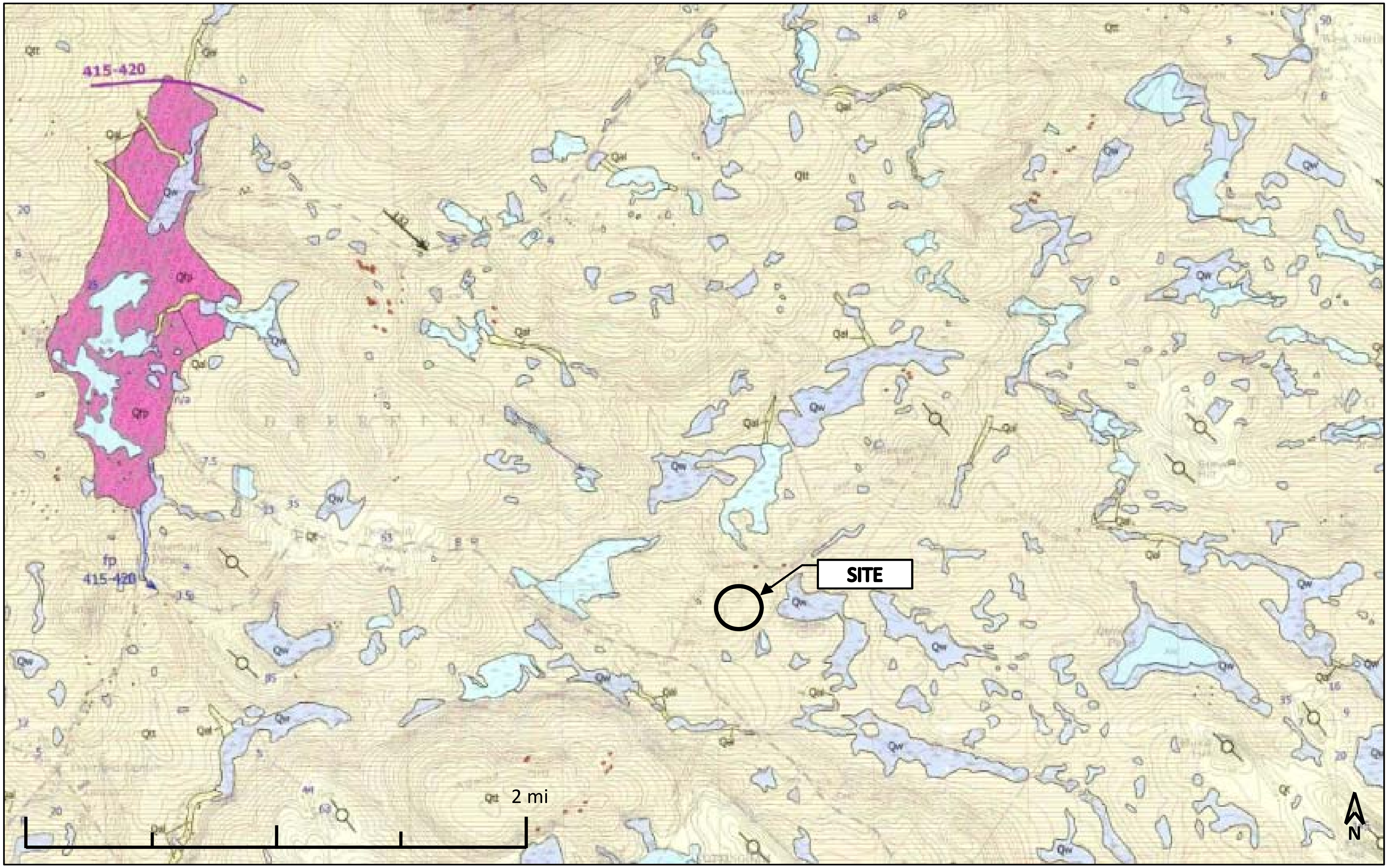
Project No.: 16004 Date: December 2016

Figure 3

QS Boring Location Plan

QUANTA SUBSURFACE Engineering – Construction

Northern Pass TL – Deerfield Substation
Geotechnical Investigation



Base Map: New Hampshire Department of Resources and Economic Development, *Surficial Geologic Map of the Northwood Quadrangle, Rockingham and Strafford Counties, New Hampshire (2004)*

Legend:

Qal	**Alluvium**
Qw	**Swamp Deposit**
Qfp	**Glaciofluvial Deposit**
Qt	**Till**
Qt	**Thin Till**

Figure 4
Surficial Geologic Map

Date: December 2016
Project No.: 16004

QUANTA SUBSURFACE

Northern Pass TL – Deerfield Substation
Geotechnical Investigation

Appendix A
QS Boring Logs

Quanta Subsurface

BORING NUMBER BH 601

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 395.0 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14011944 **LONGITUDE** -71.18830278
DRILLING METHOD Hollow Stem Auger/Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
395	0						TOPSOIL: Silty SAND (SM), trace organics, dusky red, moist, loose, fine to medium grained sand, subangular					
		SPT 1	50	2-3-8-15 (11)			TILL: Silty SAND (SM), trace organics, moderate red, moist, medium dense, fine to coarse grained gravel, fine to medium grained sand, subangular	12.5				A bulk sample was obtained from 2 to 10 feet.
		SPT 2	63	21-19-21-20 (40)			Poorly Graded SAND with silt (SP-SM), little fine to coarse gravel, grayish orange, moist, dense to very dense, fine grained sand, subangular, some oxidation, weakly stratified	9.1				
390	5	SPT 3	50	27-56-40-37 (96)								
		SPT 4	75	34-47-61-61 (108)			Poorly Graded SAND (SP), little fine to coarse gravel, trace silt, light brown, moist, very dense, fine to medium grained sand, subangular, slightly oxidized					
		SPT 5	64	46-100/5"			Poorly Graded SAND with silt (SP-SM), trace fine gravel, light brown, moist, very dense, fine to medium grained sand, subangular					Wet rotary (roller bit) drilling method used below 9 feet.
385	10											
							Silty SAND (SM), trace fine gravel, light brown, moist, very dense, fine to medium grained sand, subangular, some oxidation					
		SPT 6	80	100/5"								
380	15											
							Silty SAND with gravel (SM), light brown, moist, fine and coarse grained gravel, fine to medium grained sand, angular, granitic fragments					
375	20	SPT 7	71	39-89-100/5"								

(Continued Next Page)

QUANTA SUBSURFACE Engineering + Construction — Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
							Silty SAND with gravel (SM), light brown, moist, fine and coarse grained gravel, fine to medium grained sand, angular, granitic fragments *(continued)*					
370	25	SPT 8	50	35-35-56-54 (91)								
365	30	SPT 9		100/0"			- boulder was encountered at 29 feet					
							Silty SAND (SM), little fine gravel, brownish gray, moist, very dense, fine to medium grained sand, subangular					
360	35	SPT 10	58	36-68-73-89 (141)								
355	40	SPT 11	100	100/2"			BEDROCK: Highly weathered (IV), pale yellowish green, very weak (R1), very poor, PEGMATITE, coarse grained					
350	45						Roller Bit Refusal at 44 feet Begin Coring at 44 feet					

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
350	45											
		RC 1	72 (0)				Slightly weathered (II) to moderately weathered (III), pale yellowish green, medium strong (R3) to strong (R4), very poor, PEGMATITE, coarse grained, composed of quartz, plag, orthoclase, muscovite, trace biotite, strong oxidation along fractured surfaces - core loss from 46.7 to 48.1 feet					

Bottom of Borehole at 49.0 feet

Quanta Subsurface

QUANTA SUBSURFACE Engineering + Construction

BORING NUMBER BH 602

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 405.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14068889 **LONGITUDE** -71.18803333
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
405	0	SPT 1	54	1-3-5-10 (8)			TILL: Silty SAND (SM), little fine to coarse gravel, trace organics, light brown, moist, loose, fine to medium grained sand, subangular					
		SPT 2	71	15-13-12-9 (25)			Silty SAND (SM), trace fine gravel, grayish orange, moist, medium dense, fine to medium grained sand, subangular, oxidation					
400	5	SPT 3	58	8-15-15-15 (30)				15.7			43.6	
		SPT 4	96	16-24-29-32 (53)			Sandy SILT (ML), trace fine gravel, grayish orange, moist, hard, fine to medium grained sand, subangular					
	10	SPT 5	54	23-41-51-60 (92)			Silty SAND (SM), trace fine to coarse gravel, grayish orange, moist, very dense, fine to coarse grained sand, subangular					
395							- light brown from 13 to 17 feet					
390	15	SPT 6	56	34-41-100/4"								
		SPT 7		100/0"			BEDROCK: Highly weathered (IV), very light gray, very weak (R1), very poor, GRANITE, medium grained					
385	20	RC 1	96 (84)				Roller Bit Refusal at 18 feet Begin Coring at 18 feet Fresh (I), very light gray, strong (R4) to very strong (R5), good, GRANITE, medium grained, biotite-muscovite - slightly oxidized zone at 20.3 feet					UCS at 20.5 feet = 14,485 psi

(Continued Next Page)

Quanta Subsurface

BORING NUMBER BH 602

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
							Fresh (I), very light gray, strong (R4) to very strong (R5), good, GRANITE, medium grained, biotite-muscovite *(continued)*					
							- fair from 23 to 27.5 feet					
380	25	RC 2	100 (52)									
							- slightly to moderately weathered, medium strong (R3) to strong (R4), oxidized fracture zone					

Bottom of Borehole at 27.5 feet

BORING NUMBER BH 603

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 399.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14096667 **LONGITUDE** -71.18744444
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	58	2-3-5-6 (8)			TILL: Silty SAND (SM), little fine to coarse gravel, trace organics, moderate red, dry, loose, fine to coarse grained sand, subangular					
		SPT 2	75	14-18-24-23 (42)			Silty SAND (SM), little fine to coarse gravel, moderate orange, dry, dense, fine to coarse grained sand, subangular					A bulk sample was obtained from 2 to 10 feet. w% = 11.7% LL = NP; PI = NP % fines = 40.6% Resistivity = 9,700 ohm-cm pH = 5.3
395	5	SPT 3	54	22-20-15-17 (35)			- micaceous from 4 to 6 feet					
		SPT 4	17	27-32-71-80 (103)			- very dense from 6 to 14.6 feet					
390	10	SPT 5	63	25-50-60-66 (110)			- light brown with oxidation from 8 to 14.6 feet.					
385		SPT 6		100/0"								

Auger Refusal at 14.6 feet
Bottom of Borehole at 14.6 feet

BORING NUMBER BH 604

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 380.7 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.13978056 **LONGITUDE** -71.18766111
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
380	0						TOPSOIL: Silty SAND with gravel (SM), little organics, dusky red, moist, very loose, fine to medium grained sand, subangular				
		SPT 1	17	1-1-2-6 (3)			ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, trace organics, moderate yellowish brown, moist, loose to dense, fine to medium grained sand, subrounded, with cobbles				
		SPT 2	50	8-15-18-23 (33)							
375	5	SPT 3	50	51-67-77-90 (144)			TILL: Poorly Graded SAND (SP), little fine to coarse gravel, grayish orange, moist, very dense, fine grained sand, subangular, slight oxidation - cobbles encountered at 6 feet				
		SPT 4	83	94-93-61-60 (154)			Silty SAND with gravel (SM), pale orange, moist, very dense, fine to medium grained sand, subangular				
		SPT 5	25	27-41-50-65 (91)			- boulders and cobbles encountered at 9 feet				
370	10										
							Sandy SILT (ML), little fine gravel, light brown, moist, hard, fine to medium grained sand, subangular, weakly stratified				
365	15	SPT 6	33	16-28-27-32 (55)							63.5
							Silty SAND (SM), little fine to coarse gravel, pale brown, moist, very dense, fine to medium grained sand, subangular				
		SPT 7	60	64-100/4"							
	20										

Bottom of Borehole at 20.0 feet

BORING NUMBER BH 605

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/3/16 **COMPLETED** 11/3/16
GROUND ELEVATION 390.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14015556 **LONGITUDE** -71.18723611
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
390	0	SPT 1	54	1-2-4-5 (6)			TOPSOIL: Silty SAND (SM), trace organics, dusky red, moist, very loose, fine to medium grained sand					
							ALLUVIUM: Silty SAND (SM), trace fine gravel, trace organics, dark yellowish orange, moist, loose, fine to medium grained sand, subangular					A bulk sample was obtained from 2 to 10 feet. w% = 9.5% LL = NP; PI = NP % fines = 28.3% Resistivity = 9,600 ohm-cm pH = 5.2
		SPT 2	63	10-19-25-27 (44)			TILL: Poorly Graded SAND with silt (SP-SM), trace fine gravel, pale orange, moist, dense to very dense, fine grained sand, subangular					
385	5	SPT 3	54	21-34-41-25 (75)								
		SPT 4	96	15-32-76-84 (108)			Sandy SILT (ML), trace fine to coarse gravel, light brown, moist, very hard, fine to medium grained sand, subangular					
		SPT 5	54	47-87-70-59 (157)			Silty SAND with gravel (SM), light brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular					
380	10											
375	15	SPT 6	80	65-100/4"								
	20	SPT 7	73	77-100/5"								

Bottom of Borehole at 20.0 feet

GEOTECH BH COLUMNS - DF STD US LAB E-M.GDT - 12/22/16 09:19 - C:\USERS\MRUNION\DOCUMENTS\16004\16004 NORTHERN PASS DEERFIELD SS.GPJ

Quanta Subsurface

BORING NUMBER BH 606

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/10/16 **COMPLETED** 11/10/16
GROUND ELEVATION 380.3 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14092222 **LONGITUDE** -71.18681944
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
380	0						TOPSOIL: Silty SAND (SM), trace organics, dark reddish brown, moist, very loose				
		SPT 1	63	1-2-4-7 (6)			ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, trace organics, dark yellowish orange, moist, loose, fine to medium grained sand, subangular, weakly stratified				
		SPT 2	67	14-23-24-33 (47)			TILL: Silty SAND (SM), little fine to coarse gravel, light brown, moist, dense to very loose, fine to medium grained sand, subangular, weakly stratified - cobbles encountered at 3.6 feet				34.7
375	5	SPT 3	71	22-29-26-27 (55)							
		SPT 4	67	34-47-34-32 (81)			- moderate yellowish brown from 6 to 9.8 feet				
		SPT 5	71	23-18-18-100/3"							

Auger Refusal at 9.8 feet
Bottom of Borehole at 9.8 feet

Quanta Subsurface

BORING NUMBER BH 606A

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/10/16 **COMPLETED** 11/10/16
GROUND ELEVATION 380.3 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14092222 **LONGITUDE** -71.18681944
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
380	0						Auger Probe No Samples Obtained					Boring offset 8 feet NE of original location.
375	5											
	10											

Auger Refusal at 10.0 feet
Bottom of Borehole at 10.0 feet

QUANTA SUBSURFACE Engineering + Construction

Quanta Subsurface

BORING NUMBER BH 607

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/8/16 **COMPLETED** 11/9/16
GROUND ELEVATION 370.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.13942778 **LONGITUDE** -71.18703056
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
370	0						TOPSOIL: Silty SAND (SM), trace organics, dusky red, moist, very loose, fine grained sand					
		SPT 1	8	1-1-1-2 (2)			ALLUVIUM: Silty SAND (SM), trace fine gravel, trace organics, dark yellowish orange, moist, very loose, fine to medium grained sand, subangular					
		SPT 2	54	3-13-18-20 (31)			Silty SAND (SM), trace fine gravel, trace organics, dark yellowish orange, moist, dense to very dense, fine to medium grained sand, subangular					
365	5	SPT 3	25	19-30-39-39 (69)			- cobbles encountered at 5 feet					
		SPT 4	83	38-49-64-100 (113)			TILL: Silty SAND (SM), little fine gravel, grayish orange, moist, very dense, fine to coarse grained sand, subangular, stratified zones				20.8	
		SPT 5	50	64-75-84-80 (159)			- light brown from 9 to 13 feet					
360	10						- cobbles encountered at 10.5 feet					
							Poorly Graded SAND with silt (SP-SM), trace fine gravel, grayish orange, moist, very dense, fine to medium grained sand, subangular, silt lenses					
355	15	SPT 6	67	36-60-99-91 (159)								
		SPT 7	0	100/1"			- cobbles encountered from 19 to 20.5 feet					
350	20											

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
							Silty SAND (SM), little fine to coarse gravel, dark yellowish brown, moist, very dense, fine to medium grained sand, subrounded					
		SPT 8	60	100/5"								
345	25											
							- light olive gray from 27 to 32 feet					
		SPT 9	55	73-100/5"								
340	30											
							Sandy SILT (ML), little fine gravel, light olive gray, moist, hard, fine to coarse grained sand, subangular					
		SPT 10	100	100/5"								
335	35											
		SPT 11	77	81-89-90-100/4"								
330	40											
		SPT 12	100	100/5"			BEDROCK: Highly weathered (IV), dark gray, fine, very weak (R1), very poor, GNEISS, medium					
	45											

(Continued Next Page)

Quanta Subsurface

BORING NUMBER BH 607

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	45						grained					
325							Roller Bit Refusal at 45 feet Begin Coring at 45 feet					
		RC 1	98 (87)				Fresh (I), dark gray, fine, very strong (R5), good, GNEISS, medium grained					UCS at 47.5 feet = 10,539 psi
	50											

Bottom of Borehole at 50.0 feet

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 367.7 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14026389 **LONGITUDE** -71.18618889
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING No groundwater data

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	50	1-2-4-5 (6)			TOPSOIL: Silty SAND (SM), little fine to coarse gravel, little organics, moderate reddish brown, moist, loose, fine to medium grained sand, subangular					
							ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, loose, fine to medium grained sand, subangular					
365		SPT 2	67	22-27-26-21 (53)			Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, very dense, fine to medium grained sand, subangular, slight oxidation					
	5	SPT 3	58	22-28-34-37 (62)			Poorly Graded SAND with silt (SP-SM), little fine to coarse gravel, light brown, moist, very dense, fine to medium grained sand, subangular					
360		SPT 4	67	36-35-32-47 (67)			TILL: Silty SAND (SM), little fine to coarse gravel, light brown, moist, very dense, fine to medium grained sand, subangular				36.4	
	10	SPT 5	58	37-37-44-44 (81)								
355							- dusky yellowish brown from 12 to 17 feet					
	15	SPT 6	56	62-90-100/4"								
350							Silty SAND (SM), little fine gravel, light olive gray, moist, very dense, fine to medium grained sand, subangular					
	20	SPT 7	78	56-61-81-100/5"								

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BORING NUMBER BH 608

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
345							Silty SAND (SM), little fine gravel, light olive gray, moist, very dense, fine to medium grained sand, subangular *(continued)*					
	25	SPT 8	64	68-100/5"								
340							BEDROCK: Highly weathered (IV), very light gray, very weak (R1), very poor, GRANITE					
							Roller Bit Refusal at 28.5 feet Begin Coring at 28.5 feet					
	30	RC 1	86 (52)				Fresh (I) to slightly weathered (II), very light gray, strong (R4) to very strong (R5), fair, GRANITE, medium grained, biotite-muscovite, quartz zones, oxidized zones					UCS at 31 feet = 15,736 psi
							BEDROCK: Slightly weathered (II), pale yellowish green, strong (R4) to very strong (R5), fair, PEGMATITE, medium to coarse grained, oxidized zones					
335							Slightly weathered (II), very light gray, strong (R4), fair, GRANITE, medium grained					Core loss from 32.7 to 33.5
							Slightly weathered (II) to moderately weathered (III), pale yellowish green, medium strong (R3) to strong (R4), fair, PEGMATITE, medium to coarse grained					
	35						Fresh (I) to slightly weathered (II), very light gray, strong (R4), fair, GRANITE, medium grained					
		RC 2	100 (64)				Slightly weathered (II) to moderately weathered (III), pale yellowish green, medium strong (R3), fair, PEGMATITE, medium to coarse grained					
330							Fresh (I), very light gray, strong (R4), fair, GRANITE, medium grained, muscovite and biotite zones					

Bottom of Borehole at 38.5 feet

BORING NUMBER BH 609

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/10/16 **COMPLETED** 11/10/16
GROUND ELEVATION 368.7 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.13959444 **LONGITUDE** -71.18640833
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0						TOPSOIL: Silty SAND (SM), trace organics, moderate reddish brown, moist, very loose, fine to medium grained sand				
		SPT 1	38	1-4-4-5 (8)			ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, trace organics, light brown, moist, loose, fine to medium grained sand	15.0			
365		SPT 2	63	39-41-36-27 (77)			Silty SAND (SM), little fine to coarse gravel, grayish orange, very dense, fine to medium grained sand, with cobbles	5.1			23.5
	5	SPT 3	46	18-20-26-47 (46)			TILL: Poorly Graded SAND with silt (SP-SM), little fine to coarse gravel, grayish orange, moist, dense to very dense, fine grained sand				
		SPT 4	67	47-37-41-60 (78)							
360		SPT 5	64	76-100/5"							
	10						- cobbles encountered at 10 feet				

Auger Refusal at 13.0 feet
Bottom of Borehole at 13.0 feet

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/23/16 **COMPLETED** 11/23/16
GROUND ELEVATION 356.2 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14012222 **LONGITUDE** -71.18586111
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 9.5ft / Elev 346.7ft

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
	0										
355		SPT 1	21	4-6-4-8 (10)			TOPSOIL: SILT with sand (ML), little fine to coarse gravel, little organics, moderate reddish brown, moist, medium stiff, fine grained sand, subangular				
		SPT 2	63	20-24-26-32 (50)			ALLUVIUM: Poorly Graded SAND with silt (SP-SM), little fine to coarse gravel, dark yellowish brown, moist, dense, fine to medium grained sand, subangular				
	5	SPT 3	0	22-22-15-16 (37)			Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, dense, fine to medium grained sand, subangular				
350		SPT 4	75	36-21-14-21 (35)			Poorly Graded SAND with silt (SP-SM), little fine gravel, moderate reddish orange, moist, dense, fine grained sand, subangular				
	10	SPT 5	67	15-18-18-24 (36)			▽				
345							TILL: Silty SAND (SM), some fine to coarse gravel, light brown, moist, very dense, fine to medium grained sand, subangular, some oxidized zones				
	15	SPT 6	0	97-100/0"							
340											
							BEDROCK: Highly weathered (IV), white and moderate dark gray, very weak (R1) to very strong (R5), very poor, GNEISS, fine to medium grained				
	20						Fresh (I), white and moderate dark gray, strong (R4) to very strong (R5), excellent, GNEISS, fine to medium grained, felsic, oxidized at 20 feet				
							Roller Bit Refusal at 19 feet Begin Coring at 19 feet				

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
335		RC 1	98 (90)				Fresh (I), pale yellowish green and moderate gray, strong (R4) to very strong (R5), excellent, PEGMATITE, coarse grained, occasional biotite bands *(continued)*				
	25										
330		RC 2	98 (98)				Fresh (I), white and moderate dark gray, strong (R4) to very strong (R5), excellent, GNEISS, fine to medium grained, quartz vein at 27.5 feet				

Bottom of Borehole at 29.0 feet

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire
DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 401.1 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14021111 **LONGITUDE** -71.187725
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING Not encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
	0						TOPSOIL: Silty SAND (SM), little organics, dusky red, moist, loose, fine to medium grained sand				
400		SPT 1	38	1-2-2-4 (4)			ALLUVIUM: Silty SAND (SM), trace fine gravel, trace organics, moderate yellowish brown, moist, very loose, fine to medium grained sand, subangular, weakly cemented	13.5			
		SPT 2	54	8-8-9-17 (17)			- grayish orange	9.6			22.6
	5	SPT 3	50	23-32-29-34 (61)			TILL: Silty SAND (SM), trace fine gravel, light brown, very dense, fine to medium grained sand, subangular	10.0			
395											
	10	SPT 4	50	57-100/6"			Poorly Graded SAND with silt and gravel (SP-SM), light brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, oxidized				
390							Silty SAND (SM), trace fine gravel, light brown, moist, very dense, fine grained sand, subangular, stratified with oxidized zones				
	15	SPT 5	53	46-79-100/5"							
385							Silty SAND with gravel (SM), light olive gray, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular				
	20	SPT 6	50	71-100/4"							

(Continued Next Page)

Quanta Subsurface

BORING NUMBER BH 611

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)
380							Silty SAND with gravel (SM), light olive gray, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular *(continued)*				
	25	SPT 7	58	97-100/6"							
375											
	30	SPT 8	54	76-89-84-93 (173)							

Bottom of Borehole at 31.0 feet

BORING NUMBER BH 612

Quanta Subsurface

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/8/16 **COMPLETED** 11/9/16

GROUND ELEVATION 396.3 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR New England Boring Contractor

LATITUDE 43.14050833 **LONGITUDE** -71.18743333

DRILLING METHOD Wet Rotary

DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety

LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

AT TIME OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0						TOPSOIL: Silty SAND (SM), some organics, dusky red, moist, loose, fine to medium grained sand					
395		SPT 1	38	2-2-3-3 (5)			ALLUVIUM: Silty SAND (SM), trace fine gravel, trace organics, moderate yellowish brown, moist, loose, fine to medium grained sand, subangular	24.0				A bulk sample was obtained from 2 to 10 feet. w% = 22.6% LL = NP; PI = NP % fines = 28.3%
							TILL: Poorly Graded SAND with silt (SP-SM), trace fine gravel, grayish orange, moist, very dense, fine grained sand, subangular, weakly stratified					
	5	SPT 2	50	23-36-22-17 (58)				12.7				
390							Silty SAND (SM), little fine gravel, reddish brown, moist, very dense, fine to medium grained sand, subangular, slight oxidation					
							- encountered cobbles at 7.8 feet					
	10	SPT 3	67	40-48-60-62 (108)			- gravelly zone at 10.5 feet					
385							- encountered a boulder from 11.5 to 13.0 feet					
	15	SPT 4	82	65-100/5"			- oxidized zone at 14.5 feet					
380												
		SPT 5		100/0"			BEDROCK: Highly weathered (IV), very light gray, very weak (R1), very poor, GRANITE, medium grained					
	20						Roller Bit Refusal at 19 feet Begin Coring at 19 feet Slightly weathered (II), very light gray, strong (R4), very poor, GRANITE, medium grained, biotite-muscovite					

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
375		RC 1	82 (0)				- core loss from 21.1 to 22 feet					
							Slightly weathered (II) to moderately weathered (III), moderate dark gray, strong (R4), very poor, DIABASE DIKE, fine grained, intrusion along core, slightly oxidized					
	25											
370		RC 2	100 (0)				- oxidized from 25.4 to 26 feet					

Bottom of Borehole at 29.0 feet

BORING NUMBER BH 613

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 389.7 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14057778 **LONGITUDE** -71.18705556
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT TIME OF DRILLING No groundwater data

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0						TOPSOIL: Silty SAND (SM), dusky red, moist, loose, fine to medium grained sand					
		SPT 1	58	2-3-4-6 (7)			ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, trace organics, light brown, moist, loose, fine to medium grained sand, subangular	15.2				
385	5	SPT 2	58	27-35-29-22 (64)			TILL: Silty SAND with gravel (SM), moderate yellowish brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subangular, slight oxidation	15.2			37.4	
							Silty SAND (SM), trace fine gravel, moderate yellowish brown, moist, very dense, fine to medium grained sand, subangular, some oxidized zones					
380	10	SPT 3	54	26-41-38-42 (79)								
375	15	SPT 4	58	63-84-58-52 (142)			- dark yellowish brown from 12 to 16 feet					
							BEDROCK: Highly weathered (IV), very light gray, very weak (R1), very poor, GRANITE, medium grained					
370	20	SPT 5		0/0"			Advanced wet rotary to 19.5 feet Begin Coring at 19.5 feet					Core loss from 19.5 to 20.1 feet.

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
		RC 1	88 (29)				Fresh (I) to slightly weathered (II), very light gray, medium, strong (R4) to very strong (R5), poor, GRANITE, medium grained, biotite-muscovite, localized foliated zones *(continued)*					
365	25						- oxidized zone					Core loss from 24.5 to 24.7 feet.
		RC 2	96 (46)				- slightly to moderately weathered and oxidized zones from 26.4 to 27 feet					
							-biotite rich zone					
							- quartz vein at 29.2 feet					

Bottom of Borehole at 29.5 feet

Quanta Subsurface

BORING NUMBER BH 614

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 379.8 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14035556 **LONGITUDE** -71.18662222
DRILLING METHOD Wet Rotary
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
▽ **AT TIME OF DRILLING** 8.7ft / Elev 371.1ft

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	25	1-2-9-7 (11)			TOPSOIL: Silty SAND (SM), little organics, moderate reddish brown, moist, loose, fine to medium grained sand, subangular					
							ALLUVIUM: Silty SAND (SM), little fine to coarse gravel, trace organics, dark yellowish orange, moist, medium dense, fine to medium grained sand, subangular					
375	5	SPT 2	58	21-29-47-30 (76)			Silty SAND (SM), little fine to coarse gravel, grayish orange, moist, very dense, fine to medium grained sand, subangular - encountered cobbles at 5.5 feet and an oxidized zone at 5.8 feet					
							TILL: Sandy SILT (ML), little fine to coarse gravel, light brown, moist, very dense, fine to medium grained sand, subangular, occasional oxidized sandy lenses ▽					
370	10	SPT 3	71	50-78-84-82 (162)							37.6	
365	15	SPT 4	76	52-78-100/5"			- pale brown from 12 to 20 feet - cobbles encountered at 17.8					
360	20	SPT 5	75	71-100/2"			- becomes pale red from 18 to 20 feet					
		RC	70				Roller Bit Refusal at 20.5 feet					Core loss from 20.5 to 20.8

(Continued Next Page)

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	ATTERBERG LIMITS PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
		1	(0)				Begin Coring at 20.5 feet					Core loss from 21.5 to 21.7
		RC 2	95 (0)				BEDROCK: Slightly weathered (II), light greenish gray, medium strong (R3), very poor, DIABASE DIKE, fine to medium grained, subvertical veins containing diopside crystals, occasional styllolites, moderately to highly fractured					
355	25											Core loss from 25.5 to 26
		RC 3	80 (0)									
		RC 4	100 (0)									
350	30											

Bottom of Borehole at 30.5 feet

Quanta Subsurface

BORING NUMBER INF 601

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/17/16 **COMPLETED** 11/17/16
GROUND ELEVATION 369.6 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14044444 **LONGITUDE** -71.18598611
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	38	2-4-4-9 (8)			TOPSOIL: Silty SAND (SM), little organics, trace fine gravel, dark reddish brown, moist, loose, fine to medium grained sand, subangular					Infiltration test casing installed in an adjacent borehole to a depth of approximately 4 feet.
		SPT 2	67	11-27-29-24 (56)			TILL: Silty SAND (SM), little fine to coarse gravel, moderate reddish brown, moist, medium dense to very dense, fine to medium grained sand, subangular, oxidized zones					The ESHWT is at an approximate depth of 4 feet.
365	5	SPT 3	67	20-26-25-28 (51)			Silty SAND (SM), little fine to coarse gravel, grayish orange, moist, very dense, fine grained sand, subangular	7.6			33.8	
		SPT 4	79	31-31-31-34 (62)			Silty SAND (SM), little fine to coarse gravel, pale reddish brown, moist, very dense, fine to medium grained sand, subangular, oxidized zones					

Bottom of Borehole at 8.0 feet

Quanta Subsurface

BORING NUMBER INF 602

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Deerfield Substation

PROJECT NUMBER 16004

PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/16/16 **COMPLETED** 11/16/16

GROUND ELEVATION 372.0 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR New England Boring Contractor

LATITUDE 43.14064444 **LONGITUDE** -71.18597222

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety

LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	21	1-2-4-6 (6)			TOPSOIL: Silty SAND (SM), little organics, trace fine to coarse gravel, moderate reddish brown, moist, loose					Infiltration test casing installed in an adjacent borehole to a depth of approximately 7 feet.
370							TILL: Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, loose, fine to coarse grained sand, subangular					
		SPT 2	54	17-21-20-26 (41)			Silty SAND with gravel (SM), grayish pink, moist, dense, fine to coarse grained gravel, fine to coarse grained sand, subangular - boulders encountered at 4 feet					Auger refusal was encountered at 4 feet. The bore hole was offset 4 feet to the East and redrilled.
	5	SPT 3	67	26-26-24-22 (50)			Silty SAND (SM), little fine to coarse gravel, light brown, moist, dense, fine to coarse grained sand, subangular					The ESHWT is at an approximate depth of 6 feet.
365		SPT 4	67	21-34-34-39 (68)			Silty SAND (SM), moderate reddish orange, moist, very dense, fine to medium grained sand, subangular, oxidized, stratified zones	10.2			40.6	
	10	SPT 5	63	26-34-35-61 (69)			- light brown and oxidized zones from 9 to 10 feet					

Bottom of Borehole at 10.0 feet

GEOTECH BH COLUMNS - DF STD US LAB E-M.GDT - 12/22/16 09:19 - C:\USERS\MRUNION\DOCUMENTS\16004\16004 NORTHERN PASS DEERFIELD SS.GPJ

Quanta Subsurface

BORING NUMBER INF 603

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/11/16 **COMPLETED** 11/11/16
GROUND ELEVATION 387.9 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14108611 **LONGITUDE** -71.18716667
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0						TOPSOIL: Silty SAND (SM), little organics, moderate reddish brown, moist, loose, fine to coarse grained sand, subangular					Infiltration test casing installed in an adjacent borehole to a depth of approximately 5 feet.
		SPT 1	21	1-2-4-14 (6)			TILL: Silty SAND (SM), little fine to coarse gravel, moderate reddish orange, moist, medium dense to very dense, fine to medium grained sand, subangular - cobbles encountered from 1.8 to 2 feet - grayish orange pink with slight oxidation below 3 feet					
385		SPT 2	63	17-31-37-39 (68)								The ESHWT is at an approximate depth of 3 feet.
	5	SPT 3	63	29-100/2"			Poorly Graded SAND with silt (SP-SM), trace fine gravel, pale orange, moist, very dense, fine grained sand, subangular					

Auger Refusal at 5.0 feet
Bottom of Borehole at 5.0 feet

BORING NUMBER INF 604

Quanta Subsurface

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/11/16 **COMPLETED** 11/11/16
GROUND ELEVATION 384.9 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14119444 **LONGITUDE** -71.18706667
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AT END OF DRILLING Not Encountered

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	63	1-2-4-8 (6)			TOPSOIL: Silty SAND (SM), little organics, moderate reddish brown, moist, loose, fine to medium grained sand, subangular TILL: Silty SAND (SM), trace fine gravel, trace organics, dark yellowish orange, moist, loose, fine to medium grained sand, subangular					Infiltration test casing installed in an adjacent borehole to a depth of approximately 7 feet. The ESHWT is at an approximate depth of 2 feet.
		SPT 2	63	19-19-21-26 (40)			Silty SAND (SM), trace fine gravel, light brown, moist, dense, oxidized and reduced mottles					
380	5	SPT 3	75	30-28-25-33 (53)			Sandy SILT (ML), trace fine gravel, light brown, moist, very hard, fine to medium grained sand, subangular - cobbles encountered at 5.8 feet					
		SPT 4	74	64-29-30-100/1"			Silty SAND (SM), little fine to coarse gravel, grayish pink, moist, very dense, fine to medium grained sand, subangular, oxidized zones with silt lenses				35.4	

Auger Refusal at 8.0 feet
Bottom of Borehole at 8.0 feet

Quanta Subsurface

BORING NUMBER INF 605

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Deerfield Substation
PROJECT NUMBER 16004
PROJECT LOCATION Deerfield, New Hampshire

DATE STARTED 11/11/16 **COMPLETED** 11/11/16
GROUND ELEVATION 384.9 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR New England Boring Contractor
LATITUDE 43.14140833 **LONGITUDE** -71.18688333
DRILLING METHOD Hollow Stem Auger
DRILLING EQUIPMENT Mobile B-53 **SPT HAMMER** Manual - Safety
LOGGED BY L. Gschwind **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
AFTER DRILLING 6.1ft / Elev 378.8ft

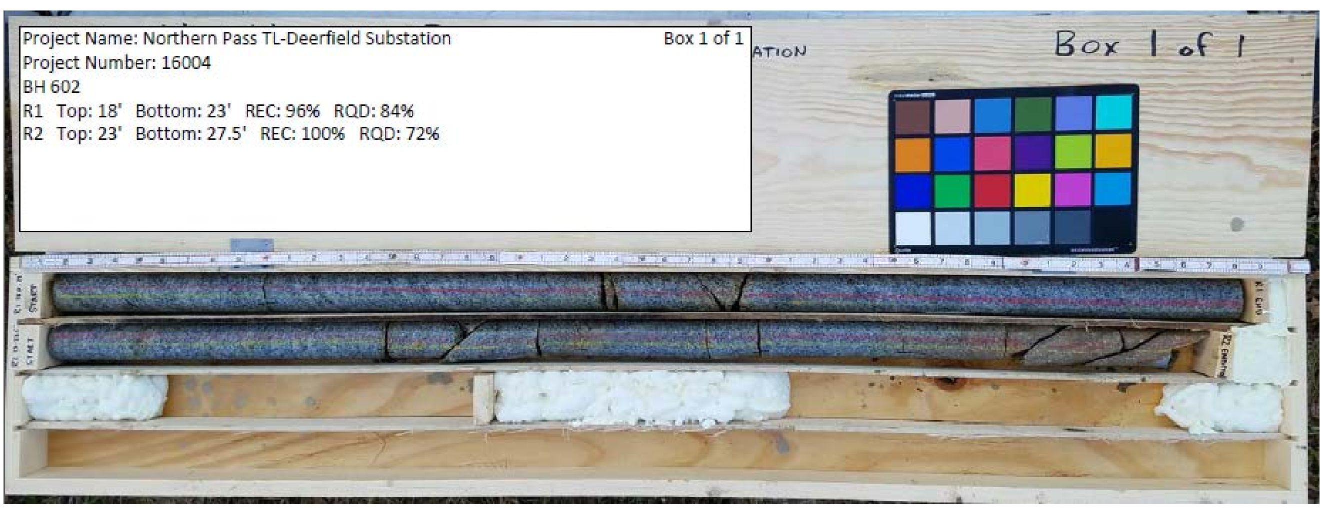
ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)	REMARKS
	0	SPT 1	58	1-2-2-6 (4)			TOPSOIL: Silty SAND (SM), little organics, moderate reddish brown, moist, very loose, fine to medium grained sand, subangular TILL: Silty SAND (SM), trace fine gravel, trace roots, pale reddish brown, moist, loose, fine to medium grained sand, subangular, slight oxidation					Infiltration test casing installed in an adjacent borehole to a depth of approximately 7 feet.
		SPT 2	54	16-27-27-31 (54)			Silty SAND (SM), trace fine to coarse gravel, pale orange, moist, very dense to dense, fine grained sand, subangular, oxidized zones					The ESHWT is at an approximate depth of 2 feet.
380	5	SPT 3	75	14-17-18-24 (35)			- oxidized (orange) and reduced (light gray) mottling from 4 to 5.5 feet					
		SPT 4	100	11-100/4"			Silty SAND (SM), trace fine to coarse gravel, light brown, wet, very dense, fine to medium grained sand, subangular	16.8			37.0	

Auger Refusal at 6.9 feet
Bottom of Borehole at 6.9 feet

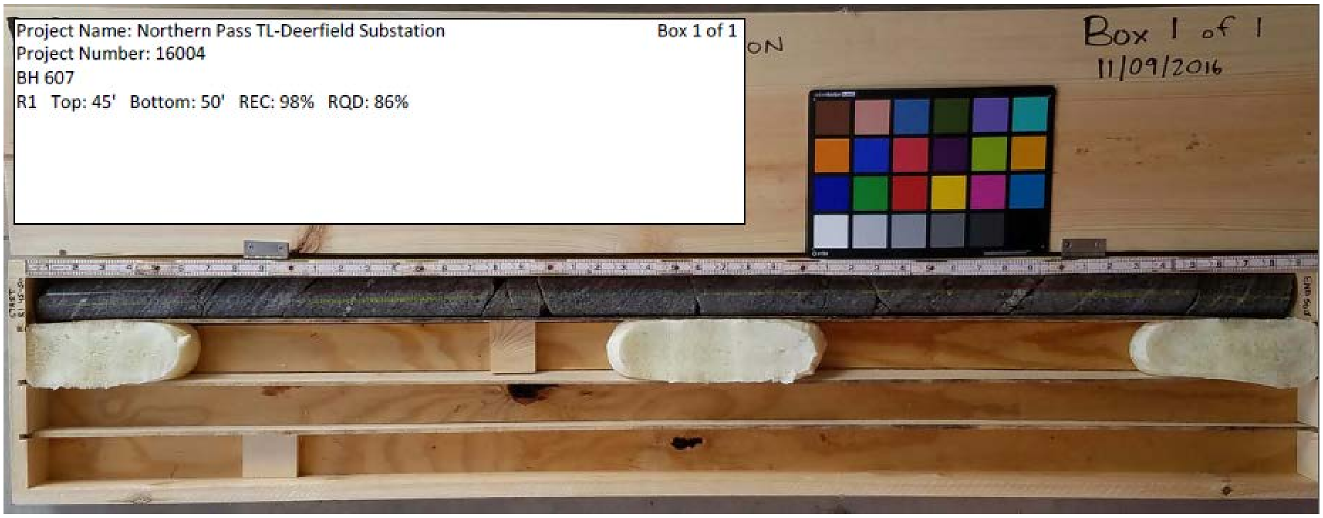
Appendix B
QS Rock Core Photographs

BH 601 Rock Core Photos

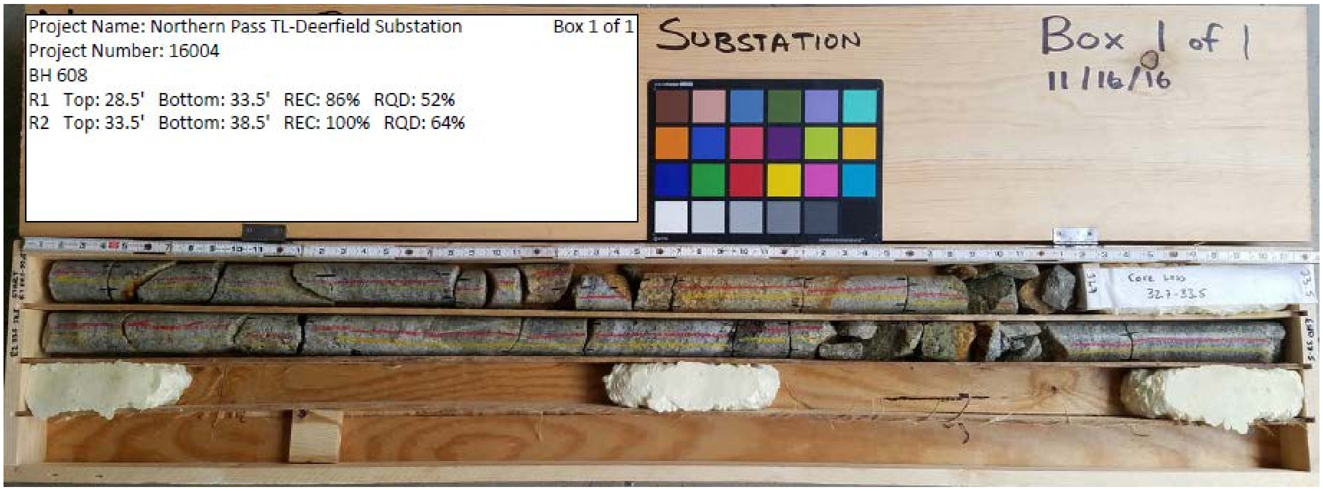
BH 602 Rock Core Photos



BH 607 Rock Core Photos

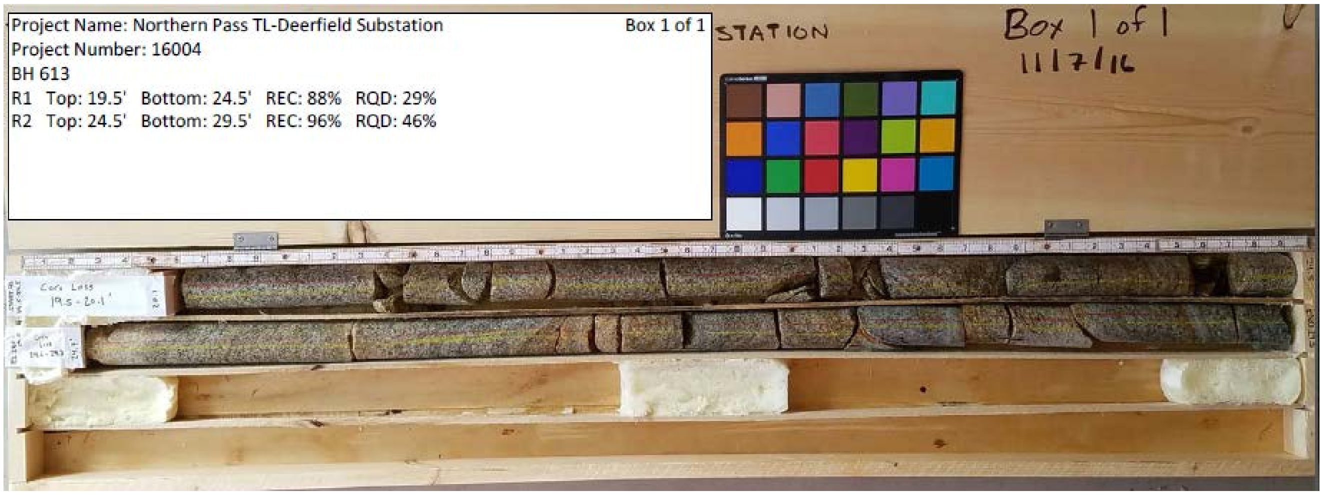


BH 608 Rock Core Photos

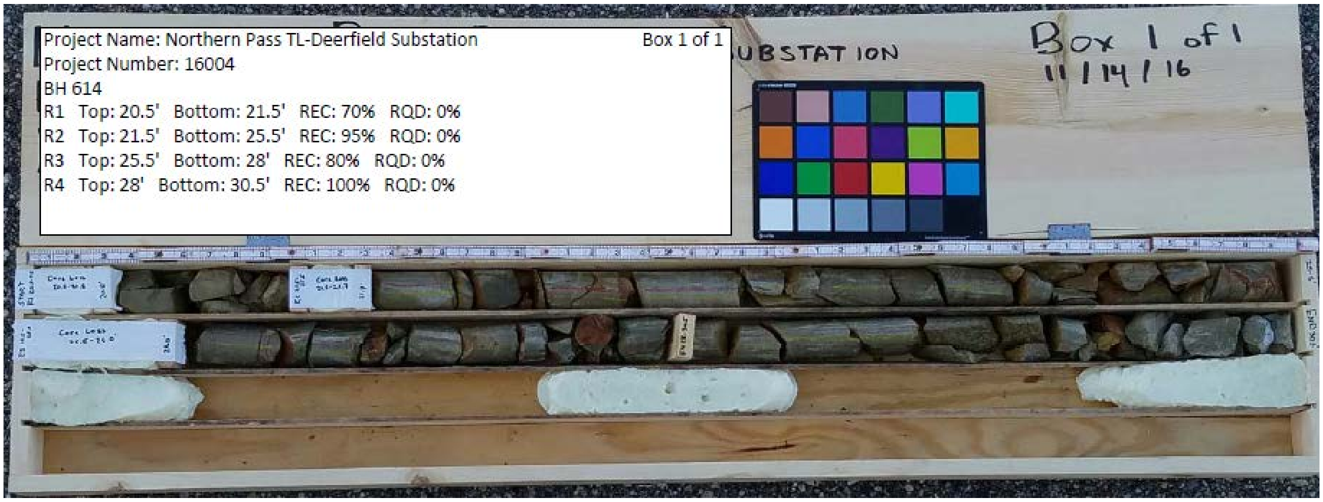


BH 612 Rock Core Photos

BH 613 Rock Core Photos



BH 614 Rock Core Photos



Appendix C
QS Laboratory Test Results

SUMMARY OF LAB TESTING RESULTS

NORTHERN PASS TRANSMISSION LINE PROJECT

DEERFIELD SUBSTATION

PROJECT NO.: 16004

SAMPLE INFORMATION			LAB TEST RESULTS																
BOREHOLE No.	FIELD SAMPLE ID	DEPTH (ft)	MOISTURE CONTENT (ASTM D2216) (%)	ORGANIC CONTENT OF SOIL (ASTM D2794) (%)	Sieve Analysis (ASTM D422)				% PASSING NO. 200 SEIVE (ASTM D1140)	ATTERBERG LIMITS (ASTM D4318)			MODIFIED PROCTOR (ASTM D1557)		UNCONFINED COMPRESSIVE STRENGTH OF ROCK (ASTM D7102) (psi)	SOIL CHEMISTRY			
					% Gravel	% Sand	% Silt	% Clay		LL	PL	PI	Max. Dry Density (pcf)	Optimum Moisture Content (%)		SO_4 (ASTM D516)	CHLORIDE (ASTM D512)	pH (ASTM G51)	RESISTIVITY (AASHTO T288) (ohm-cm)
BH 601	S1	0-2	12.5																
BH 601	S2	2-4	9.1																
BH 602	S3	4-6	15.7						43.6										
BH 603	BULK	2-10	11.7						40.6	NP	NP	NP	129.5[C]	8.8[C]		31[A]	< 5.1[A]	5.3	9,700
BH 605	BULK	2-10	9.5						28.3	NP	NP	NP	121.0[C]	9.6[C]		35[A]	< 5.1[A]	5.2	9,600
BH 611	S1	0-2	13.5																
BH 611	S2	2-4	9.6						22.6	NP	NP	NP							
BH 611	S3	4-6	10.0																
BH 602	S8	18-23													14,485[B]				
BH 604	S6	14-16							63.5										
BH 606	S2	2-4							34.7										
BH 607	S4	6-8							20.8										
BH 607	R1	45-50													10,539[B]				
BH 608	S4	6-8							36.4										
BH 608	S9	R1													15,736[B]				
BH 609	S1	0-2	15.0																
BH 609	S2	2-4	5.1						23.5										
BH 612	S1	0-2	24.0																
BH 612	BULK	2 - 10	22.6						21.4	NP	NP	NP	113.7[C]	12.0[C]					
BH 612	S2	4-6	12.7																
BH 613	S1	0-2	15.2																
BH 613	S2	4-6	15.2						37.4										
BH 614	S3	9-11							37.6										
INF 601	S3	4-6	7.6		4.4	61.8	25.5	8.3											
INF 602	S4	6-8	10.2		6.1	53.3	28.9	11.7											
INF 604	S4	6-7.6	10.5		7.6	57.0	29.9	5.5											
INF 605	S4	6-6.6	16.8		2.6	60.4	32.9	4.1											

NOTES:

General - Testing performed by S.W. Cole unless otherwise noted.

A - Testing performed by Absolute Resource Associates as a subcontractor to S.W. Cole.

B - Testing performed by GeoTesting.

C - Reported maximum dry density and optimum moisture based on corrected values.

S.W.COLE ENGINEERING, INC.

Report of Moisture Content of Soil and Rock

ASTM D2216-10

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	1566M-1571M
Client:	Quanta Subsurface	**Date Received:**	11/07/16
Material Description:	Multiple	**Date Completed:**	11/17/16
Material Source:	Deerfield Substation	**Tested By:**	A. Michaud

Lab ID	Nominal Maximum Aggregate Size	Material Description	Moisture Content
1566M	⅜"	BH-601, S1, 0'-2' (SM)	12.5%
1567M	⅜"	BH-601, S2, 2'-4" (SM)	9.1%
1568M	⅜"	B-602, S3, 4'-6' (SM)	15.7%
1569M	⅜"	BH-611, S1, 0'-2' (SM)	13.5%
1570M	⅜"	B-611, S-2, 2'-4' (SM)	9.6%
1571M	⅜"	BH-611, S-3, 4'-6' (SM)	10.0%
15309S	⅜"	BH-603, BULK, 2-10'	11.7%
15310S	⅜"	BH-605, BULK, 2-10'	9.5%

Comments:

Reviewed By: CBM

S.W.COLE ENGINEERING, INC.

Report of Moisture Content of Soil and Rock

ASTM D2216-10

Project Name:	Northern Pass	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	Multiple
Client:	Quanta Subsurface	**Date Received:**	11/22/16
Material Description:	Various	**Date Completed:**	11/28/16
Material Source:	Deerfield SS	**Tested By:**	MRB

Lab ID	Nominal Maximum Aggregate Size	Material Description	Moisture Content
1629M	⅜"	BH-609, S1, 0'-2'	15.0%
1630M	⅜"	BH-609, S2, 2'-4'	5.1%
1631M	⅜"	BH612, S1, 0'-2'	24.0%
1633M	⅜"	BH-612, S2, 4'-6'	12.7%
1634M	⅜"	BH-613, S1, 0'-2'	15.2%
1635M	⅜"	BH-613,S2, 4'-6'	15.2%
1632M	⅜"	B-612, 2'-10' (BULK)	22.6%
1637M	⅜"	INF-601, S3, 4'-6'	7.6%
1638M	⅜"	INF-602, S4, 6'-8'	10.2%
1639M	⅜"	INF-604, S4, 6'-7.6'	10.5%
1640M	⅜"	INF-605, S4, 6'-6.6'	16.8%

Comments:

Reviewed By: CBM

S.W.COLE ENGINEERING, INC.

Percent Finer than No. 200 ASTM D1140

Project Number: 16-0600
Project Name: Northern Pass - Deerfield Substation

Sample ID:	15309S
Sample Source:	BH-603, BULK, 2-10'
Client Sample Description:	SM
% Passing # 200:	40.6
Sample ID:	15310S
Sample Source:	BH-605, BULK, 2-10'
Client Sample Description:	SM
% Passing # 200:	28.3

S.W.COLE ENGINEERING, INC.

Percent Finer than No. 200 ASTM D1140

Project Number: 16-0600
Project Name: Northern Pass - Deerfield Substation

Sample ID:	1568M
Sample Source:	BH-602, S-3, 4'-6'
Client Sample Description:	SM
% Passing # 200:	43.6
Sample ID:	1570M
Sample Source:	BH-611, S-2, 2'-4'
Client Sample Description:	SM
% Passing # 200:	22.6

Percent Finer than No. 200 ASTM D1140

S.W.COLE ENGINEERING, INC.

Project Number: 16-0600
Project Name: Northern Pass Transmission - Deerfield Substation

Sample ID	Sample Source	Client Sample Description	% Passing # 200
1625M	BH-604, S6, 14'-16'	ML	63.5
1626M	BH-606, S2, 2'-4'	SM	34.7
1627M	BH-607, S4, 6'-8'	SM	20.8
1632M	BH-612, 2'10 (BULK)	SM	21.4
1635M	BH-613, S2, 4'-6'	SM	37.4

S.W.COLE ENGINEERING, INC.

Percent Finer than No. 200 ASTM D1140

Project Number: 16-0600
Project Name: Northern Pass Transmission - Deerfield Substation

Sample ID:	1636M
Sample Source:	BH-614, S3, 9'-11'
Client Sample Description:	SM
% Passing # 200:	37.6
Sample ID:	1628M
Sample Source:	BH-608, S4, 6-8'
Client Sample Description:	SM
% Passing # 200:	36.4
Sample ID:	1630M
Sample Source:	BH-609, S2, 2'-4'
Client Sample Description:	SM
% Passing # 200:	23.5

Report of Hydrometer

ASTM D422-63 (07)

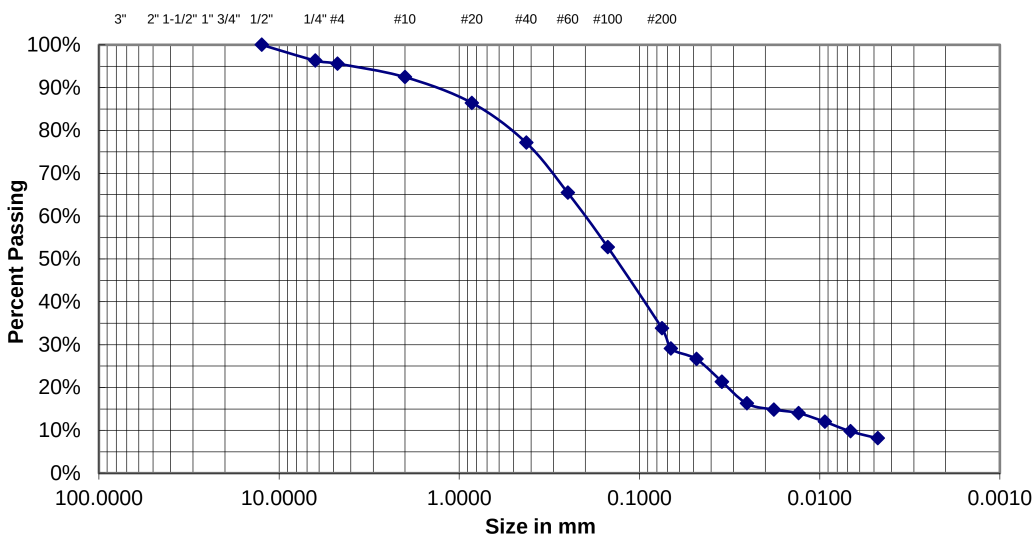
Project Name:	Northern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	1637M
Client:	Quanta Subsurface	**Date Received:**	11/22/2016
Material Description:	SM	**Date Completed:**	11/29/2016
Material Source:	INF-601, S3, 4-6'	**Tested By:**	CRW

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)	Specification (name)
3"	76	**100**	
2"	50	**100**	
1½"	38.1	**100**	
1"	25	**100**	
¾"	19	**100**	
½"	12.5	**100**	
¼"	6.3	**96**	
No. 4	4.75	**96**	
No. 10	2	**92**	
No. 20	0.85	**86**	
No. 40	0.425	**77**	
No. 60	0.25	**65**	
No. 100	0.15	**53**	
No. 200	0.075	**33.8**	

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06695	**29.1**
0.04831	**26.6**
0.03483	**21.3**
0.03483	**21.3**
0.02537	**16.3**
0.01794	**14.8**
0.01310	**14.0**
0.00936	**12.0**
0.00674	**9.8**
0.00476	**8.1**
0.00337	**7.9**
0.00241	**7.7**
0.00136	**7.1**



Particle Distribution:	Gravel (3" - No. 4)	**4.4%**	Fines (0.074 -0.005)	**25.5%**
	Sand (No. 4 - No. 200)	**61.8%**	Clay (<0.005)	**8.3%**

Comments:

CBM

Reviewed By

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S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D422-63 (07)

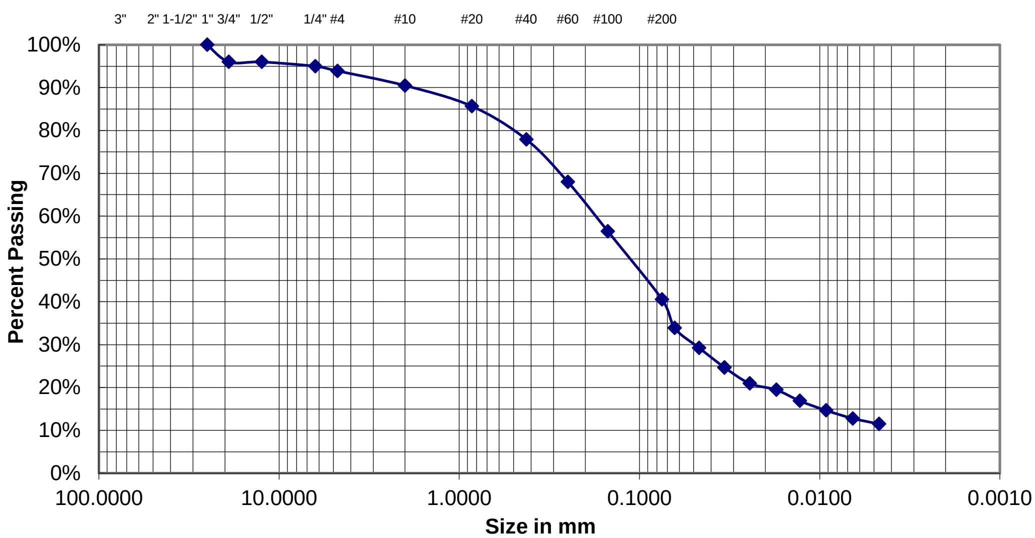
Project Name:	Northern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	1638M
Client:	Quanta Subsurface	**Date Received:**	11/22/2016
Material Description:	SM	**Date Completed:**	11/29/2016
Material Source:	INF-602, S4, 6'-8'	**Tested By:**	CRW

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)	Specification (name)
3"	76	**100**	
2"	50	**100**	
1½"	38.1	**100**	
1"	25	**100**	
¾"	19	**96**	
½"	12.5	**96**	
¼"	6.3	**95**	
No. 4	4.75	**94**	
No. 10	2	**90**	
No. 20	0.85	**86**	
No. 40	0.425	**78**	
No. 60	0.25	**68**	
No. 100	0.15	**56**	
No. 200	0.075	**40.6**	

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06384	**33.9**
0.04675	**29.3**
0.03375	**24.6**
0.03375	**24.6**
0.02444	**20.9**
0.01742	**19.4**
0.01286	**16.9**
0.00920	**14.6**
0.00655	**12.8**
0.00468	**11.5**
0.00333	**9.6**
0.00238	**8.0**
0.00136	**7.0**



Particle Distribution:	Gravel (3" - No. 4)	**6.1%**	Fines (0.074 -0.005)	**28.9%**
	Sand (No. 4 - No. 200)	**53.3%**	Clay (<0.005)	**11.7%**

Comments:

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Report of Hydrometer

ASTM D422-63 (07)

Project Name: Northern Pass
Project Location: Deerfield, NH
Client: Quanta Subsurface
Material Description: SM
Material Source: INF-604, S4, 6'-7.6'

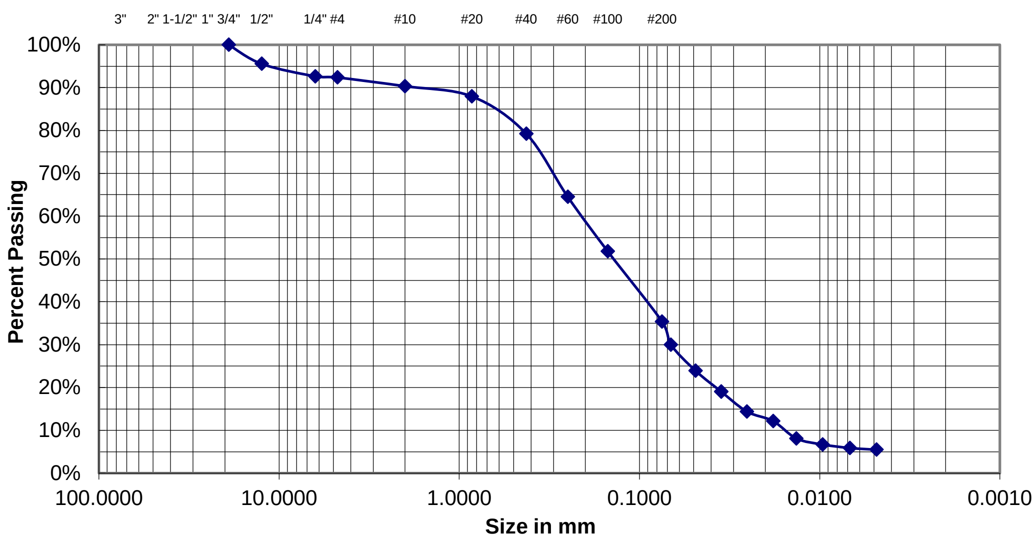
Project Number: 16-0600
Lab ID: 1639M
Date Received: 11/22/2016
Date Completed: 11/29/2016
Tested By: CRW

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)	Specification (name)
3"	76	**100**	
2"	50	**100**	
1½"	38.1	**100**	
1"	25	**100**	
¾"	19	**100**	
½"	12.5	**96**	
¼"	6.3	**93**	
No. 4	4.75	**92**	
No. 10	2	**90**	
No. 20	0.85	**88**	
No. 40	0.425	**79**	
No. 60	0.25	**65**	
No. 100	0.15	**52**	
No. 200	0.075	**35.4**	

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06695	**30.0**
0.04888	**23.9**
0.03523	**19.1**
0.03523	**19.1**
0.02537	**14.4**
0.01813	**12.2**
0.01347	**8.1**
0.00962	**6.7**
0.00681	**5.9**
0.00484	**5.5**
0.00343	**4.3**
0.00242	**3.9**
0.00138	**3.2**



Particle Distribution:

Gravel (3" - No. 4)	**7.6%**	Fines (0.074 -0.005)	**29.9%**
Sand (No. 4 - No. 200)	**57.0%**	Clay (<0.005)	**5.5%**

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Comments:

Reviewed By

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S.W.COLE ENGINEERING, INC.

Report of Hydrometer

ASTM D422-63 (07)

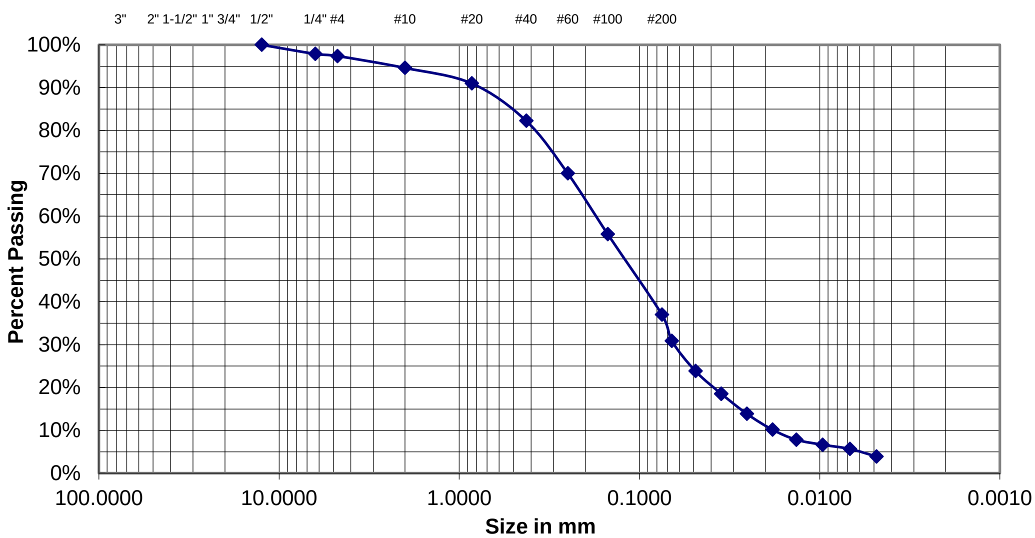
Project Name:	Northern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	1640M
Client:	Quanta Subsurface	**Date Received:**	11/22/2016
Material Description:	SM	**Date Completed:**	11/29/2016
Material Source:	INF-605, S4, 6'-6.6'	**Tested By:**	CRW

Sieve Analysis

Sieve Size	Standard Designation (mm)	Amount Passing (%)	Specification (name)
3"	76	**100**	
2"	50	**100**	
1½"	38.1	**100**	
1"	25	**100**	
¾"	19	**100**	
½"	12.5	**100**	
¼"	6.3	**98**	
No. 4	4.75	**97**	
No. 10	2	**95**	
No. 20	0.85	**91**	
No. 40	0.425	**82**	
No. 60	0.25	**70**	
No. 100	0.15	**56**	
No. 200	0.075	**37.0**	

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06612	**30.8**
0.04888	**23.8**
0.03523	**18.5**
0.03523	**18.5**
0.02537	**13.9**
0.01826	**10.2**
0.01347	**7.8**
0.00962	**6.6**
0.00681	**5.7**
0.00484	**3.9**
0.00346	**3.3**
0.00245	**2.0**
0.00138	**2.9**



Particle Distribution:	Gravel (3" - No. 4)	**2.6%**	Fines (0.074 -0.005)	**32.9%**
	Sand (No. 4 - No. 200)	**60.4%**	Clay (<0.005)	**4.1%**

Comments:

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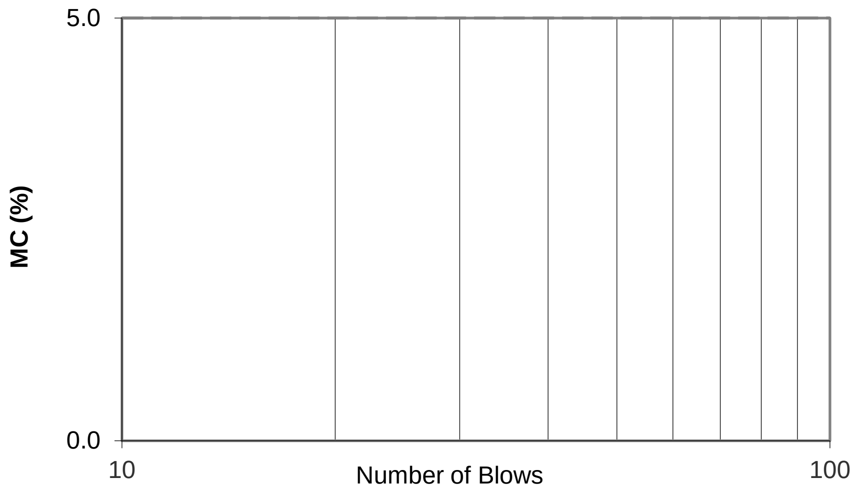
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Nothern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	15309S
Client:	Quanta Subsurface	**Date Received:**	11/07/16
Material Description:	SM	**Date Completed:**	11/17/16
Material Source:	BH-603, BULK, 2-10'	**Tested By:**	BG

Liquid Limit	**Granular**
Plastic Limit	**Non-plastic**
Plasticity Index	**N/A**

LIQUID LIMIT CURVE



As-received Moisture Content: 11.7%

Comments:

Reviewed By: CBM

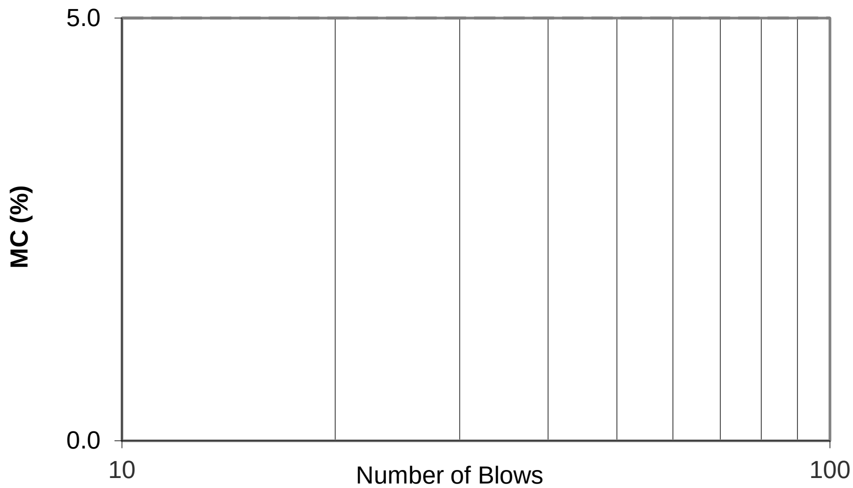
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Nothern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	15310S
Client:	Quanta Subsurface	**Date Received:**	11/07/16
Material Description:	SM	**Date Completed:**	11/17/16
Material Source:	BH-605, BULK, 2-10'	**Tested By:**	BG

Liquid Limit	**Granular**
Plastic Limit	**Non-plastic**
Plasticity Index	**N/A**

LIQUID LIMIT CURVE



As-received Moisture Content: 9.5%

Comments:

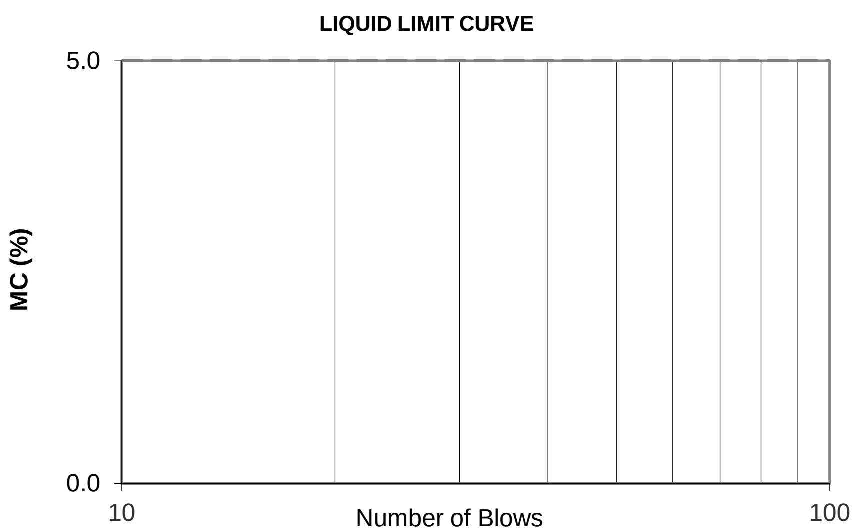
Reviewed By: CBM

Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Nothern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	1570M
Client:	Quanta Subsurface	**Date Received:**	11/07/16
Material Description:	SM	**Date Completed:**	11/17/16
Material Source:	B-611, S-2, 2'-4'	**Tested By:**	A. Michaud

Liquid Limit	**Granular**
Plastic Limit	**Non-plastic**
Plasticity Index	**N/A**



As-received Moisture Content: 9.6%

Comments:

Reviewed By: ______________________

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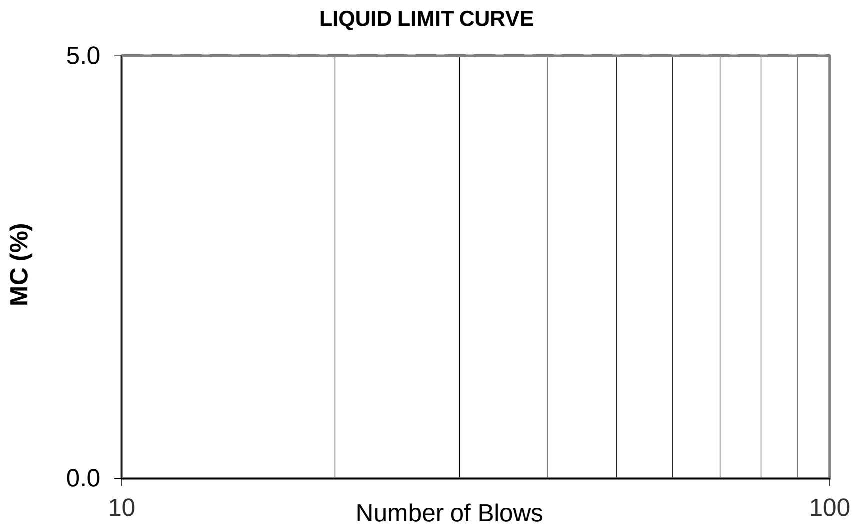
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass	**Project Number:**	16-0600
Project Location:	Deerfield, NH	**Lab ID:**	1632M
Client:	Quanta Subsurface	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/02/16
Material Source:	BH-612, 2'-10' (bulk)	**Tested By:**	MB

Liquid Limit	**Granular**
Plastic Limit	**Non-Plastic**
Plasticity Index	



Material Retained On the No. 40 Sieve: N/A

As-received Moisture Content: 22.6%

Comments:

Reviewed By: CBM

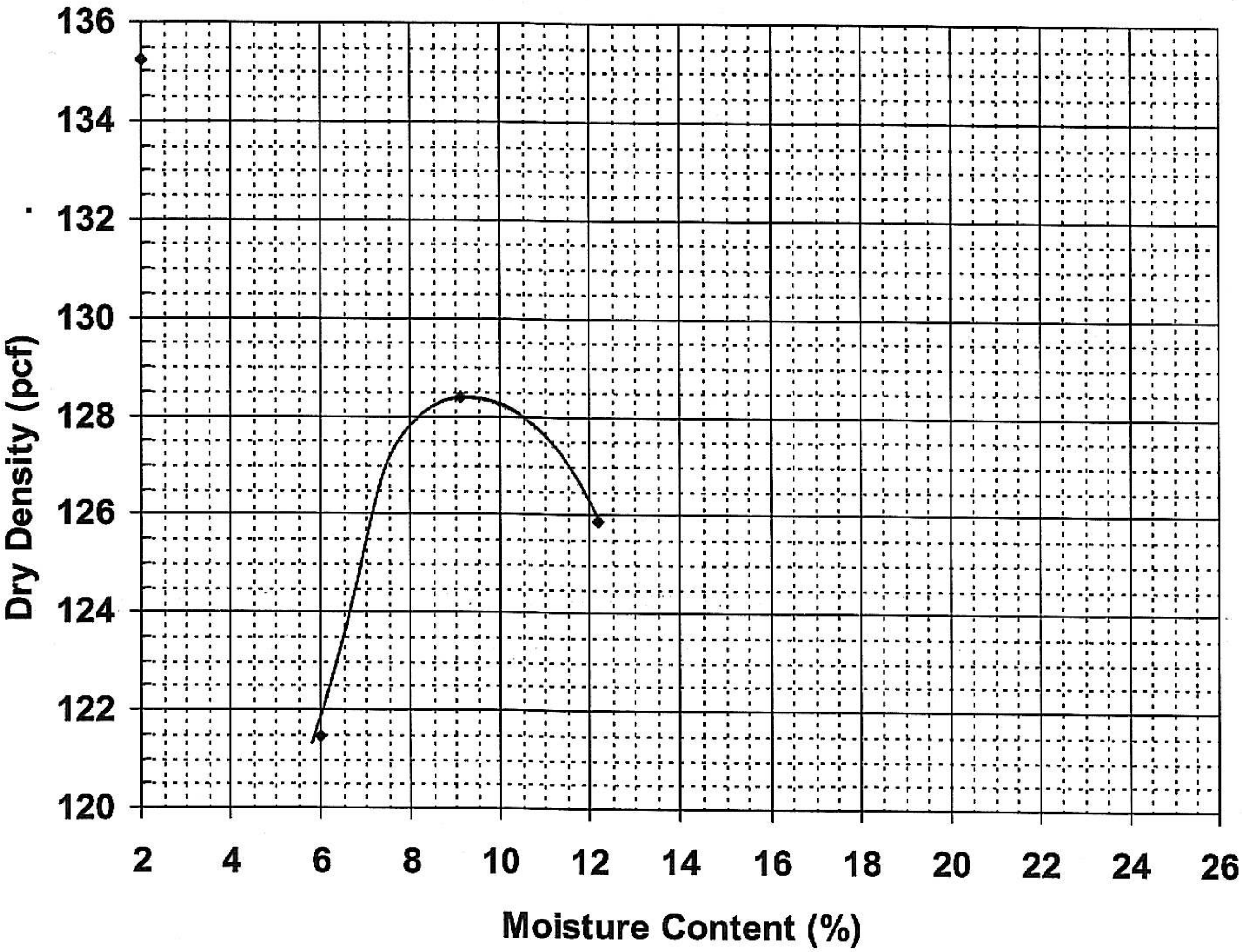
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED **Procedure A**

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	SWCOLE EXPLORATIONS, LLC	Lab ID	15309S
Material Type	SM	Date Received	11/8/2016
Material Source	BH-603, BULK, 2-10'	Date Completed	11/22/2016
		Tested By	STEPHEN PORTER

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	128.4
Optimum Moisture Content (%)	9.1
Percent Oversized	4.6%

Corrected Dry Density (pcf)	**129.5**
Corrected Moisture Content (%)	**8.8**

CBM

Comments

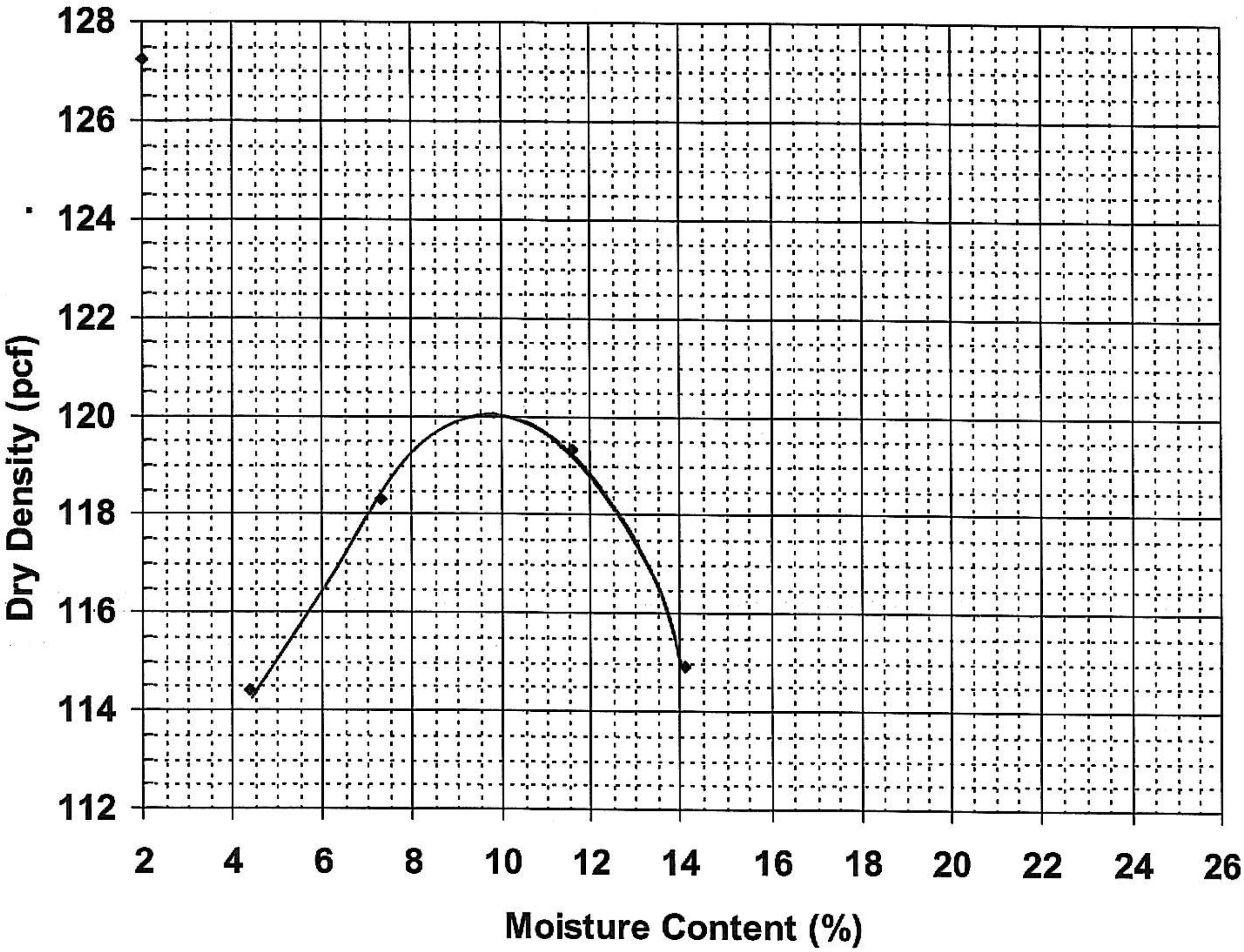
10 Centre Road, Somersworth, NH 03878-2926 • Tel (603) 692-0088 • Fax (603) 692-0044 • www.swcole.com

Report of Moisture-Density

Method ASTM D-1557 MODIFIED **Procedure A**

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	SWCOLE EXPLORATIONS, LLC	Lab ID	15310S
Material Type	SM	Date Received	11/8/2016
Material Source	BH-605, BULK, 2-10'	Date Completed	11/22/2016
		Tested By	STEPHEN PORTER

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	120.1
Optimum Moisture Content (%)	9.9
Percent Oversized	3.2%

Corrected Dry Density (pcf)	121
Corrected Moisture Content (%)	9.6

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Comments

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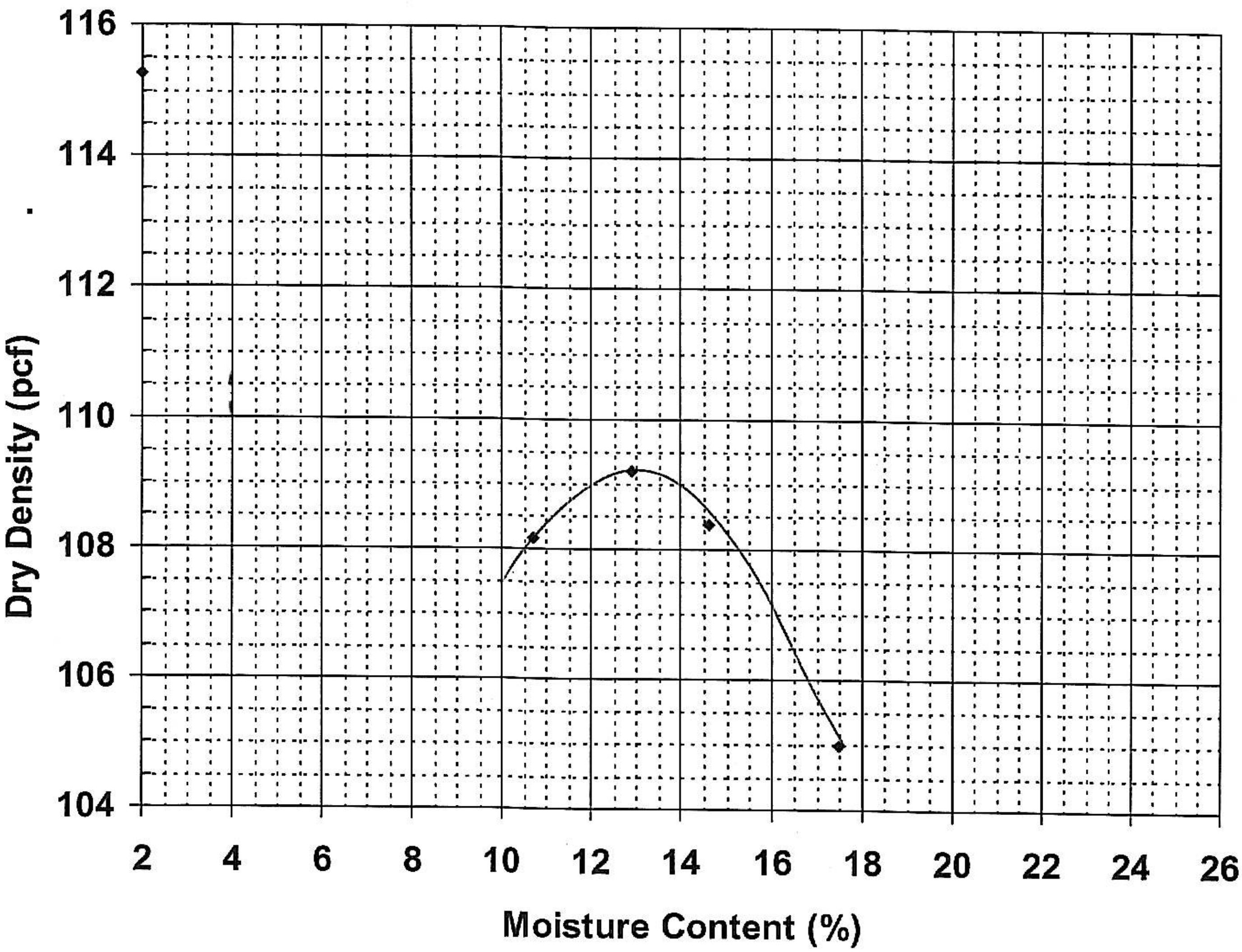
S.W.COLE ENGINEERING, INC.

Report of Moisture-Density

Method ASTM D-1557 MODIFIED **Procedure B**

Project Name	VARIOUS NH - NORTHERN PASS TRANSMISSION LINE - LABORATORY TESTING SERVICES	Project Number	16-0600
Client	SWCOLE EXPLORATIONS, LLC	Lab ID	1632M
Material Type	SM	Date Received	11/22/2016
Material Source	BH-612, 2'-10' (BULK)	Date Completed	12/8/2016
		Tested By	MARK BENNETT

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	109.5
Optimum Moisture Content (%)	12.9
Percent Oversized	8.0%

Corrected Dry Density (pcf)	113.7
Corrected Moisture Content (%)	12.0

CBM

Comments

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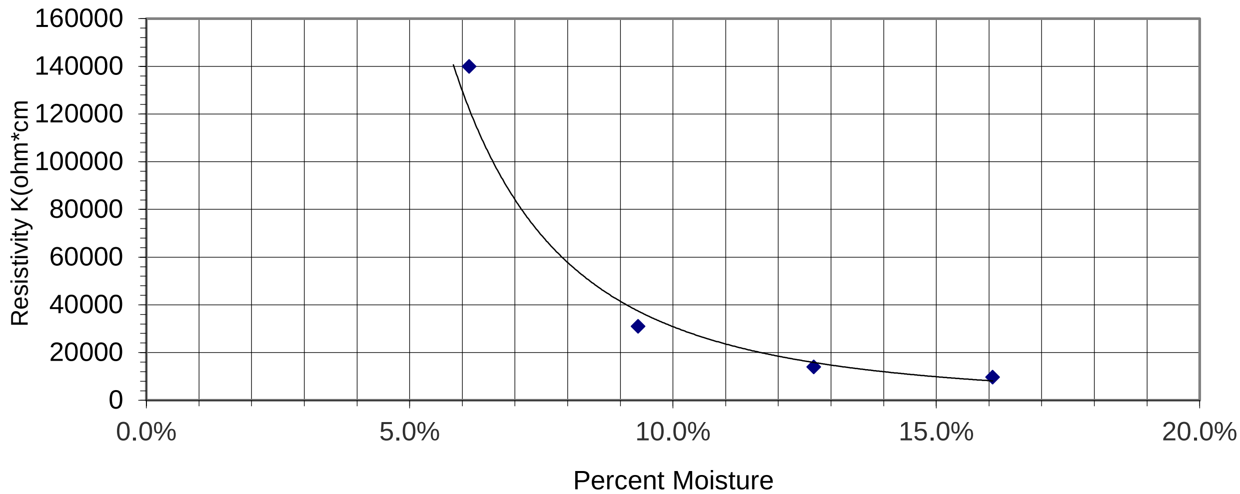
Report of Soil Resistivity

AASHTO T288

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15309S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/08/16
Material Description:	Silty Sand	**Date Completed:**	11/18/16
Material Source:	BH-603, BULK, 2-10'	**Tested By:**	BLG

Minimum Soil Resistivity 9,700 ohm-cm

Soil Temperature 20.5 °C



Comments:

Reviewed By: CBM

10 Centre Road, Somersworth, NH 03878-2926 • P: (603) 692.0088 • F: (603) 692.0044 • E: infosomersworth@swcole.com

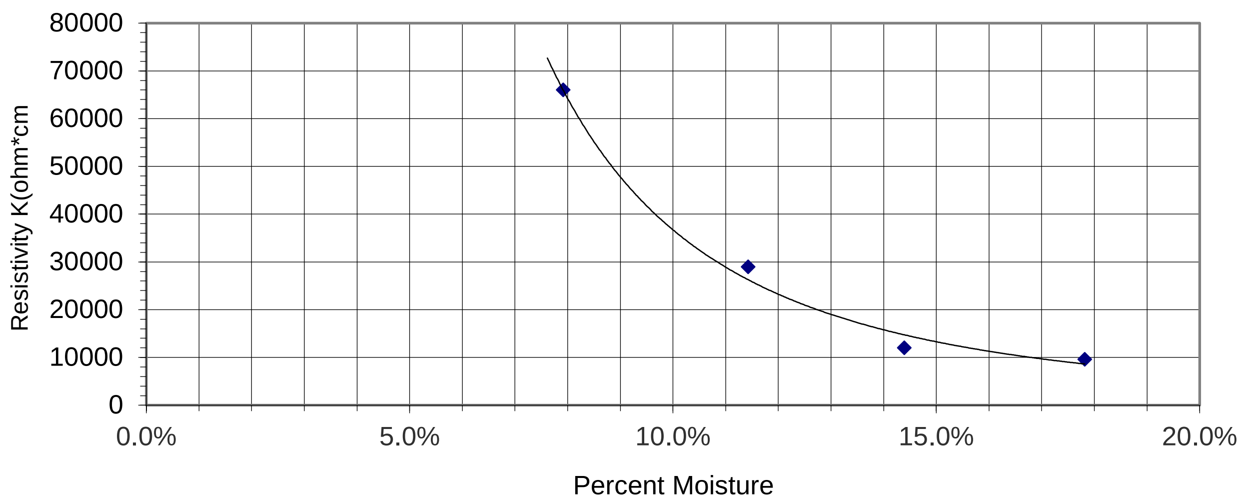
Report of Soil Resistivity

AASHTO T288

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15310S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/08/16
Material Description:	Silty Sand	**Date Completed:**	11/18/16
Material Source:	BH-605, BULK, 2-10'	**Tested By:**	BLG

Minimum Soil Resistivity **9,600** **ohm-cm**

Soil Temperature 20.5 °C



Comments:

CBM

Reviewed By: ______________________

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Project ID: NPT 16-1

Job ID: 38596

Sample#: 38596-001

Sample ID: BH-603 2-10'

Matrix: Solid Percent Dry: 98.1% Results expressed on a dry weight basis.

Sampled: 11/21/16 8:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Analysis Time	Reference
Chloride	< 5.1	5.1	ug/g	1	JZL		1603239	11/21/16	11:22	E300.0A
Sulfate	**31**	5.1	ug/g	1	JZL		1603239	11/21/16	11:22	E300.0A
pH	**5.3**		pH	1	AAG		1603238	11/22/16	9:22	SW9045C

Sample#: 38596-002

Sample ID: BH-605 2-10'

Matrix: Solid Percent Dry: 98.6% Results expressed on a dry weight basis.

Sampled: 11/21/16 8:00

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Analysis Time	Reference
Chloride	< 5.1	5.1	ug/g	1	JZL		1603239	11/21/16	11:55	E300.0A
Sulfate	**35**	5.1	ug/g	1	JZL		1603239	11/21/16	11:55	E300.0A
pH	**5.2**		pH	1	AAG		1603238	11/22/16	9:32	SW9045C

Absolute Resource associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

38596

PAGE ____ OF ____

Company Name: S.W. Cole Engineering

Company Address: 10 Centre Rd

Report To: Chad Michaud

Phone #: 603-692-0088

Invoice to Email: CMichaud@swcole.com

☐ Hard Copy Invoice Required

Project Name: NPT

Project #: 16-1

Project Location: (NH) MA ME VT NY ____ Other

Protocol: RCRA MCP SDWA NHDES NPDES OTHER

Reporting Limits: QAPP EPA DW GW-1 Other ____ S-1

Quote # ____ ☐ NH Reimbursement Pricing

PO # ____

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix: WATER	Matrix: SOLID	Matrix: OTHER	Preservation Method: HCl	Preservation Method: HNO_3	Preservation Method: H_2SO_4	Preservation Method: NaOH	Preservation Method: MeOH	Sampling: DATE	Sampling: TIME	Sampling: SAMPLER
38596-01	BH-603 2-10'			X							11/21	8:00	CBM
-02	BH-605 2-10'			X							11/21	8:00	CBM

ANALYSIS REQUEST

- ☐ VOC 8260 ☐ VOC 8260 NHDES ☐ VOC 8260 MADEP
- ☐ VOC 624 ☐ VOC BTEX ☐ MtBE, only ☐ VOC 8021VT
- ☐ VPH MADEP ☐ MEGRO ☐ GRO 8015 ☐ 1,4-Dioxane
- ☐ VOC 524.2 ☐ VOC 524.2 NH List ☐ Gases-List:
- ☐ TPH ☐ DRO 8015 ☐ MEDRO ☐ EPH MADEP ☐ TPH Fingerprint
- ☐ 8270PAH ☐ 8270ABN ☐ 625 ☐ EDB
- ☐ 8082 PCB ☐ 8081 Pesticides ☐ 608 Pest/PCB
- ☐ O&G 1664 ☐ Mineral O&G SM5520F
- ☒ pH ☐ BOD ☐ Conductivity ☐ Turbidity
- ☐ TSS ☐ TDS ☐ TS ☐ TVS ☐ Alkalinity 9045 C
- ☐ RCRA Metals ☐ Priority Pollutant Metals ☐ TAL Metals ☐ Hardness
- ☐ Total Metals-list:
- ☐ Dissolved Metals-list:
- ☐ Ammonia ☐ COD ☐ TKN ☐ TN ☐ TON ☐ TOC
- ☐ T-Phosphorus ☐ Phenols ☐ Bacteria P/A ☐ Bacteria MPN
- ☐ Cyanide ☐ Sulfide ☐ Nitrate + Nitrite ☐ Ortho P
- ☐ Nitrate ☐ Nitrite ☒ Chloride ☒ Sulfate ☐ Bromide ☐ Fluoride
- ☐ Corrosivity ☐ Reactive CN ☐ Reactive S- ☐ Ignitibility/FP
- ☐ TCLP Metals ☐ TCLP VOC ☐ TCLP SVOC ☐ TCLP Pesticide
- Subcontract: ☐ Grain Size ☐ Herbicides ☐ Formaldehyde
- Grab (G) or Composite (C)

TAT REQUESTED

- Priority (24 hr)* ☐
- Expedited (48 hr)* ☐
- Standard (10 Business Days) ☐
- *Date Needed ASAP

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

REPORTING INSTRUCTIONS ☒ PDF (e-mail address) CMichaud@swcole.com

☐ HARD COPY REQUIRED ☐ FAX (FAX#) ____

RECEIVED ON ICE ☐ YES ☒ NO

TEMPERATURE ____ °C

CUSTODY RECORD

Relinquished by	Date	Time	Received by	Date	Time
Relinquished by Sampler: Nathan Cole	11/21/16	9:36	Received by:		
Relinquished by:			Received by:		
Relinquished by:			Received by Laboratory:	11/21/16	0936

QSD-01 Revision 10/14/15

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth, ft	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
BH 602	R1	18.95-19.32	165	14485	1	Yes	---
BH 607	R1	46.45-46.80	165	10539	1	Yes	---
BH 608	R2	37.92-38.35	163	15736	1	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure
(See attached photographs)

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	11/30/2016
Project Name:	Northern Pass - Deerfield Station	Tested By:	rlc
Project Location:	Deerfield, NH	Checked By:	jsc
GTX #:	305683		
Boring ID:	BH 602		
Sample ID:	R1		
Depth:	18.95-19.32 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.09	4.09	4.09		
Specimen Diameter, in:	1.96	1.96	1.96		
Specimen Mass, g:	535.53				
Bulk Density, lb/ft^3	165			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.1			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00010	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000	0.00000	0.00010
Diameter 2, in (rotated 90^o)	0.00050	0.00040	0.00030	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010

Difference between max and min readings, in:

0° = 0.00020 90° = 0.00050

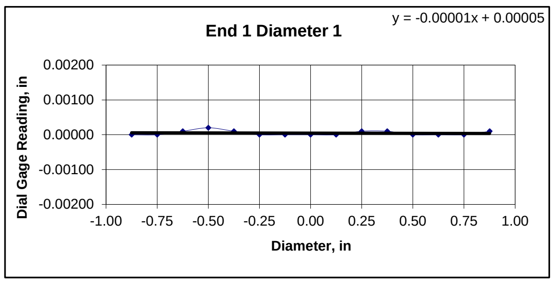
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00010	0.00020	0.00030	0.00040	0.00010	0.00000	0.00000	0.00010	0.00010	0.00020	0.00010	0.00020	0.00000	0.00000
Diameter 2, in (rotated 90^o)	0.00000	-0.00010	-0.00010	-0.00020	-0.00040	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00030	0.00030	0.00000

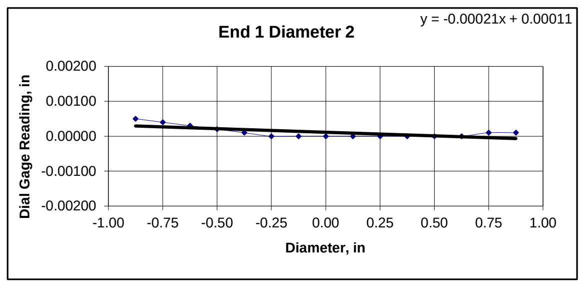
Difference between max and min readings, in:

0° = 0.0004 90° = 0.0007

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00035

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

Slope of Best Fit Line	0.00001
Angle of Best Fit Line:	0.00057

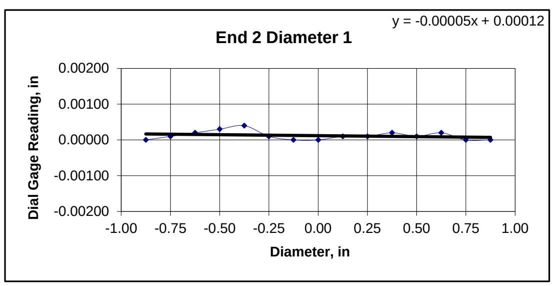
End 2:

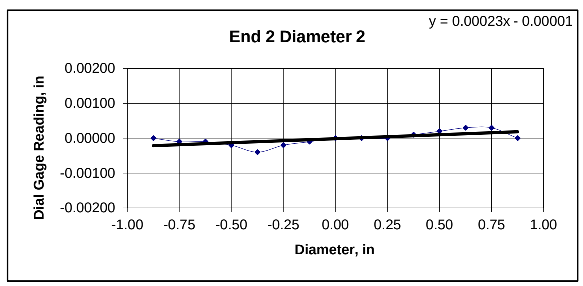
Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00286

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES

Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line	0.00021
Angle of Best Fit Line:	0.01203

End 2:

Slope of Best Fit Line	0.00023
Angle of Best Fit Line:	0.01318

Maximum Angular Difference: 0.00115

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	1.960	0.00010	0.006	YES
Diameter 2, in (rotated 90^o)	0.00050	1.960	0.00026	0.015	YES
END 2					
Diameter 1, in	0.00040	1.960	0.00020	0.012	YES
Diameter 2, in (rotated 90^o)	0.00070	1.960	0.00036	0.020	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Deerfield Station
Project Location:	Deerfield, NH
GTX #:	305683
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 602
Sample ID:	R1
Depth, ft:	18.95-19.32

After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	11/30/2016
Project Name:	Northern Pass - Deerfield Station	Tested By:	rlc
Project Location:	Deerfield, NH	Checked By:	jsc
GTX #:	305683		
Boring ID:	BH 607		
Sample ID:	R1		
Depth:	46.45-46.80 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	4.15	4.16	4.16		
Specimen Diameter, in:	1.99	1.99	1.99		
Specimen Mass, g:	559.79				
Bulk Density, lb/ft^3	165			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.1			**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00010	0.00000	-0.00010	-0.00020	-0.00030	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00020	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	-0.00010	-0.00020	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00030	-0.00020

Difference between max and min readings, in:

0° = 0.00030 90° = 0.00030

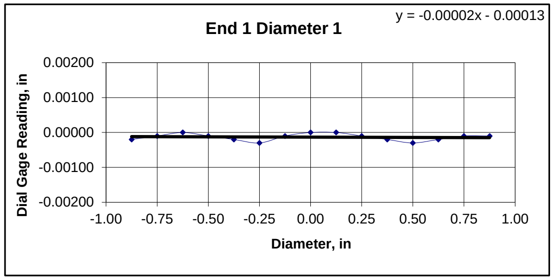
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00020	-0.00020	-0.00010	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00010	0.00000	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	-0.00030	-0.00020	-0.00010	0.00000	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

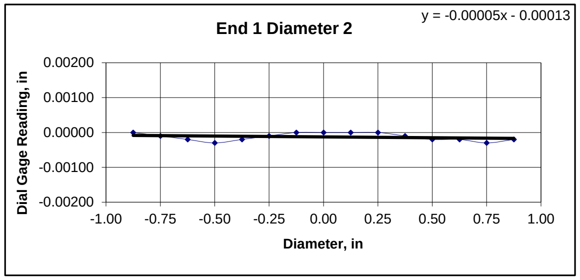
Difference between max and min readings, in:

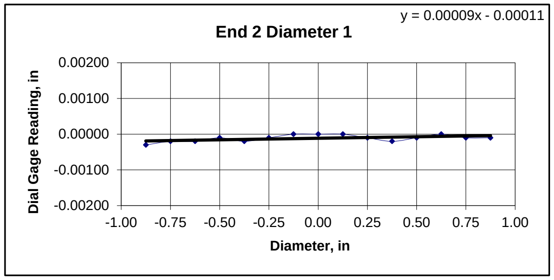
0° = 0.0003 90° = 0.0003

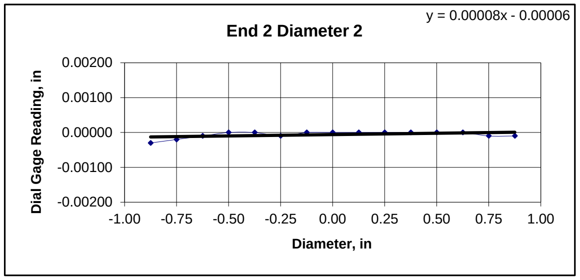
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00002
Angle of Best Fit Line: 0.00115

End 2:
Slope of Best Fit Line 0.00009
Angle of Best Fit Line: 0.00516

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00005
Angle of Best Fit Line: 0.00286

End 2:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00458

Maximum Angular Difference: 0.00172

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00030	1.990	0.00015	0.009	YES
END 2					
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90°)	0.00030	1.990	0.00015	0.009	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Deerfield Station
Project Location:	Deerfield, NH
GTX #:	305683
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 607
Sample ID:	R1
Depth, ft:	46.45-46.80

After cutting and grinding

After break

Client:	Quanta Subsurface	Test Date:	12/1/2016
Project Name:	Northern Pass - Deerfield Station	Tested By:	rlc
Project Location:	Deerfield, NH	Checked By:	jsc
GTX #:	305683		
Boring ID:	BH 608		
Sample ID:	R2		
Depth:	37.92-38.35 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average	
Specimen Length, in:	4.18	4.18	4.18	
Specimen Diameter, in:	1.98	1.98	1.98	
Specimen Mass, g:	550.38			
Bulk Density, lb/ft^3	163	**Minimum Diameter Tolerence Met?**	YES	
Length to Diameter Ratio:	2.1	**Length to Diameter Ratio Tolerance Met?**	YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	-0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00030	-0.00040
Diameter 2, in (rotated 90^o)	-0.00030	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010

Difference between max and min readings, in:

0° = 0.00040 90° = 0.00040

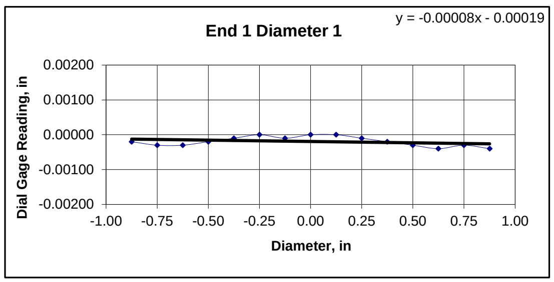
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00050	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00030	-0.00020	-0.00010
Diameter 2, in (rotated 90^o)	0.00010	0.00000	0.00000	0.00010	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00010	-0.00010	-0.00010

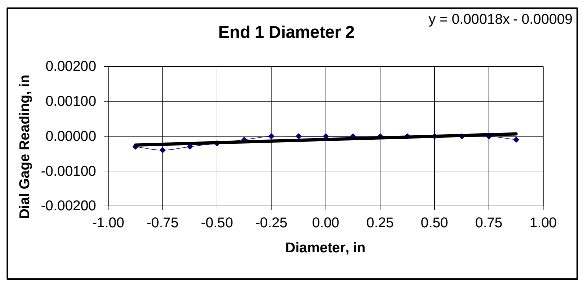
Difference between max and min readings, in:

0° = 0.0005 90° = 0.0003

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00025

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115

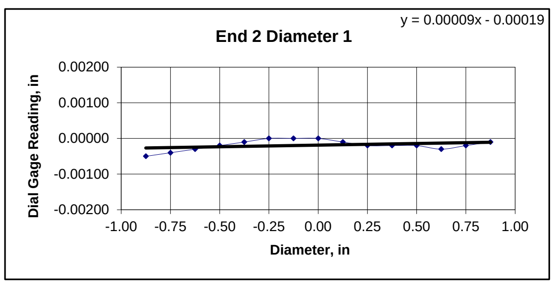
End 2:

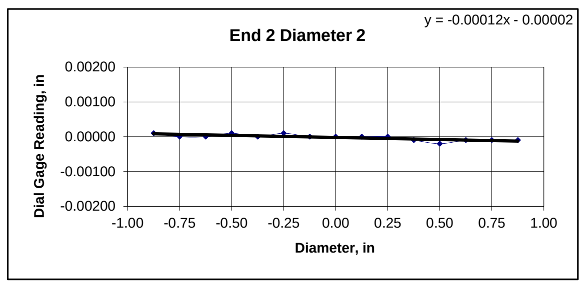
Slope of Best Fit Line	0.00009
Angle of Best Fit Line:	0.00516

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line	0.00018
Angle of Best Fit Line:	0.01031

End 2:

Slope of Best Fit Line	0.00012
Angle of Best Fit Line:	0.00688

Maximum Angular Difference: 0.00344

Parallelism Tolerance Met? YES

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	1.980	0.00020	0.012	YES
Diameter 2, in (rotated 90^o)	0.00040	1.980	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00050	1.980	0.00025	0.014	YES
Diameter 2, in (rotated 90^o)	0.00030	1.980	0.00015	0.009	YES

Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Deerfield Station
Project Location:	Deerfield, NH
GTX #:	305683
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 608
Sample ID:	R2
Depth, ft:	37.92-38.35

After cutting and grinding

After break

Appendix D
Infiltration Field Test Results

QUANTA SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/18/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 601		

FIELD TEST DATA

Run #1	**Time: 11:05**	**Run #2**	**Time: 12:07**	**Run #3**	**Time: 13:17**	**Run #4**	**Time: 14:22**
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	3.23	0	3.23	0	3.12	0	3.16
1	3.78	1	3.6	1	3.52	1	3.67
2	4.01	2	3.76	2	3.64	2	3.81
3	4.15	3	3.91	3		3	
4	4.29	4	4.02	4		4	
5	4.32	5	4.06	5		5	
6	4.35	6		6		6	
7	4.38	7		7		7	
8	4.42	8		8		8	
9	4.46	9		9		9	
10	4.48	10	4.25	10		10	
15	4.5	15	4.28	15	4.21	15	4.17
20	4.57	20		20		20	
25	4.62	25		25		25	
30	4.79	30	4.51	30	4.45	30	4.39
45	4.87	45		45		45	
60	4.96	60	4.71	60	4.67	60	4.55
(ft/hr)	1.73	(ft/hr)	1.48	(ft/hr)	1.55	(ft/hr)	1.39
(in/hr)	**20.76**	**(in/hr)**	**17.76**	**(in/hr)**	**18.60**	**(in/hr)**	**16.68**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**18.45**
Pre-Soak Performed on 11/17/2016 at 10:45	
Hole Depth from Top of Casing (ft)	5.2
Casing Stickup from Ground Surface (ft)	1.1
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/18/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 602		

FIELD TEST DATA

Run #1	Time: 11:26	Run #2	Time: 12:36	Run #3	Time: 13:45	Run #4	Time: 14:58
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	6.33	0	6.52	0	6.17	0	6.42
1	6.33	1	6.54	1	6.17	1	6.43
2	6.33	2	6.55	2	6.17	2	6.43
3	6.33	3	6.56	3		3	
4	6.33	4	6.56	4		4	
5	6.33	5	6.58	5		5	
6	6.34	6		6		6	
7	6.34	7		7		7	
8	6.34	8		8		8	
9	6.34	9		9		9	
10	6.35	10	6.60	10		10	
15	6.37	15	6.61	15	6.25	15	6.48
20	6.38	20		20		20	
25	6.40	25		25		25	
30	6.42	30	6.63	30	6.31	30	6.51
45	6.46	45		45		45	
60	6.51	60	6.74	60	6.41	60	6.62
(ft/hr)	0.18	(ft/hr)	0.22	(ft/hr)	0.24	(ft/hr)	0.20
(in/hr)	**2.16**	**(in/hr)**	**2.64**	**(in/hr)**	**2.88**	**(in/hr)**	**2.40**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**2.52**
Pre-Soak Performed on 11/17/2016 at 10:50	
Hole Depth from Top of Casing (ft)	8.3
Casing Stickup from Ground Surface (ft)	1.5
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/16/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 603		

FIELD TEST DATA

Run #1	Time: 08:35	Run #2	Time: 09:41	Run #3	Time: 10:45	Run #4	Time: 11:50
Time Elapsed (min)	Depth to Water (ft)	Time Elapsed (min)	Depth to Water (ft)	Time Elapsed (min)	Depth to Water (ft)	Time Elapsed (min)	Depth to Water (ft)
0	4.25	0	4.42	0	4.16	0	4.32
1	4.27	1	4.42	1	4.16	1	4.32
2	4.3	2	4.43	2	4.16	2	4.32
3	4.32	3	4.43	3		3	
4	4.33	4	4.43	4		4	
5	4.35	5	4.45	5	4.17	5	
6	4.35	6		6		6	
7	4.36	7		7		7	
8	4.37	8		8		8	
9	4.37	9		9		9	
10	4.38	10	4.47	10	4.20	10	
15	4.42	15	4.49	15	4.23	15	4.41
20	4.46	20		20		20	
25	4.49	25		25		25	
30	4.51	30		30	4.41	30	4.50
45	4.59	45		45		45	
60	4.7	60	4.83	60	4.59	60	4.67
(ft/hr)	0.45	(ft/hr)	0.41	(ft/hr)	0.43	(ft/hr)	0.35
(in/hr)	**5.40**	**(in/hr)**	**4.92**	**(in/hr)**	**5.16**	**(in/hr)**	**4.20**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**4.92**
Pre-Soak Performed on 11/15/2016 at 07:45	
Hole Depth from Top of Casing (ft)	6.3
Casing Stickup from Ground Surface (ft)	1.3
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

QUANTA SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation	Test Date:	11/16/16
Project Number:	16004	Tested By:	L. Gschwind
Client:	PAR Electrical Contractors	Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 604		

FIELD TEST DATA

Run #1	Time: 08:35	Run #2	Time: 09:41	Run #3	Time: 10:45	Run #4	Time: 11:50
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	5.92	0	5.86	0	5.91	0	5.96
1	5.93	1	5.86	1	5.91	1	5.96
2	5.94	2	5.86	2	5.92	2	5.96
3	5.94	3	5.86	3		3	
4	5.94	4	5.86	4		4	
5	5.94	5	5.87	5		5	
6	5.94	6		6		6	
7	5.94	7		7		7	
8	5.94	8		8		8	
9	5.95	9		9		9	
10	5.95	10	5.88	10		10	
15	5.95	15	5.88	15	5.93	15	5.99
20	5.95	20		20		20	
25	5.96	25		25		25	
30	5.96	30	5.90	30	5.93	30	6.00
45	5.97	45	5.90	45		45	
60	5.98	60	5.91	60	5.95	60	6.04
(ft/hr)	0.06	(ft/hr)	0.05	(ft/hr)	0.04	(ft/hr)	0.08
(in/hr)	**0.72**	**(in/hr)**	**0.60**	**(in/hr)**	**0.48**	**(in/hr)**	**0.96**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**0.69**
Pre-Soak Performed on 11/15/2016 at 07:50	
Hole Depth from Top of Casing (ft)	7.9
Casing Stickup from Ground Surface (ft)	0.9
Pre-Infiltration Test Water Depth (ft)	Dry

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).

2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

QUANTA SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name:	Northern Pass TL - Deerfield Substation		Test Date:	11/16/16
Project Number:	16004		Tested By:	L. Gschwind
Client:	PAR Electrical Contractors		Reviewed By:	J.T. McGinnis
Test Location:	Infiltration Boring INF 605			

FIELD TEST DATA

Run #1	Time: 08:35	Run #2	Time: 09:41	Run #3	Time: 10:45	Run #4	Time: 11:50
Time Elapsed (min)	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**	**Time Elapsed (min)**	**Depth to Water (ft)**
0	4.15	0	4.22	0	4.06	0	4.13
1	4.15	1	4.22	1	4.06	1	4.13
2	4.15	2	4.22	2	4.06	2	4.13
3	4.15	3	4.22	3	4.06	3	4.14
4	4.15	4	4.23	4		4	
5	4.15	5	4.23	5		5	
6	4.15	6		6		6	
7	4.16	7		7		7	
8	4.16	8		8		8	
9	4.16	9		9		9	
10	4.16	10	4.24	10		10	
15	4.17	15	4.24	15	4.08	15	4.16
20	4.17	20	4.24	20		20	
25	4.18	25	4.25	25		25	
30	4.18	30	4.26	30	4.10	30	4.19
45	4.20	45	4.28	45		45	
60	4.21	60	4.29	60	4.13	60	4.22
(ft/hr)	0.06	(ft/hr)	0.07	(ft/hr)	0.07	(ft/hr)	0.09
(in/hr)	**0.72**	**(in/hr)**	**0.84**	**(in/hr)**	**0.84**	**(in/hr)**	**1.08**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**0.87**
Pre-Soak Performed on 11/15/2016 at 08:00	
Hole Depth from Top of Casing (ft)	7.8
Casing Stickup from Ground Surface (ft)	0.8
Pre-Infiltration Test Water Depth (ft)	6.1

Notes:

1) Testing was performed in accordance with guidelines presented in the New Hampshire Stormwater Manual (Vol 2; Table 2-3).
2) The Average Infiltration Rate (in/hr) presented is based on field measurements obtained; a safety factor has not been applied.

Appendix E
Summary of Geotechnical Design Parameters

QUANTA SUBSURFACE
Engineering + Construction

Summary of Geotechnical Design Parameters
Deerfield Substation

Boring BH 601

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Till	0.5	2	SM	11	115	30	-	-	-
	2	4	SP-SM	40	125	36	-	-	-
	4	39	SP-SM/SM	100+	140	43	-	-	-
Bedrock	39	44	HW Pegmatite	-	150	45	-	-	-
	44	49	SW to HW Pegmatite[1]	-	170	-	-	65	4,200

[1] Assumed UCS = 10,000 psi; GSI = 30 (poor rock)

Boring BH 602

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Till	0	2	SM	8	110	28	-	-	-
	2	6	SM	28	120	34	-	-	-
	6	9	SM	53	130	38	-	-	-
	9	17	SM	100+	140	43	-	-	-
Bedrock	17	18	HW Pegmatite	-	150	45	-	-	-
	18	28	SW to F Pegmatite[1]	-	175	-	-	67	5,600

[1] Assumed UCS = 10,000 psi; GSI = 40 (fair to good rock)

Boring BH 603

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Till	0	2	SM	8	110	28	-	-	-
	2	6	SM	39	125	36	-	-	-
	6	14.6	SM	100+	140	43	-	-	-

Summary of Geotechnical Design Parameters
Deerfield Substation (cont)

Boring BH 604

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2							
Till	2	4	SP	33	125	35	-	-	-
	4	13	SM	100+	140	43	-	-	-
	13	17	ML	55	130	36	-	-	-
	17	20	SM	100+	140	43	-	-	-

Boring BH 605

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2							
Till	2	4	SP-SM	44	125	37	-	-	-
	4	8	SP-SM/ML	88	135	40	-	-	-
	8	20	SM	100+	140	43	-	-	-

Boring BH 606

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Till	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
	0.5	2							
	2	10	SM	55	130	38	-	-	-

Summary of Geotechnical Design Parameters
Deerfield Substation (cont)

Boring BH 607

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2							
Till	2	4	SM	31	125	36	-	-	-
	4	6	SM	69	135	42	-	-	-
	6	44	SP-SM/SM/ML	100+	140	42	-	-	-
Bedrock	44	45	HW Gneiss	100+	150	45	-	-	-
	45	50	F Gneiss[1]	-	175	-	-	68	8,300

[1] Assumed UCS = 10,000 psi; GSI = 50 (good rock)

Boring BH 608

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2							
Till	2	6	SM/SP-SM	58	135	40	-	-	-
	6	10	SM	74	135	42	-	-	-
	10	28	SM	100+	140	43	-	-	-
Bedrock	28	29	HW Granite	100+	150	45	-	-	-
	29	39	SW to F Granite/ Pegmatite[1]	-	175	-	-	67	5,600

[1] Assumed UCS = 10,000 psi; GSI = 40 (fair rock)

Boring BH 609

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2	SM	8	110	28	-	-	-
Till	2	8	SM/SP-SM	67	135	41	-	-	-
	2	9.8	SM	100+	140	43	-	-	-

Summary of Geotechnical Design Parameters
Deerfield Substation (cont)

Boring BH 610

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bot.	Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Friction Angle (deg)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Cohesion (psf)
Topsoil	0	2	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	2	4	SP-SM	50	130	38	-	-	-
Till	4	11	SM/SP-SM	36	125	36	-	-	-
	11	18	SM	100+	140	43	-	-	-
Bedrock	18	19	HW Gneiss	-	150	45	-	-	-
	19	26	F Pegmatite[1]	-	175	-	-	69	8,200
	26	29	F Gneiss[2]	-	175	-	-	68	8,300

[1] Assumed UCS = 10,000 psi; GSI = 50 (excellent rock)
[2] Assumed UCS = 10,000 psi; GSI = 50 (excellent rock)

Boring BH 611

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bot.	Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Friction Angle (deg)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	2							
	2	4	SM	17	115	31	-	-	-
Till	4	8	SM	61	135	41	-	-	-
	8	31	SM	100+	140	43	-	-	-

Boring BH 612

Sublayer Description	Sublayer Depth (ft) Top	Sublayer Depth (ft) Bot.	Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Friction Angle (deg)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit) Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	3							
Till	3	9	SP-SM	58	130	40	-	-	-
	9	18	SM	100+	140	43	-	-	-
Bedrock	18	19	HW Granite	100+	150	45	-	-	-
	19	22	SW to MW Granite/ Diabase[1]	-	165	-	-	63	3,600

[1] Assumed UCS = 10,000 psi; GSI = 25 (very poor rock)

QUANTA SUBSURFACE
Engineering + Construction

Summary of Geotechnical Design Parameters
Deerfield Substation (cont)

Boring BH 613

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	4							
Till	4	14	SP-SM	72	135	42	-	-	-
	14	17	SM	100+	140	43	-	-	-
Bedrock	17	20	HW Granite	100+	150	45	-	-	-
	20	30	SW to F Granite	-	170	-	-	65	4,200

[1] Assumed UCS = 10,000 psi; GSI = 30 (poor rock)

Boring BH 614

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Topsoil	0	0.5	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Alluvium	0.5	3	SM	11	110	30	-	-	-
Till	3	7	SP-SM	76	135	42	-	-	-
	7	21	SM	100+	140	43	-	-	-
Bedrock	21	31	SW Diabase	-	165		-	58	3,100

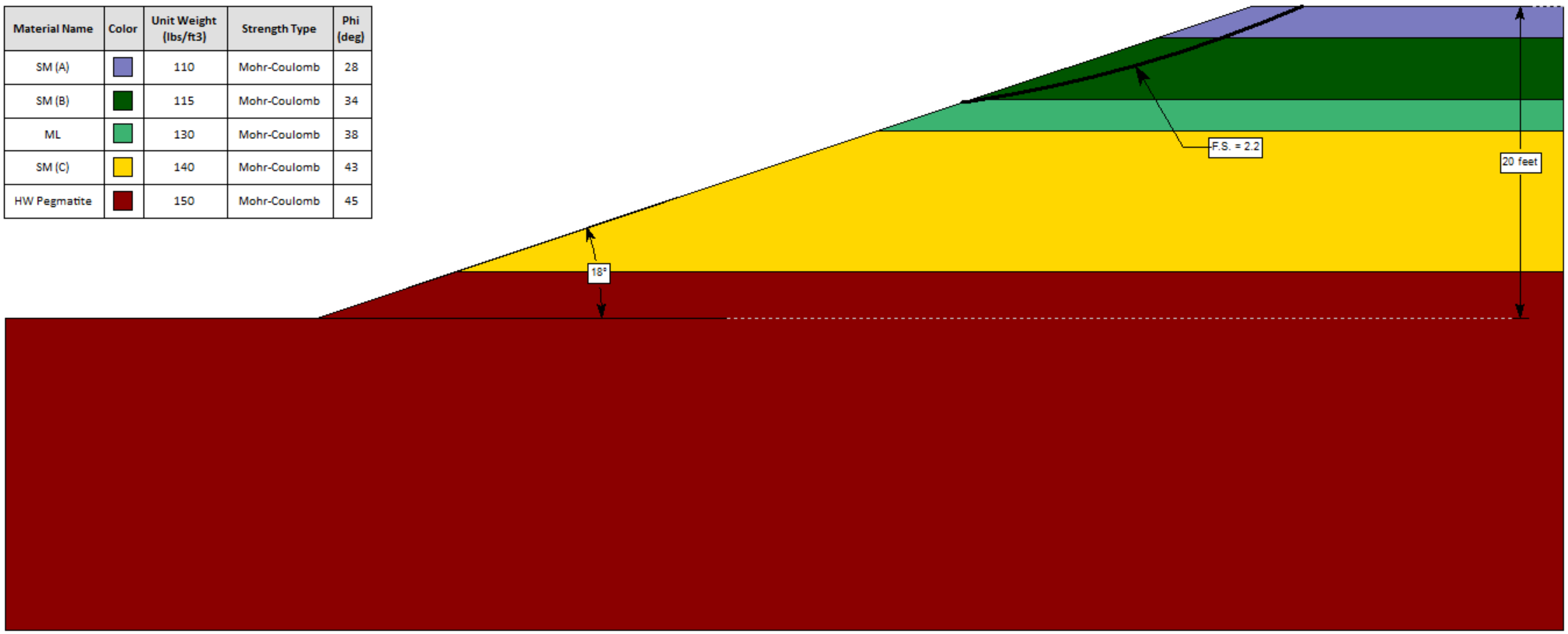
[1] Assumed UCS = 10,000 psi; GSI = 25 (very poor rock)

Controlled Structural Fill

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Soil Friction Angle (deg)	Soil Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Structural Fill	-	-	SM/ML	-	125	30	-	-	-

Appendix F
SLIDE 7.0 Stability Outputs

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Phi (deg)
SM (A)		110	Mohr-Coulomb	28
SM (B)		115	Mohr-Coulomb	34
ML		130	Mohr-Coulomb	38
SM (C)		140	Mohr-Coulomb	43
HW Pegmatite		150	Mohr-Coulomb	45



Base Map: Slide 7.0.

Date: December 2016

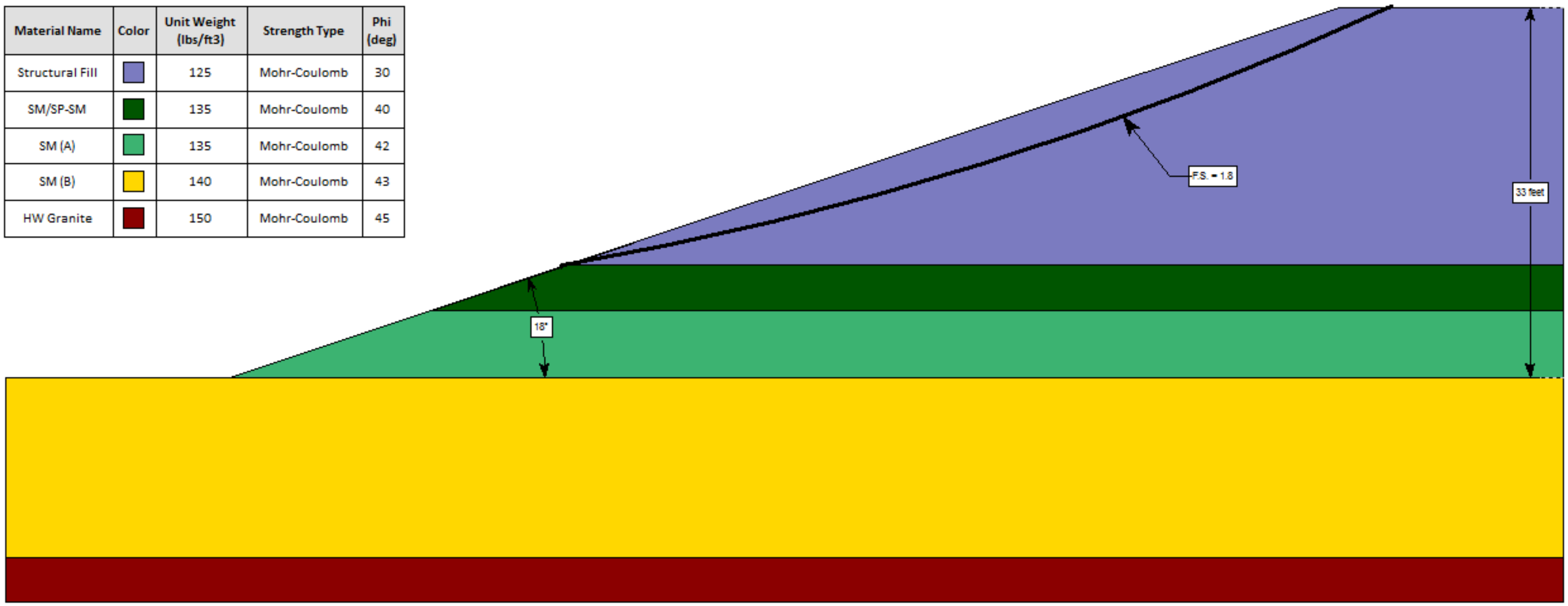
Project No.: 16004

Output 1 - BH 602 3 (H) to 1 (V)

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Deerfield Substation
Slope Stability Analysis

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Phi (deg)
Structural Fill		125	Mohr-Coulomb	30
SM/SP-SM		135	Mohr-Coulomb	40
SM (A)		135	Mohr-Coulomb	42
SM (B)		140	Mohr-Coulomb	43
HW Granite		150	Mohr-Coulomb	45



Base Map: Slide 7.0.

Date: December 2016

Project No.: 16004

Output 2 - BH 608 3 (H) to 1 (V)

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Deerfield Substation
Slope Stability Analysis

APPENDIX I – WETLAND DELINEATION REPORT (BY OTHERS)

WETLANDS REPORT INFORMATION INCLUDED UNDER SEPARATE COVER

APPENDIX J – POLLUTANT LOADING CALCULATIONS

Condition	Point of Analysis (PoA) Number	Sub-Area Number	Area Description	Land Use	BMP	Is the Impervious Area Disconnected in accordance with Chapter 6, Volume 1 of the NH Stormwater Manual or is the BMP an Infiltration BMP designed in accordance with Alteration of Terrain regulations (Env-Wq 1500)?	Pervious Undisturbed (i.e, forest, meadow, etc.)	Pervious Disturbed (i.e. lawn or other area that will be fertilized regularly)	Pervious Pavement that filters and infiltrates all stormwater (no underdrains)	Pervious Disturbed Other	Description of Pervious Disturbed Other	Pervious Total	Pervious Pavement that filters but does not infiltrate all stormwater (has underdrains)	Impervious Roof	Impervious Road	Impervious Parking and Drives	Impervious Sidewalks	Impervious Surface Water	Impervious Other	Description of Impervious Other	Impervious Total (prior to Disconnection or Infiltration BMP Credit)	Total Area	Composite % Impervious (without disconnection or Infiltration credit)	Composite % Impervious (with disconnection or Infiltration credit)
							Acres	Acres	Acres	Acres		Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres		Acres	Acres		
Pre-Development	Pre-1	Pre-1	Pre-Dev Watershed Map Area 1	Forest/Rural Open		NO	17.57	0.00	0.13	0.00		17.70	0.00	0.07	0.00	0.00	0.00	0.16	0.00		0.23	17.93	1.28%	1.28%
Pre-Development	Pre-2	Pre-2	Pre-Dev Watershed Map Area 2	Forest/Rural Open		NO	8.83	0.00	0.00	0.00		8.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	8.83	0.00%	0.00%
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Pre-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		

Condition	Point of Analysis (PoA) Number	Sub-Area Number	Area Description	Land Use	BMP	Is the Impervious Area Disconnected in accordance with Chapter 6, Volume 1 of the NH Stormwater Manual or is the BMP an Infiltration BMP designed in accordance with Alteration of Terrain regulations (Env-Wq 1500)?	Pervious Undisturbed (i.e, forest, meadow, etc.)	Pervious Disturbed (i.e. lawn or other area that will be fertilized annually)	Pervious Pavement that filters and infiltrates all stormwater (no underdrains)	Pervious Disturbed Other	Description of Pervious Disturbed Other	Pervious Total	Pervious Pavement that filters but does not infiltrate all stormwater (has underdrains)	Impervious Roof	Impervious Road	Impervious Parking and Drives	Impervious Sidewalks	Impervious Surface Water	Impervious Other	Description of Impervious Other	Impervious Total (Prior to Disconnection or Infiltration BMP Credit)	Total Area	Composite % Impervious (without disconnection or Infiltration credit)	Composite % Impervious (with disconnection or Infiltration credit)
							Acres	Acres	Acres	Acres		Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres		Acres	Acres		
Post-Development	Post-1	Post-1A	Post-Dev Watershed Map Area 1A	Forest/Rural Open		NO	5.85	0.00	0.00	1.88	meadow/grass, not fertilized	7.73	0.00	0.07	0.00	0.00	0.00	0.16	0.00		0.23	7.96	2.89%	2.89%
Post-Development	Post-1	Post-1B	Post-Dev Watershed Map Area 1B	Forest/Rural Open	Sand Filter & Infiltration Basin	YES	0.00	0.00	0.00	0.08	meadow/grass, not fertilized	0.08	3.46	0.32	0.00	0.00	0.00	0.00	0.00		3.78	3.86	97.93%	0.00%
Post-Development	Post-1	Post-1C	Post-Dev Watershed Map Area 1C	Forest/Rural Open	Sand Filter & Infiltration Basin	YES	0.00	0.00	0.00	0.12	meadow/grass, not fertilized	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.12	0.00%	0.00%
Post-Development	Post-1	Post-1D	Post-Dev Watershed Map Area 1D	Forest/Rural Open	Infiltration Basin	YES	0.00	0.00	0.00	0.56	meadow/grass, not fertilized	0.56	0.00	0.00	0.00	0.28	0.00	0.31	0.00		0.59	1.15	51.30%	0.00%
Post-Development	Post-1	Post-1E	Post-Dev Watershed Map Area 1E	Forest/Rural Open	Infiltration Basin	YES	0.00	0.00	0.00	0.05	meadow/grass, not fertilized	0.05	0.00	0.00	0.00	0.10	0.00	0.00	0.00		0.10	0.15	66.67%	0.00%
Post-Development	Post-1	Post-1F	Post-Dev Waterhsed Map Area 1F	Forest/Rural Open		NO	5.34	0.00	0.13	0.95	meadow/grass, not fertilized	6.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	6.42	0.00%	0.00%
Post-Development	Post-2	Post-2	Post-Dev Watershed Map Area 2	Forest/Rural Open		NO	6.59	0.00	0.00	0.50	meadow/grass, not fertilized	7.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	7.09	0.00%	0.00%
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		
Post-Development						NO	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00		

Date (MM/DD/YYYY):	**12/28/2016**
Project Name:	**Deerfield Substation Expansion**
Town/City:	**Deerfield, Rockingham County**
Impacted Surface Waters:	**Pistataqua-Salmon Falls**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

Average Annual Precipitation P	**45.90**	**inches**
Fraction of Annual Runoff events that produce runoff	**0.90**	**(usually 0.9)**

ONLY INPUT VALUES IN BLUE SHADED CELLS

Credit for Using Low Nutrient Fertilizer: If there are managed turf areas under post development conditions that are to be fertilized annually, reductions in post development nutrient (TP and TN) loadings can be realized by by providing enforceable documents (i.e., deed restrictions) requiring land owners to use low nutrient fertilizer. To get low nutrient fertilizer pollutant reductions input the proposed reduced fertilizer application rates for post development development for TP and TN in the table below. Low nutrient fertilizers must have application rates less than the standard fertilizer application rate shown in the table. Then input the percent of each land use in each post development sub-area that is managed turf that is fertilzed annually.

	Fertilizer Reduction Calculator	
	TP	**TN**
STANDARD FERTILIZER APPLICATION RATE (lbs/acre/year)	15.0	150.0
PROPOSED REDUCED FERTILIZER APPLICATION RATES FOR POST-DEVELOPMENT (lbs/acre/year)	**0.0**	**44.0**
INITIAL PERCENT REDUCTION	100.0%	70.7%
PERCENT OF CITIZENS THAT WILL COMPLY WITH REDUCED APPLICATION RATES	50%	50%
PERCENT OF APPLIED FERTILIZER THAT IS LOST TO RUNOFF OR PERCOLATION	10%	10%
FINAL PERCENT FERTILIZER REDUCTION WITH COMPLIANCE AND RUNOFF RATES APPLIED (%FR)	**5.0%**	**3.5%**
MINIMUM ASSUMED EMC = EMC_{MIN} (mg/L)	0.11	1.74

Used to reduce EMCs for Post TP and Post TN for each land use in each Sub Area depending on perce of area that is managed turf that is fertilized annually

PRE-DEVELOPMENT CONDITIONS

	Area	**Impervious Area**
Total Area (All Sub-Areas) (acres)	**26.76**	**0.23**

POST-DEVELOPMENT CONDITIONS

	Area	**Impervious Area**	**Area Fertilized Annually**
Total Area (All Sub-Areas) (acres)	**26.75**	**0.23**	**0.00**

Insert information for 1st sub-area below

Sub_Area_ID	**Pre-1**	
Point of Analysis (PoA) Number	**Pre-1**	
Total Area for Sub-Area (acres)	**17.93**	**0.23**

Sub_Area_ID	**Post-1A**		
Point of Analysis (PoA) Number	**Post-1**		
Total Area in Sub-Area (acres)	**7.96**	**0.23**	**0.00**

Pre-development:

Land Use	**Area**	**Ia**
	(acres)	(% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	17.93	1.28%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Post-development:

Land Use	**Total Area for each Land Use**	**Ia**	**Percent of Area that is managed turf (i.e., fertilized annually)**	**Post-TP EMC**	**Post-TN EMC**
	(acres)	(% Impervious)	%	mg/L	mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	7.96	2.89%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 2nd sub-area below

Sub_Area_ID	**Pre-2**	
Point of Analysis (PoA) Number	**Pre-2**	
Total Area for Sub-Area (acres)	**8.83**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	8.83	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	**Post-1B**		
Point of Analysis (PoA) Number	**Post-1**		
Total Area in Sub-Area (acres)	**3.86**	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)	**Percent of Area that is managed turf (i.e., fertilized annually)** %	**Post-TP EMC** mg/L	**Post-TN EMC** mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	3.86	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 3rd sub-area below

Sub_Area_ID		
Point of Analysis (PoA) Number		
Total Area for Sub-Area (acres)	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	0.00	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	**Post-1C**		
Point of Analysis (PoA) Number	**Post-1**		
Total Area in Sub-Area (acres)	**0.12**	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)	**Percent of Area that is managed turf (i.e., fertilized annually)** %	**Post-TP EMC** mg/L	**Post-TN EMC** mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	0.12	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 4th sub-area below

Sub_Area_ID		
Point of Analysis (PoA) Number		
Total Area for Sub-Area (acres)	0.00	0.00

Land Use	Area (acres)	Ia (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	0.00	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	Post-1D		
Point of Analysis (PoA) Number	Post-1		
Total Area in Sub-Area (acres)	1.15	0.00	0.00

Land Use	Area (acres)	Ia (% Impervious)	Percent of Area that is managed turf (i.e., fertilized annually) %	Post-TP EMC mg/L	Post-TN EMC mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	1.15	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 5th sub-area below

Sub_Area_ID		
Point of Analysis (PoA) Number		
Total Area for Sub-Area (acres)	0.00	0.00

Land Use	Area (acres)	Ia (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	0.00	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	Post-1E		
Point of Analysis (PoA) Number	Post-1		
Total Area in Sub-Area (acres)	0.15	0.00	0.00

Land Use	Area (acres)	Ia (% Impervious)	Percent of Area that is managed turf (i.e., fertilized annually) %	Post-TP EMC mg/L	Post-TN EMC mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	0.15	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 6th sub-area below

Sub_Area_ID		
Point of Analysis (PoA) Number		
Total Area for Sub-Area (acres)	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	0.00	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	**Post-1F**		
Point of Analysis (PoA) Number	**Post-1F**		
Total Area in Sub-Area (acres)	**6.42**	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)	**Percent of Area that is managed turf (i.e., fertilized annually)** %	**Post-TP EMC** mg/L	**Post-TN EMC** mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	6.42	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 7th sub-area below

Sub_Area_ID		
Point of Analysis (PoA) Number		
Total Area for Sub-Area (acres)	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)
From HWG		
Residential Roof	0.00	0.00%
Commercial Roof	0.00	0.00%
Commercial/Res Parking	0.00	0.00%
Residential Street	0.00	0.00%
Urban Highway	0.00	0.00%
Lawns	0.00	0.00%
Driveway	0.00	0.00%
Residential (general)	0.00	0.00%
Commercial (general)	0.00	0.00%
Industrial (general)	0.00	0.00%
From CDM		
Agriculture and Pasture	0.00	0.00%
Commercial	0.00	0.00%
Forest/Rural Open	0.00	0.00%
Highway	0.00	0.00%
Industrial	0.00	0.00%
Medium Density Residential	0.00	0.00%
Urban Open	0.00	0.00%
Water/Wetland	0.00	0.00%

Sub_Area_ID	**Post-2**		
Point of Analysis (PoA) Number	**Post-2**		
Total Area in Sub-Area (acres)	**7.09**	**0.00**	**0.00**

Land Use	**Area** (acres)	**Ia** (% Impervious)	**Percent of Area that is managed turf (i.e., fertilized annually)** %	**Post-TP EMC** mg/L	**Post-TN EMC** mg/L
From HWG					
Residential Roof	0.00	0.00%	0.0%	0.11	1.50
Commercial Roof	0.00	0.00%	0.0%	0.14	2.10
Commercial/Res Parking	0.00	0.00%	0.0%	0.15	1.90
Residential Street	0.00	0.00%	0.0%	0.55	1.40
Urban Highway	0.00	0.00%	0.0%	0.32	3.00
Lawns	0.00	0.00%	0.0%	2.10	9.10
Driveway	0.00	0.00%	0.0%	0.56	2.10
Residential (general)	0.00	0.00%	0.0%	0.40	2.20
Commercial (general)	0.00	0.00%	0.0%	0.20	2.00
Industrial (general)	0.00	0.00%	0.0%	0.40	2.50
From CDM					
Agriculture and Pasture	0.00	0.00%	0.0%	0.37	5.98
Commercial	0.00	0.00%	0.0%	0.33	2.97
Forest/Rural Open	7.09	0.00%	0.0%	0.11	1.74
Highway	0.00	0.00%	0.0%	0.43	2.65
Industrial	0.00	0.00%	0.0%	0.32	3.97
Medium Density Residential	0.00	0.00%	0.0%	0.52	5.15
Urban Open	0.00	0.00%	0.0%	0.11	1.74
Water/Wetland	0.00	0.00%	0.0%	0.08	1.38

Insert information for 8th sub-area below

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

ONLY CHANGE VALUES SHADED IN BLUE

PRE DEVELOPMENT — **INPUT BMP DESCRIPTIONS** — **INPUT OVERALL REMOVAL EFFICIENCIES (%) FOR POLLUTANTS OF CONCERN**

Sub-Area	BMP Description		TSS	TP	TN
Pre-1			0%	0%	0%
Pre-2			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%

POST DEVELOPMENT — **INPUT BMP DESCRIPTIONS** — **INPUT OVERALL REMOVAL EFFICIENCIES (%) FOR POLLUTANTS OF CONCERN**

Sub-Area	BMP Description		TSS	TP	TN
Post-1A					
Post-1B	Underground Sand Filter with Underdrain & Infiltration Basin		90%	65%	60%
Post-1C	Underground Sand Filter with Underdrain & Infiltration Basin		90%	65%	60%
Post-1D	Infiltration Basin		90%	65%	60%
Post-1E	Infiltration Basin		90%	65%	60%
Post-1F			0%	0%	0%
Post-2			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%
0.00			0%	0%	0%

OVERALL SUMMARY

Date (MM/DD/YYYY):	**12/28/2016**
Project Name:	**Deerfield Substation Expansion**
Town/City:	**Deerfield, Rockingham County**
Impacted Surface Waters:	**Pistataqua-Salmon Falls**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	26.76
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.23
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	0.9%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	26.75
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.23
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	0.9%
TOTAL POST-DEV AREA THAT IS FERTILIZED ANNUALLY (ACRES) =	0.00
TOTAL POST-DEV PERCENT OF AREA THAT IS FERTILIZED ANNUALLY (%) =	0.0%

	TSS (LBS/YR)	TP (LBS/YR)	TN (LBS/YR)
PRE DEVELOPMENT LOADS (NO BMPS)	735.7	1.6	25.1
PRE DEVELOPMENT LOADS (WITH BMPS)	735.7	1.6	25.1
PRE DEVELOPMENT LOAD REDUCTION DUE TO BMPS	0.0	0.0	0.0
PROPOSED PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	NA	5.0%	3.5%
POST DEVELOPMENT LOADS (NO BMPS)	735.4	1.6	25.1
POST DEVELOPMENT LOADS (WITH BMPS)	622.3	1.4	22.5
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	113.1	0.2	2.6
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-113.4	-0.2	-2.6
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-15.4%	-11.1%	-10.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	0.0%	0.0%	0.0%

Date (MM/DD/YYYY):	**12/28/2016**
Project Name:	**Deerfield Substation Expansion**
Town/City:	**Deerfield, Rockingham County**
Impacted Surface Waters:	**Pistataqua-Salmon Falls**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-113.4
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-15.4%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	0.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	15.4%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-15.4%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	Pre-1	Pre-1	17.93	0.23	NA	TSS	NA		525.4	525.4	0.0	0.0%
PRE	Pre-2	Pre-2	8.83	0.00	NA	TSS	NA		210.2	210.2	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
		TOTAL	26.76	0.23				TOTAL	735.7	735.7	0.0	0.0%

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-113.4
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-15.4%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	0.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	15.4%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-15.4%

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	Post-1A	Post-1	7.96	0.23	0.00	TSS	NA		288.1	288.1	0.0	0.0%
POST	Post-1B	Post-1	3.86	0.00	0.00	TSS	NA	Underground Sand Filter with Underdrain & Infiltration Basin	91.9	9.2	82.7	90.0%
POST	Post-1C	Post-1	0.12	0.00	0.00	TSS	NA	Underground Sand Filter with Underdrain & Infiltration Basin	2.9	0.3	2.6	90.0%
POST	Post-1D	Post-1	1.15	0.00	0.00	TSS	NA	Infiltration Basin	27.4	2.7	24.6	90.0%
POST	Post-1E	Post-1	0.15	0.00	0.00	TSS	NA	Infiltration Basin	3.6	0.4	3.2	90.0%
POST	Post-1F	Post-1F	6.42	0.00	0.00	TSS	NA		152.8	152.8	0.0	0.0%
POST	Post-2	Post-2	7.09	0.00	0.00	TSS	NA		168.8	168.8	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TSS	NA		0.0	0.0	0.0	0.0%
		TOTAL	26.75	0.23	0.00			TOTAL	735.4	622.3	113.1	15.4%

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-0.2
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-11.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	0.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	11.1%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-11.1%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	Pre-1	Pre-1	17.93	0.23	NA	TP	NA		1.1	1.1	0.0	0.0%
PRE	Pre-2	Pre-2	8.83	0.00	NA	TP	NA		0.5	0.5	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
		TOTAL	26.76	0.23				TOTAL	1.6	1.6	0.0	0.0%

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

POST-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	Post-1A	Post-1	7.96	0.23	0.00	TP	5.0%		0.6	0.6	0.0	0.0%
POST	Post-1B	Post-1	3.86	0.00	0.00	TP	5.0%	Underground Sand Filter with Underdrain & Infiltration Basin	0.2	0.1	0.1	65.0%
POST	Post-1C	Post-1	0.12	0.00	0.00	TP	5.0%	Underground Sand Filter with Underdrain & Infiltration Basin	0.0	0.0	0.0	65.0%
POST	Post-1D	Post-1	1.15	0.00	0.00	TP	5.0%	Infiltration Basin	0.1	0.0	0.0	65.0%
POST	Post-1E	Post-1	0.15	0.00	0.00	TP	5.0%	Infiltration Basin	0.0	0.0	0.0	65.0%
POST	Post-1F	Post-1F	6.42	0.00	0.00	TP	5.0%		0.3	0.3	0.0	0.0%
POST	Post-2	Post-2	7.09	0.00	0.00	TP	5.0%		0.4	0.4	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
		TOTAL	26.75	0.23	0.00			TOTAL	1.6	1.4	0.2	11.1%

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-2.6
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-10.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	0.0%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	10.3%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-10.3%

PRE-DEVELOPMENT

PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
PRE	Pre-1	Pre-1	17.93	0.23	NA	TN	NA		17.9	17.9	0.0	0.0%
PRE	Pre-2	Pre-2	8.83	0.00	NA	TN	NA		7.2	7.2	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
		TOTAL	26.76	0.23				TOTAL	25.1	25.1	0.0	0.0%

Date (MM/DD/YYYY): 12/28/2016
Project Name: Deerfield Substation Expansion
Town/City: Deerfield, Rockingham County
Impacted Surface Waters: Pistataqua-Salmon Falls
Applicant: Northern Pass Transmission, LLC.
DES File #:

POST-DEVELOPMENT

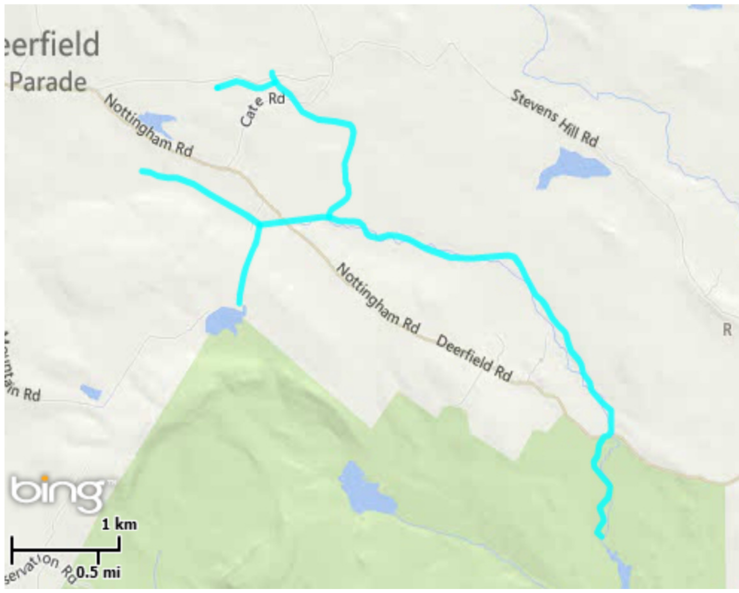
PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	Post-1A	Post-1	7.96	0.23	0.00	TN	3.5%		9.8	9.8	0.0	0.0%
POST	Post-1B	Post-1	3.86	0.00	0.00	TN	3.5%	Underground Sand Filter with Underdrain & Infiltration Basin	3.1	1.3	1.9	60.0%
POST	Post-1C	Post-1	0.12	0.00	0.00	TN	3.5%	Underground Sand Filter with Underdrain & Infiltration Basin	0.1	0.0	0.1	60.0%
POST	Post-1D	Post-1	1.15	0.00	0.00	TN	3.5%	Infiltration Basin	0.9	0.4	0.6	60.0%
POST	Post-1E	Post-1	0.15	0.00	0.00	TN	3.5%	Infiltration Basin	0.1	0.0	0.1	60.0%
POST	Post-1F	Post-1F	6.42	0.00	0.00	TN	3.5%		5.2	5.2	0.0	0.0%
POST	Post-2	Post-2	7.09	0.00	0.00	TN	3.5%		5.8	5.8	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	0.00		0.00	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
		TOTAL	26.75	0.23	0.00			TOTAL	25.1	22.5	2.6	10.3%

Watershed Assessment, Tracking & Environmental ResultS

Return to home page

On This Page

2008 Waterbody Report for Back Creek



Click on the waterbody for an interactive map

Features

- About This Database (Integrated Report)
- Assessing Water Quality (Questions and Answers)
- Integrated Reporting Guidance
- Previous National Water Quality Reports
- EnviroMapper for Water
- AskWATERS
- EPA WATERS Homepage
- Exchange Network
- Assessment Database
- Statewide Statistical Surveys
- *How's My Waterway* Local Search tool
- Pollution Categories Summary Document
- Nitrogen and Phosphorus Pollution Data Access Tool (NPDAT)

State: New Hampshire
Waterbody ID: NHRIV600030704-04
Location: 010600030704, Back Creek, Unknown Fishery
State Waterbody Type: River
EPA Waterbody Type: Rivers and Streams
Water Size: 6.42
Units: miles
Watershed Name: Piscataqua-Salmon Falls

Waterbody History Report

Data are also available for these years: 2010 2006 2004 2002

Water Quality Assessment Status for Reporting Year 2008

The overall status of this waterbody is Impaired.

Description of this table

Designated Use	Designated Use Group	Status
Aquatic Life		Impaired

	Fish, Shellfish, And Wildlife Protection And Propagation	
Drinking Water After Adequate Treatment	Public Water Supply	Good
Fish Consumption	Aquatic Life Harvesting	Impaired
Primary Contact Recreation	Recreation	Not Assessed
Secondary Contact Recreation	Recreation	Not Assessed
Wildlife	Fish, Shellfish, And Wildlife Protection And Propagation	Not Assessed

Causes of Impairment for Reporting Year 2008

Description of this table

Cause of Impairment	Cause of Impairment Group	Designated Use (s)	State TMDL Development Status
Mercury	Mercury	Fish Consumption	TMDL completed
pH	pH/Acidity/Caustic Conditions	Aquatic Life	TMDL needed

Probable Sources Contributing to Impairment for Reporting Year 2008

Description of this table

Probable Source	Probable Source Group	Cause(s) of Impairment
Atmospheric Deposition - Toxics	Atmospheric Deposition	Mercury
Source Unknown	Unknown	pH

TMDLs That Apply to this waterbody

Description of this table

TMDL Document Name	TMDL Date	TMDL Pollutant Description	TMDL Pollutant Source Type	Cause(s) of Impairment Addressed
Ne Regional Mercury Tmdl	Dec-20-2007	Mercury	Nonpoint Source	Mercury

Previous Causes of Impairments Now Attaining All Uses

No causes of impairment are recorded as attaining all uses for this waterbody.

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