BURNS McDONNELL

Stormwater Management Study

THE NORTHERN PASS

Northern Pass Transmission, LLC

Transition Station #1

Project No. 58466

RE-ISSUED FOR PERMITTING
January 13, 2017

Stormwater Management Study

prepared for

Northern Pass Transmission, LLC

Transition Station #1
Old Canaan Road, Pittsburg, NH 03592

Project No. 58466

RE-ISSUED FOR PERMITTING
January 13, 2017

prepared by

Burns & McDonnell Engineering Company, Inc.

INDEX AND CERTIFICATION

Northern Pass Transmission, LLC
Stormwater Management Study
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RE-ISSUED FOR PERMITTING– January 13, 2017

Report Index

Certification

I hereby certify, as a Professional Engineer in the State of New Hampshire, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Northern Pass Transmission, LLC or others without specific verification or adaptation by the Engineer.

ROBBYN L. REED
No. 13781

This document has been digitally sealed.
Jan 12 2017

Robbyn Reed, P.E. Date

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

Section Number	Section Title
Appendix F	FEMA Flood Insurance Rate Map
Appendix G	Soil Survey Reports (By Others)
Appendix H	Geotechinical Report (By Others)
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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
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, LLC (NPT) plans to construct Transition Station #1 (Project), a new transition station located on Eversource owned property on Old Canaan Road, Pittsburg, NH 03592 N45°01’20.61” latitude and –W71°27’55.63” longitude) in Pittsburg, Coos County, NH (Site). Refer to

Figure 1-1: USGS Site Location Map.

The Site is bounded by wooded terrain to the north and west and Old Canaan Road to the east and south. The Site is located within the surface watershed of the Connecticut River.

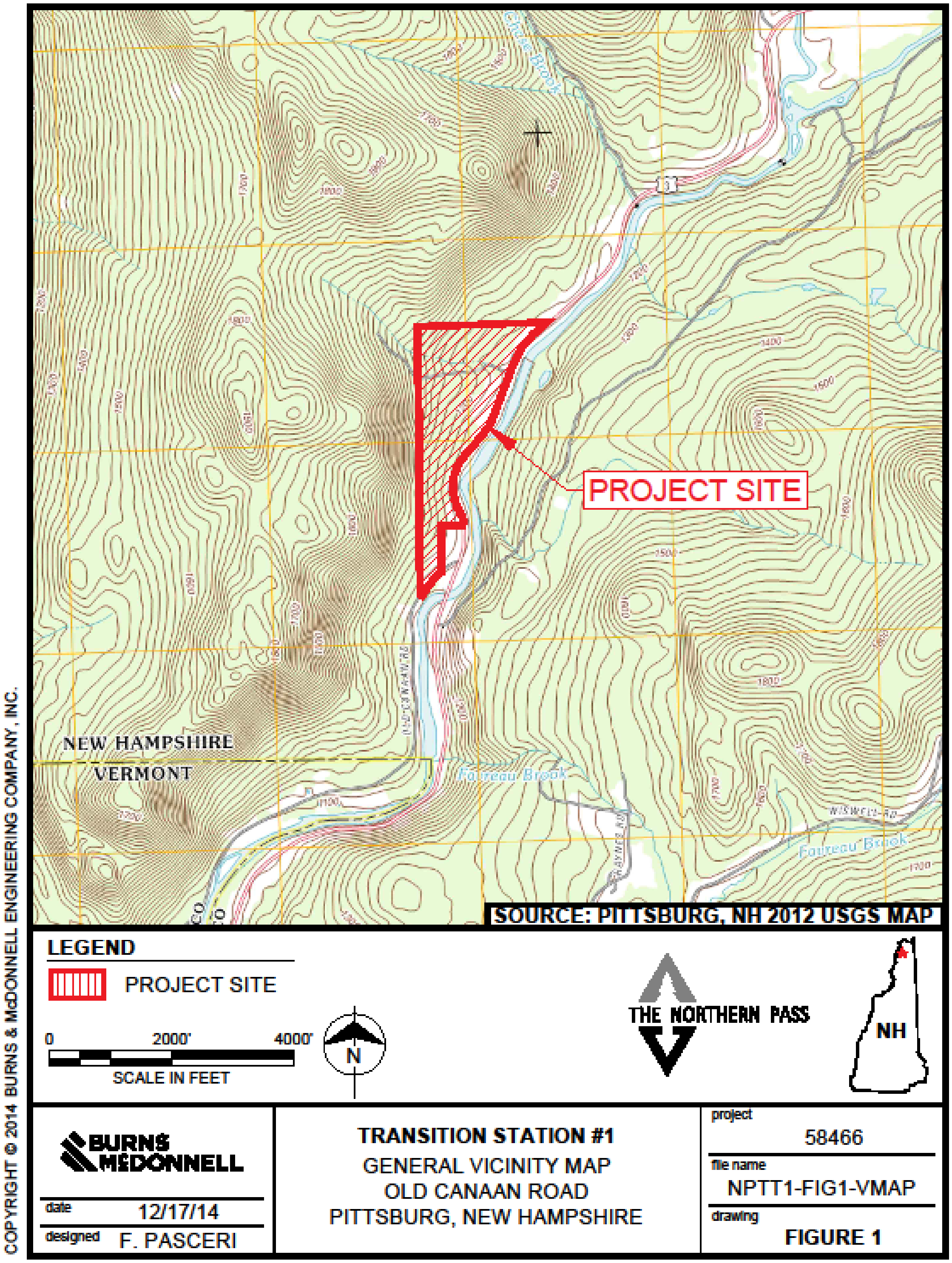
Pre-development conditions primarily consist of undeveloped woodland areas. Stormwater runoff in existing conditions generally sheet flows overland from north to south to a roadside ditch which flows toward a culvert that crosses Old Canaan Road at the south end of the site.

The post-development conditions of the Site include construction of a transition station 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 86-ft by 139-ft with a perimeter fence and access gates. A paved 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 82.67 acres. The Project will result in approximately 3.04-acres of disturbance of which 2.10-acres is on-site, 0.87-acres off-site in Eversource Right-of-Way (ROW) and 0.07-acres off-site in roadways. The additional impervious cover within the property line as a result of the project is 0.64 acres. The total undisturbed cover of the Site, within the property line, is 80.57 acres.

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, Transition Station #1 Project, Northern Pass Transmission Line, Pittsburg, New Hampshire" by Quanta Subsurface.

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 Tunbridge, Lyman and Plaisted silt loams with rock outcrop. The soils were classified as hydrologic soil group C. Two 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 Coos County, New Hampshire. The NRCS Web Soil Survey information is located in Appendix G

There is also a survey report for the site entitled "Northern Pass Transmission Project, Soil Survey Report for Transition Stations, Substation Expansions, and Converter Terminal" by Normandeau Environmental Consultants, dated February 6, 2015 describes six types of soils that are present at the Project Site.

Tunbridge fine sandy loam and Lyman loam are bedrock controlled soils. Tunbridge soils are moderately deep with bedrock within 40 inches of the soil surface. Lyman soils are shallow with bedrock within 20 inches of the soil surface. Bedrock outcrops were mapped within the vicinity of this map unit.

Plaisted silt loam is well drained with a seasonal water table greater than 40 inches from the soil surface. Chesuncook silt loam is moderately well drained with a seasonal water table within 15 to 40 inches of the soil surface. Telos silt loam is somewhat poorly drained with a seasonal water table within 15 inches of the soil surface due to the presence of dense lodgement till. Cabot, very stony, silt loam is poorly drained with dense lodgement till in the substratum. Free water is commonly at or near the surface to result in hydric conditions. Most of the soils were classified as hydrologic soil group C with one classified as hydrologic group D. The soil survey report is 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
90B	Turnbridge – Lyman Complex, slopes 1 to 8 percent	C
123B	Telos, very stony, slopes 3 to 8 percent	C
123C	Telos, very stony, slopes 8 to 15 percent	C
126C	Chesuncook, very stony, slopes 8 to 15 percent	C
126D	Chesuncook, very stony, slopes 15 to 25 percent	C
126E	Chesuncook, very stony, 25 to 45 percent	C
399/RK	Rock Outcrop, slopes 1 to 45 percent	Unknown
564D	Plaisted very fine sandy loam, very stony, slopes 15 to 25 percent	C
590B/P	Cabot gravelly silt loam, very stony, slopes 1 to 8 percent	D
561C	Turnbridge–Plaisted–Lyman Complex, very stony, slopes 8 to 15 percent	C
61D	Turnbridge – Lyman Rock Outcrop complex, slopes 25 to 35 percent	C

This soil series has an erosion factor K that is not rated, however nearby soil has a K-Factor of 0.20. 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. A stream located on the north side of the site will be impacted during earthwork activities. This stream will be intercepted and collected by a new drainage swale north of the transition station pad. 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.33007C0215D for Coos County, New Hampshire, Effective Date February 20, 2013, the Project Site is located within Zone X. Areas determined to be outside the 0.2% annual chance floodplain. The FIRM Map is located in Appendix F.

1.7 Receiving Surface Waters

The Site is within the Connecticut River Watershed. The site and onsite streams are tributary to the Connecticut River.

1.8 Pre-Development Site Conditions

The Pre-Developed site consists of a heavy forested rolling hill terrain that drains to the east toward Old Canaan Road. There is only one discharge point from this site which is a culvert under Old Canaan Road.

1.9 Post-Development Site Conditions

Pre-developed stormwater drainage patterns are mimicked in post-developed conditions and utilize the same aforementioned Site discharge point 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, there are no adverse impacts to properties as a result.

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 stormwater onsite. One above-ground detention basin is proposed and is discussed in further detail below. The following is the data used in the stormwater management analysis.

2.1 Methodology and Design Criteria

2.1.1 Rainfall Data

Type II 24-hour rainfall depths for the site location were obtained from the Northeast Regional Climate Center – http://precip.eas.cornell.edu/.

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

Return Frequency (yr)	24 Hour Depth (in)
2	2.20
10	3.08
50	4.31

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	C	70
Woods	D	77
Meadow	C	71
Meadow	D	78
Gravel	C	89
Gravel	D	91
Impervious (Asphalt Pavement, Water, Structures, Foundations)	-	98

Table 2-3: Pre-Developed Model Data

Subarea	Area (ac)	Curve Number	Time of Concentration (Minutes)
A	31.993	71	25.9

Table 2-4: Post-Developed Model Data

Subarea	Area (ac)	Composite Curve Number	Time of Concentration (Minutes)
A	10.714	71	26.8
B	0.402	88	5.0
C	0.515	87	6.4
D	0.073	78	5.0
E	9.51	70	22.7
F	10.501	70	24.1
G	0.278	89	5.0
Total	31.993	-	-

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
Woods, Dense underbrush (sheet)	0.800
Smooth Surface Gravel/Pavement (sheet)	0.100
Woods, Light underbrush (sheet)	0.400
Concrete/RCP	0.013
PVC	0.010
HDPE	0.012
Grass w/ NAG Stabilization	0.045
Riprap (D50 = 6”)	0.069
Riprap (D50 = 12”)	0.078

2.2 Stormwater Modeling Results

For the proposed Project, a new detention basin is proposed to be constructed on the southeast side of the Site. Runoff from the hill area northwest of the site will collect into Swale A which will intercept Drainline A. Runoff from the transition station pad will collect in Swale B, which will intercept the catch basin on Drainline A. Drainline A discharges to the detention basin. Runoff from the western portion of the hill area northwest of the site will collect into Swale E which intercepts Drainline B which will convey the runoff under the new access road. Runoff from the area below the detention pond will be collected in Swale C and intercept the runoff conveyed through Drainline B. This runoff will be discharged through a treatment swale and then drain to the existing Pre-Development Outlet-1 through the existing roadside swale. Runoff from the cut area east of the transition station pad will be collected in Swale D which daylights near the southeast corner of the pad. The detention basin includes a concrete outlet control structure to control the runoff rate from the basin and an emergency spillway to manage storm events larger than the 50 year storm event.

The proposed detention basin was 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 assuming no infiltration. The concrete outlet control structure will control the rate of runoff to below the pre-development runoff as shown by the modeling results. The following tables summarize flow conditions for the Project and the reduction of flow achieved by the detention basin.

There is only one Analysis Point for the Site located at the existing Outlet-1. The tables below summarize the pre- and post-developed peak discharge runoff rates from the analysis point. 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 Flow

Return Frequency (yr)	Pre-Developed Flow (cfs)	Post-Developed Flow (cfs)
2	7.35	5.39
10	20.96	17.09
50	45.73	37.18

2.3 Detention Basin Design

The detention basin, Basin 'A', was designed and analyzed to provide long term stormwater attenuation, water quality treatment, and infiltration once the Project has been constructed. The basin has been designed to meet the requirements in the NH DES Stormwater Manual. The detention basin contains storm events up to and including the 50-year design storm with a minimum 1-ft freeboard above the emergency spillway crest elevation. The detention basin has been designed as to not require a State Dam permit. The below tables summarize the detention basin storage volumes and water surface elevations respect to the design storm events.

Table 2-7: Detention Basin Storage Volume

Elevation (feet-NAVD88)	Surface Area (ac)	Cumulative Storage Volume (Acre-ft)
1,155.61	0.037	--
1,157.00	0.052	0.06
1,158.00	0.077	0.13
1,159.00	0.101	0.22
1,160.00	0.146	0.34
1,161.00	0.170	0.50
1,162.00	0.196	0.68
1,162.60	0.211	0.80

Table 2-8: Detention Basin Water Surface Elevation

Return Frequency (yr)	Maximum Water Surface Elevation (ft)
2	1,159.32
10	1,159.91
50	1,160.92

2.4 Stormwater Swales

The Stormwater swales 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 open swales will be lined with erosion control blankets and vegetated or lined with riprap 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 swale will be stable for storms up to the 10 year flow.

Table 2-9: 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 (ft)	Swale Width (ft)	Side Slopes (H:V ft)	Slope (%)
A	6.92	2.41	20.09	3.19	2.0	2.0	3:1	1.0-4.7
B	1.15	1.15	2.19	1.38	2.0	2.0	3:1	0.80
C	1.38	2.79	2.65	3.41	2.0	2.0	3:1	8.7
D	0.13	0.77	0.30	1.04	2.0	2.0	3:1	2.0
E	6.27	2.98	18.48	3.97	2.0	2.0	3:1	9.0
F	7.65	0.99	22.59	1.44	2.0	8.0	3:1	0.0
G	0.83	0.81	1.55	0.92	0.1	0.0	1000:1	0.33
H	1.86	1.31	5.57	1.72	1.2	0.0	3:1 & 8:1	1.0
I	1.86	0.73	5.57	0.96	1.2	0.0	3:1 & 8:1	0.5

Refer to Appendix C for the FlowMaster model results for the Swales.

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

Table 2-10: Stormwater Swale Stability

Swale	Stabilization Type	10 Yr. Design Discharge (cfs)	Allowable Shear Stress (psf)	Calculated Shear Stress (psf)
A	12” Riprap	6.92	4.8*	2.05
B	NAG SC250	1.15	8**	0.16
C	NAG SC250	1.38	8**	1.03
D	NAG SC250	0.13	8**	0.10
E	12” Riprap	6.27	4.8*	3.20
F	NAG SC250	7.65	8**	0.09
G	6” Riprap	0.83	2.4*	0.62
H	NAG SC250	1.86	8**	0.32
I	6” Riprap	1.86	2.4*	0.21

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

2.5 Treatment Swale Design

The steep terrain on the site requires the use of an access road that exceeds a five percent longitudinal slope. Eversource standards require that the access road be paved if this slope is exceeded. Due to the steeply sloping terrain it is not possible to route all the runoff from the impervious pavement areas through the detention basin. Runoff from the area west of the access road, turnaround and pad flows to the south through Drainline B and is joined by the runoff from a small portion of the turnaround pad, access road and the swale located east of the access road. These areas are located below the elevation of the inlet to the detention basin and must be treated with another BMP. The terrain in this area slopes steeply upward from the roadside ditch which makes it infeasible to install a small stormwater pond, such as a pocket pond for treatment. In addition, stormwater wetland BMPs are also not feasible due to the lack of available space between the roadside ditch and steep terrain. Infiltration and filtering BMPs would not function well in the roadside ditch adjacent to a steep slope due to possible slope instability caused by seepage and the extra maintenance that would be required to keep the BMP clean and functioning properly within the road right-of-way. Lower infiltration rates of the soil would also reduce the effectiveness of infiltration and filtration BMPs.

The most feasible BMP for treatment is a treatment swale, which is designed to promote sedimentation by providing a minimum hydraulic residence time within the channel under water quality flow conditions. The existing roadside ditch north of Old Canaan Road will be excavated and widened to meet the hydraulic residence time requirements. This conflicts with the guidelines that state that portions of the treatment swale cannot include a roadside ditch. Therefore, a variance is requested due to the steep slopes at the site that prevent all the runoff from the impervious paved areas from being treated in the detention basin and the infeasibility of constructing another type BMPs in the roadside ditch. The treatment swale will be graded with a 8' flat bottom width a distance of 109' with a slope of 0.2 percent, see the design calculations in Appendix D.

2.6 Basin Spillway

The detention basin is designed to contain the 100-year storm event without overtopping; the spillway is designed to provide for emergency flow for events higher than the 100-year storm. The spillway was modeled with a headwater elevation 2 inches (0.17') higher than the crest for modeling purposes. The basin spillway will be lined with riprap as specified in the Site Development Plans.

Table 2-11: Basin Spillway Summary & Stability

100 Year Max. Flow (cfs)	100 Year Velocity (ft/s)	Spillway (weir) Width (ft)	Side Slopes (H:V ft)	Downstream Slope (%)	Allowable Shear Stress (psf)	Calculated Shear Stress
1.98	1.06	11.0	3:1	50	6	5.20

Refer to Appendix C for the spillway and shear flow calculations.

2.7 Storm Drainage System

Storm drainage collection system is modeled using Bentley Culvert Master. A series of perforated underdrains are proposed around the transition station and the turnaround area to relieve stormwater by acting as curtain drains and aid in surface drainage. Underdrains were not modeled for the design, standard 6 inch diameter underdrains are specified, which should be adequate for subsurface drainage.

Riprap outlet protection is provided at all pipe discharge locations refer to Section 2.9 for further information.

2.8 Culverts

In accordance with the New Hampshire Department of Transportation Manual on Drainage Design for Highways, all culverts are designed for the 10-year storm event. They are expected to convey the 25-year and 100-year design storm events without overtopping as they are an integral part of the stormwater system. Drainline A1 conveys runoff from the northern portion of the site and outlets into the Detention Basin, Drainline A2 adds the runoff from the transition station pad and the swale south of the pad to the Drainline A1 runoff via a drop inlet. Drainline B conveys the runoff from the west portion of the site under the access road. Drainline C drains the detention basin. The culverts have been designed as to not be considered a dam. Below is a summary of the proposed culverts and design criteria. The culvert calculations for culverts A1, A2, B and C were performed using Bentley CulvertMaster and are located in Appendix C. The culvert calculations for culvert C were performed by Bentley PondPack and are located in Appendix B.

Table 2-12: Culverts

Culvert	Size	Material	Roughness Coefficient	Length (ft)	Slope (%)	10-Year Design Discharge (cfs)	25-Year Design Discharge (cfs)	100-Year Design Discharge (cfs)
A1	24”	HDPE	0.012	43	1.00	6.92	11.01	20.09
A2	24”	HDPE	0.012	38.4	1.00	8.07	12.51	22.28
B	24”	HDPE	0.012	96	1.00	6.27	10.09	18.48
C	18”	HDPE	0.012	25	1.00	3.21	6.59	15.75

2.9 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 2-13: Outlet Protection

Outlet No.	Length (ft)	Depth (ft)	Width at Culvert (ft)	Width at End of Apron (ft)	Median Stone Size (in)	25-Year Flow (cfs)	25-Year Velocity (fps)
A	28	1.5	6	17	6	12.51	7.48
B	21	2.25	10	27	9	10.09	7.38
C	18	1.5	4.5	22	6	6.59	6.39

* * * * *

3.0 BEST MANAGEMENT PRACTICES

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

3.1 Groundwater Recharge Volume & Water Quality Volume

There are two locations that will treat the runoff from the impervious areas of the site. The first area is the storm water pond that will treat the runoff from a portion of the paved turnaround pad and the structure and foundations on the transition station pad. The Water Quality Volume (WQV) that is required to be treated from these areas is 3,113 cubic feet. The storm water pond has a permanent pool volume of 7,749 cubic feet which is above the minimum required. The second area is a treatment swale that will treat the runoff from the remaining portion of the turnaround pad that does not flow into the stormwater pond and all of the asphalt access road. The WQV that is required to be treated is 3,194 cubic feet. The Water Quality Flow (WQF) is 0.36 cfs and the treatment swale will have a residence time of 11 minutes. The Groundwater Recharge Volume (GRV) that is needed due to the impervious cover is 142 cubic feet, this volume will infiltrate slowly through the soil under the permanent pool in the detention basin. The worksheets for the stormwater pond and the treatment swale 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/Paving

Crushed rock will be installed on the station pad area and the access road and turnaround area will be paved with asphalt.

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 permanent riprap or vegetated as 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;
- Detention Basin will detain the 2-year through 50-year, 24-hour storm event;
- An emergency spillway will be used to convey storm events larger than the 50-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 Outstanding Resource Water (ORW) according to the New Hampshire Department of Environmental Services (NH DES) OneStop GIS mapper. 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. Also, an impervious area summary table has been prepared to outline the impervious areas draining to the proposed BMP, refer to Appendix D.

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 BMP is designed to remove a percentage of the pollutants. Sub-watershed Post-Areas C and F are considered disconnected impervious area because they drain continuously through a vegetated swale or filter strip to the property line or to a treatment BMP. The disconnected impervious credit and the treatment BMP 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 2010 Waterbody Report for the Connecticut River. 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, riprap lined swales and a detention basin. The detention basin 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 detention basin utilizes 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.

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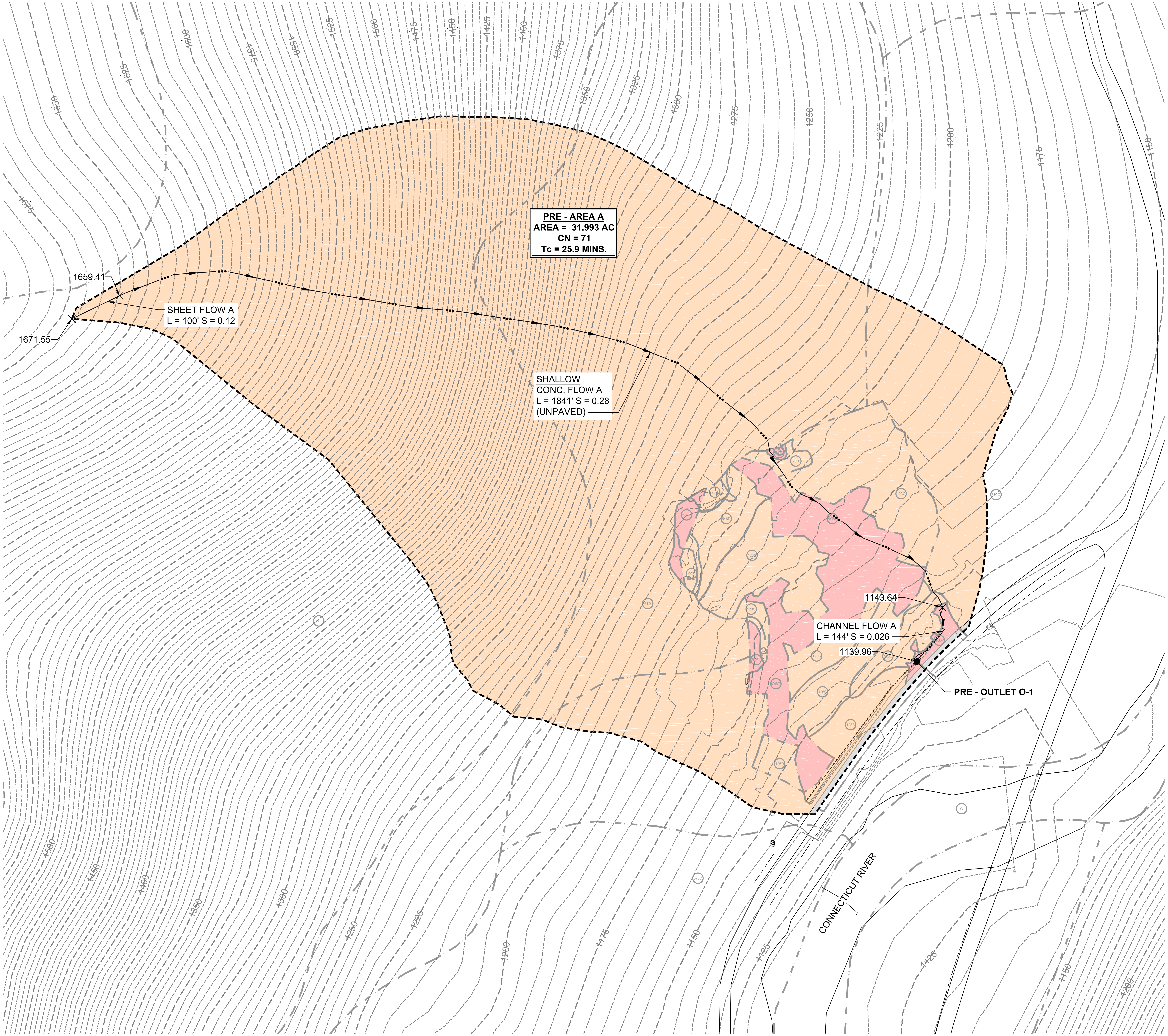
APPENDIX A – PRE- AND POST-DEVELOPMENT WATERSHED MAPS



SOIL TYPE LEGEND

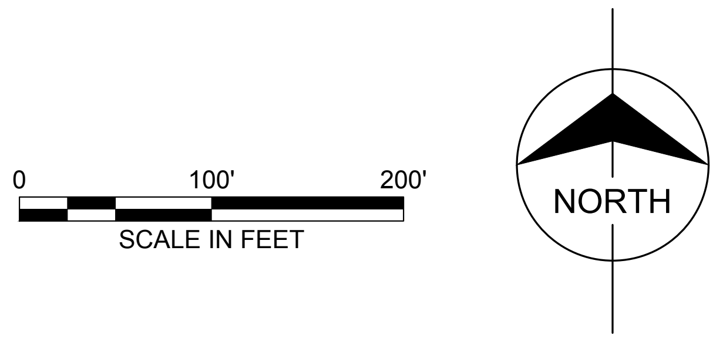
Map Legend	Soil Type	Hydrologic Soil Group
90B	Turnbridge – Lyman Complex, slopes 1 to 8 percent	C
123B	Telos, very stony, slopes 3 to 8 percent	C
123C	Telos, very stony, slopes 8 to 15 percent	C
126C	Chesuncook, very stony, slopes 8 to 15 percent	C
126D	Chesuncook, very stony, slopes 15 to 25 percent	C
126E	Chesuncook, very stony, 25 to 45 percent	C
399/RK	Rock Outcrop, slopes 1 to 45 percent	Unknown (D)
564D	Plaisted very fine sandy loam, very stony, slopes 15 to 25 percent	C
590B/P	Cabot gravelly silt loam, very stony, slopes 1 to 8 percent	D
561C	Turnbridge – Plaisted – Lyman Complex, very stony, slopes 8 to 15 percent	C
61D	Turnbridge – Lyman Rock Outcrop complex, slopes 25 to 35 percent	C

HSG TOTAL AREA IN ACRES

HSG	AREA A	TOTAL
A	-	-
B	-	-
C	29.990	29.990
D	1.893	1.893
WATER	-	-
IMPERVIOUS	0.110	0.110
TOTAL	31.993	31.993

LEGEND

▬ ▬ ▬	PRE-DEVELOPMENT SUB-AREA BOUNDARY
— · —	NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY
—►···	TIME OF CONCENTRATION
(140B)	NRCS SOIL DESIGNATION
×380.50	SPOT ELEVATION



FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
6	.	.	.	.	.
5	.	.	.	.	.
4	.	.	.	.	.
3	REISSUED FOR PERMITTING	1/13/17	KAM	RLR	RLR
2	REVISED PER PERMIT REVIEW COMMENTS	8/8/16	KAM	RLR	RLR
1	ISSUED FOR PERMITTING	10/1/15	JJS	BSS	RLR

SEAL

A/E INFO

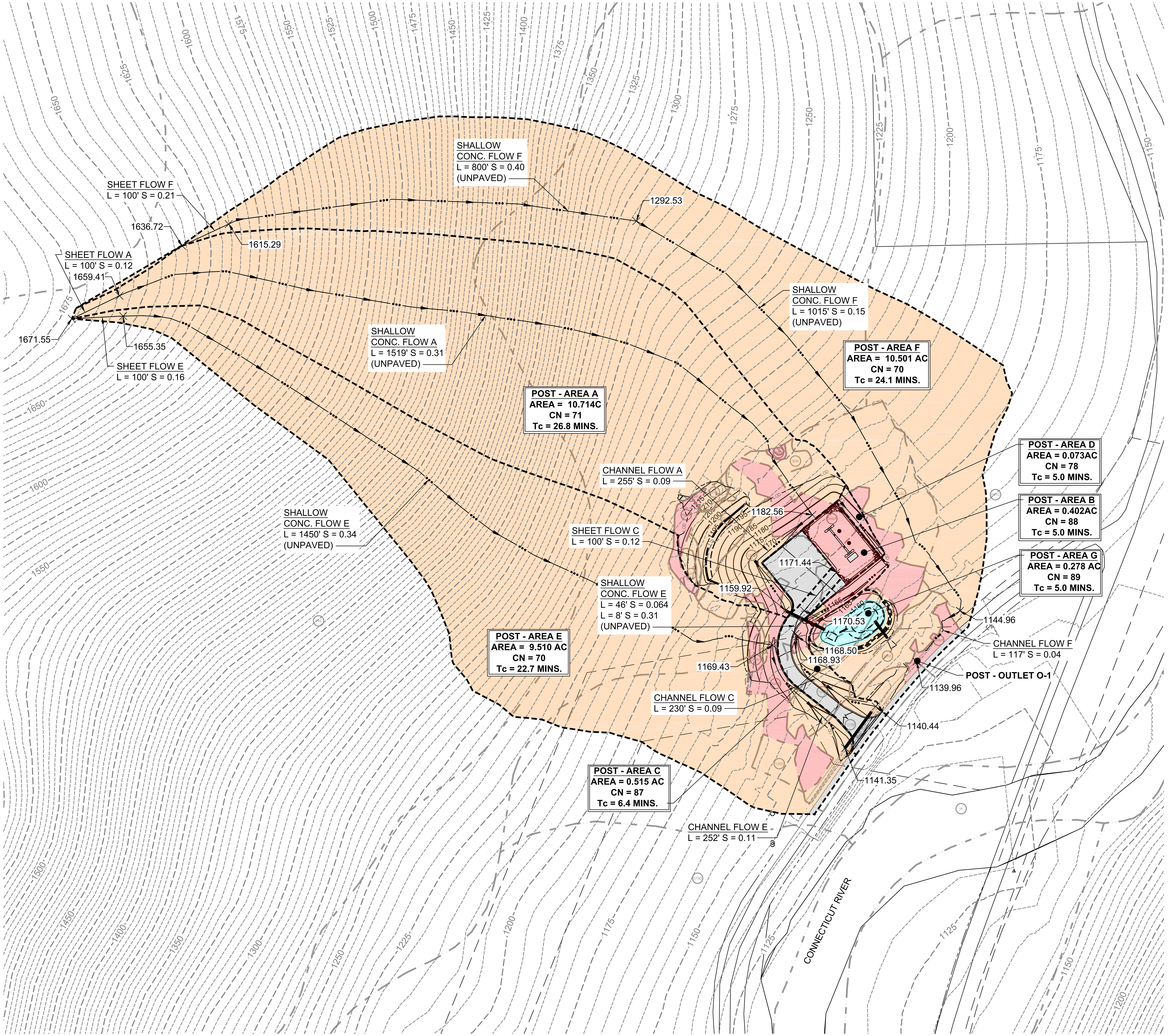
THE NORTHERN PASS
Transmission
Business

#

TRANSITION STATION #1
PRE–DEVELOPMENT
WATERSHED MAP

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

DES: JJS CHK: RLR
DRW: JJS APR: BSS
TOWN:
OLD CANAAN ROAD, PITTSBURG, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 2
NPTT1-WSPRE
REVISION: XXX



SOIL TYPE LEGEND

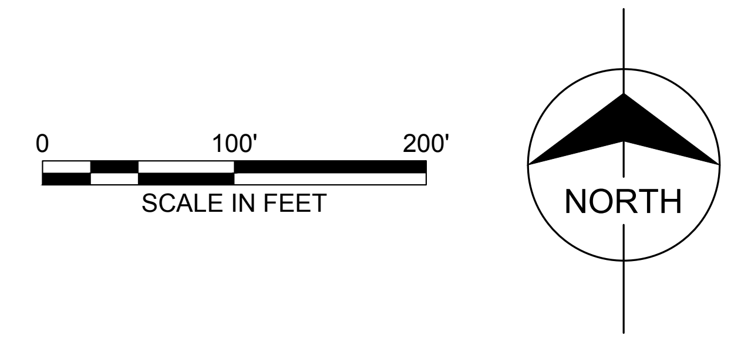
Map Legend	Soil Type	Hydrologic Soil Group
90B	Turnbridge – Lyman Complex, slopes 1 to 8 percent	C
123B	Telos, very stony, slopes 3 to 8 percent	C
123C	Telos, very stony, slopes 8 to 15 percent	C
126C	Chesuncook, very stony, slopes 8 to 15 percent	C
126D	Chesuncook, very stony, slopes 15 to 25 percent	C
126E	Chesuncook, very stony, 25 to 45 percent	C
399/RK	Rock Outcrop, slopes 1 to 45 percent	Unknown (D)
564D	Plaisted very fine sandy loam, very stony, slopes 15 to 25 percent	C
590B/P	Cabot gravelly silt loam, very stony, slopes 1 to 8 percent	D
561C	Turnbridge – Plaisted – Lyman Complex, very stony, slopes 8 to 15 percent	C
61D	Turnbridge – Lyman Rock Outcrop complex, slopes 25 to 35 percent	C

HSG TOTAL AREA IN ACRES

HSG	AREA A	AREA B	AREA C	AREA D	AREA E	AREA F	AREA G	TOTAL
A	-	-	-	-	-	-	-	-
B	-	-	-	-	-	-	-	-
C	10.069	0.016	0.181	0.005	9.040	10.113	0.052	29.476
D	0.411	0.359	0.043	0.068	0.440	0.333	0.055	1.709
WATER		-	-	-	-	-	0.171	0.171
IMPERVIOUS	0.234	0.027	0.291	-	0.030	0.055	-	0.637
TOTAL	10.714	0.402	0.515	0.073	9.510	10.501	0.278	31.993

LEGEND

- - - -	POST-DEVELOPMENT SUB-AREA BOUNDARY
— · —	NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY
—▸—	TIME OF CONCENTRATION
(140B)	NRCS SOIL DESIGNATION
✕ 380.50	SPOT ELEVATION



FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
6	.	.	.	.	.
5	.	.	.	.	.
4	.	.	.	.	.
3	REISSUED FOR PERMITTING	1/13/17	KAM	RLR	RLR
2	REVISED PER PERMIT REVIEW COMMENTS	8/8/16	KAM	RLR	RLR
1	ISSUED FOR PERMITTING	10/1/15	JJS	BSS	RLR

SEAL

A/E INFO

THE NORTHERN PASS

Transmission Business

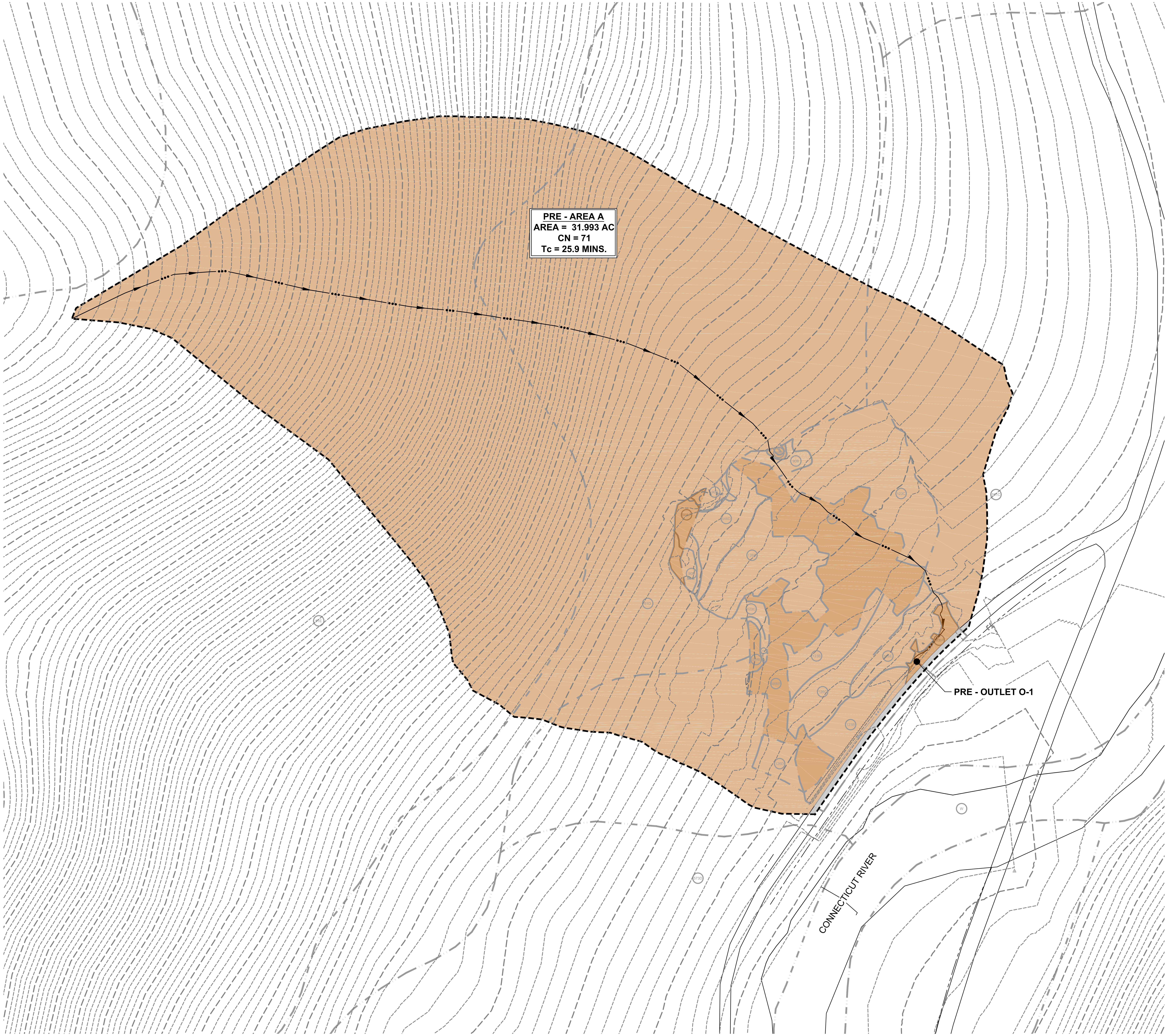
#

TRANSITION STATION #1
POST-DEVELOPMENT
WATERSHED MAP

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

DES: JJS CHK: RLR
DRW: JJS APR: BSS
TOWN:
OLD CANAAN ROAD, PITTSBURG, NH
TRANSMISSION LINE:
MILE NO:
SHEET 2 OF 2
NPTT1-WSPOST

REVISION: XXX



COVER TYPE TOTAL AREA IN ACRES		
COVER TYPE	AREA A	TOTAL
WOODS (HSG C)	29.990	29.990
WOODS (HSG D)	1.893	1.893
IMPERVIOUS (HSG C)	0.110	0.110
TOTAL	31.993	31.993

LEGEND

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

0 100' 200'
SCALE IN FEET

NORTH

NOTES:

REFER TO PRE-DEVELOPMENT WATERSHED MAP DRAWING "NPTT1-WSPRE" 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
2	.	.	.	.	.
3	.	.	.	.	.
4	.	.	.	.	.
5	.	.	.	.	.
6	.	.	.	.	.

SEAL

A/E INFO

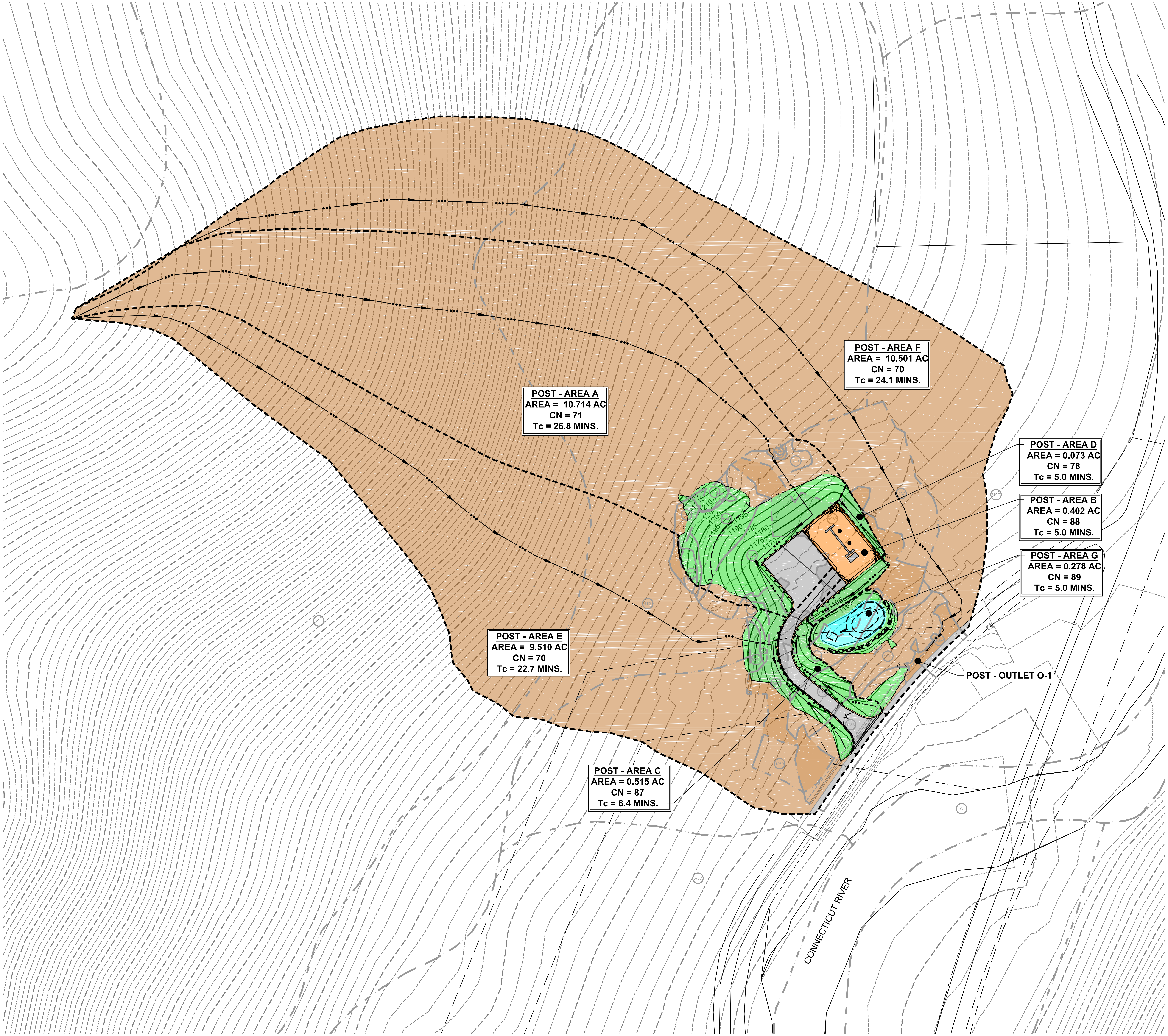
THE NORTHERN PASS
Transmission Business

#

TRANSITION STATION #1
PRE-DEVELOPMENT
COVER TYPE SUMMARY

SCALE: 1" = 100'
DATE: 07/6/2016

DES: JJS CHK: RLR
DRW: JJS APR: BSS
TOWN:
OLD CANAAN ROAD, PITTSBURG, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 2
NPTT1-WSPRE-COVER
REVISION: XXX



COVER TYPE TOTAL AREA IN ACRES								
COVER TYPE	AREA A	AREA B	AREA C	AREA D	AREA E	AREA F	AREA G	TOTAL
WOODS (HSG C)	9.252	-	-	-	8.850	10.004	-	28.106
WOODS (HSG D)	0.140	-	-	-	0.270	0.329	-	0.739
MEADOW (HSG C)	0.809	0.012	0.170	0.005	0.180	0.109	0.052	1.337
MEADOW (HSG D)	0.268	0.096	0.039	0.068	0.164	0.004	0.055	0.694
IMPERVIOUS (HSG C)	0.211	0.002	0.204	-	0.030	0.055	-	0.502
IMPERVIOUS (HSG D)	0.023	0.025	0.087	-	-	-	-	0.135
GRAVEL (HSG C)	0.008	0.004	0.011	-	0.010	-	-	0.033
GRAVEL (HSG D)	0.003	0.263	0.004	-	0.006	-	-	0.276
WATER (HSG C)	-	-	-	-	-	-	0.120	0.120
WATER (HSG D)	-	-	-	-	-	-	0.051	0.051
TOTAL	10.714	0.402	0.515	0.073	9.510	10.501	0.278	31.993

LEGEND

- - - -	POST-DEVELOPMENT SUB-AREA BOUNDARY
— - —	NRCS WEB SOIL APPROX. SURVEY SOIL BOUNDARY
—►···	TIME OF CONCENTRATION
(140B)	NRCS SOIL DESIGNATION

0 100' 200'
SCALE IN FEET

NORTH

NOTES:

REFER TO POST-DEVELOPMENT WATERSHED MAP DRAWING "NPTT1-WSPOST" FOR FURTHER INFORMATION

FOR PERMITTING PURPOSES ONLY
NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
6	.	.	.	.	.
5	.	.	.	.	.
4	.	.	.	.	.
3	.	.	.	.	.
2	.	.	.	.	.
1	ISSUED FOR PERMITTING	1/13/17	KAM	RLR	RLR

SEAL

A/E INFO

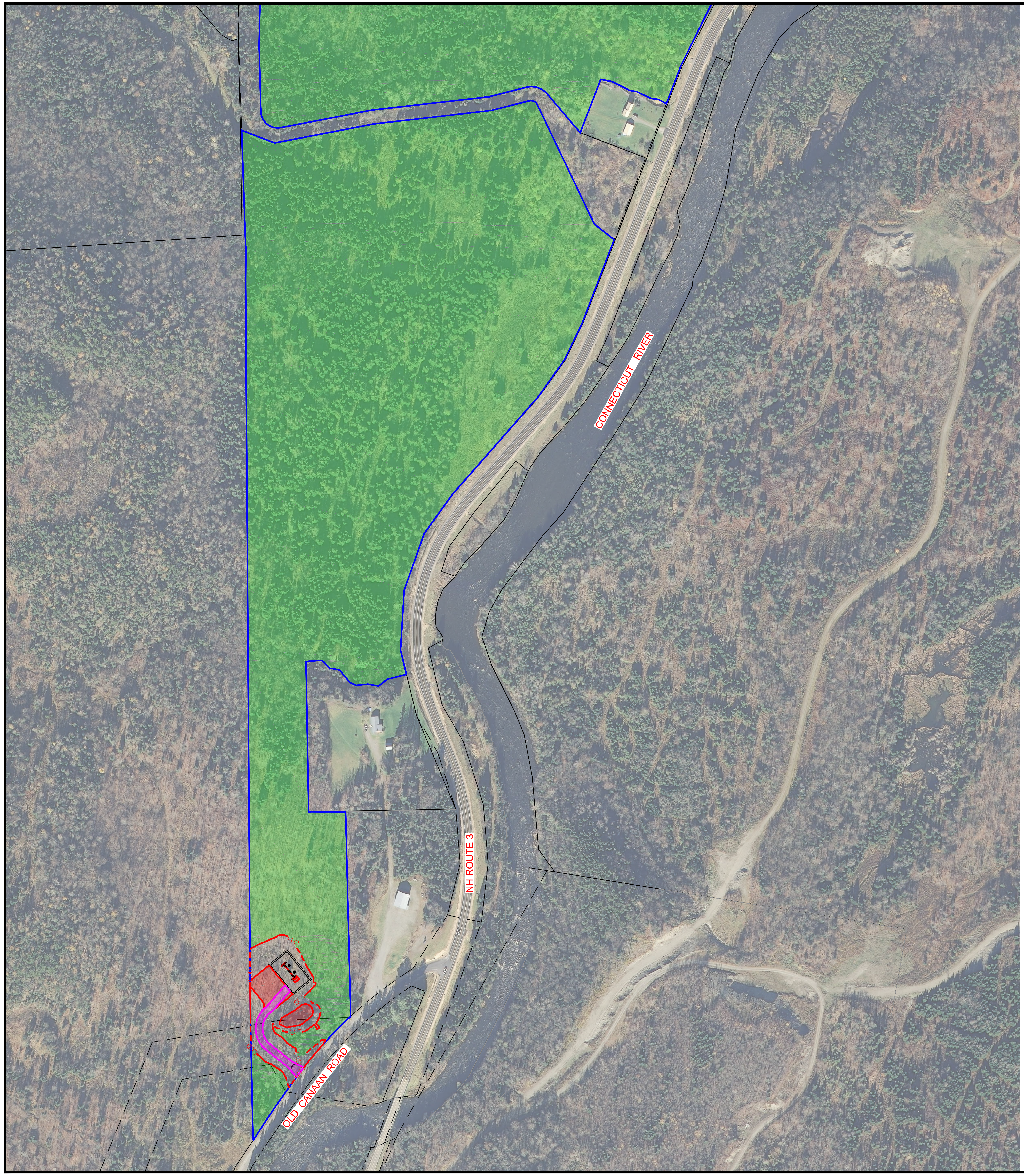
THE NORTHERN PASS
Transmission Business

#

TRANSITION STATION #1
POST-DEVELOPMENT
COVER TYPE SUMMARY

SCALE: 1" = 100'
DATE: 07/08/2016

DES: XXX CHK: XXX
DRW: XXX APR: XXX
TOWN:
OLD CANAAN ROAD, PITTSBURG, NH
TRANSMISSION LINE:
MILE NO:
SHEET 2 OF 2
NPTT1-WSPOST-COVER
REVISION: XXX



LEGEND

🟨	EI - EXISITING 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:

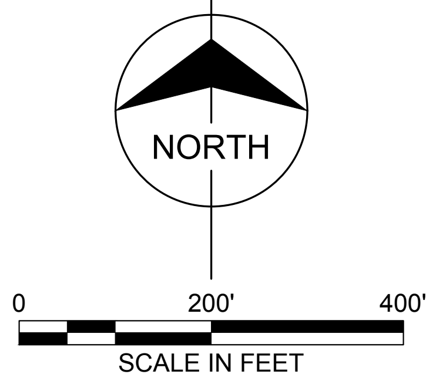
1. 2011 ORTHOIMAGERY OBTAINED IN .SID FORMAT FROM NH STATEWIDE GIS CLEARINGHOUSE WEBSITE AT www.granit.unh.edu.
   TILES USED: 1035009150 & 1035009200

SITE COVER AREA

ITEM	DESCRIPTION	AREA (SF)	AREA (AC)
PS	PARCEL SIZE	3,601,217	82.67
EI	EXISTING IMPERVIOUS	0	0.00
PI	PROPOSED IMPERVIOUS	27,945	0.64
PDA	PROPOSED DISTURBED AREA	91,472	2.10
UDC	UNDISTURBED COVER	3,509,770	80.57
DIA	PROPOSED DISCONNECTED IMPERVIOUS AREA	10,758	0.25

SITE COVER TABULATION

ITEM	DESCRIPTION	FORMULA	TOTAL
TIC	TOTAL IMPERVIOUS COVER (ACRES)	EI + PI	0.64 AC
EIC	EFFECTIVE IMPERVIOUS COVER (ACRES)	TIC - DIA	0.39 AC
EIC %	EIC PERCENTAGE	EIC / PS	0.5%
UDC %	UDC PERCENTAGE	UDC / PS	97.5%



FOR PERMITTING PURPOSES ONLY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	DRWN	CHKD	APPRV.
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.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
2	REISSUED FOR PERMITTING	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

#

TRANSITION STATION #1 SITE COVER PLAN

DATE: 10/1/2015
SCALE: H 1" = 200'
DES: JJS CHK: RLR
DRW: FP APR: BSS
TOWN: OLD CANAAN ROAD, PITTSBURG, NH
TRANSMISSION LINE:
MILE NO:
SHEET 1 OF 1
NPTT1-SCP

REVISION: 11/10/2013

Z:\CLIENTS\TND\NUSC\58466_NPT\DESIGN\SUBSTATION\100-TRANSITION_STATION-1\CADD\CIVIL-SITE\NPTT1-SCP.DWG 9/30/2015 11:06 AM RLREED

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	71.422 degrees West
Latitude	45.011 degrees North
Elevation	Unknown/Unavailable
Date/Time	Wed, 17 Dec 2014 12:20:43 -0500

Extreme Precipitation Estimates

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.27	0.42	0.52	0.68	0.85	1.04	**1yr**	0.73	0.97	1.17	1.39	1.62	1.88	2.20	**1yr**	1.67	2.12	2.53	3.13	3.74	**1yr**
2yr	0.29	0.45	0.56	0.74	0.93	1.15	**2yr**	0.80	1.05	1.30	1.57	1.87	2.21	2.55	**2yr**	1.95	2.45	2.95	3.64	4.26	**2yr**
5yr	0.34	0.53	0.67	0.89	1.14	1.42	**5yr**	0.98	1.27	1.61	1.93	2.28	2.67	3.10	**5yr**	2.36	2.98	3.54	4.28	4.96	**5yr**
10yr	0.38	0.60	0.75	1.03	1.34	1.67	**10yr**	1.15	1.47	1.90	2.27	2.66	3.09	3.59	**10yr**	2.73	3.45	4.06	4.84	5.57	**10yr**
25yr	0.44	0.71	0.90	1.24	1.65	2.07	**25yr**	1.43	1.79	2.36	2.80	3.26	3.74	4.36	**25yr**	3.31	4.19	4.87	5.71	6.50	**25yr**
50yr	0.50	0.80	1.03	1.44	1.94	2.44	**50yr**	1.68	2.07	2.78	3.29	3.81	4.32	5.05	**50yr**	3.82	4.85	5.60	6.48	7.31	**50yr**
100yr	0.57	0.92	1.19	1.68	2.28	2.88	**100yr**	1.97	2.41	3.28	3.86	4.43	5.00	5.86	**100yr**	4.43	5.63	6.44	7.35	8.23	**100yr**
200yr	0.64	1.05	1.36	1.95	2.69	3.41	**200yr**	2.32	2.80	3.87	4.54	5.17	5.79	6.80	**200yr**	5.12	6.53	7.41	8.35	9.26	**200yr**
500yr	0.77	1.26	1.64	2.39	3.35	4.24	**500yr**	2.89	3.42	4.81	5.60	6.34	7.03	8.28	**500yr**	6.22	7.96	8.93	9.89	10.85	**500yr**

Lower Confidence Limits

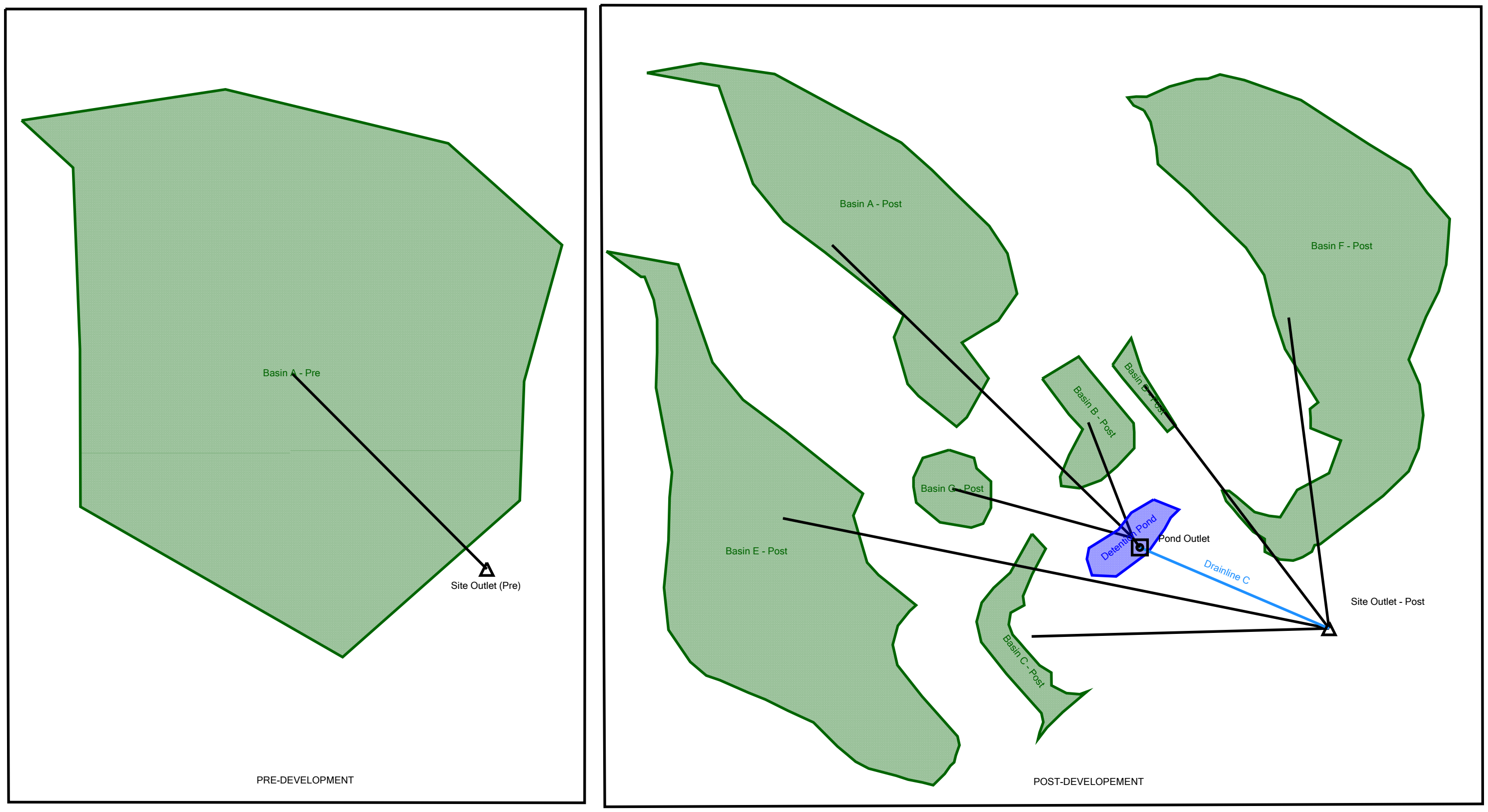
	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.22	0.34	0.41	0.56	0.68	0.88	**1yr**	0.59	0.86	0.88	1.12	1.49	1.65	1.99	**1yr**	1.46	1.92	2.24	2.80	3.32	**1yr**
2yr	0.28	0.43	0.53	0.72	0.88	1.03	**2yr**	0.76	1.01	1.14	1.38	1.72	2.13	2.47	**2yr**	1.89	2.38	2.86	3.53	4.15	**2yr**
5yr	0.31	0.48	0.59	0.81	1.03	1.19	**5yr**	0.89	1.17	1.32	1.65	1.98	2.47	2.86	**5yr**	2.18	2.75	3.28	3.99	4.65	**5yr**
10yr	0.33	0.51	0.63	0.88	1.14	1.33	**10yr**	0.98	1.30	1.48	1.86	2.21	2.73	3.17	**10yr**	2.42	3.05	3.62	4.35	5.04	**10yr**
25yr	0.36	0.55	0.68	0.98	1.29	1.54	**25yr**	1.11	1.51	1.73	2.11	2.54	3.13	3.61	**25yr**	2.77	3.47	4.10	4.85	5.57	**25yr**
50yr	0.38	0.58	0.72	1.03	1.39	1.72	**50yr**	1.20	1.68	1.94	2.29	2.81	3.45	3.98	**50yr**	3.05	3.82	4.48	5.26	5.97	**50yr**
100yr	0.40	0.61	0.76	1.10	1.51	1.92	**100yr**	1.30	1.88	2.17	2.49	3.12	3.80	4.36	**100yr**	3.36	4.19	4.89	5.67	6.40	**100yr**
200yr	0.43	0.64	0.81	1.18	1.64	2.16	**200yr**	1.42	2.11	2.44	2.68	3.44	4.17	4.77	**200yr**	3.69	4.58	5.32	6.11	6.83	**200yr**
500yr	0.46	0.68	0.88	1.27	1.81	2.52	**500yr**	1.56	2.47	2.85	2.98	3.91	4.69	5.32	**500yr**	4.15	5.12	5.90	6.69	7.35	**500yr**

Upper Confidence Limits

	5min	**10min**	**15min**	**30min**	**60min**	**120min**		**1hr**	**2hr**	**3hr**	**6hr**	**12hr**	**24hr**	**48hr**		**1day**	**2day**	**4day**	**7day**	**10day**	
1yr	0.30	0.46	0.57	0.76	0.94	1.09	**1yr**	0.81	1.06	1.21	1.49	1.77	2.06	2.44	**1yr**	1.82	2.34	2.78	3.40	4.04	**1yr**
2yr	0.30	0.47	0.58	0.78	0.96	1.12	**2yr**	0.83	1.10	1.25	1.56	1.83	2.28	2.66	**2yr**	2.02	2.55	3.06	3.75	4.40	**2yr**
5yr	0.36	0.56	0.70	0.96	1.22	1.37	**5yr**	1.05	1.34	1.53	1.88	2.36	2.88	3.33	**5yr**	2.55	3.21	3.80	4.57	5.26	**5yr**
10yr	0.42	0.65	0.81	1.13	1.46	1.64	**10yr**	1.26	1.60	1.84	2.26	2.72	3.45	3.99	**10yr**	3.05	3.84	4.49	5.32	6.08	**10yr**
25yr	0.53	0.81	1.01	1.44	1.89	2.09	**25yr**	1.63	2.04	2.36	2.93	3.43	4.37	5.08	**25yr**	3.87	4.88	5.64	6.54	7.37	**25yr**
50yr	0.62	0.95	1.18	1.70	2.29	2.49	**50yr**	1.98	2.44	2.85	3.58	4.10	5.23	6.09	**50yr**	4.63	5.85	6.70	7.66	8.54	**50yr**
100yr	0.74	1.12	1.41	2.03	2.79	2.98	**100yr**	2.41	2.92	3.43	4.38	4.92	6.27	7.31	**100yr**	5.55	7.03	7.97	8.98	9.91	**100yr**
200yr	0.89	1.34	1.70	2.45	3.42	3.56	**200yr**	2.95	3.48	4.15	5.35	5.88	7.51	8.78	**200yr**	6.64	8.44	9.48	10.54	11.51	**200yr**
500yr	1.13	1.68	2.16	3.15	4.47	4.53	**500yr**	3.86	4.43	5.33	6.96	7.48	9.54	11.19	**500yr**	8.44	10.76	11.95	13.05	14.04	**500yr**

Powered by ACIS
Northeast Regional Climate Center

Scenario: Post-Development 2 year



NPT Transition Station #1

Project Summary

Title	Northern Pass Transition Station #1
Engineer	Robbyn Reed
Company	Burns & McDonnell
Date	1/5/2017

Notes

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Basin A - Pre	2 year	2	0.923	12.200	7.35
Basin A - Pre	10 year	10	2.132	12.200	20.96
Basin A - Pre	50 year	50	4.261	12.150	45.73
Basin A - Pre	100 year	100	5.582	12.150	60.96
Basin A - Post	2 year	2	0.309	12.200	2.40
Basin A - Post	10 year	10	0.714	12.200	6.92
Basin A - Post	50 year	50	1.427	12.150	15.05
Basin A - Post	100 year	100	1.870	12.150	20.09
Basin B - Post	2 year	2	0.038	11.900	0.68
Basin B - Post	10 year	10	0.063	11.900	1.15
Basin B - Post	50 year	50	0.101	11.900	1.82
Basin B - Post	100 year	100	0.122	11.900	2.19
Basin C - Post	2 year	2	0.046	11.950	0.82
Basin C - Post	10 year	10	0.078	11.950	1.38
Basin C - Post	50 year	50	0.125	11.950	2.20
Basin C - Post	100 year	100	0.153	11.950	2.65
Basin D - Post	2 year	2	0.004	11.950	0.06
Basin D - Post	10 year	10	0.007	11.950	0.13
Basin D - Post	50 year	50	0.013	11.950	0.23
Basin D - Post	100 year	100	0.016	11.900	0.30
Basin E - Post	2 year	2	0.251	12.200	2.04
Basin E - Post	10 year	10	0.597	12.150	6.27
Basin E - Post	50 year	50	1.213	12.150	13.82
Basin E - Post	100 year	100	1.598	12.100	18.48
Basin F - Post	2 year	2	0.277	12.200	2.19
Basin F - Post	10 year	10	0.658	12.150	6.68
Basin F - Post	50 year	50	1.338	12.150	14.88
Basin F - Post	100 year	100	1.763	12.150	19.94
Basin G - Post	2 year	2	0.028	11.900	0.50
Basin G - Post	10 year	10	0.046	11.900	0.83
Basin G - Post	50 year	50	0.072	11.900	1.29
Basin G - Post	100 year	100	0.087	11.900	1.55

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
Site Outlet (Pre)	2 year	2	0.923	12.200	7.35
Site Outlet (Pre)	10 year	10	2.132	12.200	20.96
Site Outlet (Pre)	50 year	50	4.261	12.150	45.73
Site Outlet (Pre)	100 year	100	5.582	12.150	60.96
Site Outlet - Post	2 year	2	0.936	12.250	5.39
Site Outlet - Post	10 year	10	2.133	12.200	17.09
Site Outlet - Post	50 year	50	4.246	12.150	37.18
Site Outlet - Post	100 year	100	5.562	12.150	51.96

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)
Detention Pond (IN)	2 year	2	0.374	12.200	2.60	(N/A)	(N/A)
Detention Pond (OUT)	2 year	2	0.358	12.450	1.72	1,159.32	0.252
Detention Pond (IN)	10 year	10	0.823	12.200	7.22	(N/A)	(N/A)
Detention Pond (OUT)	10 year	10	0.792	12.350	5.21	1,159.91	0.327
Detention Pond (IN)	50 year	50	1.600	12.150	15.60	(N/A)	(N/A)
Detention Pond (OUT)	50 year	50	1.557	12.350	11.48	1,160.92	0.486
Detention Pond (IN)	100 year	100	2.079	12.150	20.74	(N/A)	(N/A)
Detention Pond (OUT)	100 year	100	2.032	12.300	17.11	1,161.25	0.542

Subsection: Time-Depth Curve | Return Event: 10 years
Label: TS #1 | Storm Event: 10 Year Storm

Time-Depth Curve: 10 Year Storm	
Label	10 Year Storm
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	0.0	0.0	0.0
1.500	0.0	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	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.2	0.2	0.2	0.2
4.500	0.2	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	0.3	0.3	0.3	0.3
6.500	0.3	0.3	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	0.4	0.4
8.000	0.4	0.4	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.5	0.5	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	0.6	0.7	0.7	0.7
11.000	0.7	0.7	0.8	0.8	0.8
11.500	0.9	0.9	1.1	1.3	1.7
12.000	2.0	2.1	2.2	2.2	2.2
12.500	2.3	2.3	2.3	2.3	2.4
13.000	2.4	2.4	2.4	2.4	2.4
13.500	2.5	2.5	2.5	2.5	2.5
14.000	2.5	2.5	2.5	2.6	2.6
14.500	2.6	2.6	2.6	2.6	2.6
15.000	2.6	2.6	2.6	2.7	2.7
15.500	2.7	2.7	2.7	2.7	2.7
16.000	2.7	2.7	2.7	2.7	2.7
16.500	2.7	2.8	2.8	2.8	2.8
17.000	2.8	2.8	2.8	2.8	2.8
17.500	2.8	2.8	2.8	2.8	2.8
18.000	2.8	2.8	2.8	2.9	2.9
18.500	2.9	2.9	2.9	2.9	2.9
19.000	2.9	2.9	2.9	2.9	2.9
19.500	2.9	2.9	2.9	2.9	2.9
20.000	2.9	2.9	2.9	2.9	2.9
20.500	3.0	3.0	3.0	3.0	3.0
21.000	3.0	3.0	3.0	3.0	3.0

Subsection: Time-Depth Curve
Label: TS #1

Return Event: 10 years
Storm Event: 10 Year Storm

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)
21.500	3.0	3.0	3.0	3.0	3.0
22.000	3.0	3.0	3.0	3.0	3.0
22.500	3.0	3.0	3.0	3.0	3.0
23.000	3.0	3.0	3.1	3.1	3.1
23.500	3.1	3.1	3.1	3.1	3.1
24.000	3.1	(N/A)	(N/A)	(N/A)	(N/A)

Time-Depth Curve: 100 Year Storm	
Label	100 Year Storm
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	0.0	0.0	0.0
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	0.1	0.1
2.500	0.1	0.1	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.3
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.5	0.5	0.5	0.5
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.5	0.6	0.6	0.6	0.6
8.000	0.6	0.6	0.6	0.6	0.6
8.500	0.7	0.7	0.7	0.7	0.7
9.000	0.7	0.7	0.8	0.8	0.8
9.500	0.8	0.8	0.8	0.9	0.9
10.000	0.9	0.9	0.9	1.0	1.0
10.500	1.0	1.0	1.1	1.1	1.1
11.000	1.2	1.2	1.3	1.3	1.4
11.500	1.4	1.5	1.8	2.1	2.8
12.000	3.3	3.4	3.5	3.6	3.6
12.500	3.7	3.7	3.7	3.8	3.8
13.000	3.9	3.9	3.9	3.9	4.0
13.500	4.0	4.0	4.0	4.1	4.1
14.000	4.1	4.1	4.1	4.1	4.2
14.500	4.2	4.2	4.2	4.2	4.2
15.000	4.3	4.3	4.3	4.3	4.3
15.500	4.3	4.3	4.4	4.4	4.4
16.000	4.4	4.4	4.4	4.4	4.4
16.500	4.4	4.5	4.5	4.5	4.5
17.000	4.5	4.5	4.5	4.5	4.5
17.500	4.5	4.6	4.6	4.6	4.6
18.000	4.6	4.6	4.6	4.6	4.6
18.500	4.6	4.6	4.7	4.7	4.7
19.000	4.7	4.7	4.7	4.7	4.7
19.500	4.7	4.7	4.7	4.7	4.7
20.000	4.8	4.8	4.8	4.8	4.8
20.500	4.8	4.8	4.8	4.8	4.8
21.000	4.8	4.8	4.8	4.8	4.8

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)
21.500	4.8	4.9	4.9	4.9	4.9
22.000	4.9	4.9	4.9	4.9	4.9
22.500	4.9	4.9	4.9	4.9	4.9
23.000	4.9	4.9	4.9	5.0	5.0
23.500	5.0	5.0	5.0	5.0	5.0
24.000	5.0	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Time-Depth Curve	Return Event: 2 years
Label: TS #1	Storm Event: 2 Year Storm

Time-Depth Curve: 2 Year Storm	
Label	2 Year Storm
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	0.0	0.0	0.0
2.000	0.0	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	0.1	0.1	0.1	0.1
5.000	0.1	0.1	0.1	0.1	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	0.2	0.2	0.2
7.000	0.2	0.2	0.2	0.2	0.2
7.500	0.2	0.2	0.2	0.3	0.3
8.000	0.3	0.3	0.3	0.3	0.3
8.500	0.3	0.3	0.3	0.3	0.3
9.000	0.3	0.3	0.3	0.3	0.4
9.500	0.4	0.4	0.4	0.4	0.4
10.000	0.4	0.4	0.4	0.4	0.4
10.500	0.4	0.5	0.5	0.5	0.5
11.000	0.5	0.5	0.6	0.6	0.6
11.500	0.6	0.7	0.8	0.9	1.2
12.000	1.5	1.5	1.5	1.6	1.6
12.500	1.6	1.6	1.7	1.7	1.7
13.000	1.7	1.7	1.7	1.7	1.7
13.500	1.8	1.8	1.8	1.8	1.8
14.000	1.8	1.8	1.8	1.8	1.8
14.500	1.8	1.9	1.9	1.9	1.9
15.000	1.9	1.9	1.9	1.9	1.9
15.500	1.9	1.9	1.9	1.9	1.9
16.000	1.9	1.9	1.9	2.0	2.0
16.500	2.0	2.0	2.0	2.0	2.0
17.000	2.0	2.0	2.0	2.0	2.0
17.500	2.0	2.0	2.0	2.0	2.0
18.000	2.0	2.0	2.0	2.0	2.0
18.500	2.0	2.0	2.1	2.1	2.1
19.000	2.1	2.1	2.1	2.1	2.1
19.500	2.1	2.1	2.1	2.1	2.1
20.000	2.1	2.1	2.1	2.1	2.1
20.500	2.1	2.1	2.1	2.1	2.1
21.000	2.1	2.1	2.1	2.1	2.1

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)
21.500	2.1	2.1	2.1	2.1	2.1
22.000	2.1	2.2	2.2	2.2	2.2
22.500	2.2	2.2	2.2	2.2	2.2
23.000	2.2	2.2	2.2	2.2	2.2
23.500	2.2	2.2	2.2	2.2	2.2
24.000	2.2	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Time-Depth Curve | Return Event: 50 years
Label: TS #1 | Storm Event: 50 Year Storm

Time-Depth Curve: 50 Year Storm	
Label	50 Year Storm
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	0.0	0.0
1.000	0.0	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	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.2	0.2	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	0.3	0.3	0.3
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	0.4	0.4	0.4	0.4
6.500	0.4	0.4	0.4	0.4	0.4
7.000	0.4	0.4	0.4	0.5	0.5
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	0.6	0.6	0.7	0.7	0.7
9.500	0.7	0.7	0.7	0.7	0.8
10.000	0.8	0.8	0.8	0.8	0.9
10.500	0.9	0.9	0.9	1.0	1.0
11.000	1.0	1.0	1.1	1.1	1.2
11.500	1.2	1.3	1.5	1.9	2.4
12.000	2.9	2.9	3.0	3.1	3.1
12.500	3.2	3.2	3.2	3.3	3.3
13.000	3.3	3.4	3.4	3.4	3.4
13.500	3.4	3.5	3.5	3.5	3.5
14.000	3.5	3.6	3.6	3.6	3.6
14.500	3.6	3.6	3.6	3.7	3.7
15.000	3.7	3.7	3.7	3.7	3.7
15.500	3.7	3.8	3.8	3.8	3.8
16.000	3.8	3.8	3.8	3.8	3.8
16.500	3.8	3.9	3.9	3.9	3.9
17.000	3.9	3.9	3.9	3.9	3.9
17.500	3.9	3.9	3.9	4.0	4.0
18.000	4.0	4.0	4.0	4.0	4.0
18.500	4.0	4.0	4.0	4.0	4.0
19.000	4.0	4.0	4.1	4.1	4.1
19.500	4.1	4.1	4.1	4.1	4.1
20.000	4.1	4.1	4.1	4.1	4.1
20.500	4.1	4.1	4.1	4.1	4.2
21.000	4.2	4.2	4.2	4.2	4.2

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)
21.500	4.2	4.2	4.2	4.2	4.2
22.000	4.2	4.2	4.2	4.2	4.2
22.500	4.2	4.2	4.2	4.3	4.3
23.000	4.3	4.3	4.3	4.3	4.3
23.500	4.3	4.3	4.3	4.3	4.3
24.000	4.3	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time of Concentration Calculations
Label: Basin A - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00 ft
Manning's n	0.800
Slope	0.120 ft/ft
2 Year 24 Hour Depth	2.2 in
Average Velocity	0.08 ft/s
Segment Time of Concentration	0.367 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	1,519.00 ft
Is Paved?	False
Slope	0.310 ft/ft
Average Velocity	8.98 ft/s
Segment Time of Concentration	0.047 hours

Segment #3: TR-55 Channel Flow

Flow Area	16.0 ft²
Hydraulic Length	255.00 ft
Manning's n	0.069
Slope	0.009 ft/ft
Wetted Perimeter	14.65 ft
Average Velocity	2.17 ft/s
Segment Time of Concentration	0.033 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.447 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations
Return Event: 2 years
Label: Basin A - Pre
Storm Event: 2 Year Storm

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00	ft
Manning's n	0.800	
Slope	0.120	ft/ft
2 Year 24 Hour Depth	2.2	in
Average Velocity	0.08	ft/s
Segment Time of Concentration	0.367	hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	1,841.00	ft
Is Paved?	False	
Slope	0.280	ft/ft
Average Velocity	8.54	ft/s
Segment Time of Concentration	0.060	hours

Segment #3: TR-55 Channel Flow

Flow Area	53.0	ft²
Hydraulic Length	144.00	ft
Manning's n	0.030	
Slope	0.026	ft/ft
Wetted Perimeter	40.00	ft
Average Velocity	9.66	ft/s
Segment Time of Concentration	0.004	hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.431	hours

Subsection: Time of Concentration Calculations
Label: Basin A - Pre

Return Event: 2 years
Storm Event: 2 Year Storm

==== 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

NPT Transition Station #1

Subsection: Time of Concentration Calculations
Return Event: 2 years
Label: Basin C - Post
Storm Event: 2 Year Storm

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00 ft
Manning's n	0.100
Slope	0.056 ft/ft
2 Year 24 Hour Depth	2.2 in
Average Velocity	0.29 ft/s
Segment Time of Concentration	0.094 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	46.00 ft
Is Paved?	False
Slope	0.064 ft/ft
Average Velocity	4.08 ft/s
Segment Time of Concentration	0.003 hours

Segment #3: TR-55 Shallow Concentrated Flow

Hydraulic Length	8.00 ft
Is Paved?	False
Slope	0.313 ft/ft
Average Velocity	9.03 ft/s
Segment Time of Concentration	0.000 hours

Segment #4: TR-55 Channel Flow

Flow Area	16.0 ft²
Hydraulic Length	230.00 ft
Manning's n	0.069
Slope	0.086 ft/ft
Wetted Perimeter	14.60 ft
Average Velocity	6.73 ft/s
Segment Time of Concentration	0.009 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.107 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations
Label: Basin E - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00 ft
Manning's n	0.800
Slope	0.160 ft/ft
2 Year 24 Hour Depth	2.2 in
Average Velocity	0.08 ft/s
Segment Time of Concentration	0.327 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	1,450.00 ft
Is Paved?	False
Slope	0.340 ft/ft
Average Velocity	9.41 ft/s
Segment Time of Concentration	0.043 hours

Segment #3: TR-55 Channel Flow

Flow Area	16.0 ft²
Hydraulic Length	252.00 ft
Manning's n	0.069
Slope	0.110 ft/ft
Wetted Perimeter	14.65 ft
Average Velocity	7.60 ft/s
Segment Time of Concentration	0.009 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.379 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

==== SCS TR-55 Sheet Flow

Tc = (0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations
Return Event: 2 years
Label: Basin F - Post
Storm Event: 2 Year Storm

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	100.00 ft
Manning's n	0.800
Slope	0.210 ft/ft
2 Year 24 Hour Depth	2.2 in
Average Velocity	0.09 ft/s
Segment Time of Concentration	0.293 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	800.00 ft
Is Paved?	False
Slope	0.400 ft/ft
Average Velocity	10.20 ft/s
Segment Time of Concentration	0.022 hours

Segment #3: TR-55 Channel Flow

Flow Area	16.0 ft²
Hydraulic Length	117.00 ft
Manning's n	0.400
Slope	0.040 ft/ft
Wetted Perimeter	14.65 ft
Average Velocity	0.79 ft/s
Segment Time of Concentration	0.041 hours

Segment #4: TR-55 Shallow Concentrated Flow

Hydraulic Length	1,015.00 ft
Is Paved?	False
Slope	0.145 ft/ft
Average Velocity	6.14 ft/s
Segment Time of Concentration	0.046 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.402 hours

Subsection: Time of Concentration Calculations
Return Event: 2 years
Label: Basin F - Post
Storm Event: 2 Year Storm

==== 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

==== SCS TR-55 Sheet Flow

Tc =

(0.007 * ((n * Lf)**0.8)) / ((P**0.5) * (Sf**0.4))

Where:

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

NPT Transition Station #1

Subsection: Runoff CN-Area
Label: Basin A - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	9.252	0.0	0.0	70.000
Woods - good - Soil D	77.000	0.14	0.0	0.0	77.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.809	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.268	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.211	0.0	0.0	98.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.023	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.008	0.0	0.0	89.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.003	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	10.714	(N/A)	(N/A)	70.999

Subsection: Runoff CN-Area
Label: Basin A - Pre

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	29.99	0.0	0.0	70.000
Woods - good - Soil D	77.000	1.893	0.0	0.0	77.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.11	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	31.993	(N/A)	(N/A)	70.510

Subsection: Runoff CN-Area
Label: Basin B - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.012	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.096	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.002	0.0	0.0	98.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.025	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.004	0.0	0.0	89.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.263	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.402	(N/A)	(N/A)	87.749

NPT Transition Station #1

Subsection: Runoff CN-Area
Label: Basin C - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.17	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.039	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.204	0.0	0.0	98.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.087	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.011	0.0	0.0	89.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.004	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.515	(N/A)	(N/A)	87.326

Subsection: Runoff CN-Area
Label: Basin D - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.005	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.068	0.0	0.0	78.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.073	(N/A)	(N/A)	77.521

NPT Transition Station #1

Subsection: Runoff CN-Area
Return Event: 2 years
Label: Basin E - Post
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	8.85	0.0	0.0	70.000
Woods - good - Soil D	77.000	0.27	0.0	0.0	77.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.18	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.164	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.03	0.0	0.0	98.000
Impervious Areas - Gravel (w/ right-of-way) - Soil C	89.000	0.01	0.0	0.0	89.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.006	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	9.51	(N/A)	(N/A)	70.477

Subsection: Runoff CN-Area
Label: Basin F - Post

Return Event: 2 years
Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Woods - good - Soil C	70.000	10.004	0.0	0.0	70.000
Woods - good - Soil D	77.000	0.329	0.0	0.0	77.000
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.109	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.004	0.0	0.0	78.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil C	98.000	0.055	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	10.501	(N/A)	(N/A)	70.379

Subsection: Runoff CN-Area

Label: Basin G - Post

Return Event: 2 years

Storm Event: 2 Year Storm

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Meadow - cont. grass (non grazed) - ---- - Soil C	71.000	0.052	0.0	0.0	71.000
Meadow - cont. grass (non grazed) - ---- - Soil D	78.000	0.055	0.0	0.0	78.000
Water/Pond - Soil C	98.000	0.12	0.0	0.0	98.000
Water/Pond - Soil D	98.000	0.051	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.278	(N/A)	(N/A)	88.993

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 acres

Computational Time Increment	0.060 hours
Time to Peak (Computed)	12.207 hours
Flow (Peak, Computed)	2.42 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	2.40 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	10.714 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	0.312 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.309 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.447 hours
Computational Time Increment	0.060 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.18 ft³/s
Unit peak time, Tp	0.298 hours
Unit receding limb, Tr	1.191 hours
Total unit time, Tb	1.489 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 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)
11.700	0.00	0.00	0.02	0.07	0.23
11.950	0.52	0.95	1.44	1.90	2.26
12.200	2.40	2.37	2.22	2.01	1.78
12.450	1.58	1.41	1.27	1.16	1.05
12.700	0.96	0.88	0.81	0.76	0.71
12.950	0.67	0.64	0.61	0.59	0.56
13.200	0.54	0.52	0.50	0.49	0.47
13.450	0.46	0.45	0.44	0.43	0.42
13.700	0.41	0.40	0.39	0.38	0.38
13.950	0.37	0.36	0.35	0.35	0.34
14.200	0.33	0.33	0.32	0.32	0.31
14.450	0.31	0.31	0.30	0.30	0.30
14.700	0.30	0.29	0.29	0.29	0.29
14.950	0.28	0.28	0.28	0.28	0.27
15.200	0.27	0.27	0.27	0.26	0.26
15.450	0.26	0.26	0.25	0.25	0.25
15.700	0.25	0.24	0.24	0.24	0.24
15.950	0.23	0.23	0.23	0.22	0.22
16.200	0.22	0.22	0.21	0.21	0.21
16.450	0.21	0.21	0.21	0.21	0.21
16.700	0.20	0.20	0.20	0.20	0.20
16.950	0.20	0.20	0.20	0.20	0.20
17.200	0.20	0.19	0.19	0.19	0.19
17.450	0.19	0.19	0.19	0.19	0.19
17.700	0.19	0.19	0.18	0.18	0.18
17.950	0.18	0.18	0.18	0.18	0.18
18.200	0.18	0.18	0.17	0.17	0.17
18.450	0.17	0.17	0.17	0.17	0.17
18.700	0.17	0.16	0.16	0.16	0.16
18.950	0.16	0.16	0.16	0.16	0.16
19.200	0.16	0.15	0.15	0.15	0.15
19.450	0.15	0.15	0.15	0.15	0.15
19.700	0.14	0.14	0.14	0.14	0.14
19.950	0.14	0.14	0.14	0.14	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	0.13	0.13	0.13
21.200	0.13	0.13	0.13	0.13	0.13
21.450	0.13	0.13	0.13	0.13	0.13
21.700	0.13	0.13	0.12	0.12	0.12
21.950	0.12	0.12	0.12	0.12	0.12

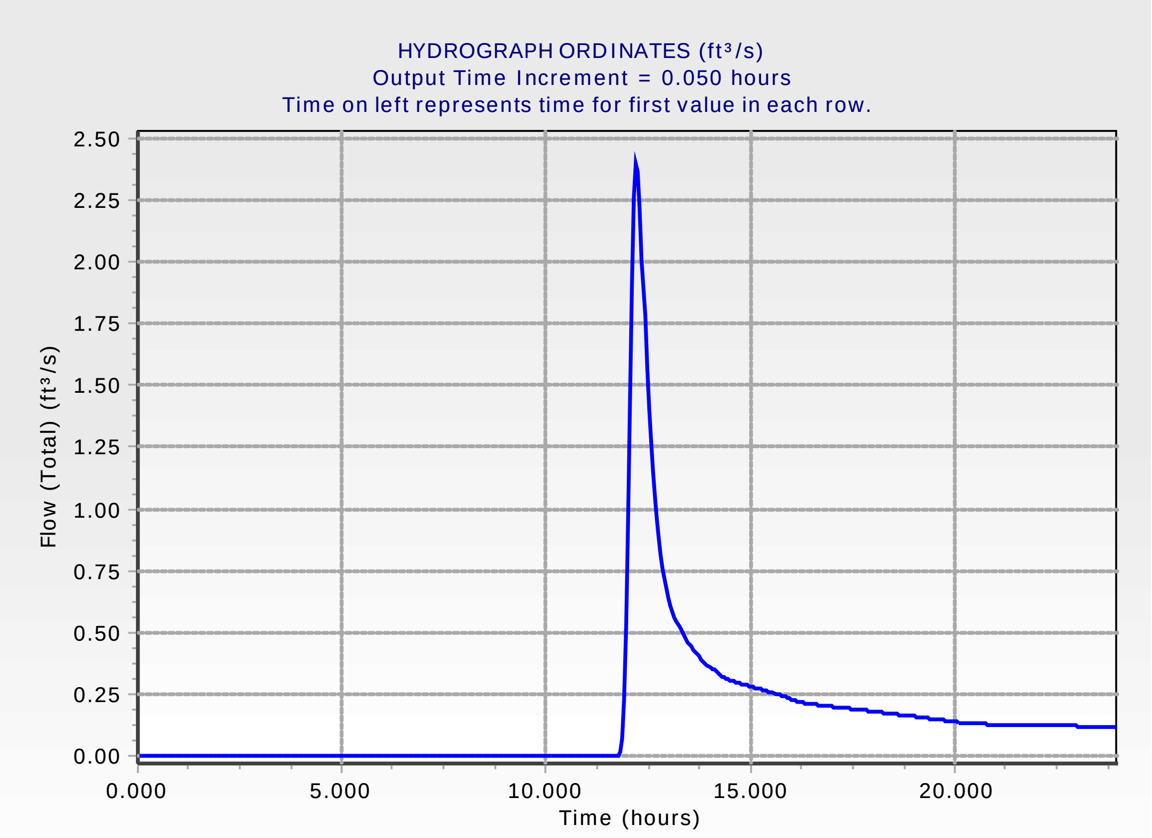
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.200	0.12	0.12	0.12	0.12	0.12
22.450	0.12	0.12	0.12	0.12	0.12
22.700	0.12	0.12	0.12	0.12	0.12
22.950	0.12	0.12	0.12	0.12	0.12
23.200	0.12	0.12	0.12	0.12	0.12
23.450	0.12	0.12	0.12	0.12	0.12
23.700	0.12	0.12	0.12	0.12	0.12
23.950	0.12	0.12	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years

Label: Basin A - Post Storm Event: 2 Year Storm



Subsection: Unit Hydrograph Summary — Return Event: 10 years

Label: Basin A - Post — Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 acres

Computational Time Increment	0.060 hours
Time to Peak (Computed)	12.207 hours
Flow (Peak, Computed)	6.93 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	6.92 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	10.714 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.720 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.714 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.447 hours
Computational Time Increment	0.060 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.18 ft³/s
Unit peak time, Tp	0.298 hours
Unit receding limb, Tr	1.191 hours
Total unit time, Tb	1.489 hours

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin A - Post

Return Event: 10 years
Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 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)
11.400	0.00	0.00	0.00	0.01	0.03
11.650	0.07	0.15	0.29	0.53	0.95
11.900	1.67	2.70	3.93	5.18	6.22
12.150	6.86	6.92	6.55	5.94	5.23
12.400	4.53	3.92	3.44	3.05	2.72
12.650	2.43	2.19	1.98	1.81	1.67
12.900	1.56	1.46	1.38	1.30	1.24
13.150	1.19	1.13	1.09	1.05	1.01
13.400	0.98	0.95	0.93	0.90	0.88
13.650	0.86	0.84	0.82	0.80	0.78
13.900	0.76	0.75	0.73	0.71	0.70
14.150	0.68	0.67	0.66	0.65	0.64
14.400	0.63	0.62	0.61	0.61	0.60
14.650	0.59	0.59	0.58	0.58	0.57
14.900	0.57	0.56	0.56	0.55	0.55
15.150	0.54	0.54	0.53	0.52	0.52
15.400	0.51	0.51	0.50	0.50	0.49
15.650	0.49	0.48	0.48	0.47	0.47
15.900	0.46	0.45	0.45	0.44	0.44
16.150	0.43	0.43	0.42	0.42	0.41
16.400	0.41	0.41	0.41	0.40	0.40
16.650	0.40	0.40	0.39	0.39	0.39
16.900	0.39	0.39	0.38	0.38	0.38
17.150	0.38	0.38	0.37	0.37	0.37
17.400	0.37	0.37	0.36	0.36	0.36
17.650	0.36	0.36	0.36	0.35	0.35
17.900	0.35	0.35	0.35	0.34	0.34
18.150	0.34	0.34	0.34	0.33	0.33
18.400	0.33	0.33	0.32	0.32	0.32
18.650	0.32	0.32	0.31	0.31	0.31
18.900	0.31	0.31	0.30	0.30	0.30
19.150	0.30	0.30	0.29	0.29	0.29
19.400	0.29	0.28	0.28	0.28	0.28
19.650	0.28	0.27	0.27	0.27	0.27
19.900	0.26	0.26	0.26	0.26	0.26
20.150	0.25	0.25	0.25	0.25	0.25
20.400	0.25	0.25	0.25	0.24	0.24
20.650	0.24	0.24	0.24	0.24	0.24
20.900	0.24	0.24	0.24	0.24	0.24
21.150	0.24	0.24	0.24	0.24	0.24
21.400	0.24	0.24	0.24	0.24	0.24
21.650	0.24	0.24	0.23	0.23	0.23

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years
Label: Basin A - Post
Storm Event: 10 Year Storm

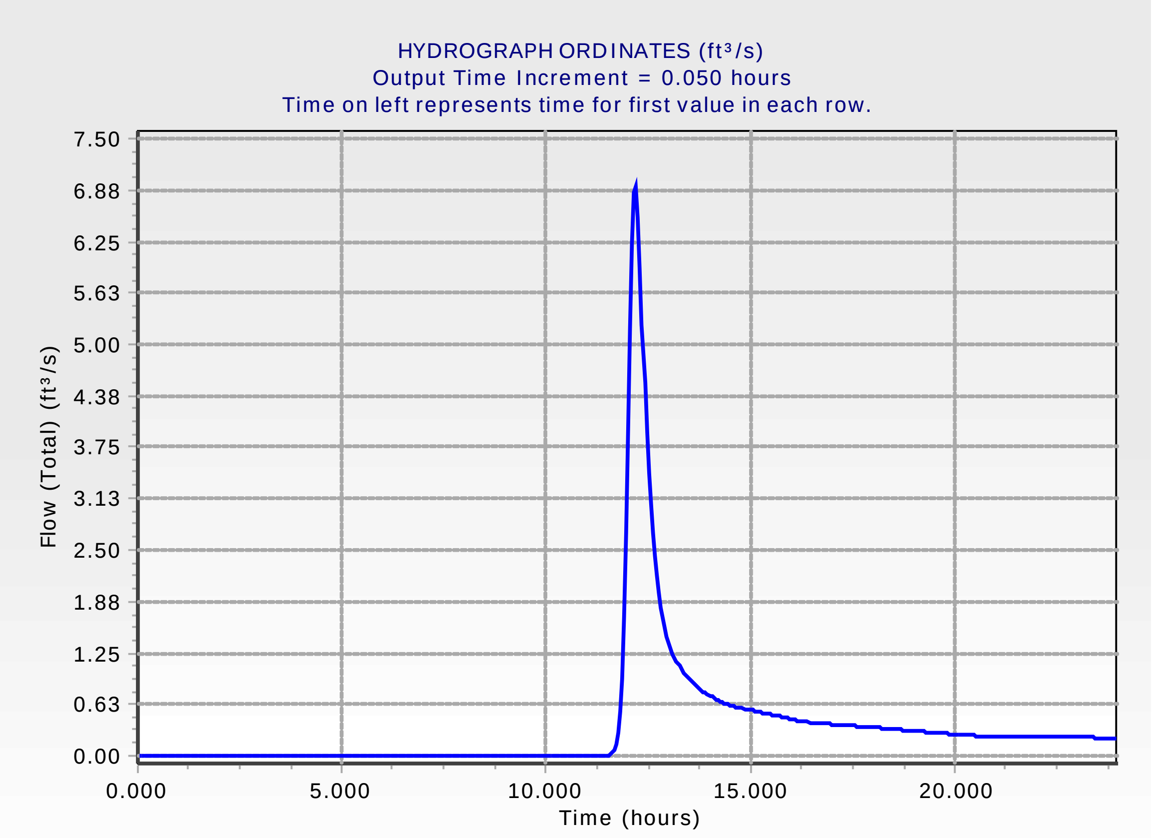
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
21.900	0.23	0.23	0.23	0.23	0.23
22.150	0.23	0.23	0.23	0.23	0.23
22.400	0.23	0.23	0.23	0.23	0.23
22.650	0.23	0.23	0.23	0.23	0.23
22.900	0.23	0.23	0.23	0.22	0.22
23.150	0.22	0.22	0.22	0.22	0.22
23.400	0.22	0.22	0.22	0.22	0.22
23.650	0.22	0.22	0.22	0.22	0.22
23.900	0.22	0.22	0.22	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years

Label: Basin A - Post
Storm Event: 10 Year Storm



Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 acres

Computational Time Increment	0.060 hours
Time to Peak (Computed)	12.147 hours
Flow (Peak, Computed)	15.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	15.05 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	10.714 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	1.438 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.427 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.447 hours
Computational Time Increment	0.060 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.18 ft³/s
Unit peak time, Tp	0.298 hours
Unit receding limb, Tr	1.191 hours
Total unit time, Tb	1.489 hours

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 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)
10.300	0.00	0.00	0.00	0.01	0.01
10.550	0.02	0.02	0.03	0.04	0.05
10.800	0.07	0.08	0.10	0.12	0.14
11.050	0.16	0.18	0.20	0.23	0.26
11.300	0.30	0.34	0.38	0.43	0.48
11.550	0.55	0.65	0.83	1.13	1.60
11.800	2.31	3.39	5.08	7.30	9.81
12.050	12.22	14.08	15.05	14.85	13.81
12.300	12.34	10.73	9.20	7.88	6.84
12.550	6.01	5.31	4.71	4.20	3.78
12.800	3.43	3.15	2.91	2.72	2.55
13.050	2.41	2.28	2.17	2.07	1.98
13.300	1.90	1.83	1.77	1.72	1.67
13.550	1.63	1.59	1.54	1.51	1.47
13.800	1.43	1.40	1.37	1.34	1.31
14.050	1.28	1.25	1.22	1.20	1.17
14.300	1.15	1.13	1.12	1.10	1.09
14.550	1.08	1.06	1.05	1.04	1.03
14.800	1.02	1.01	1.00	0.99	0.98
15.050	0.97	0.96	0.95	0.94	0.93
15.300	0.92	0.91	0.90	0.89	0.89
15.550	0.88	0.87	0.86	0.85	0.84
15.800	0.83	0.82	0.81	0.80	0.79
16.050	0.77	0.77	0.76	0.75	0.74
16.300	0.73	0.72	0.72	0.71	0.71
16.550	0.70	0.70	0.69	0.69	0.69
16.800	0.68	0.68	0.68	0.67	0.67
17.050	0.66	0.66	0.66	0.65	0.65
17.300	0.65	0.64	0.64	0.64	0.63
17.550	0.63	0.63	0.62	0.62	0.62
17.800	0.61	0.61	0.60	0.60	0.60
18.050	0.59	0.59	0.59	0.58	0.58
18.300	0.58	0.57	0.57	0.56	0.56
18.550	0.56	0.55	0.55	0.55	0.54
18.800	0.54	0.53	0.53	0.53	0.52
19.050	0.52	0.52	0.51	0.51	0.50
19.300	0.50	0.50	0.49	0.49	0.49
19.550	0.48	0.48	0.47	0.47	0.47
19.800	0.46	0.46	0.45	0.45	0.45
20.050	0.44	0.44	0.44	0.43	0.43
20.300	0.43	0.42	0.42	0.42	0.42
20.550	0.42	0.42	0.42	0.42	0.41

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 50 years
Label: Basin A - Post
Storm Event: 50 Year Storm

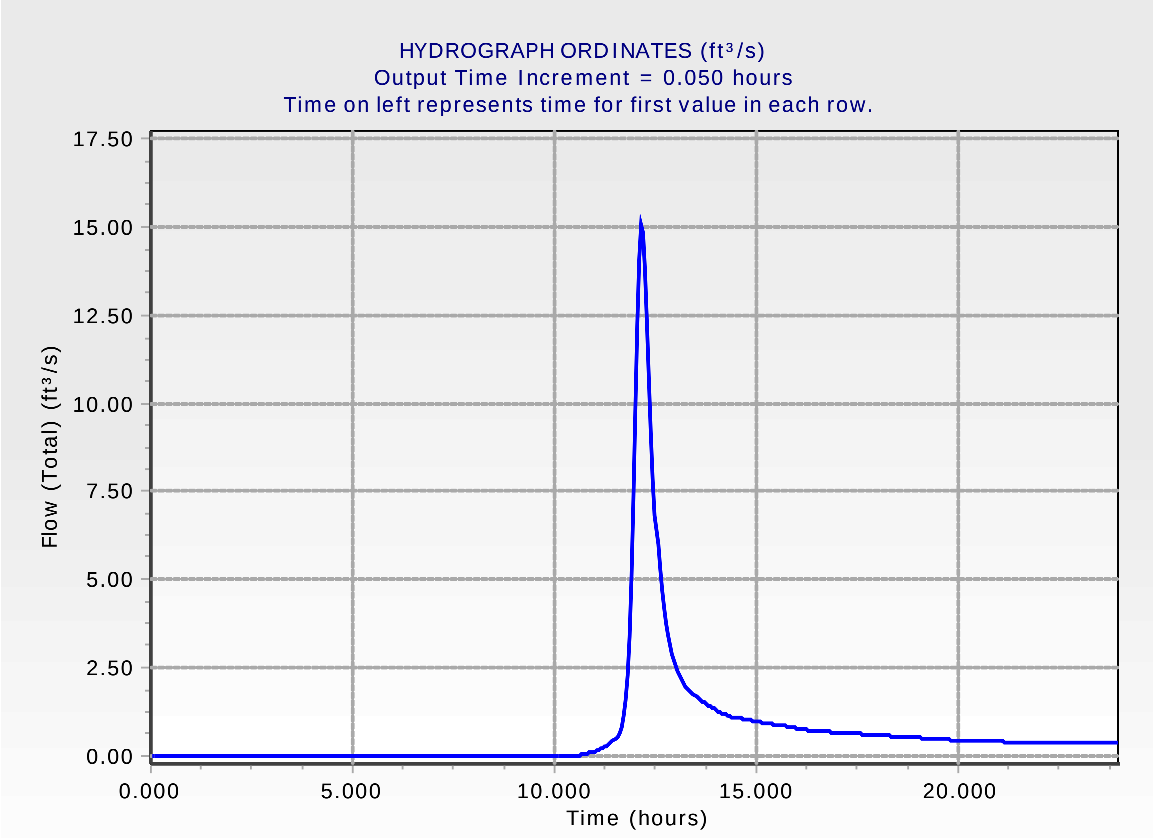
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.800	0.41	0.41	0.41	0.41	0.41
21.050	0.41	0.41	0.41	0.41	0.41
21.300	0.41	0.41	0.41	0.40	0.40
21.550	0.40	0.40	0.40	0.40	0.40
21.800	0.40	0.40	0.40	0.40	0.40
22.050	0.40	0.40	0.39	0.39	0.39
22.300	0.39	0.39	0.39	0.39	0.39
22.550	0.39	0.39	0.39	0.39	0.39
22.800	0.39	0.39	0.38	0.38	0.38
23.050	0.38	0.38	0.38	0.38	0.38
23.300	0.38	0.38	0.38	0.38	0.38
23.550	0.38	0.37	0.37	0.37	0.37
23.800	0.37	0.37	0.37	0.37	0.37

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years

Label: Basin A - Post Storm Event: 50 Year Storm



Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 acres

Computational Time Increment	0.060 hours
Time to Peak (Computed)	12.147 hours
Flow (Peak, Computed)	20.12 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	20.09 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	10.714 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	1.883 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.870 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.447 hours
Computational Time Increment	0.060 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	27.18 ft³/s
Unit peak time, Tp	0.298 hours
Unit receding limb, Tr	1.191 hours
Total unit time, Tb	1.489 hours

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.447 hours
Area (User Defined)	10.714 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)
9.650	0.00	0.00	0.00	0.01	0.01
9.900	0.01	0.02	0.03	0.03	0.04
10.150	0.05	0.06	0.07	0.08	0.09
10.400	0.11	0.12	0.14	0.15	0.17
10.650	0.18	0.20	0.22	0.25	0.27
10.900	0.30	0.32	0.35	0.38	0.42
11.150	0.45	0.50	0.54	0.59	0.65
11.400	0.72	0.79	0.87	0.97	1.12
11.650	1.39	1.82	2.49	3.51	5.01
11.900	7.29	10.24	13.53	16.62	18.95
12.150	20.09	19.70	18.23	16.23	14.06
12.400	12.01	10.26	8.88	7.78	6.85
12.650	6.06	5.40	4.84	4.38	4.02
12.900	3.71	3.45	3.24	3.05	2.89
13.150	2.75	2.62	2.51	2.40	2.31
13.400	2.23	2.17	2.11	2.05	2.00
13.650	1.94	1.89	1.85	1.80	1.76
13.900	1.72	1.68	1.64	1.60	1.57
14.150	1.53	1.50	1.47	1.44	1.42
14.400	1.40	1.38	1.36	1.35	1.33
14.650	1.32	1.30	1.29	1.28	1.27
14.900	1.25	1.24	1.23	1.22	1.20
15.150	1.19	1.18	1.17	1.15	1.14
15.400	1.13	1.12	1.10	1.09	1.08
15.650	1.07	1.05	1.04	1.03	1.02
15.900	1.00	0.99	0.98	0.97	0.95
16.150	0.94	0.93	0.92	0.91	0.90
16.400	0.89	0.89	0.88	0.87	0.87
16.650	0.86	0.86	0.85	0.85	0.84
16.900	0.84	0.84	0.83	0.83	0.82
17.150	0.82	0.81	0.81	0.80	0.80
17.400	0.80	0.79	0.79	0.78	0.78
17.650	0.77	0.77	0.76	0.76	0.75
17.900	0.75	0.75	0.74	0.74	0.73
18.150	0.73	0.72	0.72	0.71	0.71
18.400	0.70	0.70	0.70	0.69	0.69
18.650	0.68	0.68	0.67	0.67	0.66
18.900	0.66	0.65	0.65	0.64	0.64
19.150	0.63	0.63	0.62	0.62	0.62
19.400	0.61	0.61	0.60	0.60	0.59
19.650	0.59	0.58	0.58	0.57	0.57
19.900	0.56	0.56	0.55	0.55	0.54

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin A - Post

Return Event: 100 years
Storm Event: 100 Year Storm

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)
20.150	0.54	0.54	0.53	0.53	0.53
20.400	0.52	0.52	0.52	0.52	0.52
20.650	0.52	0.51	0.51	0.51	0.51
20.900	0.51	0.51	0.51	0.51	0.51
21.150	0.51	0.50	0.50	0.50	0.50
21.400	0.50	0.50	0.50	0.50	0.50
21.650	0.50	0.50	0.49	0.49	0.49
21.900	0.49	0.49	0.49	0.49	0.49
22.150	0.49	0.49	0.49	0.49	0.48
22.400	0.48	0.48	0.48	0.48	0.48
22.650	0.48	0.48	0.48	0.48	0.48
22.900	0.47	0.47	0.47	0.47	0.47
23.150	0.47	0.47	0.47	0.47	0.47
23.400	0.47	0.46	0.46	0.46	0.46
23.650	0.46	0.46	0.46	0.46	0.46
23.900	0.46	0.46	0.45	(N/A)	(N/A)

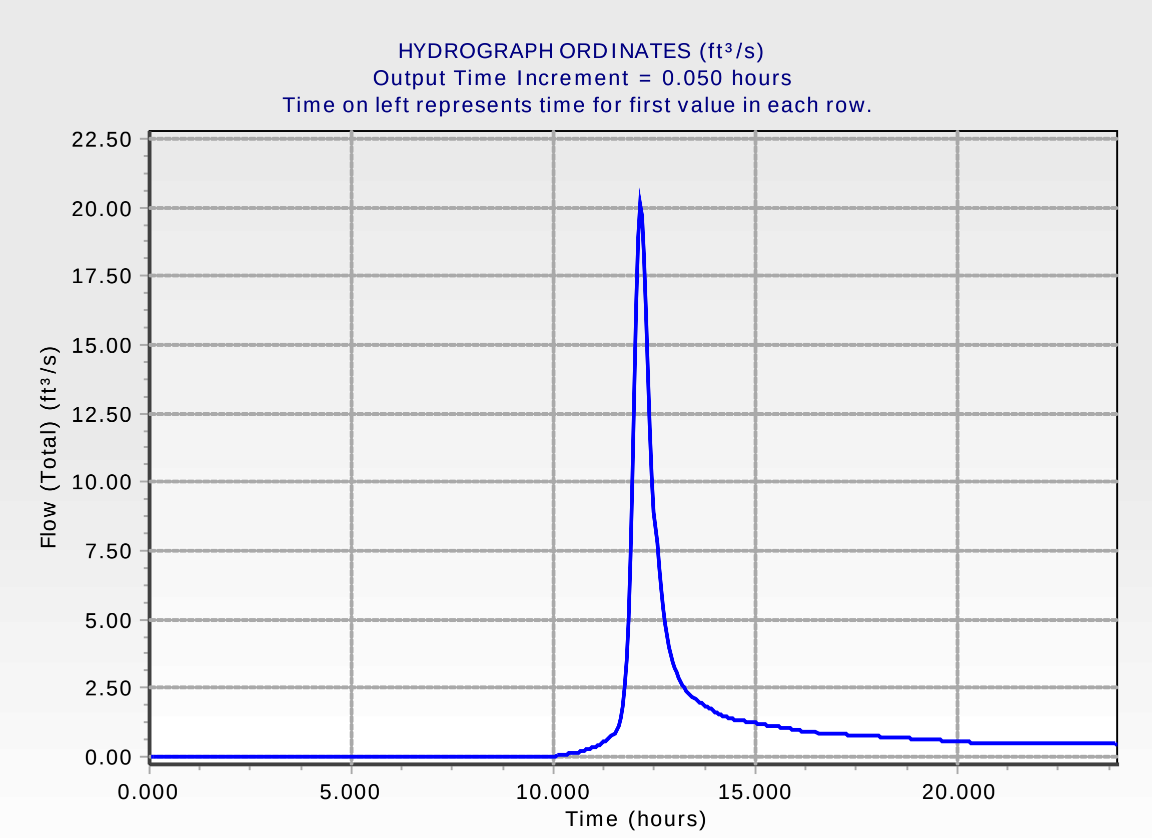
NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 100 years

Label: Basin A - Post

Storm Event: 100 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary — Return Event: 2 years

Label: Basin A - Pre — Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 acres

Computational Time Increment	0.057 hours
Time to Peak (Computed)	12.185 hours
Flow (Peak, Computed)	7.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	7.35 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	31.993 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	0.933 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.923 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.431 hours
Computational Time Increment	0.057 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	84.09 ft³/s
Unit peak time, Tp	0.287 hours
Unit receding limb, Tr	1.149 hours
Total unit time, Tb	1.437 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 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)
11.700	0.00	0.01	0.07	0.25	0.72
11.950	1.64	3.05	4.61	6.02	6.98
12.200	7.35	7.18	6.62	5.90	5.19
12.450	4.59	4.11	3.70	3.35	3.04
12.700	2.78	2.56	2.37	2.21	2.08
12.950	1.97	1.88	1.79	1.72	1.66
13.200	1.59	1.54	1.49	1.44	1.40
13.450	1.37	1.34	1.31	1.28	1.25
13.700	1.22	1.19	1.17	1.14	1.12
13.950	1.10	1.07	1.05	1.03	1.01
14.200	0.99	0.97	0.96	0.94	0.93
14.450	0.92	0.91	0.90	0.90	0.89
14.700	0.88	0.87	0.87	0.86	0.85
14.950	0.84	0.84	0.83	0.82	0.82
15.200	0.81	0.80	0.79	0.79	0.78
15.450	0.77	0.76	0.76	0.75	0.74
15.700	0.73	0.72	0.72	0.71	0.70
15.950	0.69	0.68	0.68	0.67	0.66
16.200	0.65	0.65	0.64	0.63	0.63
16.450	0.63	0.62	0.62	0.62	0.61
16.700	0.61	0.61	0.60	0.60	0.60
16.950	0.60	0.59	0.59	0.59	0.59
17.200	0.58	0.58	0.58	0.57	0.57
17.450	0.57	0.57	0.56	0.56	0.56
17.700	0.55	0.55	0.55	0.55	0.54
17.950	0.54	0.54	0.53	0.53	0.53
18.200	0.53	0.52	0.52	0.52	0.51
18.450	0.51	0.51	0.50	0.50	0.50
18.700	0.49	0.49	0.49	0.49	0.48
18.950	0.48	0.48	0.47	0.47	0.47
19.200	0.46	0.46	0.46	0.45	0.45
19.450	0.45	0.44	0.44	0.44	0.43
19.700	0.43	0.43	0.42	0.42	0.42
19.950	0.41	0.41	0.41	0.40	0.40
20.200	0.40	0.40	0.39	0.39	0.39
20.450	0.39	0.39	0.39	0.39	0.39
20.700	0.38	0.38	0.38	0.38	0.38
20.950	0.38	0.38	0.38	0.38	0.38
21.200	0.38	0.38	0.38	0.38	0.38
21.450	0.38	0.38	0.38	0.38	0.37
21.700	0.37	0.37	0.37	0.37	0.37
21.950	0.37	0.37	0.37	0.37	0.37

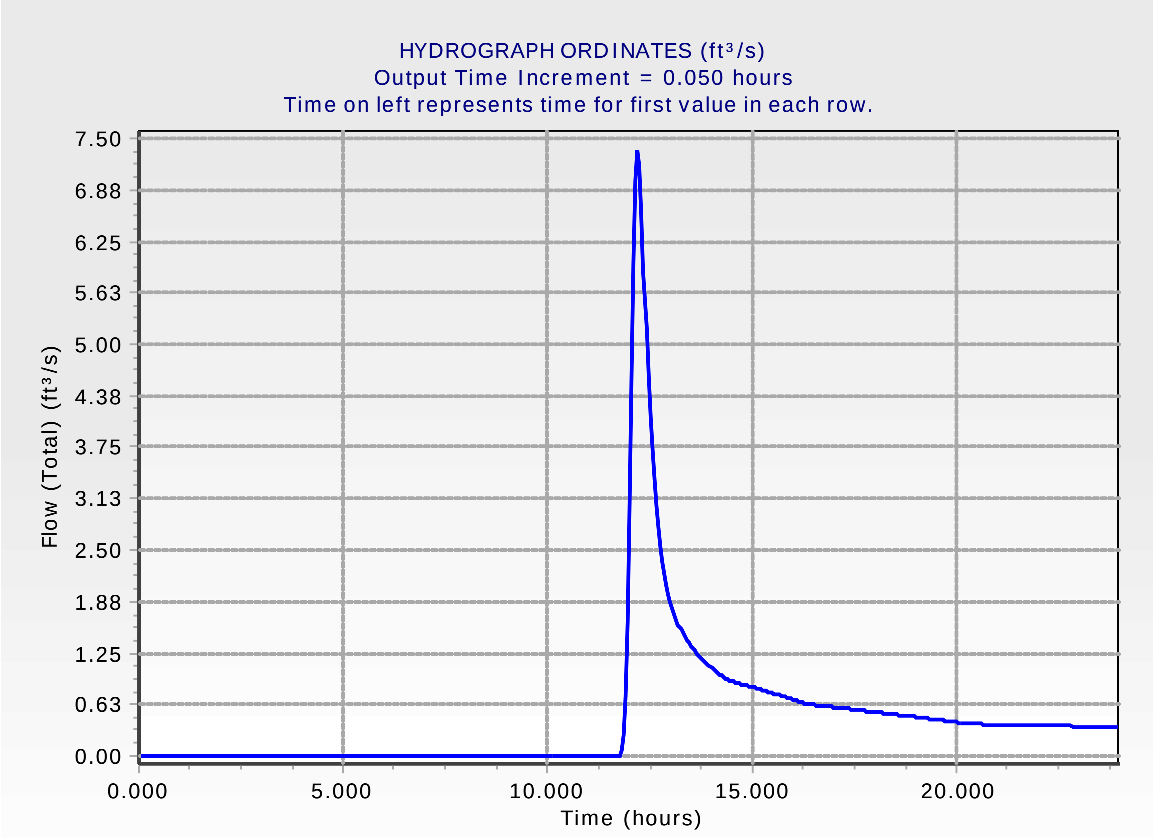
Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin A - Pre
Storm Event: 2 Year Storm

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)
22.200	0.37	0.37	0.37	0.37	0.37
22.450	0.37	0.37	0.37	0.36	0.36
22.700	0.36	0.36	0.36	0.36	0.36
22.950	0.36	0.36	0.36	0.36	0.36
23.200	0.36	0.36	0.36	0.36	0.36
23.450	0.36	0.35	0.35	0.35	0.35
23.700	0.35	0.35	0.35	0.35	0.35
23.950	0.35	0.35	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin A - Pre
Storm Event: 2 Year Storm



Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 acres

Computational Time Increment	0.057 hours
Time to Peak (Computed)	12.185 hours
Flow (Peak, Computed)	21.32 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	20.96 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	31.993 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	2.151 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	2.132 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.431 hours
Computational Time Increment	0.057 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	84.09 ft³/s
Unit peak time, Tp	0.287 hours
Unit receding limb, Tr	1.149 hours
Total unit time, Tb	1.437 hours

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 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	0.01	0.04
11.600	0.09	0.21	0.46	0.92	1.73
11.850	3.11	5.30	8.53	12.52	16.37
12.100	19.36	20.95	20.96	19.64	17.53
12.350	15.22	13.10	11.35	9.95	8.80
12.600	7.83	7.00	6.30	5.73	5.25
12.850	4.85	4.52	4.25	4.01	3.81
13.100	3.64	3.48	3.33	3.20	3.08
13.350	2.98	2.89	2.82	2.74	2.68
13.600	2.61	2.55	2.48	2.43	2.37
13.850	2.32	2.27	2.22	2.17	2.12
14.100	2.08	2.03	1.99	1.95	1.92
14.350	1.89	1.87	1.84	1.82	1.80
14.600	1.79	1.77	1.75	1.74	1.72
14.850	1.70	1.69	1.67	1.66	1.64
15.100	1.63	1.61	1.59	1.58	1.56
15.350	1.55	1.53	1.52	1.50	1.48
15.600	1.47	1.45	1.43	1.42	1.40
15.850	1.38	1.37	1.35	1.33	1.32
16.100	1.30	1.29	1.27	1.26	1.24
16.350	1.23	1.22	1.22	1.21	1.20
16.600	1.19	1.19	1.18	1.18	1.17
16.850	1.16	1.16	1.15	1.15	1.14
17.100	1.13	1.13	1.12	1.12	1.11
17.350	1.11	1.10	1.09	1.09	1.08
17.600	1.08	1.07	1.06	1.06	1.05
17.850	1.05	1.04	1.04	1.03	1.02
18.100	1.02	1.01	1.01	1.00	0.99
18.350	0.99	0.98	0.97	0.97	0.96
18.600	0.96	0.95	0.94	0.94	0.93
18.850	0.92	0.92	0.91	0.91	0.90
19.100	0.89	0.89	0.88	0.87	0.87
19.350	0.86	0.85	0.85	0.84	0.84
19.600	0.83	0.82	0.82	0.81	0.80
19.850	0.80	0.79	0.78	0.78	0.77
20.100	0.76	0.76	0.75	0.75	0.74
20.350	0.74	0.74	0.73	0.73	0.73
20.600	0.73	0.73	0.72	0.72	0.72
20.850	0.72	0.72	0.72	0.72	0.72
21.100	0.71	0.71	0.71	0.71	0.71
21.350	0.71	0.71	0.71	0.71	0.71
21.600	0.70	0.70	0.70	0.70	0.70

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin A - Pre

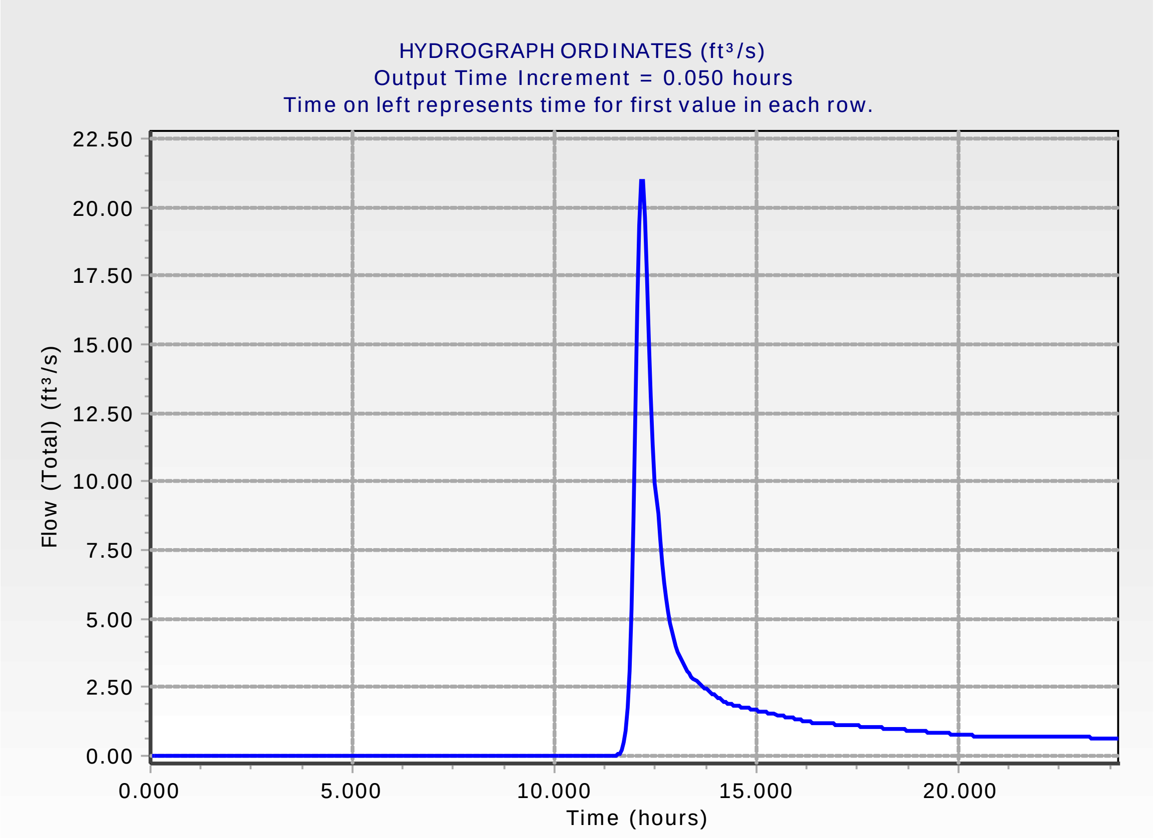
Return Event: 10 years
Storm Event: 10 Year Storm

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)
21.850	0.70	0.70	0.70	0.70	0.69
22.100	0.69	0.69	0.69	0.69	0.69
22.350	0.69	0.69	0.68	0.68	0.68
22.600	0.68	0.68	0.68	0.68	0.68
22.850	0.68	0.67	0.67	0.67	0.67
23.100	0.67	0.67	0.67	0.67	0.67
23.350	0.66	0.66	0.66	0.66	0.66
23.600	0.66	0.66	0.66	0.65	0.65
23.850	0.65	0.65	0.65	0.65	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years
Label: Basin A - Pre
Storm Event: 10 Year Storm



Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 acres

Computational Time Increment	0.057 hours
Time to Peak (Computed)	12.185 hours
Flow (Peak, Computed)	45.76 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	45.73 ft³/s

Drainage Area

SCS CN (Composite)	71.000
Area (User Defined)	31.993 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.6 in
Runoff Volume (Pervious)	4.293 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	4.261 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.431 hours
Computational Time Increment	0.057 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	84.09 ft³/s
Unit peak time, Tp	0.287 hours
Unit receding limb, Tr	1.149 hours
Total unit time, Tb	1.437 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years
Label: Basin A - Pre Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 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)
10.250	0.00	0.00	0.00	0.01	0.02
10.500	0.03	0.05	0.08	0.10	0.13
10.750	0.17	0.21	0.26	0.30	0.36
11.000	0.42	0.48	0.55	0.62	0.70
11.250	0.80	0.91	1.03	1.16	1.31
11.500	1.47	1.68	2.00	2.56	3.49
11.750	4.99	7.32	10.85	15.96	22.93
12.000	31.00	38.32	43.52	45.73	44.75
12.250	41.20	36.23	31.08	26.48	22.72
12.500	19.71	17.26	15.22	13.48	12.05
12.750	10.88	9.90	9.11	8.44	7.89
13.000	7.42	7.02	6.67	6.36	6.07
13.250	5.82	5.60	5.40	5.24	5.09
13.500	4.95	4.82	4.70	4.58	4.47
13.750	4.36	4.25	4.15	4.06	3.97
14.000	3.88	3.79	3.71	3.63	3.55
14.250	3.48	3.42	3.37	3.32	3.28
14.500	3.24	3.20	3.17	3.14	3.10
14.750	3.07	3.04	3.01	2.98	2.96
15.000	2.93	2.90	2.87	2.84	2.81
15.250	2.78	2.75	2.72	2.69	2.67
15.500	2.64	2.61	2.58	2.55	2.52
15.750	2.49	2.46	2.43	2.40	2.37
16.000	2.34	2.31	2.28	2.25	2.22
16.250	2.20	2.17	2.16	2.14	2.12
16.500	2.11	2.09	2.08	2.07	2.06
16.750	2.05	2.04	2.03	2.01	2.00
17.000	1.99	1.98	1.97	1.96	1.95
17.250	1.94	1.93	1.92	1.91	1.90
17.500	1.89	1.88	1.87	1.86	1.84
17.750	1.83	1.82	1.81	1.80	1.79
18.000	1.78	1.77	1.76	1.75	1.74
18.250	1.73	1.71	1.70	1.69	1.68
18.500	1.67	1.66	1.65	1.64	1.63
18.750	1.62	1.60	1.59	1.58	1.57
19.000	1.56	1.55	1.54	1.53	1.51
19.250	1.50	1.49	1.48	1.47	1.46
19.500	1.45	1.43	1.42	1.41	1.40
19.750	1.39	1.38	1.37	1.35	1.34
20.000	1.33	1.32	1.31	1.30	1.29
20.250	1.28	1.27	1.27	1.26	1.26
20.500	1.25	1.25	1.25	1.24	1.24

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin A - Pre

Return Event: 50 years
Storm Event: 50 Year Storm

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

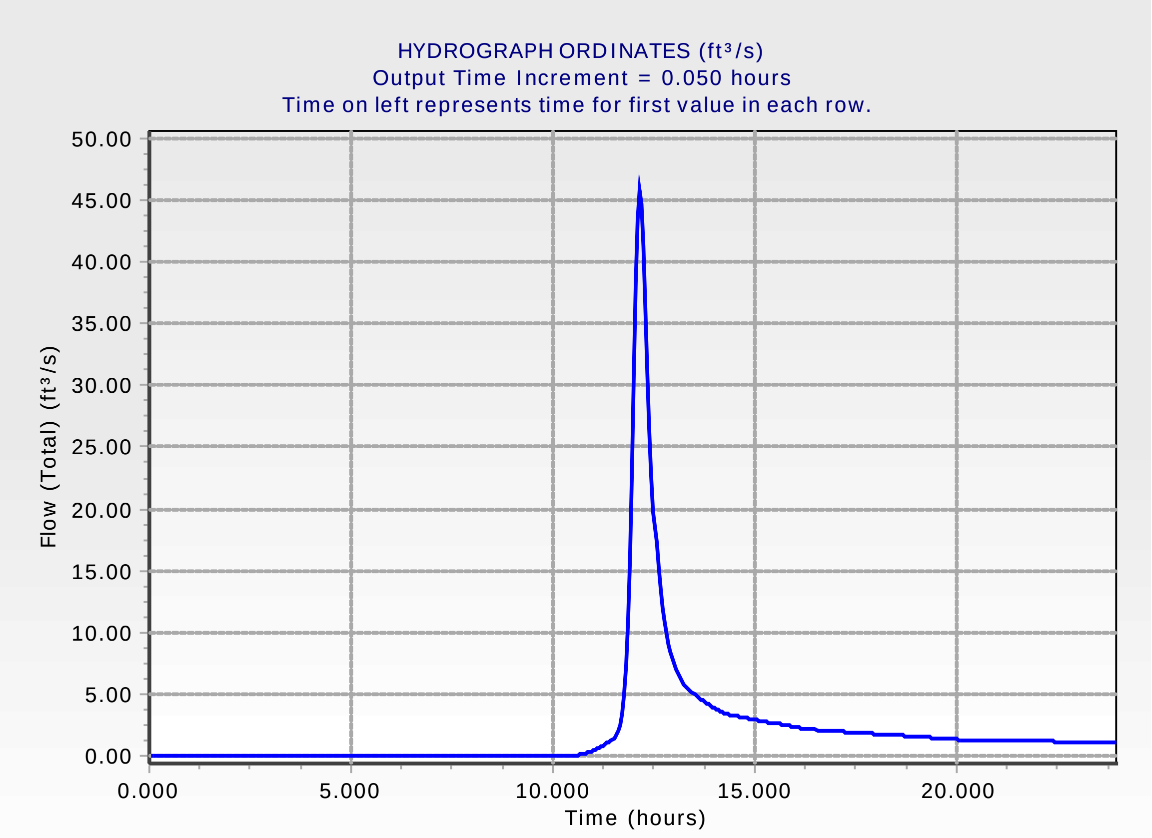
Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.750	1.24	1.24	1.23	1.23	1.23
21.000	1.23	1.22	1.22	1.22	1.22
21.250	1.22	1.21	1.21	1.21	1.21
21.500	1.21	1.20	1.20	1.20	1.20
21.750	1.20	1.19	1.19	1.19	1.19
22.000	1.19	1.18	1.18	1.18	1.18
22.250	1.17	1.17	1.17	1.17	1.17
22.500	1.16	1.16	1.16	1.16	1.16
22.750	1.15	1.15	1.15	1.15	1.15
23.000	1.14	1.14	1.14	1.14	1.13
23.250	1.13	1.13	1.13	1.13	1.12
23.500	1.12	1.12	1.12	1.12	1.11
23.750	1.11	1.11	1.11	1.10	1.10
24.000	1.10	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 50 years

Label: Basin A - Pre

Storm Event: 50 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary | Return Event: 100 years
Label: Basin A - Pre | Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 acres

Computational Time Increment	0.057 hours
Time to Peak (Computed)	12.127 hours
Flow (Peak, Computed)	61.12 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	60.96 ft³/s

Drainage Area	
SCS CN (Composite)	71.000
Area (User Defined)	31.993 acres
Maximum Retention (Pervious)	4.1 in
Maximum Retention (Pervious, 20 percent)	0.8 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	5.623 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	5.582 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.431 hours
Computational Time Increment	0.057 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	84.09 ft³/s
Unit peak time, Tp	0.287 hours
Unit receding limb, Tr	1.149 hours
Total unit time, Tb	1.437 hours

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.431 hours
Area (User Defined)	31.993 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	0.01	0.02
9.850	0.03	0.04	0.06	0.08	0.11
10.100	0.13	0.16	0.19	0.22	0.25
10.350	0.29	0.33	0.37	0.41	0.46
10.600	0.51	0.56	0.62	0.68	0.75
10.850	0.82	0.90	0.98	1.07	1.17
11.100	1.27	1.38	1.51	1.65	1.81
11.350	1.99	2.18	2.40	2.64	2.95
11.600	3.42	4.24	5.61	7.77	11.07
11.850	15.96	22.89	32.14	42.66	52.01
12.100	58.48	60.96	59.29	54.33	47.57
12.350	40.66	34.54	29.54	25.55	22.32
12.600	19.62	17.33	15.45	13.92	12.65
12.850	11.61	10.75	10.03	9.42	8.90
13.100	8.44	8.04	7.67	7.34	7.06
13.350	6.81	6.60	6.41	6.24	6.07
13.600	5.91	5.76	5.61	5.48	5.34
13.850	5.22	5.10	4.98	4.87	4.76
14.100	4.65	4.55	4.45	4.37	4.29
14.350	4.22	4.16	4.11	4.05	4.01
14.600	3.97	3.92	3.88	3.84	3.81
14.850	3.77	3.73	3.69	3.66	3.62
15.100	3.58	3.55	3.51	3.47	3.44
15.350	3.40	3.36	3.33	3.29	3.25
15.600	3.21	3.18	3.14	3.10	3.06
15.850	3.03	2.99	2.95	2.91	2.87
16.100	2.84	2.80	2.77	2.74	2.71
16.350	2.68	2.66	2.64	2.62	2.61
16.600	2.59	2.58	2.56	2.55	2.53
16.850	2.52	2.51	2.49	2.48	2.47
17.100	2.45	2.44	2.43	2.41	2.40
17.350	2.39	2.37	2.36	2.35	2.33
17.600	2.32	2.30	2.29	2.28	2.26
17.850	2.25	2.24	2.22	2.21	2.20
18.100	2.18	2.17	2.15	2.14	2.13
18.350	2.11	2.10	2.09	2.07	2.06
18.600	2.04	2.03	2.02	2.00	1.99
18.850	1.97	1.96	1.95	1.93	1.92
19.100	1.90	1.89	1.88	1.86	1.85
19.350	1.83	1.82	1.81	1.79	1.78
19.600	1.76	1.75	1.73	1.72	1.71
19.850	1.69	1.68	1.66	1.65	1.63

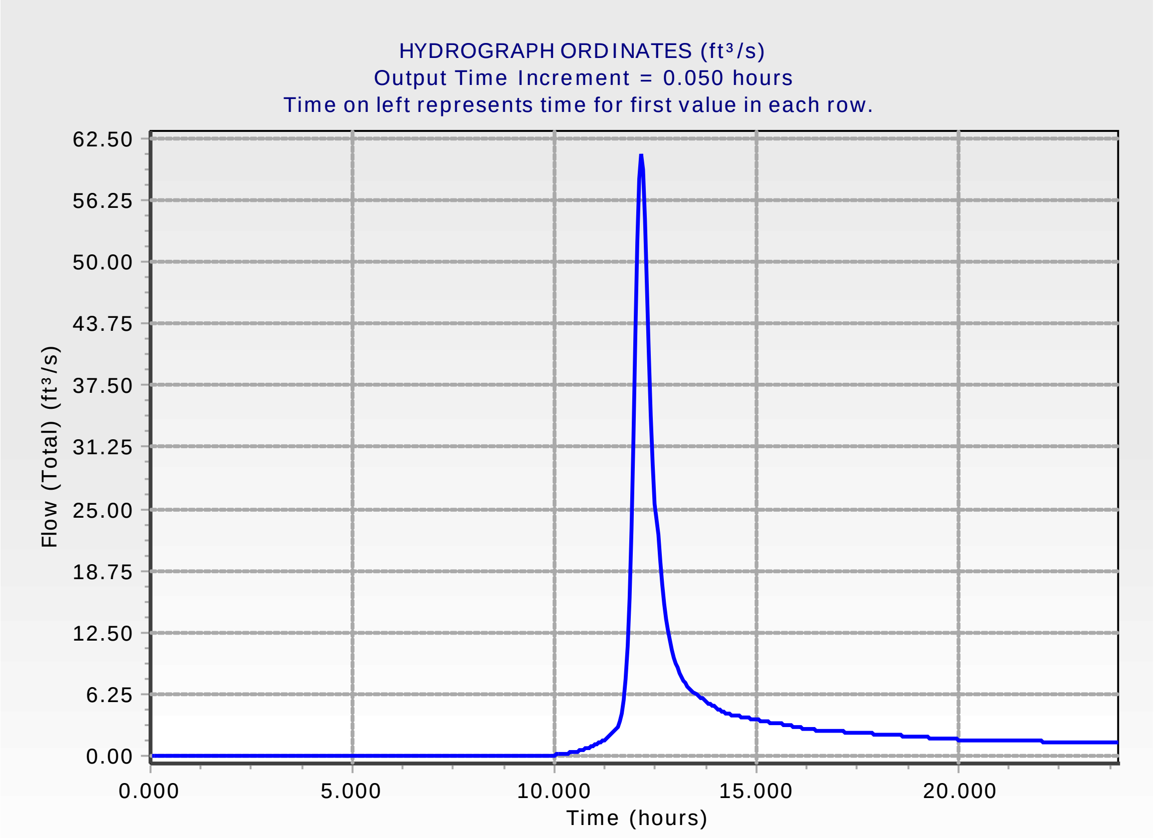
Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin A - Pre Storm Event: 100 Year Storm

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)
20.100	1.62	1.61	1.59	1.58	1.57
20.350	1.57	1.56	1.55	1.55	1.54
20.600	1.54	1.54	1.53	1.53	1.53
20.850	1.52	1.52	1.52	1.52	1.51
21.100	1.51	1.51	1.51	1.50	1.50
21.350	1.50	1.50	1.49	1.49	1.49
21.600	1.48	1.48	1.48	1.48	1.47
21.850	1.47	1.47	1.47	1.46	1.46
22.100	1.46	1.46	1.45	1.45	1.45
22.350	1.45	1.44	1.44	1.44	1.43
22.600	1.43	1.43	1.43	1.42	1.42
22.850	1.42	1.42	1.41	1.41	1.41
23.100	1.41	1.40	1.40	1.40	1.39
23.350	1.39	1.39	1.39	1.38	1.38
23.600	1.38	1.38	1.37	1.37	1.37
23.850	1.36	1.36	1.36	1.35	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 100 years
Label: Basin A - Pre
Storm Event: 100 Year Storm



Subsection: Unit Hydrograph Summary | Return Event: 2 years

Label: Basin B - Post | Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.72 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.68 ft³/s

Drainage Area

SCS CN (Composite)	88.000
Area (User Defined)	0.402 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.1 in
Runoff Volume (Pervious)	0.038 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.038 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.47 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin B - Post
Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 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)
8.700	0.00	0.00	0.00	0.00	0.00
8.950	0.00	0.00	0.00	0.00	0.00
9.200	0.00	0.00	0.00	0.00	0.00
9.450	0.00	0.00	0.00	0.00	0.00
9.700	0.00	0.00	0.00	0.00	0.00
9.950	0.01	0.01	0.01	0.01	0.01
10.200	0.01	0.01	0.01	0.01	0.01
10.450	0.01	0.01	0.01	0.01	0.01
10.700	0.01	0.01	0.01	0.01	0.02
10.950	0.02	0.02	0.02	0.02	0.02
11.200	0.02	0.02	0.03	0.03	0.03
11.450	0.03	0.04	0.05	0.07	0.12
11.700	0.17	0.24	0.32	0.48	0.68
11.950	0.68	0.61	0.42	0.19	0.13
12.200	0.11	0.10	0.10	0.09	0.08
12.450	0.07	0.07	0.06	0.06	0.06
12.700	0.05	0.05	0.05	0.05	0.05
12.950	0.05	0.04	0.04	0.04	0.04
13.200	0.04	0.04	0.04	0.04	0.04
13.450	0.03	0.03	0.03	0.03	0.03
13.700	0.03	0.03	0.03	0.03	0.03
13.950	0.03	0.03	0.03	0.03	0.03
14.200	0.03	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
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	0.01
16.950	0.01	0.01	0.01	0.01	0.01
17.200	0.01	0.01	0.01	0.01	0.01
17.450	0.01	0.01	0.01	0.01	0.01
17.700	0.01	0.01	0.01	0.01	0.01
17.950	0.01	0.01	0.01	0.01	0.01
18.200	0.01	0.01	0.01	0.01	0.01
18.450	0.01	0.01	0.01	0.01	0.01
18.700	0.01	0.01	0.01	0.01	0.01
18.950	0.01	0.01	0.01	0.01	0.01

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin B - Post
Storm Event: 2 Year Storm

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)
19.200	0.01	0.01	0.01	0.01	0.01
19.450	0.01	0.01	0.01	0.01	0.01
19.700	0.01	0.01	0.01	0.01	0.01
19.950	0.01	0.01	0.01	0.01	0.01
20.200	0.01	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)

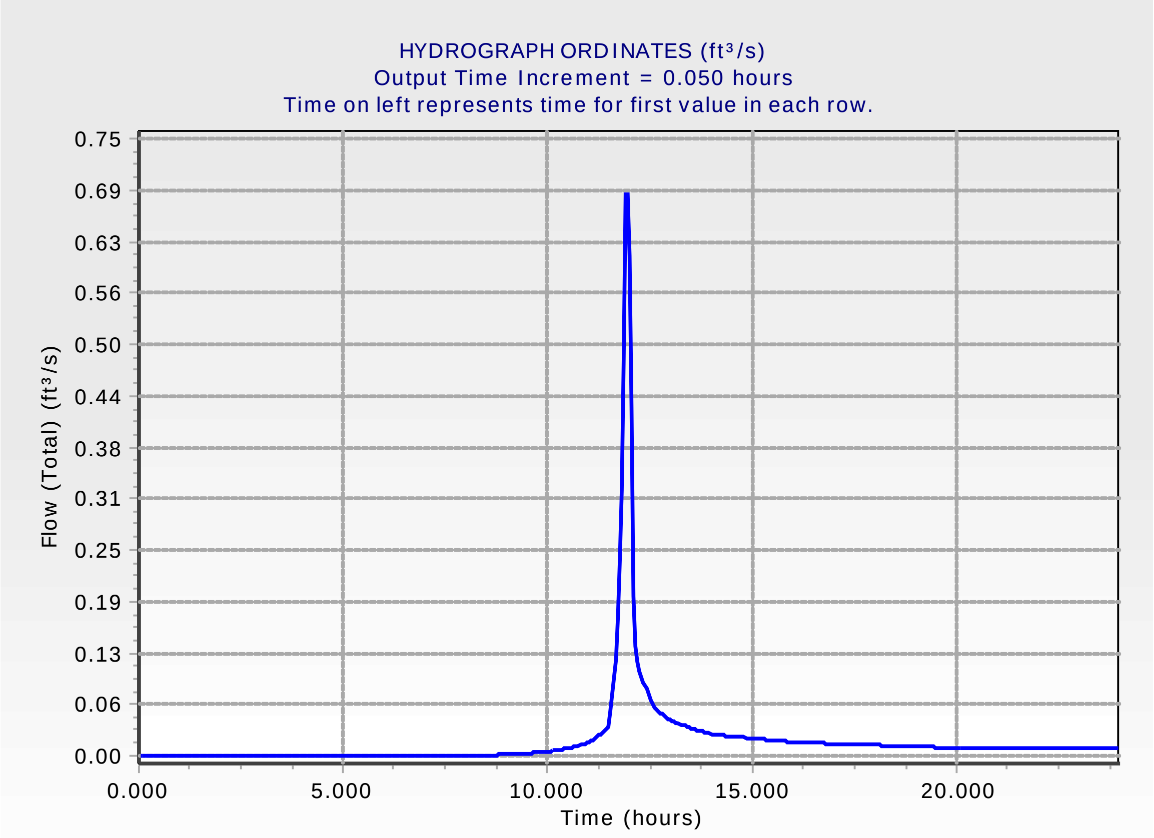
NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Basin B - Post

Return Event: 2 years

Storm Event: 2 Year Storm



Subsection: Unit Hydrograph Summary | Return Event: 10 years

Label: Basin B - Post | Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.19 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.15 ft³/s

Drainage Area

SCS CN (Composite)	88.000
Area (User Defined)	0.402 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.9 in
Runoff Volume (Pervious)	0.063 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.063 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.47 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years

Label: Basin B - Post Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 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)
7.000	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	0.00
7.750	0.00	0.00	0.00	0.00	0.00
8.000	0.00	0.00	0.00	0.00	0.00
8.250	0.00	0.00	0.00	0.00	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	0.01	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	0.02	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	0.03	0.03	0.03
10.750	0.03	0.03	0.03	0.03	0.04
11.000	0.04	0.04	0.04	0.04	0.05
11.250	0.05	0.06	0.06	0.06	0.07
11.500	0.07	0.10	0.15	0.22	0.32
11.750	0.44	0.57	0.83	1.15	1.12
12.000	0.98	0.68	0.31	0.21	0.18
12.250	0.16	0.15	0.14	0.13	0.12
12.500	0.11	0.10	0.09	0.09	0.08
12.750	0.08	0.08	0.08	0.07	0.07
13.000	0.07	0.07	0.06	0.06	0.06
13.250	0.06	0.06	0.06	0.05	0.05
13.500	0.05	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.04	0.04	0.04
14.000	0.04	0.04	0.04	0.04	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	0.03	0.03	0.03	0.03	0.03
15.000	0.03	0.03	0.03	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
17.000	0.02	0.02	0.02	0.02	0.02
17.250	0.02	0.02	0.02	0.02	0.02

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: Basin B - Post Storm Event: 10 Year Storm

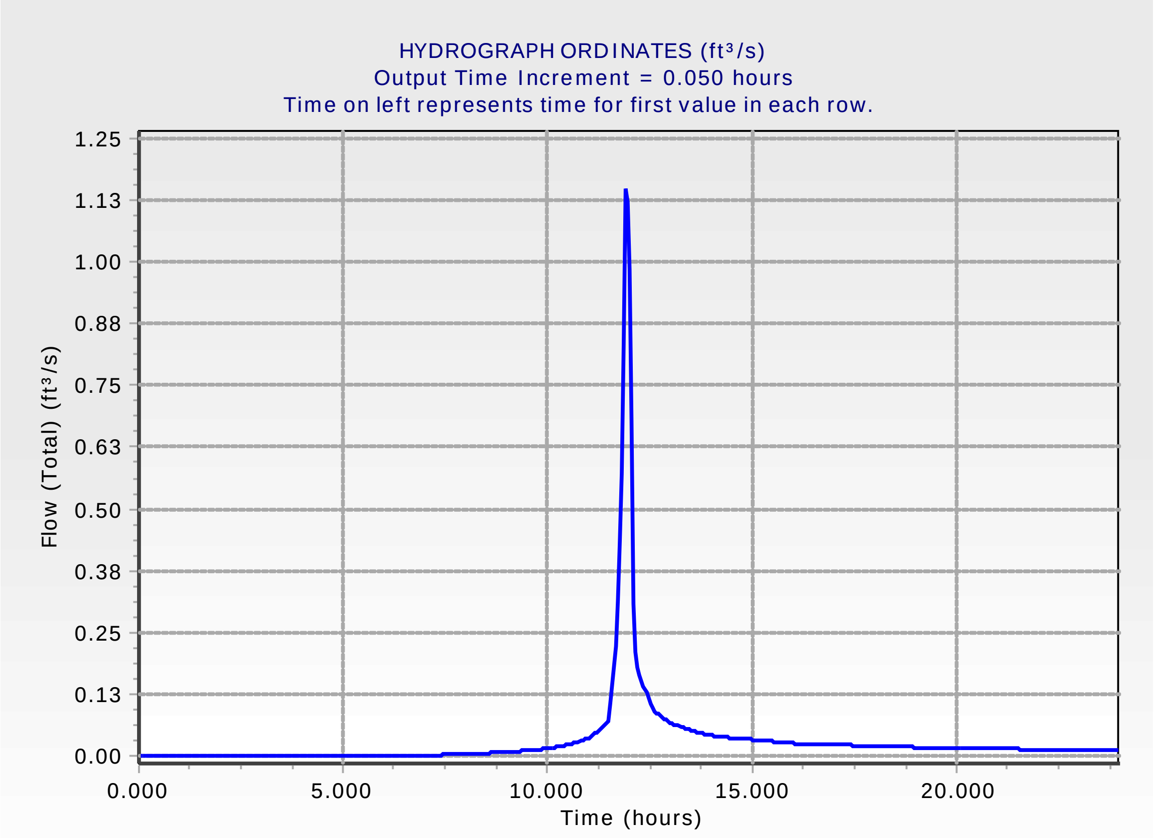
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
17.500	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	0.01	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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin B - Post

Return Event: 10 years
Storm Event: 10 Year Storm



Subsection: Unit Hydrograph Summary | Return Event: 50 years

Label: Basin B - Post | Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.87 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.82 ft³/s

Drainage Area

SCS CN (Composite)	88.000
Area (User Defined)	0.402 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.0 in
Runoff Volume (Pervious)	0.101 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.101 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.47 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)	Return Event: 50 years
Label: Basin B - Post	Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 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)
5.400	0.00	0.00	0.00	0.00	0.00
5.650	0.00	0.00	0.00	0.00	0.00
5.900	0.00	0.00	0.00	0.00	0.00
6.150	0.00	0.00	0.00	0.00	0.00
6.400	0.00	0.00	0.00	0.00	0.00
6.650	0.01	0.01	0.01	0.01	0.01
6.900	0.01	0.01	0.01	0.01	0.01
7.150	0.01	0.01	0.01	0.01	0.01
7.400	0.01	0.01	0.01	0.01	0.01
7.650	0.01	0.01	0.01	0.01	0.01
7.900	0.01	0.01	0.01	0.01	0.01
8.150	0.01	0.01	0.01	0.01	0.01
8.400	0.01	0.01	0.01	0.02	0.02
8.650	0.02	0.02	0.02	0.02	0.02
8.900	0.02	0.02	0.02	0.02	0.02
9.150	0.02	0.02	0.02	0.02	0.02
9.400	0.02	0.02	0.02	0.02	0.02
9.650	0.03	0.03	0.03	0.03	0.03
9.900	0.03	0.03	0.03	0.03	0.03
10.150	0.04	0.04	0.04	0.04	0.04
10.400	0.04	0.04	0.05	0.05	0.05
10.650	0.05	0.05	0.06	0.06	0.06
10.900	0.06	0.07	0.07	0.07	0.08
11.150	0.08	0.09	0.09	0.10	0.11
11.400	0.11	0.12	0.13	0.18	0.25
11.650	0.38	0.54	0.73	0.95	1.35
11.900	1.82	1.75	1.52	1.03	0.47
12.150	0.32	0.27	0.25	0.23	0.21
12.400	0.19	0.18	0.16	0.15	0.14
12.650	0.13	0.13	0.12	0.12	0.11
12.900	0.11	0.11	0.10	0.10	0.10
13.150	0.09	0.09	0.09	0.09	0.08
13.400	0.08	0.08	0.08	0.08	0.07
13.650	0.07	0.07	0.07	0.07	0.07
13.900	0.06	0.06	0.06	0.06	0.06
14.150	0.06	0.06	0.06	0.06	0.06
14.400	0.06	0.05	0.05	0.05	0.05
14.650	0.05	0.05	0.05	0.05	0.05
14.900	0.05	0.05	0.05	0.05	0.05
15.150	0.05	0.05	0.05	0.05	0.05
15.400	0.04	0.04	0.04	0.04	0.04
15.650	0.04	0.04	0.04	0.04	0.04

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years
Label: Basin B - Post Storm Event: 50 Year Storm

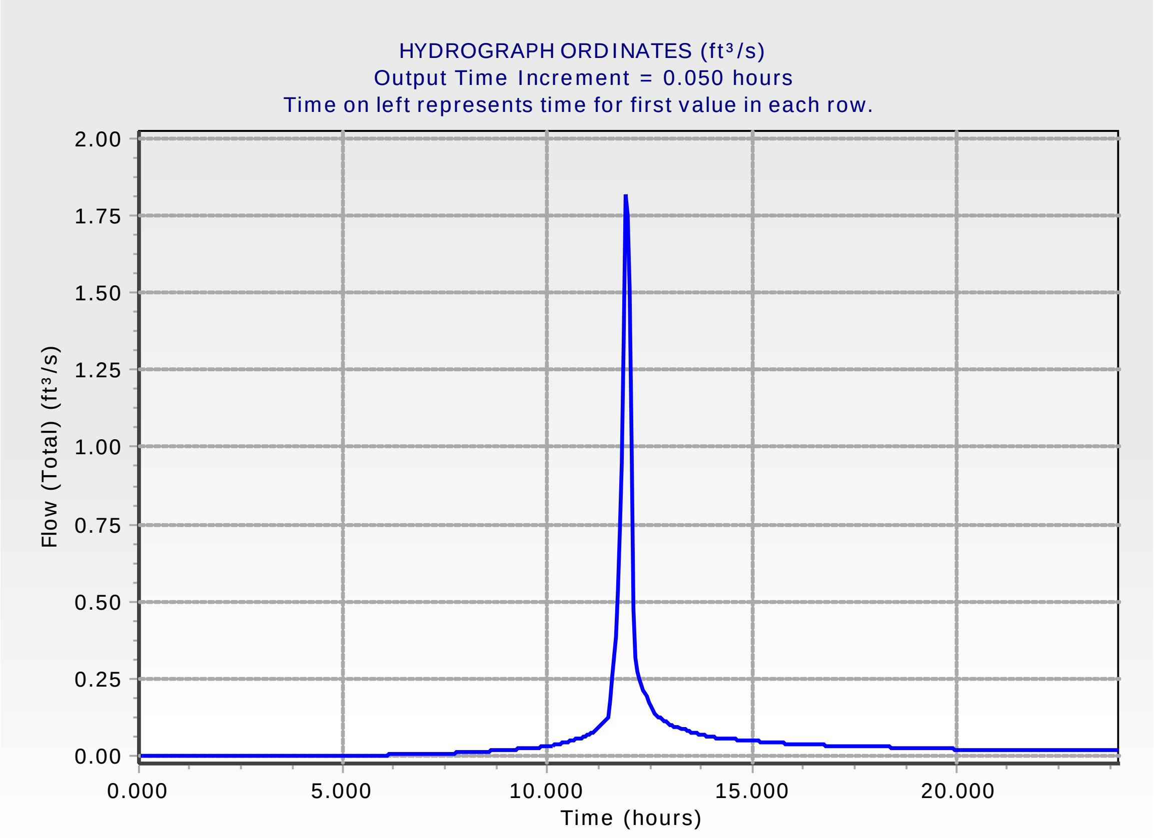
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.900	0.04	0.04	0.04	0.04	0.04
16.150	0.04	0.04	0.04	0.04	0.04
16.400	0.04	0.04	0.04	0.04	0.03
16.650	0.03	0.03	0.03	0.03	0.03
16.900	0.03	0.03	0.03	0.03	0.03
17.150	0.03	0.03	0.03	0.03	0.03
17.400	0.03	0.03	0.03	0.03	0.03
17.650	0.03	0.03	0.03	0.03	0.03
17.900	0.03	0.03	0.03	0.03	0.03
18.150	0.03	0.03	0.03	0.03	0.03
18.400	0.03	0.03	0.03	0.03	0.03
18.650	0.03	0.03	0.03	0.03	0.03
18.900	0.03	0.03	0.03	0.03	0.03
19.150	0.02	0.02	0.02	0.02	0.02
19.400	0.02	0.02	0.02	0.02	0.02
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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years

Label: Basin B - Post Storm Event: 50 Year Storm



Subsection: Unit Hydrograph Summary
Return Event: 100 years
Label: Basin B - Post
Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.25 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.19 ft³/s

Drainage Area

SCS CN (Composite)	88.000
Area (User Defined)	0.402 acres
Maximum Retention (Pervious)	1.4 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.7 in
Runoff Volume (Pervious)	0.123 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.122 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.47 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin B - Post Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.402 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)
4.800	0.00	0.00	0.00	0.00	0.00
5.050	0.00	0.00	0.00	0.00	0.00
5.300	0.00	0.00	0.00	0.00	0.00
5.550	0.00	0.00	0.00	0.00	0.00
5.800	0.00	0.00	0.01	0.01	0.01
6.050	0.01	0.01	0.01	0.01	0.01
6.300	0.01	0.01	0.01	0.01	0.01
6.550	0.01	0.01	0.01	0.01	0.01
6.800	0.01	0.01	0.01	0.01	0.01
7.050	0.01	0.01	0.01	0.01	0.01
7.300	0.01	0.01	0.01	0.01	0.01
7.550	0.01	0.01	0.01	0.01	0.01
7.800	0.01	0.01	0.01	0.01	0.02
8.050	0.02	0.02	0.02	0.02	0.02
8.300	0.02	0.02	0.02	0.02	0.02
8.550	0.02	0.02	0.02	0.02	0.02
8.800	0.02	0.03	0.03	0.03	0.03
9.050	0.03	0.03	0.03	0.03	0.03
9.300	0.03	0.03	0.03	0.03	0.03
9.550	0.03	0.03	0.03	0.03	0.04
9.800	0.04	0.04	0.04	0.04	0.04
10.050	0.04	0.04	0.05	0.05	0.05
10.300	0.05	0.05	0.05	0.06	0.06
10.550	0.06	0.06	0.07	0.07	0.07
10.800	0.08	0.08	0.08	0.09	0.09
11.050	0.09	0.10	0.10	0.11	0.12
11.300	0.13	0.14	0.14	0.15	0.16
11.550	0.23	0.32	0.48	0.66	0.90
11.800	1.15	1.63	2.19	2.10	1.81
12.050	1.23	0.56	0.38	0.32	0.29
12.300	0.27	0.25	0.23	0.21	0.19
12.550	0.17	0.16	0.15	0.15	0.14
12.800	0.14	0.13	0.13	0.13	0.12
13.050	0.12	0.11	0.11	0.11	0.10
13.300	0.10	0.10	0.10	0.09	0.09
13.550	0.09	0.09	0.09	0.08	0.08
13.800	0.08	0.08	0.08	0.07	0.07
14.050	0.07	0.07	0.07	0.07	0.07
14.300	0.07	0.07	0.07	0.06	0.06
14.550	0.06	0.06	0.06	0.06	0.06
14.800	0.06	0.06	0.06	0.06	0.06
15.050	0.06	0.06	0.06	0.05	0.05

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years

Label: Basin B - Post Storm Event: 100 Year Storm

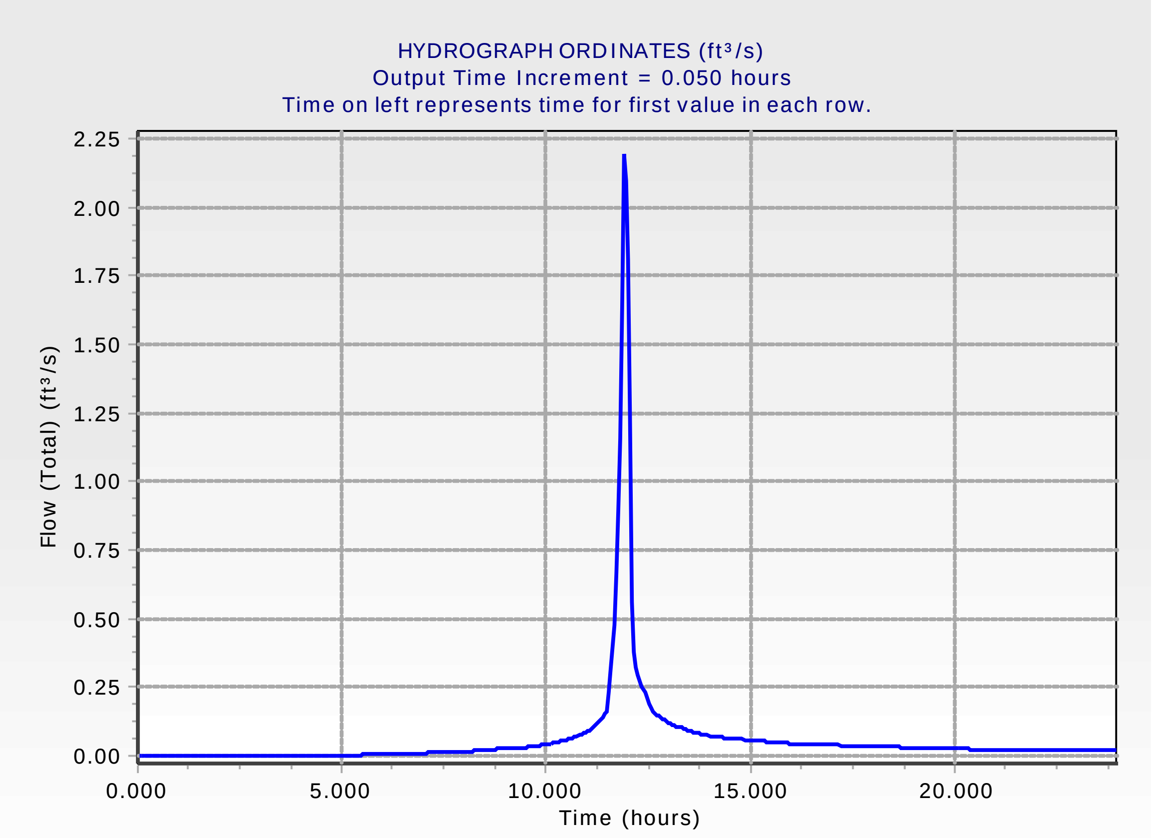
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.300	0.05	0.05	0.05	0.05	0.05
15.550	0.05	0.05	0.05	0.05	0.05
15.800	0.05	0.05	0.05	0.05	0.04
16.050	0.04	0.04	0.04	0.04	0.04
16.300	0.04	0.04	0.04	0.04	0.04
16.550	0.04	0.04	0.04	0.04	0.04
16.800	0.04	0.04	0.04	0.04	0.04
17.050	0.04	0.04	0.04	0.04	0.04
17.300	0.04	0.04	0.04	0.04	0.04
17.550	0.04	0.04	0.04	0.04	0.04
17.800	0.04	0.04	0.04	0.03	0.03
18.050	0.03	0.03	0.03	0.03	0.03
18.300	0.03	0.03	0.03	0.03	0.03
18.550	0.03	0.03	0.03	0.03	0.03
18.800	0.03	0.03	0.03	0.03	0.03
19.050	0.03	0.03	0.03	0.03	0.03
19.300	0.03	0.03	0.03	0.03	0.03
19.550	0.03	0.03	0.03	0.03	0.03
19.800	0.03	0.03	0.03	0.03	0.03
20.050	0.03	0.02	0.02	0.02	0.02
20.300	0.02	0.02	0.02	0.02	0.02
20.550	0.02	0.02	0.02	0.02	0.02
20.800	0.02	0.02	0.02	0.02	0.02
21.050	0.02	0.02	0.02	0.02	0.02
21.300	0.02	0.02	0.02	0.02	0.02
21.550	0.02	0.02	0.02	0.02	0.02
21.800	0.02	0.02	0.02	0.02	0.02
22.050	0.02	0.02	0.02	0.02	0.02
22.300	0.02	0.02	0.02	0.02	0.02
22.550	0.02	0.02	0.02	0.02	0.02
22.800	0.02	0.02	0.02	0.02	0.02
23.050	0.02	0.02	0.02	0.02	0.02
23.300	0.02	0.02	0.02	0.02	0.02
23.550	0.02	0.02	0.02	0.02	0.02
23.800	0.02	0.02	0.02	0.02	0.02

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years

Label: Basin B - Post Storm Event: 100 Year Storm



Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	11.948 hours
Flow (Peak, Computed)	0.82 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.82 ft³/s

Drainage Area

SCS CN (Composite)	87.000
Area (User Defined)	0.515 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.1 in
Runoff Volume (Pervious)	0.046 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.046 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.107 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.44 ft³/s
Unit peak time, Tp	0.071 hours
Unit receding limb, Tr	0.286 hours
Total unit time, Tb	0.357 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: Basin C - Post Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 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)
9.050	0.00	0.00	0.00	0.00	0.00
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	0.02	0.02	0.02
11.050	0.02	0.02	0.02	0.02	0.03
11.300	0.03	0.03	0.03	0.04	0.04
11.550	0.05	0.08	0.11	0.18	0.25
11.800	0.35	0.50	0.74	0.82	0.76
12.050	0.60	0.33	0.20	0.15	0.14
12.300	0.12	0.11	0.10	0.10	0.09
12.550	0.08	0.07	0.07	0.07	0.06
12.800	0.06	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	0.04	0.04	0.04
13.550	0.04	0.04	0.04	0.04	0.04
13.800	0.04	0.04	0.03	0.03	0.03
14.050	0.03	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	0.02	0.02	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	0.02	0.02	0.02	0.02	0.02
17.550	0.02	0.02	0.02	0.02	0.02
17.800	0.02	0.02	0.02	0.02	0.02
18.050	0.02	0.02	0.02	0.02	0.02
18.300	0.02	0.02	0.02	0.02	0.02
18.550	0.02	0.02	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

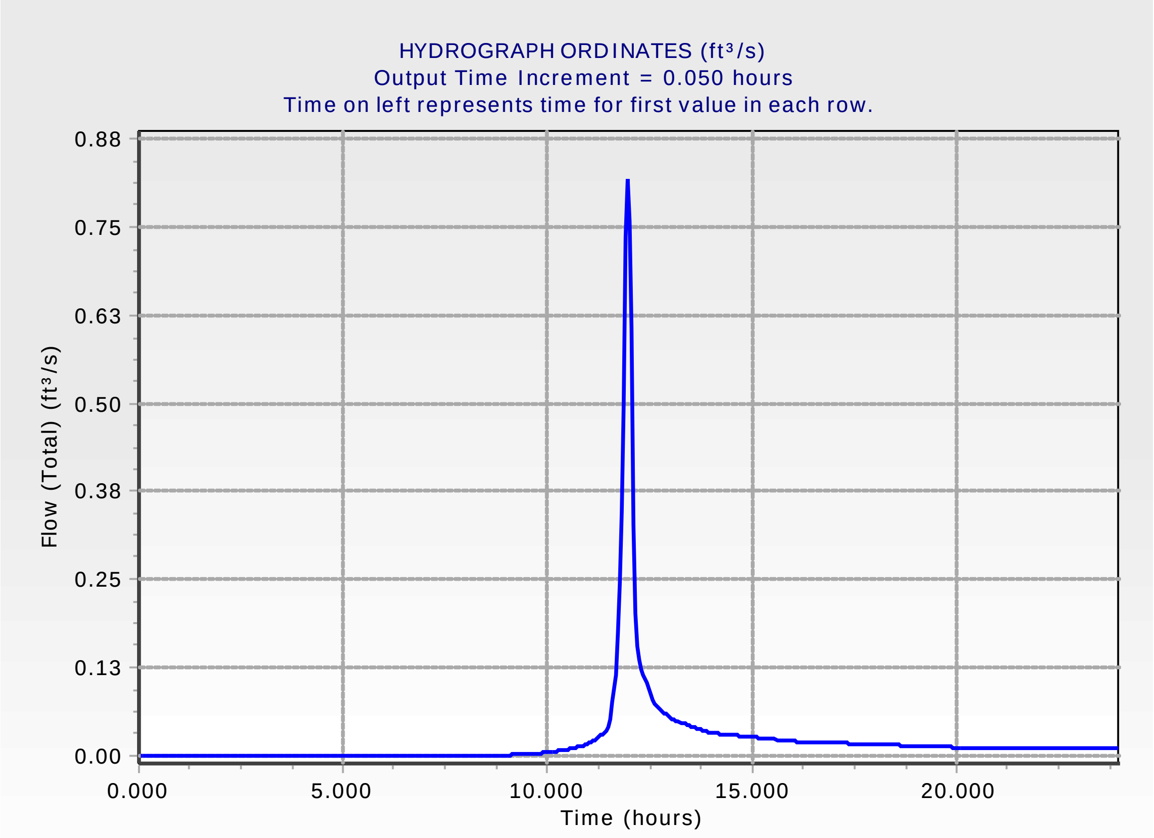
NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin C - Post
Storm Event: 2 Year Storm

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)
19.550	0.01	0.01	0.01	0.01	0.01
19.800	0.01	0.01	0.01	0.01	0.01
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

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin C - Post
Storm Event: 2 Year Storm



Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	11.934 hours
Flow (Peak, Computed)	1.40 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	1.38 ft³/s

Drainage Area

SCS CN (Composite)	87.000
Area (User Defined)	0.515 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.8 in
Runoff Volume (Pervious)	0.078 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.078 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.107 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.44 ft³/s
Unit peak time, Tp	0.071 hours
Unit receding limb, Tr	0.286 hours
Total unit time, Tb	0.357 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: Basin C - Post Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 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)
7.350	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	0.00	0.00
8.100	0.00	0.00	0.00	0.00	0.00
8.350	0.00	0.00	0.00	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	0.01
9.100	0.01	0.01	0.01	0.01	0.01
9.350	0.01	0.01	0.01	0.01	0.01
9.600	0.01	0.01	0.01	0.01	0.01
9.850	0.01	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	0.03	0.03
10.600	0.03	0.03	0.03	0.03	0.03
10.850	0.04	0.04	0.04	0.04	0.04
11.100	0.05	0.05	0.05	0.06	0.06
11.350	0.07	0.07	0.08	0.08	0.11
11.600	0.16	0.23	0.34	0.47	0.64
11.850	0.89	1.28	1.38	1.25	0.99
12.100	0.53	0.33	0.25	0.22	0.20
12.350	0.18	0.17	0.15	0.14	0.13
12.600	0.12	0.11	0.11	0.10	0.10
12.850	0.10	0.09	0.09	0.09	0.08
13.100	0.08	0.08	0.08	0.07	0.07
13.350	0.07	0.07	0.07	0.07	0.06
13.600	0.06	0.06	0.06	0.06	0.06
13.850	0.06	0.05	0.05	0.05	0.05
14.100	0.05	0.05	0.05	0.05	0.05
14.350	0.05	0.05	0.05	0.05	0.05
14.600	0.05	0.04	0.04	0.04	0.04
14.850	0.04	0.04	0.04	0.04	0.04
15.100	0.04	0.04	0.04	0.04	0.04
15.350	0.04	0.04	0.04	0.04	0.04
15.600	0.04	0.04	0.04	0.03	0.03
15.850	0.03	0.03	0.03	0.03	0.03
16.100	0.03	0.03	0.03	0.03	0.03
16.350	0.03	0.03	0.03	0.03	0.03
16.600	0.03	0.03	0.03	0.03	0.03
16.850	0.03	0.03	0.03	0.03	0.03
17.100	0.03	0.03	0.03	0.03	0.03
17.350	0.03	0.03	0.03	0.03	0.03
17.600	0.03	0.03	0.03	0.03	0.03

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin C - Post

Return Event: 10 years
Storm Event: 10 Year Storm

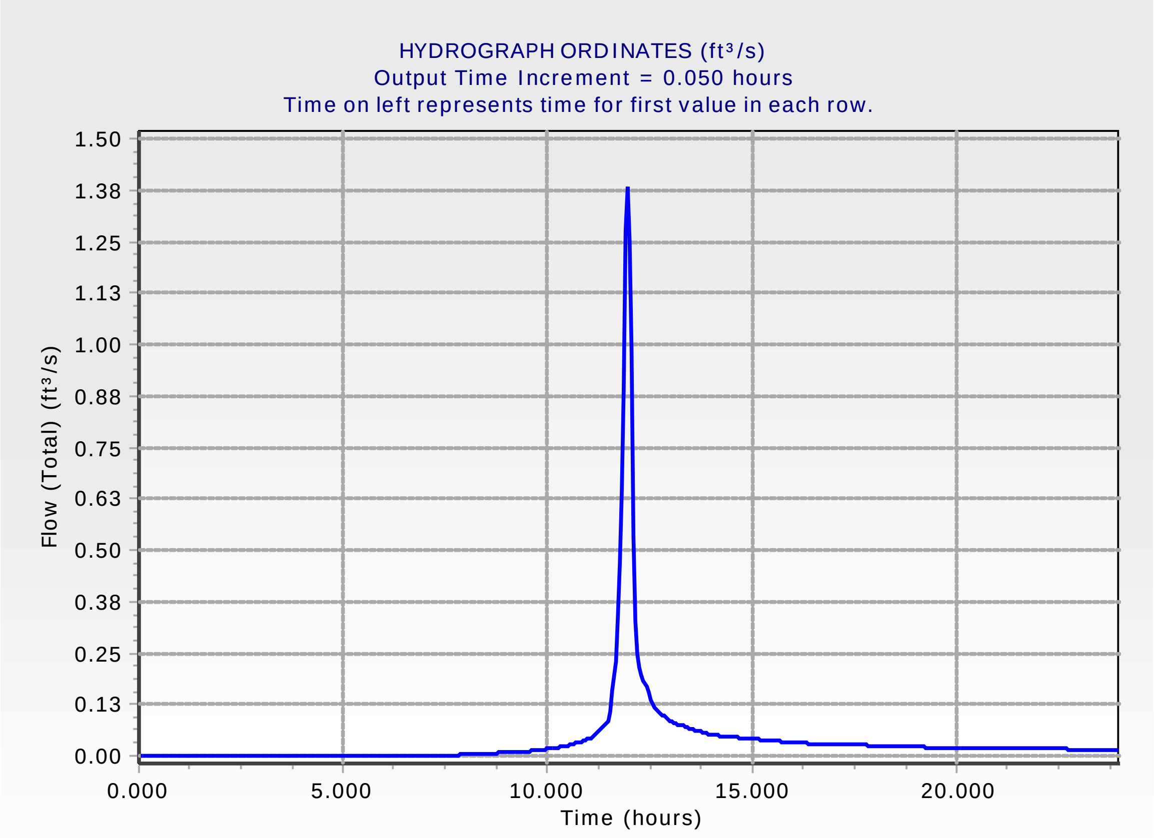
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
17.850	0.03	0.03	0.03	0.03	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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)　　Return Event: 10 years

Label: Basin C - Post　　Storm Event: 10 Year Storm



Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	11.934 hours
Flow (Peak, Computed)	2.23 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	2.20 ft³/s

Drainage Area	
SCS CN (Composite)	87.000
Area (User Defined)	0.515 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.125 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.125 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.107 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.44 ft³/s
Unit peak time, Tp	0.071 hours
Unit receding limb, Tr	0.286 hours
Total unit time, Tb	0.357 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years
Label: Basin C - Post Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 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	0.00	0.00	0.00	0.00
6.250	0.00	0.00	0.00	0.00	0.00
6.500	0.00	0.00	0.00	0.00	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	0.01	0.01	0.01	0.01
7.500	0.01	0.01	0.01	0.01	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	0.02	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	0.03	0.03	0.03	0.03
9.500	0.03	0.03	0.03	0.03	0.03
9.750	0.03	0.03	0.03	0.03	0.04
10.000	0.04	0.04	0.04	0.04	0.04
10.250	0.04	0.05	0.05	0.05	0.05
10.500	0.05	0.05	0.06	0.06	0.06
10.750	0.07	0.07	0.07	0.08	0.08
11.000	0.08	0.09	0.09	0.10	0.10
11.250	0.11	0.12	0.13	0.13	0.14
11.500	0.15	0.20	0.28	0.41	0.60
11.750	0.80	1.08	1.47	2.06	2.20
12.000	1.97	1.54	0.82	0.50	0.38
12.250	0.33	0.30	0.28	0.25	0.23
12.500	0.21	0.19	0.18	0.17	0.16
12.750	0.16	0.15	0.15	0.14	0.14
13.000	0.13	0.13	0.12	0.12	0.12
13.250	0.11	0.11	0.11	0.10	0.10
13.500	0.10	0.10	0.09	0.09	0.09
13.750	0.09	0.09	0.08	0.08	0.08
14.000	0.08	0.08	0.07	0.07	0.07
14.250	0.07	0.07	0.07	0.07	0.07
14.500	0.07	0.07	0.07	0.07	0.07
14.750	0.07	0.06	0.06	0.06	0.06
15.000	0.06	0.06	0.06	0.06	0.06
15.250	0.06	0.06	0.06	0.06	0.06
15.500	0.06	0.05	0.05	0.05	0.05
15.750	0.05	0.05	0.05	0.05	0.05
16.000	0.05	0.05	0.05	0.05	0.05

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)
16.250	0.05	0.05	0.05	0.05	0.05
16.500	0.04	0.04	0.04	0.04	0.04
16.750	0.04	0.04	0.04	0.04	0.04
17.000	0.04	0.04	0.04	0.04	0.04
17.250	0.04	0.04	0.04	0.04	0.04
17.500	0.04	0.04	0.04	0.04	0.04
17.750	0.04	0.04	0.04	0.04	0.04
18.000	0.04	0.04	0.04	0.04	0.04
18.250	0.04	0.04	0.04	0.04	0.04
18.500	0.03	0.03	0.03	0.03	0.03
18.750	0.03	0.03	0.03	0.03	0.03
19.000	0.03	0.03	0.03	0.03	0.03
19.250	0.03	0.03	0.03	0.03	0.03
19.500	0.03	0.03	0.03	0.03	0.03
19.750	0.03	0.03	0.03	0.03	0.03
20.000	0.03	0.03	0.03	0.03	0.03
20.250	0.03	0.03	0.03	0.03	0.03
20.500	0.03	0.03	0.03	0.03	0.03
20.750	0.03	0.03	0.03	0.03	0.03
21.000	0.03	0.03	0.03	0.03	0.03
21.250	0.03	0.03	0.03	0.03	0.03
21.500	0.03	0.03	0.03	0.03	0.03
21.750	0.03	0.03	0.03	0.03	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)

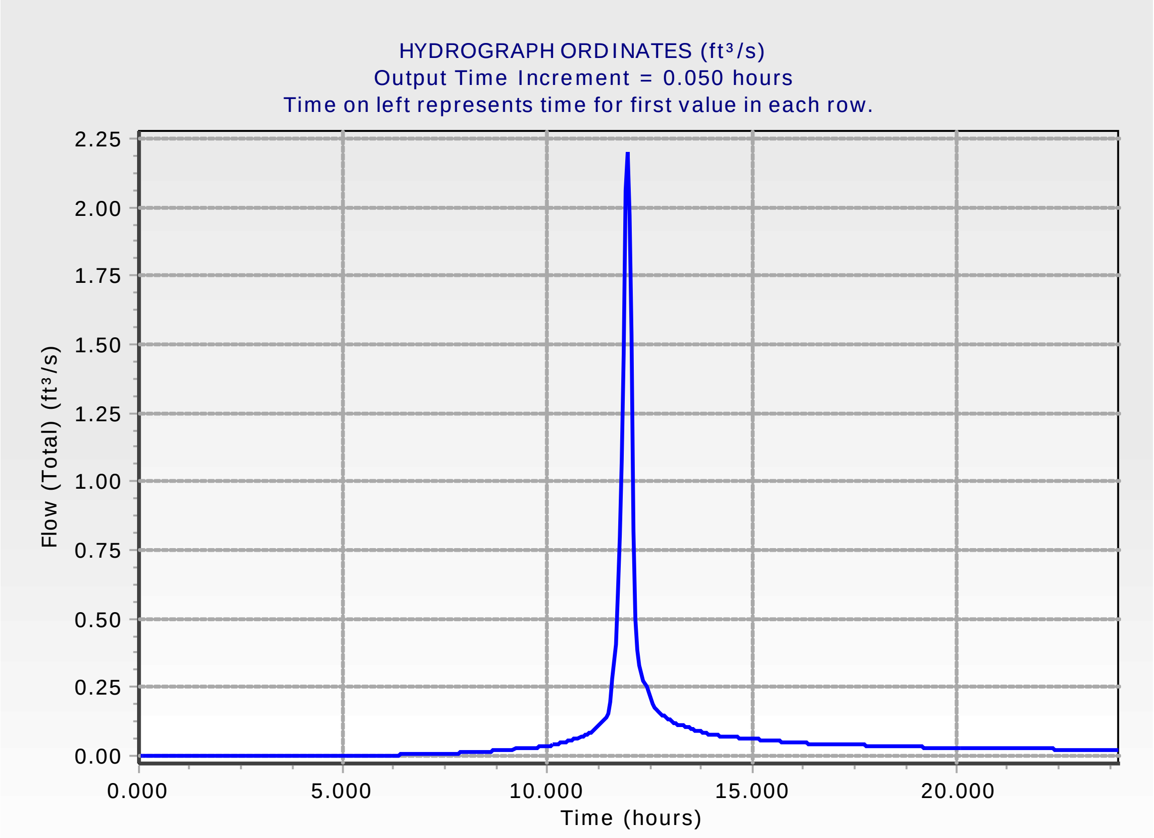
NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)

Label: Basin C - Post

Return Event: 50 years

Storm Event: 50 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary
Return Event: 100 years
Label: Basin C - Post
Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 acres

Computational Time Increment	0.014 hours
Time to Peak (Computed)	11.934 hours
Flow (Peak, Computed)	2.69 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	2.65 ft³/s

Drainage Area

SCS CN (Composite)	87.000
Area (User Defined)	0.515 acres
Maximum Retention (Pervious)	1.5 in
Maximum Retention (Pervious, 20 percent)	0.3 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.6 in
Runoff Volume (Pervious)	0.153 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.153 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.107 hours
Computational Time Increment	0.014 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	5.44 ft³/s
Unit peak time, Tp	0.071 hours
Unit receding limb, Tr	0.286 hours
Total unit time, Tb	0.357 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin C - Post Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.107 hours
Area (User Defined)	0.515 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)
5.100	0.00	0.00	0.00	0.00	0.00
5.350	0.00	0.00	0.00	0.00	0.00
5.600	0.00	0.00	0.00	0.00	0.00
5.850	0.00	0.00	0.00	0.01	0.01
6.100	0.01	0.01	0.01	0.01	0.01
6.350	0.01	0.01	0.01	0.01	0.01
6.600	0.01	0.01	0.01	0.01	0.01
6.850	0.01	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	0.02	0.02	0.02
7.850	0.02	0.02	0.02	0.02	0.02
8.100	0.02	0.02	0.02	0.02	0.02
8.350	0.02	0.02	0.02	0.02	0.02
8.600	0.02	0.03	0.03	0.03	0.03
8.850	0.03	0.03	0.03	0.03	0.03
9.100	0.03	0.03	0.03	0.03	0.03
9.350	0.04	0.04	0.04	0.04	0.04
9.600	0.04	0.04	0.04	0.04	0.04
9.850	0.04	0.05	0.05	0.05	0.05
10.100	0.05	0.05	0.06	0.06	0.06
10.350	0.06	0.06	0.07	0.07	0.07
10.600	0.07	0.08	0.08	0.09	0.09
10.850	0.09	0.10	0.10	0.11	0.11
11.100	0.12	0.12	0.13	0.14	0.15
11.350	0.16	0.17	0.18	0.19	0.25
11.600	0.36	0.51	0.74	0.99	1.33
11.850	1.79	2.50	2.65	2.36	1.84
12.100	0.98	0.60	0.46	0.40	0.36
12.350	0.33	0.30	0.28	0.25	0.23
12.600	0.21	0.20	0.19	0.18	0.18
12.850	0.17	0.17	0.16	0.15	0.15
13.100	0.14	0.14	0.14	0.13	0.13
13.350	0.13	0.12	0.12	0.12	0.11
13.600	0.11	0.11	0.11	0.10	0.10
13.850	0.10	0.10	0.09	0.09	0.09
14.100	0.09	0.09	0.09	0.09	0.08
14.350	0.08	0.08	0.08	0.08	0.08
14.600	0.08	0.08	0.08	0.08	0.08
14.850	0.08	0.07	0.07	0.07	0.07
15.100	0.07	0.07	0.07	0.07	0.07
15.350	0.07	0.07	0.07	0.07	0.06

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin C - Post

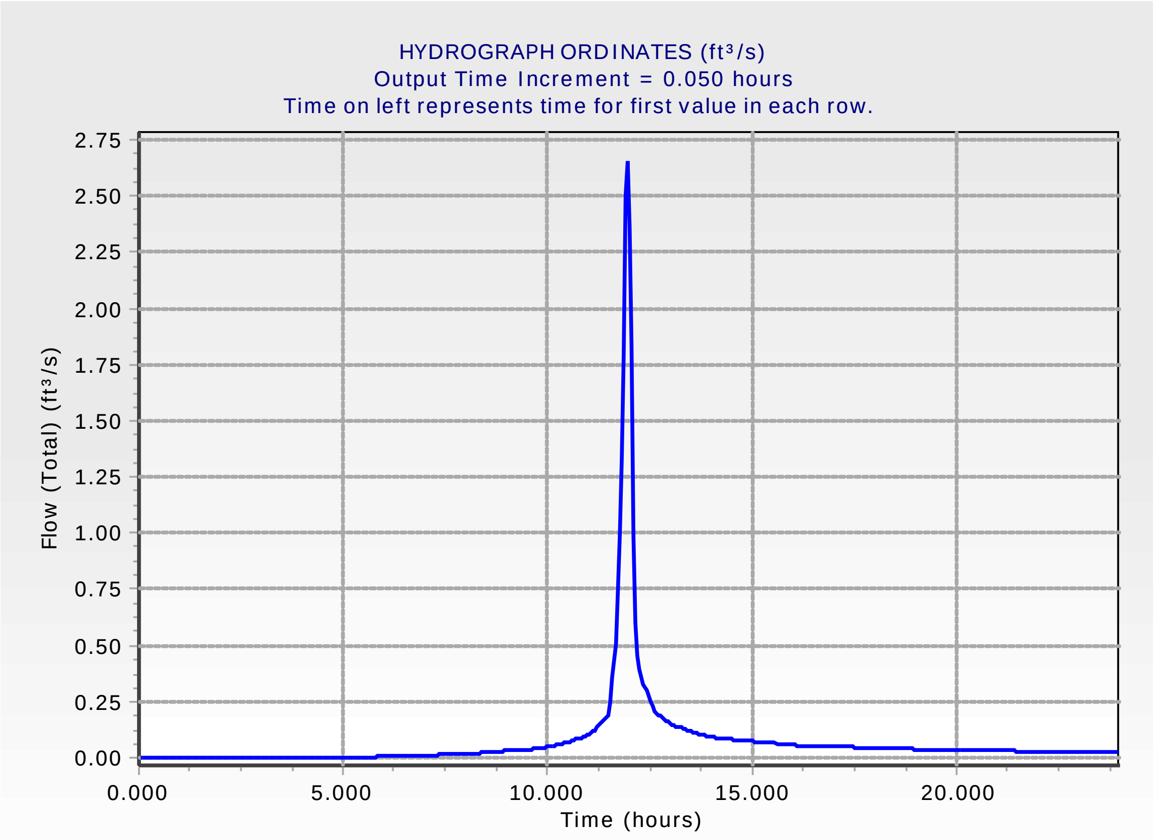
Return Event: 100 years
Storm Event: 100 Year Storm

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)
15.600	0.06	0.06	0.06	0.06	0.06
15.850	0.06	0.06	0.06	0.06	0.06
16.100	0.06	0.06	0.05	0.05	0.05
16.350	0.05	0.05	0.05	0.05	0.05
16.600	0.05	0.05	0.05	0.05	0.05
16.850	0.05	0.05	0.05	0.05	0.05
17.100	0.05	0.05	0.05	0.05	0.05
17.350	0.05	0.05	0.05	0.05	0.05
17.600	0.05	0.05	0.05	0.05	0.05
17.850	0.04	0.04	0.04	0.04	0.04
18.100	0.04	0.04	0.04	0.04	0.04
18.350	0.04	0.04	0.04	0.04	0.04
18.600	0.04	0.04	0.04	0.04	0.04
18.850	0.04	0.04	0.04	0.04	0.04
19.100	0.04	0.04	0.04	0.04	0.04
19.350	0.04	0.04	0.04	0.04	0.03
19.600	0.03	0.03	0.03	0.03	0.03
19.850	0.03	0.03	0.03	0.03	0.03
20.100	0.03	0.03	0.03	0.03	0.03
20.350	0.03	0.03	0.03	0.03	0.03
20.600	0.03	0.03	0.03	0.03	0.03
20.850	0.03	0.03	0.03	0.03	0.03
21.100	0.03	0.03	0.03	0.03	0.03
21.350	0.03	0.03	0.03	0.03	0.03
21.600	0.03	0.03	0.03	0.03	0.03
21.850	0.03	0.03	0.03	0.03	0.03
22.100	0.03	0.03	0.03	0.03	0.03
22.350	0.03	0.03	0.03	0.03	0.03
22.600	0.03	0.03	0.03	0.03	0.03
22.850	0.03	0.03	0.03	0.03	0.03
23.100	0.03	0.03	0.03	0.03	0.03
23.350	0.03	0.03	0.03	0.03	0.03
23.600	0.03	0.03	0.03	0.03	0.03
23.850	0.03	0.03	0.03	0.03	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 100 years
Label: Basin C - Post
Storm Event: 100 Year Storm



Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	0.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.06 ft³/s

Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	0.073 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 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)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.99 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 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)
11.500	0.00	0.00	0.00	0.00	0.01
11.750	0.01	0.02	0.04	0.06	0.06
12.000	0.06	0.04	0.02	0.01	0.01
12.250	0.01	0.01	0.01	0.01	0.01
12.500	0.01	0.01	0.01	0.01	0.01
12.750	0.01	0.01	0.01	0.01	0.01
13.000	0.01	0.00	0.00	0.00	0.00
13.250	0.00	0.00	0.00	0.00	0.00
13.500	0.00	0.00	0.00	0.00	0.00
13.750	0.00	0.00	0.00	0.00	0.00
14.000	0.00	0.00	0.00	0.00	0.00
14.250	0.00	0.00	0.00	0.00	0.00
14.500	0.00	0.00	0.00	0.00	0.00
14.750	0.00	0.00	0.00	0.00	0.00
15.000	0.00	0.00	0.00	0.00	0.00
15.250	0.00	0.00	0.00	0.00	0.00
15.500	0.00	0.00	0.00	0.00	0.00
15.750	0.00	0.00	0.00	0.00	0.00
16.000	0.00	0.00	0.00	0.00	0.00
16.250	0.00	0.00	0.00	0.00	0.00
16.500	0.00	0.00	0.00	0.00	0.00
16.750	0.00	0.00	0.00	0.00	0.00
17.000	0.00	0.00	0.00	0.00	0.00
17.250	0.00	0.00	0.00	0.00	0.00
17.500	0.00	0.00	0.00	0.00	0.00
17.750	0.00	0.00	0.00	0.00	0.00
18.000	0.00	0.00	0.00	0.00	0.00
18.250	0.00	0.00	0.00	0.00	0.00
18.500	0.00	0.00	0.00	0.00	0.00
18.750	0.00	0.00	0.00	0.00	0.00
19.000	0.00	0.00	0.00	0.00	0.00
19.250	0.00	0.00	0.00	0.00	0.00
19.500	0.00	0.00	0.00	0.00	0.00
19.750	0.00	0.00	0.00	0.00	0.00
20.000	0.00	0.00	0.00	0.00	0.00
20.250	0.00	0.00	0.00	0.00	0.00
20.500	0.00	0.00	0.00	0.00	0.00
20.750	0.00	0.00	0.00	0.00	0.00
21.000	0.00	0.00	0.00	0.00	0.00
21.250	0.00	0.00	0.00	0.00	0.00
21.500	0.00	0.00	0.00	0.00	0.00
21.750	0.00	0.00	0.00	0.00	0.00

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin D - Post
Storm Event: 2 Year Storm

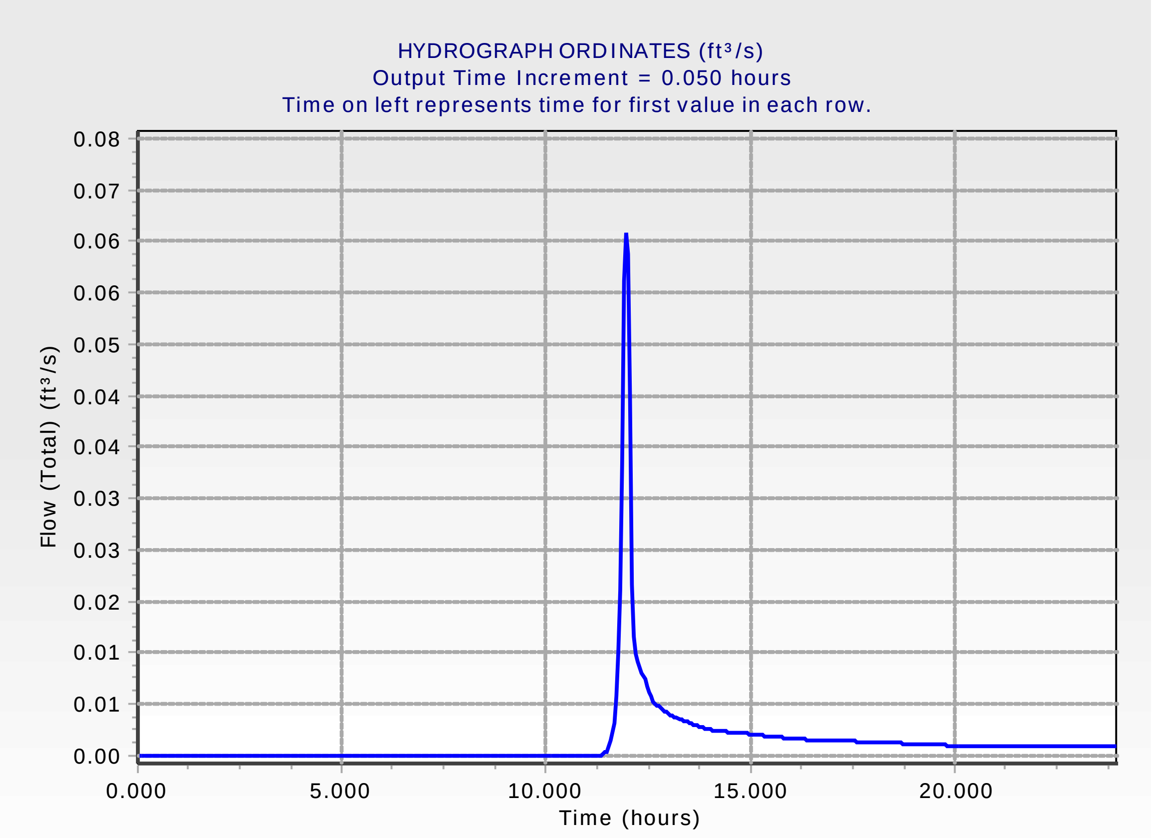
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.000	0.00	0.00	0.00	0.00	0.00
22.250	0.00	0.00	0.00	0.00	0.00
22.500	0.00	0.00	0.00	0.00	0.00
22.750	0.00	0.00	0.00	0.00	0.00
23.000	0.00	0.00	0.00	0.00	0.00
23.250	0.00	0.00	0.00	0.00	0.00
23.500	0.00	0.00	0.00	0.00	0.00
23.750	0.00	0.00	0.00	0.00	0.00
24.000	0.00	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin D - Post

Return Event: 2 years
Storm Event: 2 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary | Return Event: 10 years
Label: Basin D - Post | Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.933 hours
Flow (Peak, Computed)	0.13 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.13 ft³/s

Drainage Area

SCS CN (Composite)	78.000
Area (User Defined)	0.073 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.2 in
Runoff Volume (Pervious)	0.007 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.007 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.99 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)　Return Event: 10 years

Label: Basin D - Post　Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 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)
10.800	0.00	0.00	0.00	0.00	0.00
11.050	0.00	0.00	0.00	0.00	0.00
11.300	0.00	0.00	0.00	0.00	0.00
11.550	0.01	0.01	0.02	0.03	0.04
11.800	0.05	0.08	0.13	0.13	0.12
12.050	0.08	0.04	0.03	0.02	0.02
12.300	0.02	0.02	0.02	0.02	0.01
12.550	0.01	0.01	0.01	0.01	0.01
12.800	0.01	0.01	0.01	0.01	0.01
13.050	0.01	0.01	0.01	0.01	0.01
13.300	0.01	0.01	0.01	0.01	0.01
13.550	0.01	0.01	0.01	0.01	0.01
13.800	0.01	0.01	0.01	0.01	0.01
14.050	0.01	0.01	0.01	0.01	0.01
14.300	0.01	0.01	0.01	0.01	0.01
14.550	0.01	0.00	0.00	0.00	0.00
14.800	0.00	0.00	0.00	0.00	0.00
15.050	0.00	0.00	0.00	0.00	0.00
15.300	0.00	0.00	0.00	0.00	0.00
15.550	0.00	0.00	0.00	0.00	0.00
15.800	0.00	0.00	0.00	0.00	0.00
16.050	0.00	0.00	0.00	0.00	0.00
16.300	0.00	0.00	0.00	0.00	0.00
16.550	0.00	0.00	0.00	0.00	0.00
16.800	0.00	0.00	0.00	0.00	0.00
17.050	0.00	0.00	0.00	0.00	0.00
17.300	0.00	0.00	0.00	0.00	0.00
17.550	0.00	0.00	0.00	0.00	0.00
17.800	0.00	0.00	0.00	0.00	0.00
18.050	0.00	0.00	0.00	0.00	0.00
18.300	0.00	0.00	0.00	0.00	0.00
18.550	0.00	0.00	0.00	0.00	0.00
18.800	0.00	0.00	0.00	0.00	0.00
19.050	0.00	0.00	0.00	0.00	0.00
19.300	0.00	0.00	0.00	0.00	0.00
19.550	0.00	0.00	0.00	0.00	0.00
19.800	0.00	0.00	0.00	0.00	0.00
20.050	0.00	0.00	0.00	0.00	0.00
20.300	0.00	0.00	0.00	0.00	0.00
20.550	0.00	0.00	0.00	0.00	0.00
20.800	0.00	0.00	0.00	0.00	0.00
21.050	0.00	0.00	0.00	0.00	0.00

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years
Label: Basin D - Post
Storm Event: 10 Year Storm

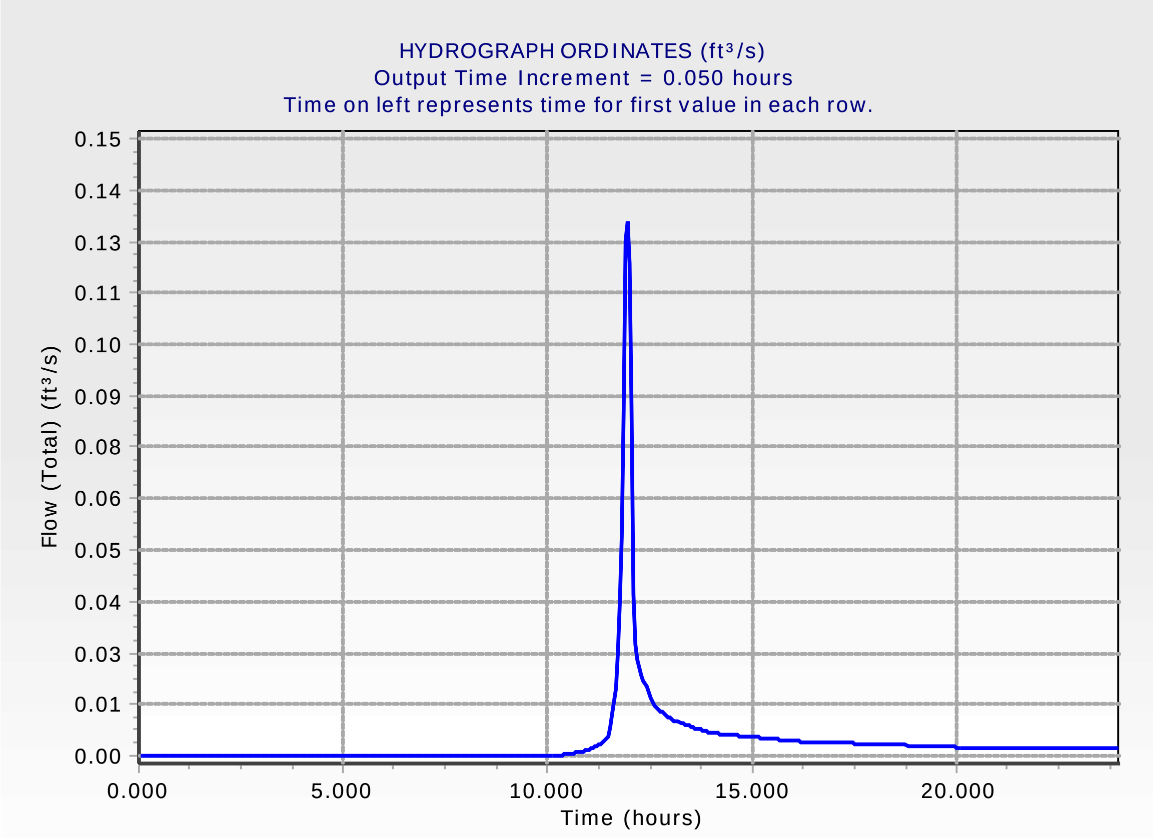
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
21.300	0.00	0.00	0.00	0.00	0.00
21.550	0.00	0.00	0.00	0.00	0.00
21.800	0.00	0.00	0.00	0.00	0.00
22.050	0.00	0.00	0.00	0.00	0.00
22.300	0.00	0.00	0.00	0.00	0.00
22.550	0.00	0.00	0.00	0.00	0.00
22.800	0.00	0.00	0.00	0.00	0.00
23.050	0.00	0.00	0.00	0.00	0.00
23.300	0.00	0.00	0.00	0.00	0.00
23.550	0.00	0.00	0.00	0.00	0.00
23.800	0.00	0.00	0.00	0.00	0.00

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin D - Post

Return Event: 10 years
Storm Event: 10 Year Storm



Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.25 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.23 ft³/s

Drainage Area

SCS CN (Composite)	78.000
Area (User Defined)	0.073 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	0.013 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.013 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.99 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) | Return Event: 50 years
Label: Basin D - Post | Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 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)
9.650	0.00	0.00	0.00	0.00	0.00
9.900	0.00	0.00	0.00	0.00	0.00
10.150	0.00	0.00	0.00	0.00	0.00
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	0.01	0.01	0.01	0.01
11.150	0.01	0.01	0.01	0.01	0.01
11.400	0.01	0.01	0.01	0.02	0.02
11.650	0.04	0.06	0.08	0.11	0.16
11.900	0.23	0.23	0.21	0.15	0.07
12.150	0.05	0.04	0.04	0.03	0.03
12.400	0.03	0.03	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	0.01	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	0.01	0.01	0.01
14.900	0.01	0.01	0.01	0.01	0.01
15.150	0.01	0.01	0.01	0.01	0.01
15.400	0.01	0.01	0.01	0.01	0.01
15.650	0.01	0.01	0.01	0.01	0.01
15.900	0.01	0.01	0.01	0.01	0.01
16.150	0.01	0.01	0.01	0.01	0.01
16.400	0.01	0.01	0.01	0.01	0.01
16.650	0.01	0.01	0.01	0.01	0.01
16.900	0.01	0.01	0.01	0.01	0.01
17.150	0.01	0.01	0.01	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

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years

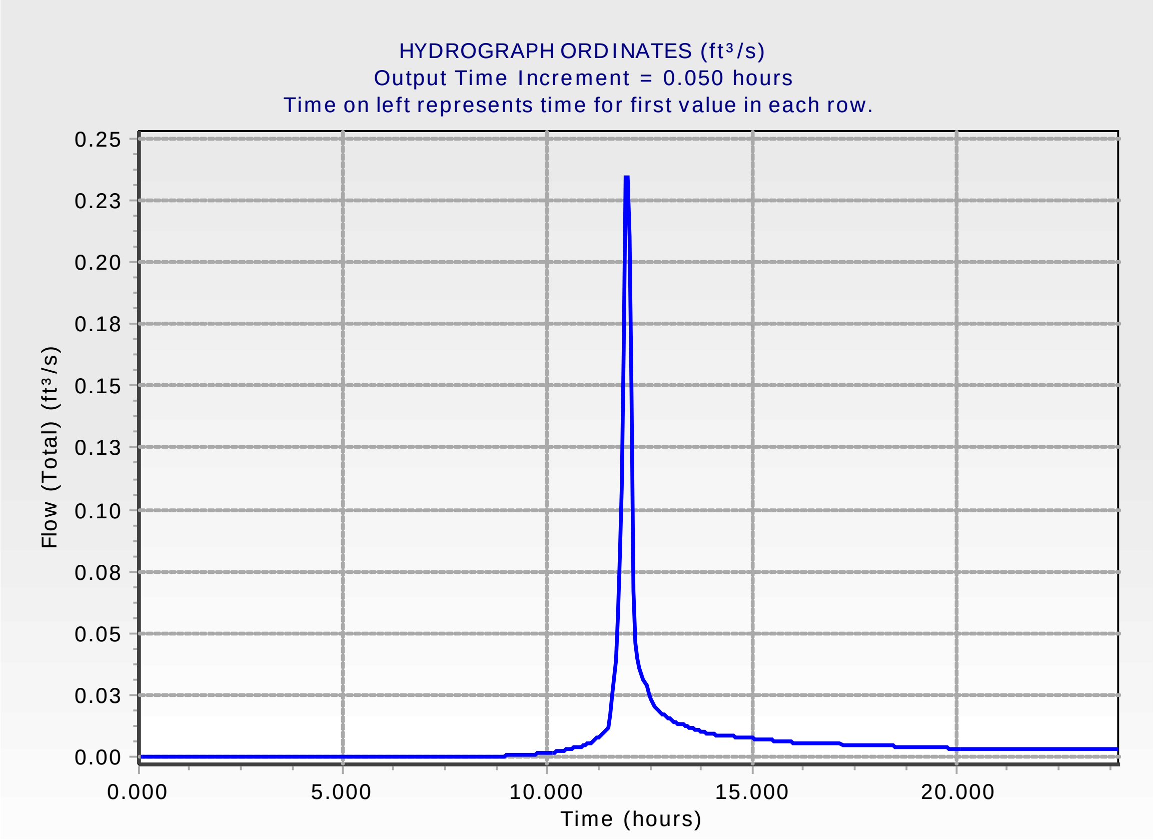
Label: Basin D - Post Storm Event: 50 Year Storm

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)
20.150	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
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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 50 years
Label: Basin D - Post
Storm Event: 50 Year Storm



Subsection: Unit Hydrograph Summary
Return Event: 100 years
Label: Basin D - Post
Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.31 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.30 ft³/s

Drainage Area	
SCS CN (Composite)	78.000
Area (User Defined)	0.073 acres
Maximum Retention (Pervious)	2.8 in
Maximum Retention (Pervious, 20 percent)	0.6 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.7 in
Runoff Volume (Pervious)	0.016 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.016 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	0.99 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.073 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)
8.850	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	0.00	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	0.01	0.01	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	0.02	0.02	0.02
11.600	0.03	0.05	0.08	0.11	0.14
11.850	0.21	0.30	0.30	0.26	0.18
12.100	0.08	0.06	0.05	0.04	0.04
12.350	0.04	0.04	0.03	0.03	0.03
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	0.01	0.01	0.01
13.600	0.01	0.01	0.01	0.01	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	0.01	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	0.00	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

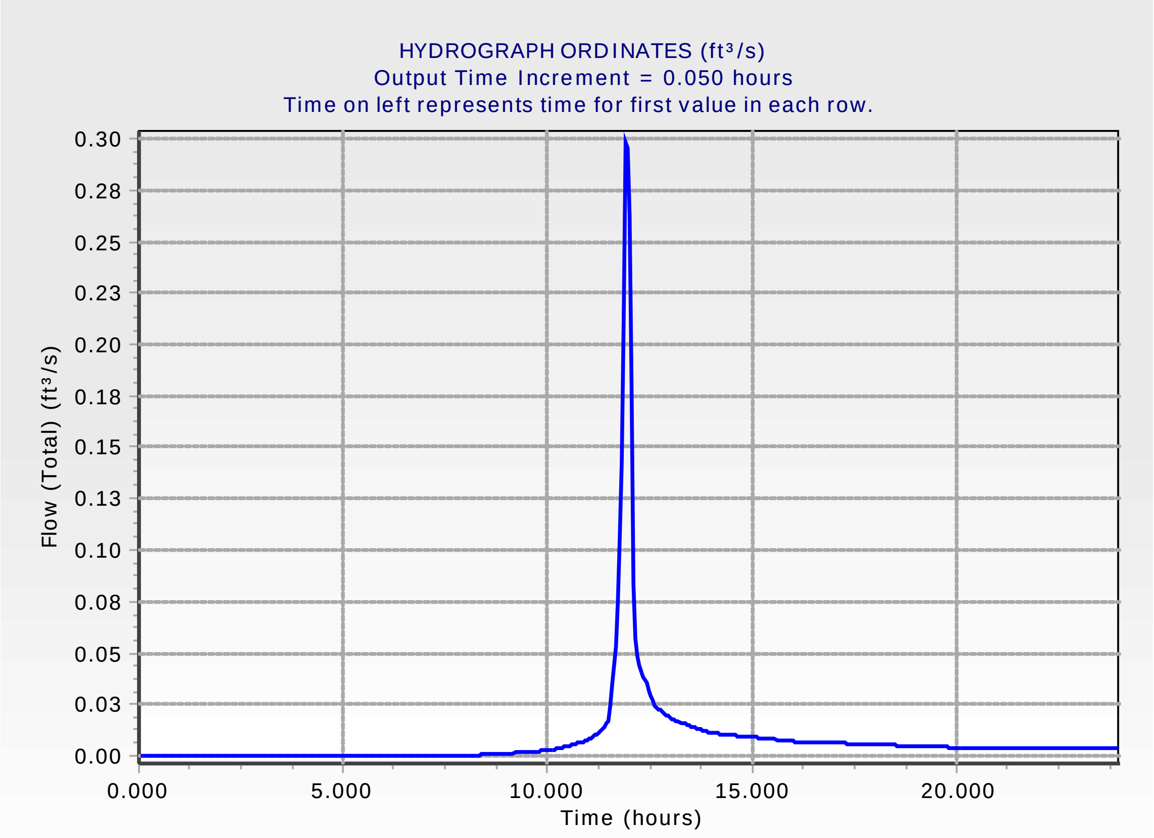
Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin D - Post

Return Event: 100 years
Storm Event: 100 Year Storm

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)
19.350	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
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)

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin D - Post Storm Event: 100 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary | Return Event: 2 years

Label: Basin E - Post | Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.183 hours
Flow (Peak, Computed)	2.08 ft^3/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	2.04 ft^3/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	9.51 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	0.254 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.251 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.379 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	28.42 ft^3/s
Unit peak time, Tp	0.253 hours
Unit receding limb, Tr	1.011 hours
Total unit time, Tb	1.264 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 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)
11.750	0.00	0.01	0.06	0.21	0.50
12.000	0.93	1.41	1.82	2.03	2.04
12.250	1.90	1.68	1.46	1.27	1.13
12.500	1.01	0.92	0.83	0.76	0.69
12.750	0.64	0.60	0.56	0.54	0.51
13.000	0.49	0.47	0.45	0.44	0.42
13.250	0.41	0.40	0.39	0.38	0.37
13.500	0.36	0.35	0.35	0.34	0.33
13.750	0.32	0.32	0.31	0.31	0.30
14.000	0.29	0.29	0.28	0.28	0.27
14.250	0.27	0.26	0.26	0.26	0.25
14.500	0.25	0.25	0.25	0.25	0.24
14.750	0.24	0.24	0.24	0.24	0.23
15.000	0.23	0.23	0.23	0.23	0.22
15.250	0.22	0.22	0.22	0.22	0.21
15.500	0.21	0.21	0.21	0.21	0.20
15.750	0.20	0.20	0.20	0.19	0.19
16.000	0.19	0.19	0.19	0.18	0.18
16.250	0.18	0.18	0.18	0.18	0.17
16.500	0.17	0.17	0.17	0.17	0.17
16.750	0.17	0.17	0.17	0.17	0.17
17.000	0.17	0.17	0.16	0.16	0.16
17.250	0.16	0.16	0.16	0.16	0.16
17.500	0.16	0.16	0.16	0.16	0.16
17.750	0.15	0.15	0.15	0.15	0.15
18.000	0.15	0.15	0.15	0.15	0.15
18.250	0.15	0.15	0.14	0.14	0.14
18.500	0.14	0.14	0.14	0.14	0.14
18.750	0.14	0.14	0.14	0.13	0.13
19.000	0.13	0.13	0.13	0.13	0.13
19.250	0.13	0.13	0.13	0.13	0.13
19.500	0.12	0.12	0.12	0.12	0.12
19.750	0.12	0.12	0.12	0.12	0.12
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	0.11	0.11
21.000	0.11	0.11	0.11	0.11	0.11
21.250	0.11	0.11	0.11	0.11	0.11
21.500	0.11	0.11	0.11	0.11	0.11
21.750	0.11	0.11	0.10	0.10	0.10
22.000	0.10	0.10	0.10	0.10	0.10

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin E - Post
Storm Event: 2 Year Storm

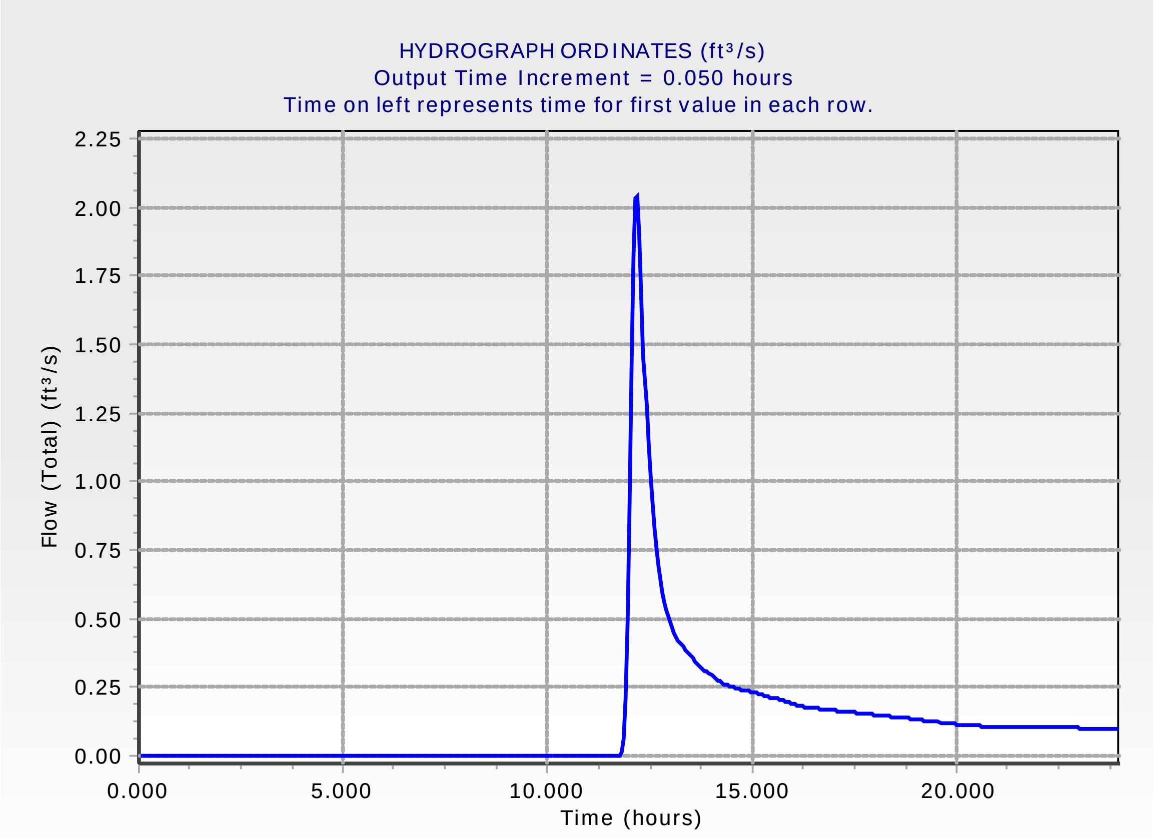
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.250	0.10	0.10	0.10	0.10	0.10
22.500	0.10	0.10	0.10	0.10	0.10
22.750	0.10	0.10	0.10	0.10	0.10
23.000	0.10	0.10	0.10	0.10	0.10
23.250	0.10	0.10	0.10	0.10	0.10
23.500	0.10	0.10	0.10	0.10	0.10
23.750	0.10	0.10	0.10	0.10	0.10
24.000	0.10	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)	Return Event: 2 years

Label: Basin E - Post	Storm Event: 2 Year Storm



Subsection: Unit Hydrograph Summary Return Event: 10 years
Label: Basin E - Post Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	6.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	6.27 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	9.51 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.602 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.597 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.379 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	28.42 ft³/s
Unit peak time, Tp	0.253 hours
Unit receding limb, Tr	1.011 hours
Total unit time, Tb	1.264 hours

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 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)
11.500	0.00	0.00	0.01	0.04	0.10
11.750	0.24	0.49	0.95	1.71	2.78
12.000	4.05	5.23	6.04	6.27	5.96
12.250	5.31	4.55	3.85	3.27	2.83
12.500	2.49	2.20	1.96	1.76	1.59
12.750	1.45	1.34	1.25	1.18	1.12
13.000	1.06	1.01	0.97	0.93	0.90
13.250	0.87	0.84	0.82	0.80	0.78
13.500	0.76	0.74	0.72	0.71	0.69
13.750	0.68	0.66	0.65	0.63	0.62
14.000	0.61	0.59	0.58	0.57	0.56
14.250	0.55	0.54	0.53	0.52	0.52
14.500	0.51	0.51	0.50	0.50	0.50
14.750	0.49	0.49	0.48	0.48	0.47
15.000	0.47	0.46	0.46	0.46	0.45
15.250	0.45	0.44	0.44	0.43	0.43
15.500	0.42	0.42	0.42	0.41	0.41
15.750	0.40	0.40	0.39	0.39	0.38
16.000	0.38	0.37	0.37	0.36	0.36
16.250	0.36	0.35	0.35	0.35	0.35
16.500	0.34	0.34	0.34	0.34	0.34
16.750	0.33	0.33	0.33	0.33	0.33
17.000	0.33	0.32	0.32	0.32	0.32
17.250	0.32	0.32	0.32	0.31	0.31
17.500	0.31	0.31	0.31	0.31	0.30
17.750	0.30	0.30	0.30	0.30	0.29
18.000	0.29	0.29	0.29	0.29	0.29
18.250	0.28	0.28	0.28	0.28	0.28
18.500	0.28	0.27	0.27	0.27	0.27
18.750	0.27	0.27	0.26	0.26	0.26
19.000	0.26	0.26	0.25	0.25	0.25
19.250	0.25	0.25	0.25	0.24	0.24
19.500	0.24	0.24	0.24	0.23	0.23
19.750	0.23	0.23	0.23	0.22	0.22
20.000	0.22	0.22	0.22	0.22	0.21
20.250	0.21	0.21	0.21	0.21	0.21
20.500	0.21	0.21	0.21	0.21	0.21
20.750	0.21	0.21	0.21	0.21	0.21
21.000	0.21	0.21	0.20	0.20	0.20
21.250	0.20	0.20	0.20	0.20	0.20
21.500	0.20	0.20	0.20	0.20	0.20
21.750	0.20	0.20	0.20	0.20	0.20

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years
Label: Basin E - Post
Storm Event: 10 Year Storm

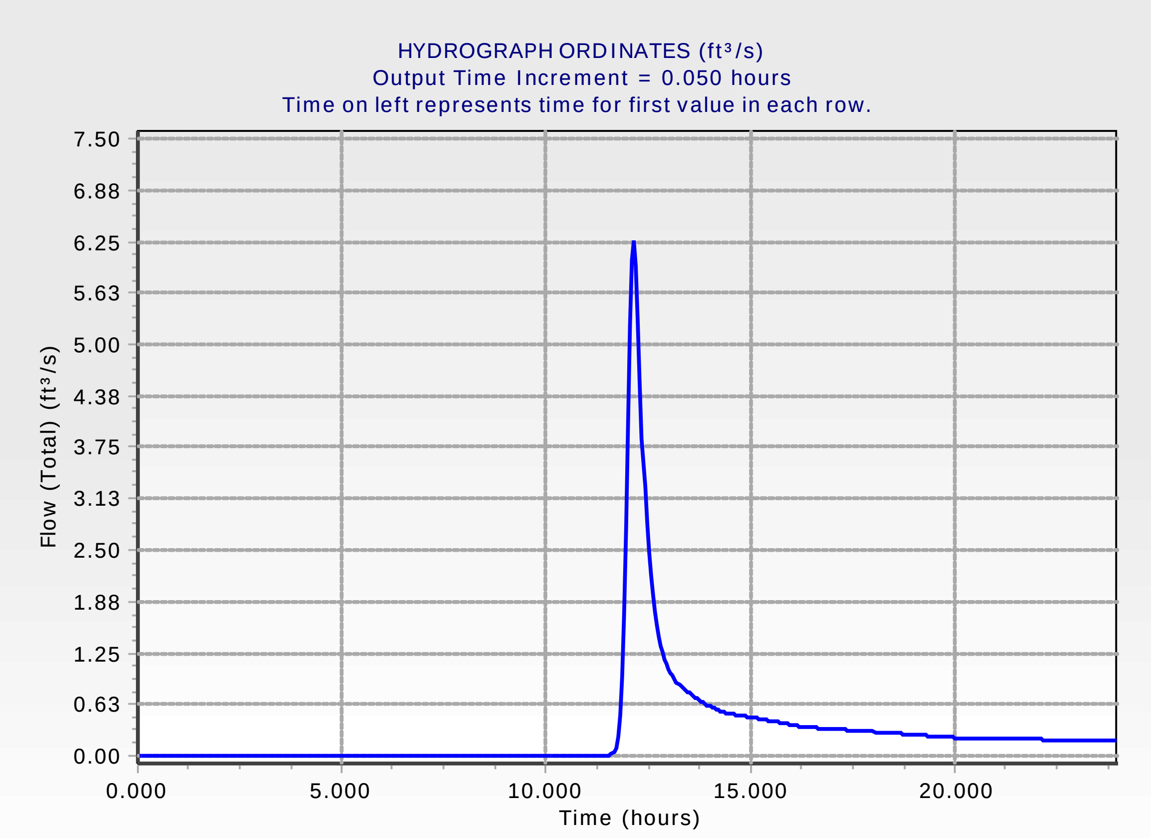
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.000	0.20	0.20	0.20	0.20	0.20
22.250	0.20	0.20	0.20	0.20	0.20
22.500	0.20	0.20	0.20	0.20	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
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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin E - Post

Return Event: 10 years
Storm Event: 10 Year Storm



Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	14.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	13.82 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	9.51 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	1.221 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.213 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.379 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	28.42 ft³/s
Unit peak time, Tp	0.253 hours
Unit receding limb, Tr	1.011 hours
Total unit time, Tb	1.264 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) — Return Event: 50 years

Label: Basin E - Post — Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 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)
10.500	0.00	0.00	0.00	0.01	0.01
10.750	0.02	0.03	0.04	0.06	0.07
11.000	0.09	0.11	0.12	0.15	0.17
11.250	0.20	0.23	0.26	0.30	0.35
11.500	0.40	0.46	0.57	0.74	1.05
11.750	1.55	2.34	3.55	5.32	7.64
12.000	10.20	12.41	13.72	13.82	12.84
12.250	11.24	9.50	7.93	6.66	5.70
12.500	4.95	4.33	3.82	3.40	3.06
12.750	2.77	2.55	2.36	2.21	2.09
13.000	1.98	1.88	1.80	1.72	1.66
13.250	1.60	1.55	1.51	1.47	1.43
13.500	1.39	1.36	1.32	1.29	1.26
13.750	1.23	1.20	1.17	1.15	1.12
14.000	1.10	1.07	1.05	1.03	1.01
14.250	0.99	0.97	0.96	0.95	0.93
14.500	0.92	0.92	0.91	0.90	0.89
14.750	0.88	0.87	0.86	0.86	0.85
15.000	0.84	0.83	0.82	0.81	0.81
15.250	0.80	0.79	0.78	0.77	0.76
15.500	0.76	0.75	0.74	0.73	0.72
15.750	0.71	0.70	0.70	0.69	0.68
16.000	0.67	0.66	0.65	0.64	0.64
16.250	0.63	0.62	0.62	0.61	0.61
16.500	0.61	0.60	0.60	0.60	0.59
16.750	0.59	0.59	0.58	0.58	0.58
17.000	0.57	0.57	0.57	0.57	0.56
17.250	0.56	0.56	0.55	0.55	0.55
17.500	0.54	0.54	0.54	0.54	0.53
17.750	0.53	0.53	0.52	0.52	0.52
18.000	0.51	0.51	0.51	0.50	0.50
18.250	0.50	0.49	0.49	0.49	0.48
18.500	0.48	0.48	0.48	0.47	0.47
18.750	0.47	0.46	0.46	0.46	0.45
19.000	0.45	0.45	0.44	0.44	0.44
19.250	0.43	0.43	0.43	0.42	0.42
19.500	0.42	0.41	0.41	0.41	0.40
19.750	0.40	0.40	0.39	0.39	0.39
20.000	0.38	0.38	0.38	0.37	0.37
20.250	0.37	0.37	0.37	0.36	0.36
20.500	0.36	0.36	0.36	0.36	0.36
20.750	0.36	0.36	0.36	0.36	0.36

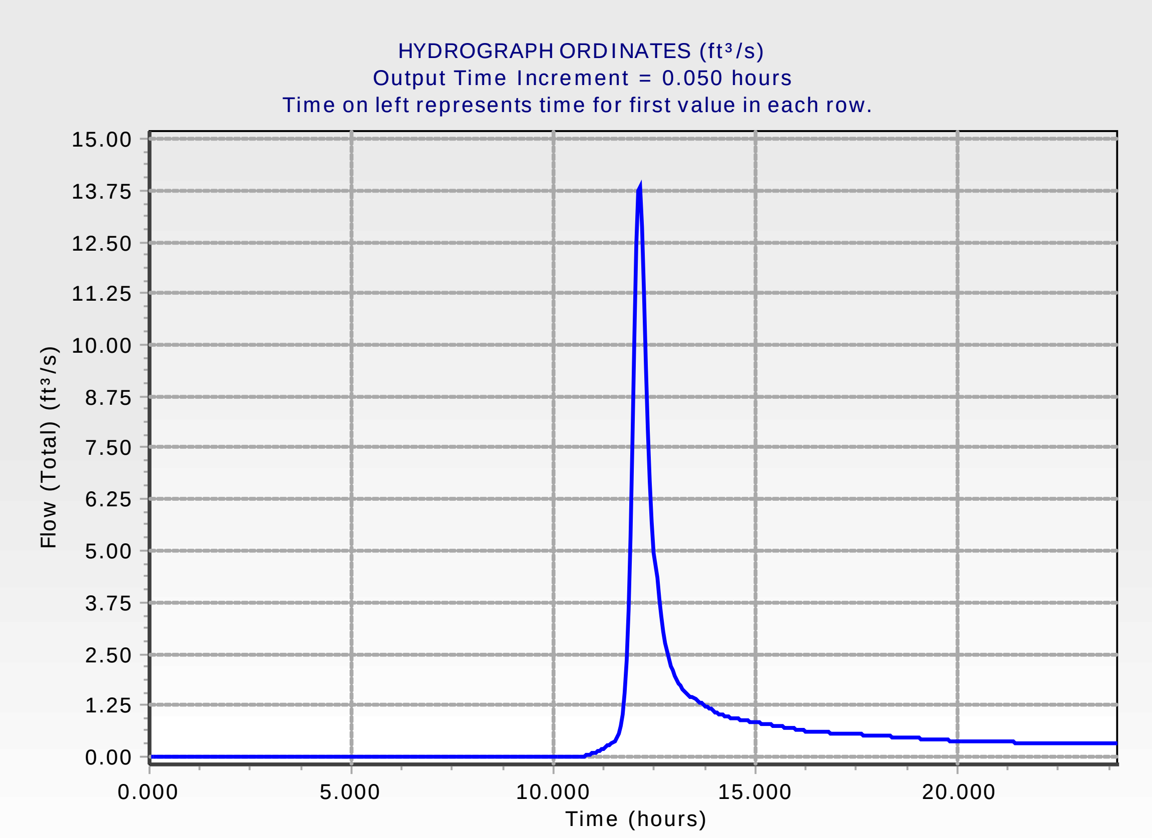
Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years
Label: Basin E - Post Storm Event: 50 Year Storm

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)
21.000	0.36	0.35	0.35	0.35	0.35
21.250	0.35	0.35	0.35	0.35	0.35
21.500	0.35	0.35	0.35	0.35	0.35
21.750	0.35	0.35	0.35	0.34	0.34
22.000	0.34	0.34	0.34	0.34	0.34
22.250	0.34	0.34	0.34	0.34	0.34
22.500	0.34	0.34	0.34	0.34	0.34
22.750	0.33	0.33	0.33	0.33	0.33
23.000	0.33	0.33	0.33	0.33	0.33
23.250	0.33	0.33	0.33	0.33	0.33
23.500	0.33	0.32	0.32	0.32	0.32
23.750	0.32	0.32	0.32	0.32	0.32
24.000	0.32	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)	Return Event: 50 years
Label: Basin E - Post	Storm Event: 50 Year Storm



Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 acres

Computational Time Increment	0.051 hours
Time to Peak (Computed)	12.133 hours
Flow (Peak, Computed)	18.84 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.100 hours
Flow (Peak Interpolated Output)	18.48 ft³/s

Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	9.51 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	1.608 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	1.598 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.379 hours
Computational Time Increment	0.051 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	28.42 ft³/s
Unit peak time, Tp	0.253 hours
Unit receding limb, Tr	1.011 hours
Total unit time, Tb	1.264 hours

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 100 years
Label: Basin E - Post
Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.379 hours
Area (User Defined)	9.51 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)
9.850	0.00	0.00	0.00	0.01	0.01
10.100	0.01	0.02	0.03	0.04	0.05
10.350	0.06	0.07	0.08	0.09	0.10
10.600	0.12	0.13	0.15	0.17	0.19
10.850	0.21	0.23	0.25	0.28	0.31
11.100	0.34	0.37	0.41	0.45	0.49
11.350	0.55	0.61	0.67	0.74	0.84
11.600	1.00	1.27	1.73	2.46	3.59
11.850	5.28	7.68	10.76	14.10	16.91
12.100	18.48	18.47	17.06	14.86	12.51
12.350	10.40	8.71	7.43	6.43	5.61
12.600	4.94	4.38	3.93	3.56	3.26
12.850	3.02	2.82	2.66	2.52	2.39
13.100	2.28	2.18	2.10	2.03	1.97
13.350	1.91	1.86	1.81	1.76	1.72
13.600	1.67	1.63	1.59	1.55	1.52
13.850	1.48	1.45	1.41	1.38	1.35
14.100	1.32	1.29	1.27	1.24	1.22
14.350	1.21	1.19	1.18	1.16	1.15
14.600	1.14	1.13	1.12	1.11	1.10
14.850	1.08	1.07	1.06	1.05	1.04
15.100	1.03	1.02	1.01	1.00	0.99
15.350	0.98	0.97	0.96	0.95	0.94
15.600	0.92	0.91	0.90	0.89	0.88
15.850	0.87	0.86	0.85	0.84	0.83
16.100	0.82	0.81	0.80	0.79	0.78
16.350	0.77	0.77	0.76	0.76	0.75
16.600	0.75	0.74	0.74	0.74	0.73
16.850	0.73	0.73	0.72	0.72	0.71
17.100	0.71	0.71	0.70	0.70	0.69
17.350	0.69	0.69	0.68	0.68	0.67
17.600	0.67	0.67	0.66	0.66	0.66
17.850	0.65	0.65	0.64	0.64	0.64
18.100	0.63	0.63	0.62	0.62	0.62
18.350	0.61	0.61	0.60	0.60	0.60
18.600	0.59	0.59	0.58	0.58	0.58
18.850	0.57	0.57	0.56	0.56	0.55
19.100	0.55	0.55	0.54	0.54	0.53
19.350	0.53	0.53	0.52	0.52	0.51
19.600	0.51	0.51	0.50	0.50	0.49
19.850	0.49	0.48	0.48	0.48	0.47
20.100	0.47	0.46	0.46	0.46	0.46

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin E - Post Storm Event: 100 Year Storm

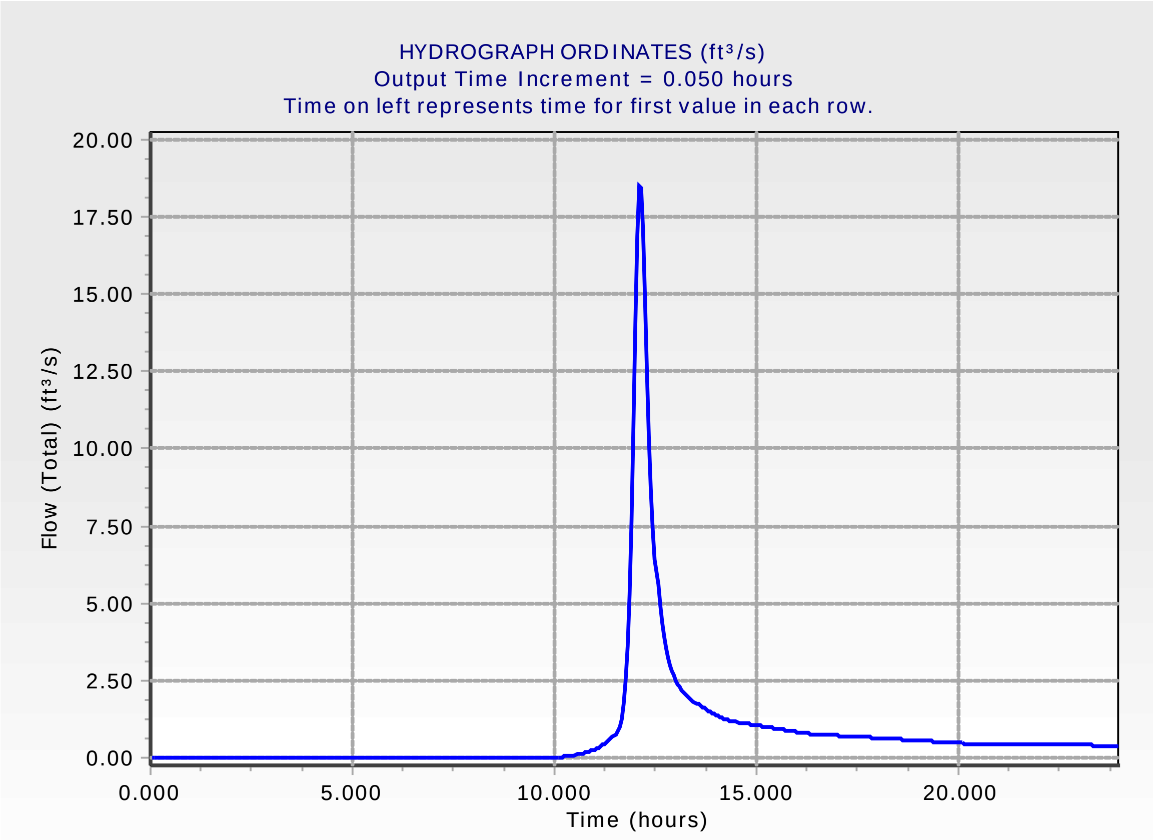
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
20.350	0.45	0.45	0.45	0.45	0.45
20.600	0.45	0.45	0.45	0.44	0.44
20.850	0.44	0.44	0.44	0.44	0.44
21.100	0.44	0.44	0.44	0.44	0.44
21.350	0.44	0.43	0.43	0.43	0.43
21.600	0.43	0.43	0.43	0.43	0.43
21.850	0.43	0.43	0.43	0.43	0.43
22.100	0.42	0.42	0.42	0.42	0.42
22.350	0.42	0.42	0.42	0.42	0.42
22.600	0.42	0.42	0.42	0.41	0.41
22.850	0.41	0.41	0.41	0.41	0.41
23.100	0.41	0.41	0.41	0.41	0.41
23.350	0.40	0.40	0.40	0.40	0.40
23.600	0.40	0.40	0.40	0.40	0.40
23.850	0.40	0.40	0.40	0.39	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years

Label: Basin E - Post Storm Event: 100 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary

Return Event: 2 years

Label: Basin F - Post

Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 acres

Computational Time Increment	0.054 hours
Time to Peak (Computed)	12.174 hours
Flow (Peak, Computed)	2.21 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.200 hours
Flow (Peak Interpolated Output)	2.19 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	10.501 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.3 in
Runoff Volume (Pervious)	0.280 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.277 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.402 hours
Computational Time Increment	0.054 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.58 ft³/s
Unit peak time, Tp	0.268 hours
Unit receding limb, Tr	1.073 hours
Total unit time, Tb	1.341 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 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)
11.750	0.00	0.01	0.05	0.19	0.48
12.000	0.92	1.42	1.85	2.12	2.19
12.250	2.09	1.89	1.66	1.46	1.29
12.500	1.16	1.05	0.95	0.87	0.80
12.750	0.73	0.68	0.64	0.61	0.58
13.000	0.55	0.53	0.51	0.49	0.47
13.250	0.46	0.44	0.43	0.42	0.41
13.500	0.40	0.39	0.39	0.38	0.37
13.750	0.36	0.35	0.35	0.34	0.33
14.000	0.33	0.32	0.31	0.31	0.30
14.250	0.30	0.29	0.29	0.28	0.28
14.500	0.28	0.28	0.27	0.27	0.27
14.750	0.27	0.27	0.26	0.26	0.26
15.000	0.26	0.25	0.25	0.25	0.25
15.250	0.25	0.24	0.24	0.24	0.24
15.500	0.23	0.23	0.23	0.23	0.23
15.750	0.22	0.22	0.22	0.22	0.21
16.000	0.21	0.21	0.21	0.20	0.20
16.250	0.20	0.20	0.20	0.19	0.19
16.500	0.19	0.19	0.19	0.19	0.19
16.750	0.19	0.19	0.19	0.18	0.18
17.000	0.18	0.18	0.18	0.18	0.18
17.250	0.18	0.18	0.18	0.18	0.18
17.500	0.18	0.17	0.17	0.17	0.17
17.750	0.17	0.17	0.17	0.17	0.17
18.000	0.17	0.17	0.16	0.16	0.16
18.250	0.16	0.16	0.16	0.16	0.16
18.500	0.16	0.16	0.16	0.15	0.15
18.750	0.15	0.15	0.15	0.15	0.15
19.000	0.15	0.15	0.15	0.14	0.14
19.250	0.14	0.14	0.14	0.14	0.14
19.500	0.14	0.14	0.14	0.13	0.13
19.750	0.13	0.13	0.13	0.13	0.13
20.000	0.13	0.13	0.13	0.12	0.12
20.250	0.12	0.12	0.12	0.12	0.12
20.500	0.12	0.12	0.12	0.12	0.12
20.750	0.12	0.12	0.12	0.12	0.12
21.000	0.12	0.12	0.12	0.12	0.12
21.250	0.12	0.12	0.12	0.12	0.12
21.500	0.12	0.12	0.12	0.12	0.12
21.750	0.12	0.12	0.12	0.12	0.12
22.000	0.12	0.12	0.12	0.12	0.11

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 2 years
Label: Basin F - Post
Storm Event: 2 Year Storm

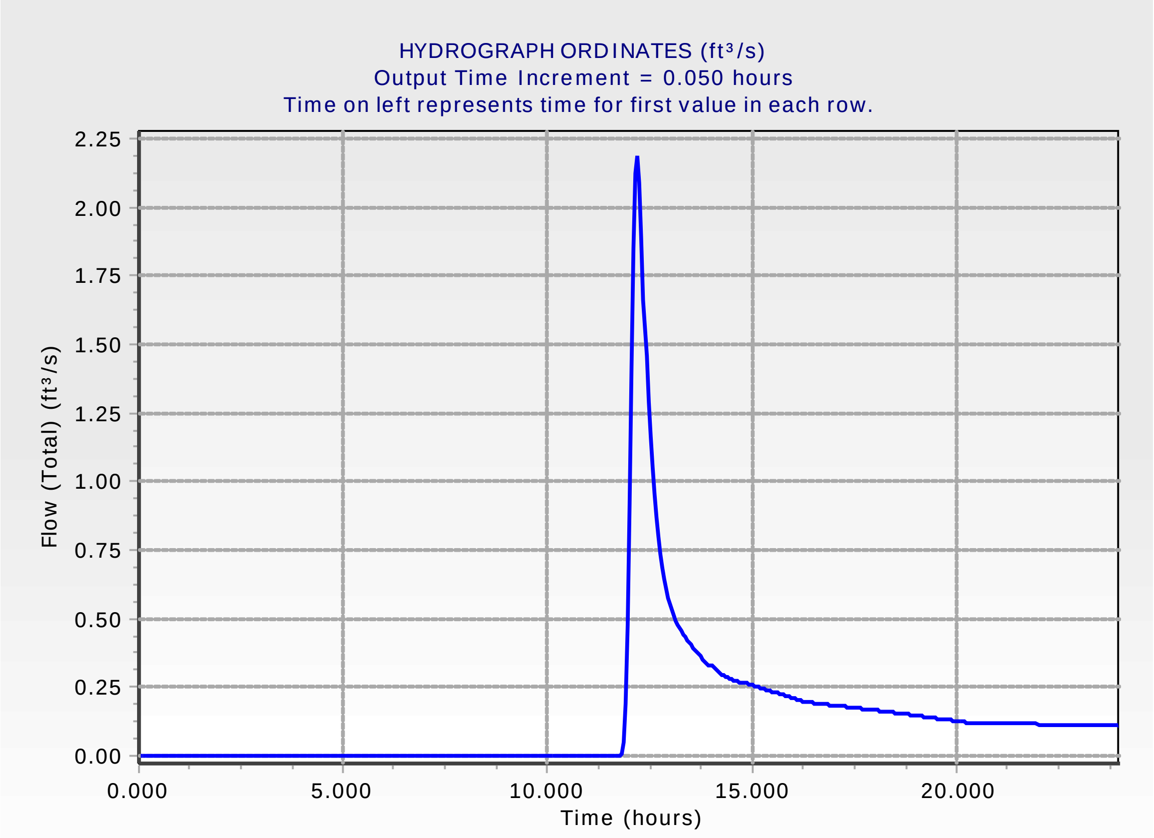
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
22.250	0.11	0.11	0.11	0.11	0.11
22.500	0.11	0.11	0.11	0.11	0.11
22.750	0.11	0.11	0.11	0.11	0.11
23.000	0.11	0.11	0.11	0.11	0.11
23.250	0.11	0.11	0.11	0.11	0.11
23.500	0.11	0.11	0.11	0.11	0.11
23.750	0.11	0.11	0.11	0.11	0.11
24.000	0.11	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) | Return Event: 2 years

Label: Basin F - Post | Storm Event: 2 Year Storm



Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 acres

Computational Time Increment	0.054 hours
Time to Peak (Computed)	12.174 hours
Flow (Peak, Computed)	6.74 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	6.68 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	10.501 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.664 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.658 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.402 hours
Computational Time Increment	0.054 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.58 ft³/s
Unit peak time, Tp	0.268 hours
Unit receding limb, Tr	1.073 hours
Total unit time, Tb	1.341 hours

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 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)
11.500	0.00	0.00	0.01	0.04	0.10
11.750	0.22	0.46	0.90	1.65	2.76
12.000	4.10	5.37	6.30	6.68	6.51
12.250	5.95	5.20	4.45	3.79	3.28
12.500	2.88	2.55	2.27	2.04	1.84
12.750	1.68	1.55	1.44	1.35	1.27
13.000	1.21	1.15	1.10	1.05	1.01
13.250	0.98	0.94	0.92	0.89	0.87
13.500	0.85	0.83	0.81	0.79	0.77
13.750	0.75	0.74	0.72	0.70	0.69
14.000	0.67	0.66	0.65	0.63	0.62
14.250	0.61	0.60	0.59	0.58	0.58
14.500	0.57	0.56	0.56	0.55	0.55
14.750	0.54	0.54	0.53	0.53	0.52
15.000	0.52	0.51	0.51	0.50	0.50
15.250	0.50	0.49	0.49	0.48	0.48
15.500	0.47	0.47	0.46	0.46	0.45
15.750	0.44	0.44	0.43	0.43	0.42
16.000	0.42	0.41	0.41	0.40	0.40
16.250	0.39	0.39	0.39	0.38	0.38
16.500	0.38	0.38	0.38	0.37	0.37
16.750	0.37	0.37	0.37	0.36	0.36
17.000	0.36	0.36	0.36	0.36	0.35
17.250	0.35	0.35	0.35	0.35	0.34
17.500	0.34	0.34	0.34	0.34	0.34
17.750	0.33	0.33	0.33	0.33	0.33
18.000	0.32	0.32	0.32	0.32	0.32
18.250	0.31	0.31	0.31	0.31	0.31
18.500	0.31	0.30	0.30	0.30	0.30
18.750	0.30	0.29	0.29	0.29	0.29
19.000	0.29	0.28	0.28	0.28	0.28
19.250	0.28	0.27	0.27	0.27	0.27
19.500	0.27	0.26	0.26	0.26	0.26
19.750	0.26	0.25	0.25	0.25	0.25
20.000	0.24	0.24	0.24	0.24	0.24
20.250	0.24	0.23	0.23	0.23	0.23
20.500	0.23	0.23	0.23	0.23	0.23
20.750	0.23	0.23	0.23	0.23	0.23
21.000	0.23	0.23	0.23	0.23	0.23
21.250	0.23	0.22	0.22	0.22	0.22
21.500	0.22	0.22	0.22	0.22	0.22
21.750	0.22	0.22	0.22	0.22	0.22

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years

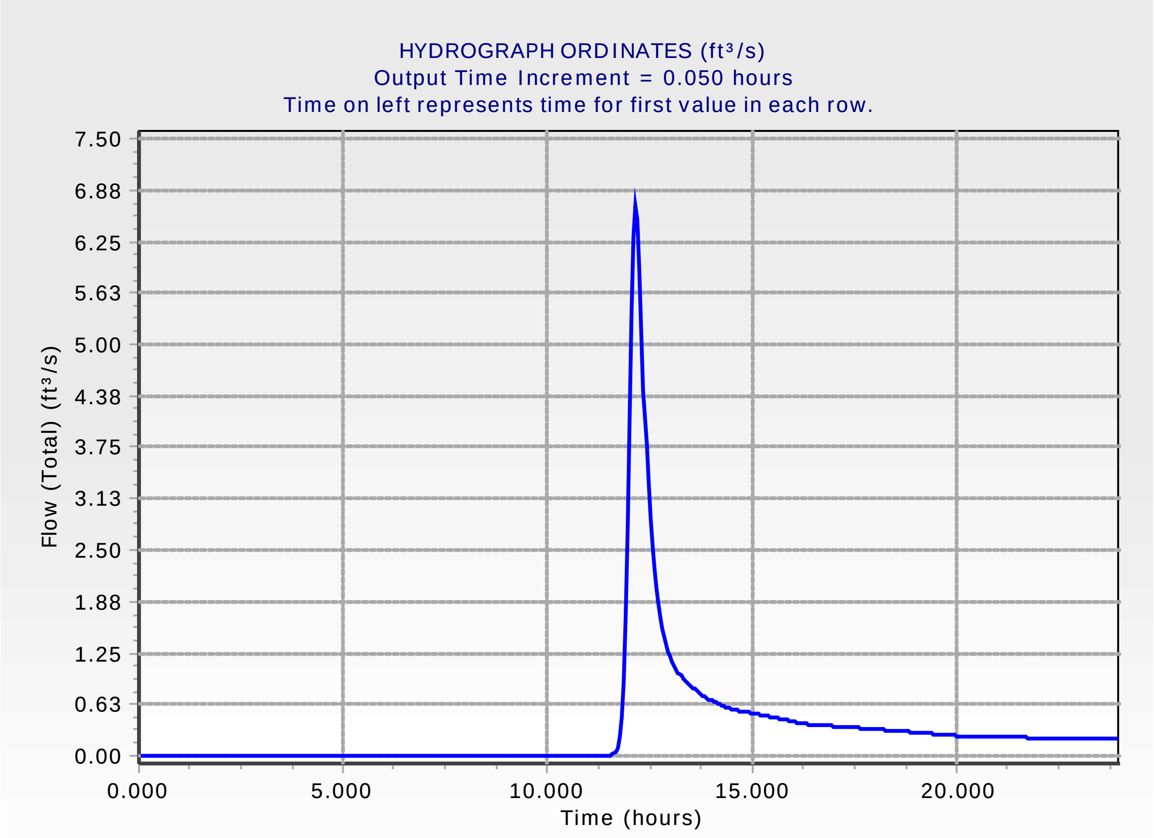
Label: Basin F - Post Storm Event: 10 Year Storm

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)
22.000	0.22	0.22	0.22	0.22	0.22
22.250	0.22	0.22	0.22	0.22	0.22
22.500	0.22	0.22	0.22	0.22	0.22
22.750	0.21	0.21	0.21	0.21	0.21
23.000	0.21	0.21	0.21	0.21	0.21
23.250	0.21	0.21	0.21	0.21	0.21
23.500	0.21	0.21	0.21	0.21	0.21
23.750	0.21	0.21	0.21	0.21	0.21
24.000	0.20	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 10 years
Label: Basin F - Post
Storm Event: 10 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary

Return Event: 50 years

Label: Basin F - Post

Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 acres

Computational Time Increment	0.054 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	14.95 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	14.88 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	10.501 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.5 in
Runoff Volume (Pervious)	1.348 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.338 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.402 hours
Computational Time Increment	0.054 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.58 ft³/s
Unit peak time, Tp	0.268 hours
Unit receding limb, Tr	1.073 hours
Total unit time, Tb	1.341 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years
Label: Basin F - Post Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 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)
10.500	0.00	0.00	0.00	0.01	0.01
10.750	0.02	0.03	0.05	0.06	0.07
11.000	0.09	0.11	0.13	0.15	0.18
11.250	0.21	0.24	0.28	0.32	0.37
11.500	0.42	0.49	0.60	0.77	1.07
11.750	1.56	2.31	3.51	5.31	7.73
12.000	10.47	12.89	14.47	14.88	14.17
12.250	12.70	10.93	9.23	7.78	6.66
12.500	5.78	5.07	4.47	3.98	3.57
12.750	3.23	2.95	2.73	2.54	2.39
13.000	2.26	2.14	2.04	1.95	1.87
13.250	1.80	1.74	1.69	1.64	1.60
13.500	1.55	1.51	1.48	1.44	1.40
13.750	1.37	1.34	1.31	1.28	1.25
14.000	1.22	1.19	1.17	1.14	1.12
14.250	1.10	1.08	1.06	1.05	1.04
14.500	1.03	1.02	1.00	0.99	0.99
14.750	0.98	0.97	0.96	0.95	0.94
15.000	0.93	0.92	0.91	0.90	0.89
15.250	0.88	0.87	0.87	0.86	0.85
15.500	0.84	0.83	0.82	0.81	0.80
15.750	0.79	0.78	0.77	0.76	0.75
16.000	0.74	0.73	0.72	0.71	0.71
16.250	0.70	0.69	0.69	0.68	0.68
16.500	0.67	0.67	0.66	0.66	0.66
16.750	0.65	0.65	0.65	0.64	0.64
17.000	0.64	0.63	0.63	0.63	0.62
17.250	0.62	0.62	0.61	0.61	0.61
17.500	0.60	0.60	0.60	0.59	0.59
17.750	0.59	0.58	0.58	0.57	0.57
18.000	0.57	0.56	0.56	0.56	0.55
18.250	0.55	0.55	0.54	0.54	0.54
18.500	0.53	0.53	0.53	0.52	0.52
18.750	0.52	0.51	0.51	0.50	0.50
19.000	0.50	0.49	0.49	0.49	0.48
19.250	0.48	0.48	0.47	0.47	0.47
19.500	0.46	0.46	0.45	0.45	0.45
19.750	0.44	0.44	0.44	0.43	0.43
20.000	0.42	0.42	0.42	0.41	0.41
20.250	0.41	0.41	0.40	0.40	0.40
20.500	0.40	0.40	0.40	0.40	0.40
20.750	0.40	0.40	0.39	0.39	0.39

Subsection: Unit Hydrograph (Hydrograph Table)

Return Event: 50 years

Label: Basin F - Post

Storm Event: 50 Year Storm

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

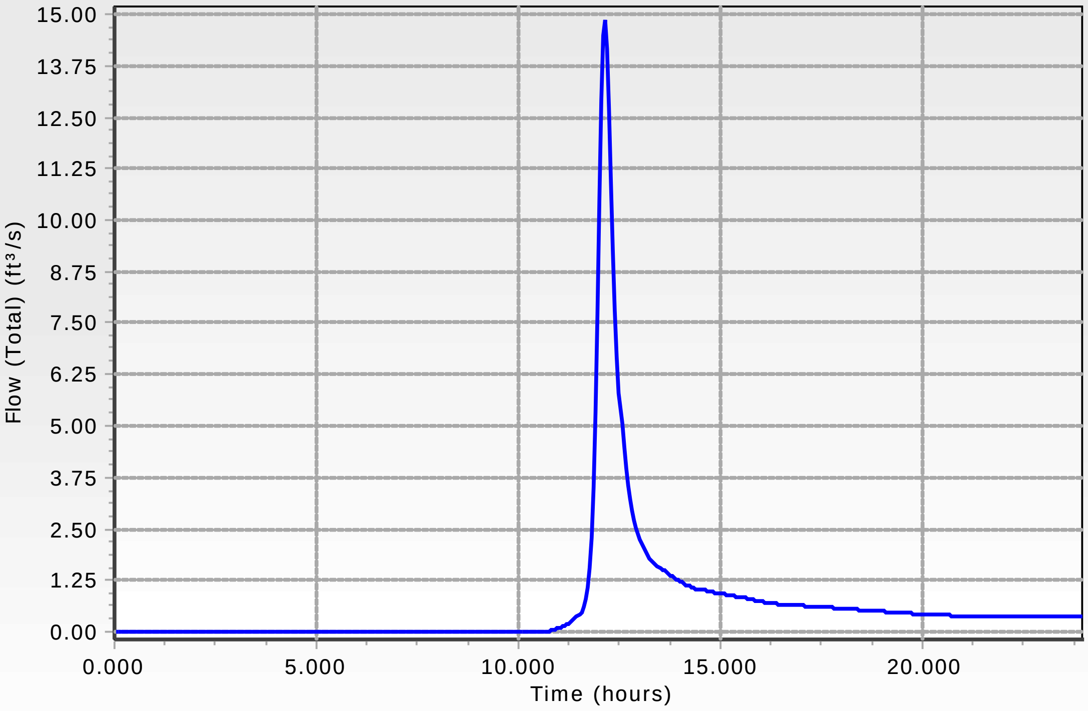
Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
21.000	0.39	0.39	0.39	0.39	0.39
21.250	0.39	0.39	0.39	0.39	0.39
21.500	0.39	0.39	0.38	0.38	0.38
21.750	0.38	0.38	0.38	0.38	0.38
22.000	0.38	0.38	0.38	0.38	0.38
22.250	0.38	0.38	0.37	0.37	0.37
22.500	0.37	0.37	0.37	0.37	0.37
22.750	0.37	0.37	0.37	0.37	0.37
23.000	0.37	0.37	0.36	0.36	0.36
23.250	0.36	0.36	0.36	0.36	0.36
23.500	0.36	0.36	0.36	0.36	0.36
23.750	0.36	0.36	0.35	0.35	0.35
24.000	0.35	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 50 years

Label: Basin F - Post Storm Event: 50 Year Storm

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



NPT Transition Station #1

Subsection: Unit Hydrograph Summary — Return Event: 100 years

Label: Basin F - Post — Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 acres

Computational Time Increment	0.054 hours
Time to Peak (Computed)	12.120 hours
Flow (Peak, Computed)	20.13 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.150 hours
Flow (Peak Interpolated Output)	19.94 ft³/s

Drainage Area

SCS CN (Composite)	70.000
Area (User Defined)	10.501 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	1.775 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	1.763 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.402 hours
Computational Time Increment	0.054 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	29.58 ft³/s
Unit peak time, Tp	0.268 hours
Unit receding limb, Tr	1.073 hours
Total unit time, Tb	1.341 hours

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.402 hours
Area (User Defined)	10.501 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)
9.850	0.00	0.00	0.00	0.01	0.01
10.100	0.01	0.02	0.03	0.04	0.05
10.350	0.06	0.07	0.08	0.10	0.11
10.600	0.12	0.14	0.16	0.18	0.20
10.850	0.22	0.24	0.27	0.30	0.33
11.100	0.36	0.39	0.43	0.48	0.53
11.350	0.59	0.65	0.72	0.80	0.90
11.600	1.06	1.33	1.78	2.50	3.57
11.850	5.25	7.71	10.93	14.51	17.61
12.100	19.55	19.94	18.87	16.82	14.43
12.350	12.14	10.20	8.70	7.52	6.57
12.600	5.78	5.13	4.59	4.14	3.78
12.850	3.49	3.25	3.05	2.88	2.73
13.100	2.59	2.47	2.37	2.28	2.20
13.350	2.14	2.08	2.02	1.97	1.91
13.600	1.87	1.82	1.77	1.73	1.69
13.850	1.65	1.61	1.58	1.54	1.51
14.100	1.47	1.44	1.41	1.38	1.36
14.350	1.34	1.32	1.31	1.29	1.28
14.600	1.26	1.25	1.24	1.23	1.21
14.850	1.20	1.19	1.18	1.17	1.16
15.100	1.14	1.13	1.12	1.11	1.10
15.350	1.08	1.07	1.06	1.05	1.04
15.600	1.03	1.01	1.00	0.99	0.98
15.850	0.97	0.95	0.94	0.93	0.92
16.100	0.90	0.89	0.88	0.87	0.86
16.350	0.86	0.85	0.84	0.84	0.83
16.600	0.83	0.82	0.82	0.82	0.81
16.850	0.81	0.80	0.80	0.79	0.79
17.100	0.79	0.78	0.78	0.77	0.77
17.350	0.76	0.76	0.76	0.75	0.75
17.600	0.74	0.74	0.73	0.73	0.73
17.850	0.72	0.72	0.71	0.71	0.70
18.100	0.70	0.69	0.69	0.69	0.68
18.350	0.68	0.67	0.67	0.66	0.66
18.600	0.65	0.65	0.65	0.64	0.64
18.850	0.63	0.63	0.62	0.62	0.61
19.100	0.61	0.61	0.60	0.60	0.59
19.350	0.59	0.58	0.58	0.57	0.57
19.600	0.56	0.56	0.56	0.55	0.55
19.850	0.54	0.54	0.53	0.53	0.52
20.100	0.52	0.51	0.51	0.51	0.50

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin F - Post

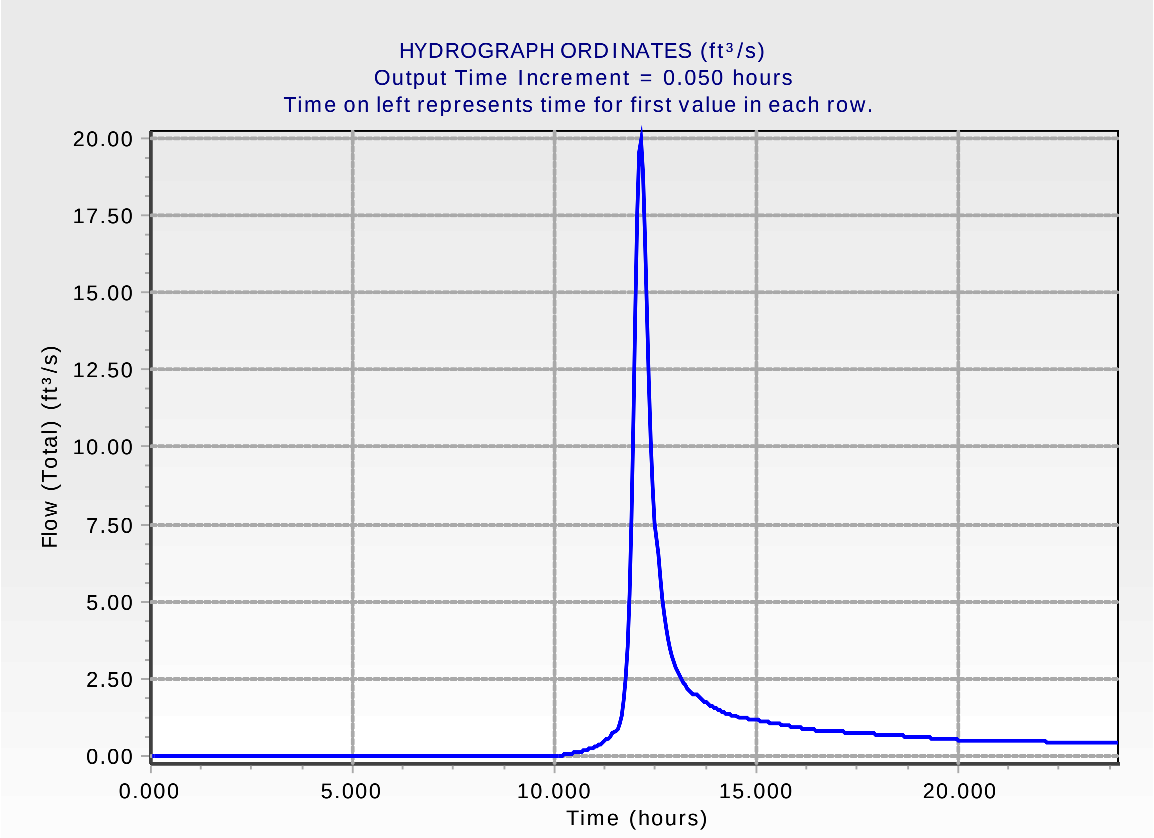
Return Event: 100 years
Storm Event: 100 Year Storm

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)
20.350	0.50	0.50	0.50	0.50	0.50
20.600	0.49	0.49	0.49	0.49	0.49
20.850	0.49	0.49	0.49	0.49	0.49
21.100	0.49	0.48	0.48	0.48	0.48
21.350	0.48	0.48	0.48	0.48	0.48
21.600	0.48	0.48	0.48	0.47	0.47
21.850	0.47	0.47	0.47	0.47	0.47
22.100	0.47	0.47	0.47	0.47	0.47
22.350	0.46	0.46	0.46	0.46	0.46
22.600	0.46	0.46	0.46	0.46	0.46
22.850	0.46	0.46	0.45	0.45	0.45
23.100	0.45	0.45	0.45	0.45	0.45
23.350	0.45	0.45	0.45	0.44	0.44
23.600	0.44	0.44	0.44	0.44	0.44
23.850	0.44	0.44	0.44	0.43	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 100 years
Label: Basin F - Post
Storm Event: 100 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary
Return Event: 2 years
Label: Basin G - Post
Storm Event: 2 Year Storm

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.52 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.50 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	0.278 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	1.2 in
Runoff Volume (Pervious)	0.028 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.028 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.78 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	2 Year Storm
Return Event	2 years
Duration	24.000 hours
Depth	2.2 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 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)
8.500	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	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	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	0.01	0.01
10.750	0.01	0.01	0.01	0.01	0.01
11.000	0.01	0.01	0.02	0.02	0.02
11.250	0.02	0.02	0.02	0.02	0.03
11.500	0.03	0.04	0.06	0.09	0.13
11.750	0.18	0.24	0.36	0.50	0.50
12.000	0.44	0.31	0.14	0.10	0.08
12.250	0.07	0.07	0.06	0.06	0.05
12.500	0.05	0.04	0.04	0.04	0.04
12.750	0.04	0.04	0.03	0.03	0.03
13.000	0.03	0.03	0.03	0.03	0.03
13.250	0.03	0.03	0.03	0.03	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	0.01	0.01	0.01
15.250	0.01	0.01	0.01	0.01	0.01
15.500	0.01	0.01	0.01	0.01	0.01
15.750	0.01	0.01	0.01	0.01	0.01
16.000	0.01	0.01	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

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin G - Post

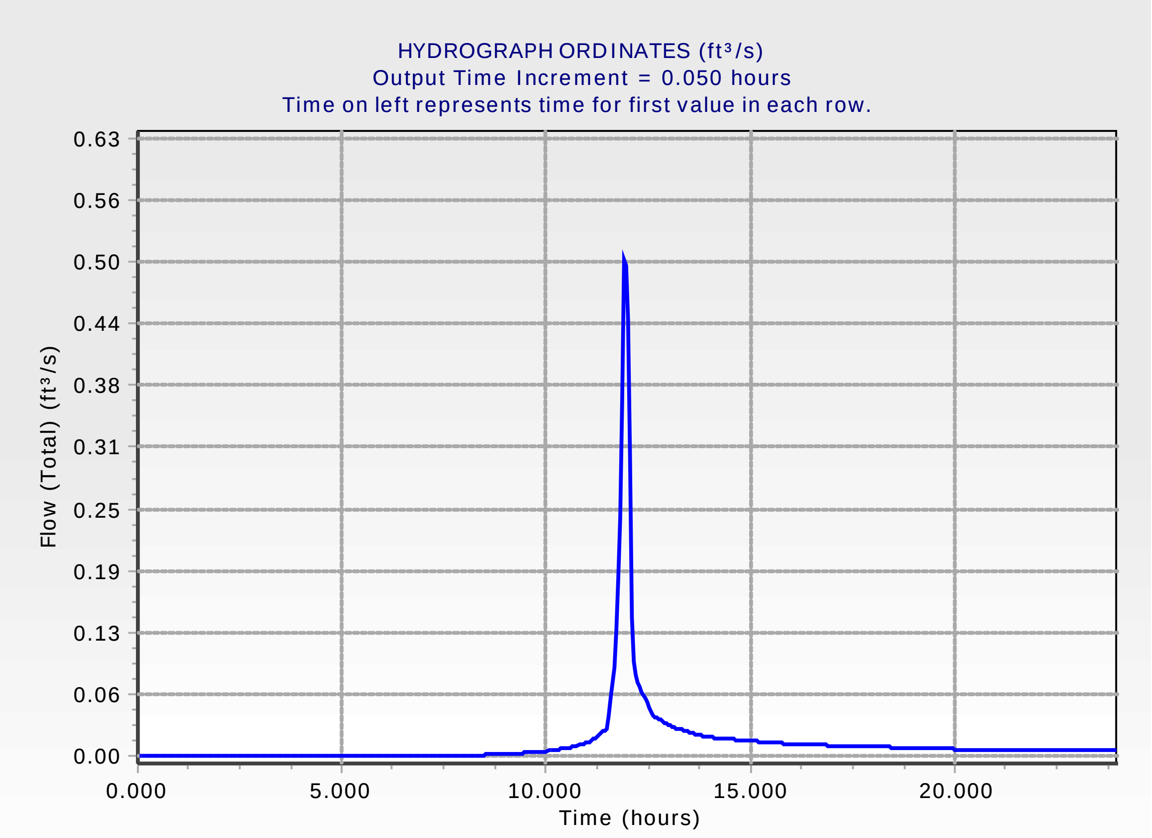
Return Event: 2 years
Storm Event: 2 Year Storm

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)
19.000	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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 2 years
Label: Basin G - Post Storm Event: 2 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary | Return Event: 10 years

Label: Basin G - Post | Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.86 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.83 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	0.278 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	0.046 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.046 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.78 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: Basin G - Post Storm Event: 10 Year Storm

Storm Event	10 Year Storm
Return Event	10 years
Duration	24.000 hours
Depth	3.1 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 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)
6.750	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	0.00
7.750	0.00	0.00	0.00	0.00	0.00
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	0.01	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	0.01	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	0.02	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	0.03	0.03
11.000	0.03	0.03	0.03	0.03	0.04
11.250	0.04	0.04	0.04	0.05	0.05
11.500	0.05	0.08	0.11	0.17	0.23
11.750	0.32	0.42	0.60	0.83	0.80
12.000	0.70	0.48	0.22	0.15	0.13
12.250	0.12	0.11	0.10	0.09	0.08
12.500	0.08	0.07	0.06	0.06	0.06
12.750	0.06	0.06	0.05	0.05	0.05
13.000	0.05	0.05	0.05	0.04	0.04
13.250	0.04	0.04	0.04	0.04	0.04
13.500	0.04	0.04	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	0.03	0.03	0.03	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
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

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 10 years
Label: Basin G - Post Storm Event: 10 Year Storm

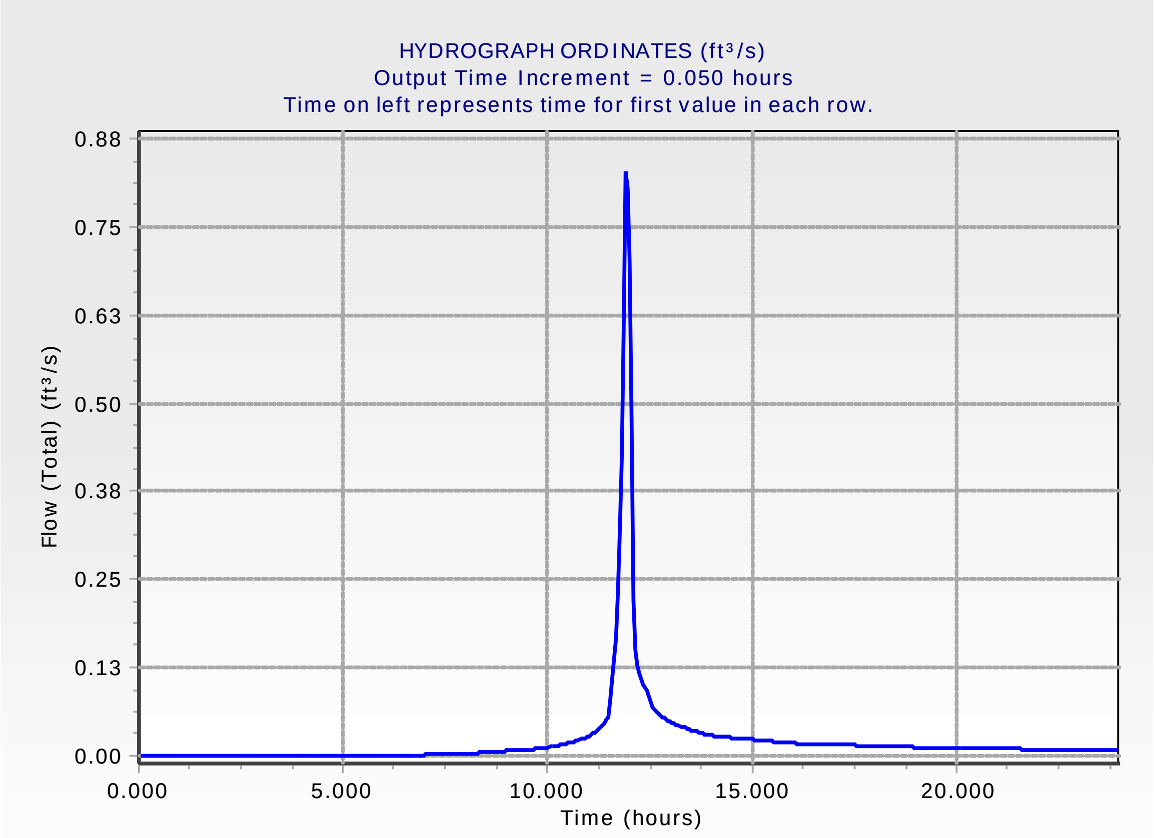
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
17.250	0.02	0.02	0.02	0.02	0.02
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
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)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin G - Post

Return Event: 10 years
Storm Event: 10 Year Storm



NPT Transition Station #1

Subsection: Unit Hydrograph Summary
Return Event: 50 years
Label: Basin G - Post
Storm Event: 50 Year Storm

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.33 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.29 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	0.278 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	0.072 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.072 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.78 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Storm Event	50 Year Storm
Return Event	50 years
Duration	24.000 hours
Depth	4.3 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 acres

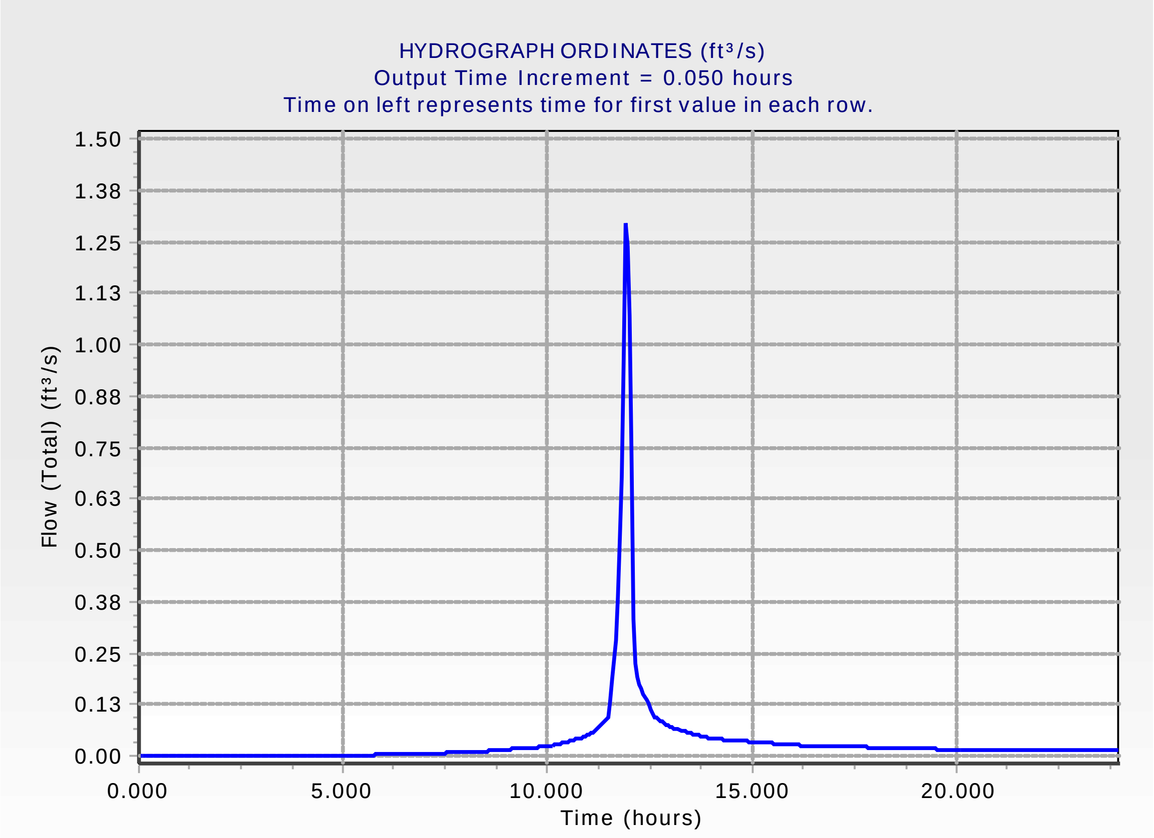
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
5.200	0.00	0.00	0.00	0.00	0.00
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	0.01	0.01
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	0.01	0.01
8.700	0.01	0.01	0.01	0.01	0.01
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	0.03	0.03
10.200	0.03	0.03	0.03	0.03	0.03
10.450	0.03	0.03	0.04	0.04	0.04
10.700	0.04	0.04	0.04	0.05	0.05
10.950	0.05	0.05	0.05	0.06	0.06
11.200	0.07	0.07	0.07	0.08	0.08
11.450	0.09	0.09	0.13	0.19	0.28
11.700	0.39	0.53	0.68	0.96	1.29
11.950	1.24	1.07	0.73	0.33	0.23
12.200	0.19	0.17	0.16	0.15	0.14
12.450	0.12	0.11	0.10	0.10	0.09
12.700	0.09	0.09	0.08	0.08	0.08
12.950	0.07	0.07	0.07	0.07	0.07
13.200	0.06	0.06	0.06	0.06	0.06
13.450	0.06	0.05	0.05	0.05	0.05
13.700	0.05	0.05	0.05	0.05	0.05
13.950	0.04	0.04	0.04	0.04	0.04
14.200	0.04	0.04	0.04	0.04	0.04
14.450	0.04	0.04	0.04	0.04	0.04
14.700	0.04	0.04	0.04	0.04	0.04
14.950	0.03	0.03	0.03	0.03	0.03
15.200	0.03	0.03	0.03	0.03	0.03
15.450	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)
15.700	0.03	0.03	0.03	0.03	0.03
15.950	0.03	0.03	0.03	0.03	0.03
16.200	0.03	0.03	0.03	0.03	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	0.01	0.01	0.01	0.01
20.200	0.01	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)

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 50 years
Label: Basin G - Post
Storm Event: 50 Year Storm



Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 acres

Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.59 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.55 ft³/s

Drainage Area

SCS CN (Composite)	89.000
Area (User Defined)	0.278 acres
Maximum Retention (Pervious)	1.2 in
Maximum Retention (Pervious, 20 percent)	0.2 in

Cumulative Runoff

Cumulative Runoff Depth (Pervious)	3.8 in
Runoff Volume (Pervious)	0.087 ac-ft

Hydrograph Volume (Area under Hydrograph curve)

Volume	0.087 ac-ft

SCS Unit Hydrograph Parameters

Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	3.78 ft³/s
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table) Return Event: 100 years
Label: Basin G - Post Storm Event: 100 Year Storm

Storm Event	100 Year Storm
Return Event	100 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.278 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)
4.600	0.00	0.00	0.00	0.00	0.00
4.850	0.00	0.00	0.00	0.00	0.00
5.100	0.00	0.00	0.00	0.00	0.00
5.350	0.00	0.00	0.00	0.00	0.00
5.600	0.00	0.00	0.00	0.00	0.00
5.850	0.00	0.00	0.00	0.01	0.01
6.100	0.01	0.01	0.01	0.01	0.01
6.350	0.01	0.01	0.01	0.01	0.01
6.600	0.01	0.01	0.01	0.01	0.01
6.850	0.01	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	0.02	0.02	0.02
8.600	0.02	0.02	0.02	0.02	0.02
8.850	0.02	0.02	0.02	0.02	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	0.03	0.03	0.03	0.03
9.850	0.03	0.03	0.03	0.03	0.03
10.100	0.03	0.03	0.04	0.04	0.04
10.350	0.04	0.04	0.04	0.04	0.04
10.600	0.05	0.05	0.05	0.05	0.06
10.850	0.06	0.06	0.06	0.06	0.07
11.100	0.07	0.08	0.08	0.09	0.09
11.350	0.10	0.10	0.11	0.12	0.17
11.600	0.23	0.34	0.48	0.64	0.82
11.850	1.16	1.55	1.48	1.27	0.87
12.100	0.39	0.27	0.23	0.21	0.19
12.350	0.18	0.16	0.15	0.13	0.12
12.600	0.11	0.11	0.10	0.10	0.10
12.850	0.09	0.09	0.09	0.08	0.08
13.100	0.08	0.08	0.07	0.07	0.07
13.350	0.07	0.07	0.07	0.06	0.06
13.600	0.06	0.06	0.06	0.06	0.06
13.850	0.05	0.05	0.05	0.05	0.05
14.100	0.05	0.05	0.05	0.05	0.05
14.350	0.05	0.05	0.05	0.04	0.04
14.600	0.04	0.04	0.04	0.04	0.04
14.850	0.04	0.04	0.04	0.04	0.04

Subsection: Unit Hydrograph (Hydrograph Table)
Return Event: 100 years
Label: Basin G - Post
Storm Event: 100 Year Storm

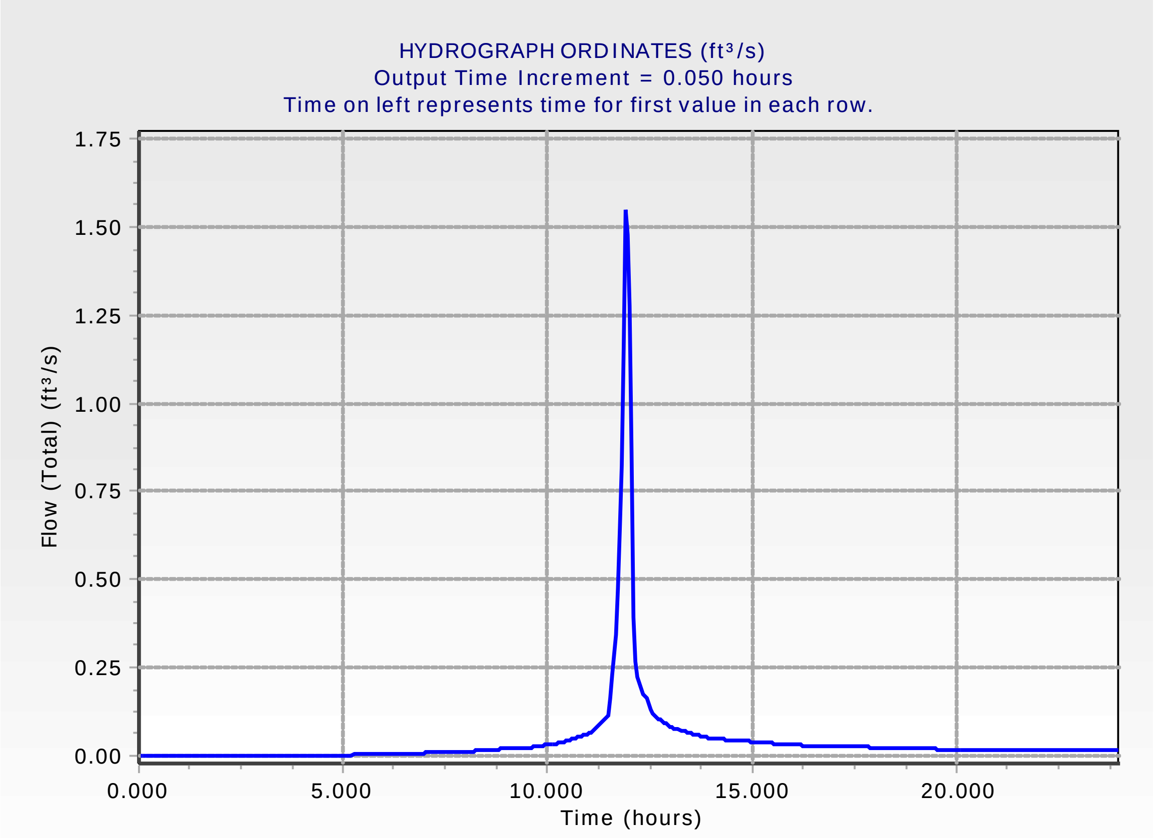
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.100	0.04	0.04	0.04	0.04	0.04
15.350	0.04	0.04	0.04	0.04	0.04
15.600	0.03	0.03	0.03	0.03	0.03
15.850	0.03	0.03	0.03	0.03	0.03
16.100	0.03	0.03	0.03	0.03	0.03
16.350	0.03	0.03	0.03	0.03	0.03
16.600	0.03	0.03	0.03	0.03	0.03
16.850	0.03	0.03	0.03	0.03	0.03
17.100	0.03	0.03	0.03	0.03	0.03
17.350	0.03	0.03	0.03	0.03	0.03
17.600	0.03	0.03	0.03	0.02	0.02
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	0.01	0.01	0.01	0.01
23.850	0.01	0.01	0.01	0.01	(N/A)

NPT Transition Station #1

Subsection: Unit Hydrograph (Hydrograph Table)
Label: Basin G - Post

Return Event: 100 years
Storm Event: 100 Year Storm



Summary for Hydrograph Addition at 'Site Outlet - Post'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin E - Post
<Catchment to Outflow Node>	Basin D - Post
<Catchment to Outflow Node>	Basin C - Post
<Catchment to Outflow Node>	Basin F - Post
Drainline C	Detention Pond

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin E - Post	0.251	12.200	2.04
Flow (From)	Basin D - Post	0.004	11.950	0.06
Flow (From)	Basin C - Post	0.046	11.950	0.82
Flow (From)	Basin F - Post	0.277	12.200	2.19
Flow (From)	Drainline C	0.358	12.450	1.72
Flow (In)	Site Outlet - Post	0.936	12.250	5.39

Summary for Hydrograph Addition at 'Site Outlet - Post'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin E - Post
<Catchment to Outflow Node>	Basin D - Post
<Catchment to Outflow Node>	Basin C - Post
<Catchment to Outflow Node>	Basin F - Post
Drainline C	Detention Pond

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin E - Post	0.597	12.150	6.27
Flow (From)	Basin D - Post	0.007	11.950	0.13
Flow (From)	Basin C - Post	0.078	11.950	1.38
Flow (From)	Basin F - Post	0.658	12.150	6.68
Flow (From)	Drainline C	0.792	12.350	5.21
Flow (In)	Site Outlet - Post	2.133	12.200	17.09

Subsection: Addition Summary
Label: Site Outlet - Post

Return Event: 50 years
Storm Event: 50 Year Storm

Summary for Hydrograph Addition at 'Site Outlet - Post'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin E - Post
<Catchment to Outflow Node>	Basin D - Post
<Catchment to Outflow Node>	Basin C - Post
<Catchment to Outflow Node>	Basin F - Post
Drainline C	Detention Pond

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin E - Post	1.213	12.150	13.82
Flow (From)	Basin D - Post	0.013	11.950	0.23
Flow (From)	Basin C - Post	0.125	11.950	2.20
Flow (From)	Basin F - Post	1.338	12.150	14.88
Flow (From)	Drainline C	1.557	12.350	11.48
Flow (In)	Site Outlet - Post	4.246	12.150	37.18

Subsection: Addition Summary
Label: Site Outlet - Post

Return Event: 100 years
Storm Event: 100 Year Storm

Summary for Hydrograph Addition at 'Site Outlet - Post'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin E - Post
<Catchment to Outflow Node>	Basin D - Post
<Catchment to Outflow Node>	Basin C - Post
<Catchment to Outflow Node>	Basin F - Post
Drainline C	Detention Pond

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin E - Post	1.598	12.100	18.48
Flow (From)	Basin D - Post	0.016	11.900	0.30
Flow (From)	Basin C - Post	0.153	11.950	2.65
Flow (From)	Basin F - Post	1.763	12.150	19.94
Flow (From)	Drainline C	2.032	12.300	17.11
Flow (In)	Site Outlet - Post	5.562	12.150	51.96

Subsection: Addition Summary
Label: Site Outlet (Pre)

Return Event: 2 years
Storm Event: 2 Year Storm

Summary for Hydrograph Addition at 'Site Outlet (Pre)'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin A - Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin A - Pre	0.923	12.200	7.35
Flow (In)	Site Outlet (Pre)	0.923	12.200	7.35

Summary for Hydrograph Addition at 'Site Outlet (Pre)'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin A - Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin A - Pre	2.132	12.200	20.96
Flow (In)	Site Outlet (Pre)	2.132	12.200	20.96

Subsection: Addition Summary
Label: Site Outlet (Pre)

Return Event: 50 years
Storm Event: 50 Year Storm

Summary for Hydrograph Addition at 'Site Outlet (Pre)'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin A - Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	Basin A - Pre	4.261	12.150	45.73
Flow (In)	Site Outlet (Pre)	4.261	12.150	45.73

Summary for Hydrograph Addition at 'Site Outlet (Pre)'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin A - Pre

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Basin A - Pre	5.582	12.150	60.96
Flow (In)	Site Outlet (Pre)	5.582	12.150	60.96

NPT Transition Station #1

Subsection: Elevation-Area Volume Curve
Label: Detention Pond

Return Event: 2 years
Storm Event: 2 Year Storm

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
1,155.61	0.0	0.0368227731739573	0	0.000	0.000
1,156.00	0.0	0.0408172635307332	0.116408643032154	0.015	0.015
1,157.00	0.0	0.0523415977784431	0.139380509810094	0.046	0.062
1,157.19	0.0	0.0622359963058593	0.171652382616385	0.011	0.072
1,158.00	0.0	0.0769054177885019	0.208324398255105	0.056	0.129
1,158.61	0.0	0.0919651055703697	0.252969363219199	0.051	0.180
1,159.00	0.0	0.100918273611419	0.28922111678577	0.038	0.218
1,160.00	0.0	0.146074380115892	0.368407538565019	0.123	0.341
1,161.00	0.0	0.170431588555772	0.47428964542706	0.158	0.499
1,161.60	0.0	0.184848484785975	0.532773794087585	0.107	0.605
1,162.00	0.0	0.195844811687674	0.570960520907237	0.076	0.681
1,162.60	0.0	0.211317722609898	0.610596748703124	0.122	0.803

NPT Transition Station #1

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 2 years
Storm Event: 2 Year Storm

Requested Pond Water Surface Elevations	
Minimum (Headwater)	1,155.61 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	1,162.60 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Inlet Box	Riser - 1	Forward	Culvert - 1	1,160.77	1,162.60
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	1,159.02	1,162.60
Culvert-Circular	Culvert - 1	Forward	TW	1,155.50	1,162.60
Orifice-Circular	Orifice - 2	Forward	TW	1,158.61	1,162.60
Irregular Weir	Weir - 1	Forward	TW	1,161.60	1,162.60
Tailwater Settings	Tailwater			(N/A)	(N/A)

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

Number of Barrels	1
Diameter	18.0 in
Length	25.00 ft
Length (Computed Barrel)	25.00 ft
Slope (Computed)	0.010 ft/ft

Outlet Control Data

Manning's n	0.012
Ke	0.200
Kb	0.016
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)	1.090
T2 ratio (HW/D)	1.192
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	1,157.14 ft	T1 Flow	7.58 ft³/s
T2 Elevation	1,157.29 ft	T2 Flow	8.66 ft³/s

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 2 years
Storm Event: 2 Year Storm

Structure ID: Orifice - 1
Structure Type: Orifice-Circular

Number of Openings	3
Elevation	1,159.02 ft
Orifice Diameter	9.0 in
Orifice Coefficient	0.600

Structure ID: Riser - 1
Structure Type: Inlet Box

Number of Openings	1
Elevation	1,160.77 ft
Orifice Area	4.0 ft²
Orifice Coefficient	0.600
Weir Length	9.00 ft
Weir Coefficient	2.80 (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 - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	1.00
3.00	0.00
14.00	0.00
17.00	1.00

Lowest Elevation	1,161.60 ft
Weir Coefficient	3.33 (ft^0.5)/s

Structure ID: Orifice - 2
Structure Type: Orifice-Circular

Number of Openings	1
Elevation	1,158.61 ft
Orifice Diameter	6.0 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

NPT Transition Station #1

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1

Return Event: 2 years
Storm Event: 2 Year Storm

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

NPT Transition Station #1

Subsection: Level Pool Pond Routing Summary Return Event: 2 years
Label: Detention Pond (IN) Storm Event: 2 Year Storm

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	1,158.61 ft
Volume (Initial)	0.180 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)	2.60 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	1.72 ft³/s	Time to Peak (Flow, Outlet)	12.450 hours

Elevation (Water Surface, Peak)	1,159.32 ft
Volume (Peak)	0.252 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.180 ac-ft
Volume (Total Inflow)	0.374 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.358 ac-ft
Volume (Retained)	0.196 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.3 %

Subsection: Level Pool Pond Routing Summary
Label: Detention Pond (IN)

Return Event: 10 years
Storm Event: 10 Year Storm

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	1,158.61 ft
Volume (Initial)	0.180 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)	7.22 ft³/s	Time to Peak (Flow, In)	12.200 hours
Flow (Peak Outlet)	5.21 ft³/s	Time to Peak (Flow, Outlet)	12.350 hours

Elevation (Water Surface, Peak)	1,159.91 ft
Volume (Peak)	0.327 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.180 ac-ft
Volume (Total Inflow)	0.823 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.792 ac-ft
Volume (Retained)	0.209 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)	1,158.61 ft
Volume (Initial)	0.180 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)	15.60 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	11.48 ft³/s	Time to Peak (Flow, Outlet)	12.350 hours

Elevation (Water Surface, Peak)	1,160.92 ft
Volume (Peak)	0.486 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.180 ac-ft
Volume (Total Inflow)	1.600 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.557 ac-ft
Volume (Retained)	0.221 ac-ft
Volume (Unrouted)	-0.002 ac-ft
Error (Mass Balance)	0.1 %

NPT Transition Station #1

Subsection: Level Pool Pond Routing Summary
Return Event: 100 years
Label: Detention Pond (IN)
Storm Event: 100 Year Storm

Infiltration

Infiltration Method (Computed)	No Infiltration

Initial Conditions

Elevation (Water Surface, Initial)	1,158.61 ft
Volume (Initial)	0.180 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)	20.74 ft³/s	Time to Peak (Flow, In)	12.150 hours
Flow (Peak Outlet)	17.11 ft³/s	Time to Peak (Flow, Outlet)	12.300 hours

Elevation (Water Surface, Peak)	1,161.25 ft
Volume (Peak)	0.542 ac-ft

Mass Balance (ac-ft)

Volume (Initial)	0.180 ac-ft
Volume (Total Inflow)	2.079 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.032 ac-ft
Volume (Retained)	0.225 ac-ft
Volume (Unrouted)	-0.002 ac-ft
Error (Mass Balance)	0.1 %

Subsection: Pond Routed Hydrograph (total out) Return Event: 2 years
Label: Detention Pond (OUT) Storm Event: 2 Year Storm

Peak Discharge	1.72 ft³/s
Time to Peak	12.450 hours
Hydrograph Volume	0.358 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)
9.000	0.00	0.00	0.00	0.00	0.00
9.250	0.00	0.00	0.00	0.00	0.00
9.500	0.00	0.00	0.00	0.00	0.00
9.750	0.00	0.00	0.00	0.00	0.00
10.000	0.00	0.00	0.00	0.00	0.00
10.250	0.01	0.01	0.01	0.01	0.01
10.500	0.01	0.01	0.01	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	0.02	0.02	0.02	0.02	0.02
11.500	0.02	0.02	0.03	0.03	0.04
11.750	0.05	0.06	0.09	0.12	0.17
12.000	0.23	0.29	0.40	0.62	0.97
12.250	1.26	1.48	1.63	1.70	1.72
12.500	1.70	1.66	1.60	1.52	1.45
12.750	1.37	1.29	1.21	1.14	1.07
13.000	1.01	0.95	0.90	0.85	0.81
13.250	0.77	0.74	0.70	0.68	0.65
13.500	0.62	0.60	0.58	0.56	0.55
13.750	0.54	0.53	0.52	0.51	0.50
14.000	0.50	0.49	0.48	0.47	0.46
14.250	0.45	0.45	0.44	0.43	0.42
14.500	0.42	0.41	0.40	0.40	0.39
14.750	0.39	0.38	0.38	0.37	0.37
15.000	0.36	0.36	0.35	0.35	0.35
15.250	0.34	0.34	0.33	0.33	0.33
15.500	0.33	0.33	0.32	0.32	0.32
15.750	0.32	0.32	0.32	0.31	0.31
16.000	0.31	0.31	0.31	0.31	0.30
16.250	0.30	0.30	0.30	0.30	0.29
16.500	0.29	0.29	0.29	0.29	0.28
16.750	0.28	0.28	0.28	0.28	0.28
17.000	0.27	0.27	0.27	0.27	0.27
17.250	0.27	0.26	0.26	0.26	0.26
17.500	0.26	0.26	0.25	0.25	0.25
17.750	0.25	0.25	0.25	0.25	0.24
18.000	0.24	0.24	0.24	0.24	0.24
18.250	0.24	0.24	0.23	0.23	0.23
18.500	0.23	0.23	0.23	0.23	0.22
18.750	0.22	0.22	0.22	0.22	0.22
19.000	0.22	0.22	0.21	0.21	0.21
19.250	0.21	0.21	0.21	0.21	0.21
19.500	0.20	0.20	0.20	0.20	0.20
19.750	0.20	0.20	0.20	0.19	0.19
20.000	0.19	0.19	0.19	0.19	0.19
20.250	0.18	0.18	0.18	0.18	0.18

Subsection: Pond Routed Hydrograph (total out)
Label: Detention Pond (OUT)

Return Event: 2 years
Storm Event: 2 Year Storm

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)
20.500	0.18	0.18	0.18	0.18	0.17
20.750	0.17	0.17	0.17	0.17	0.17
21.000	0.17	0.17	0.17	0.17	0.17
21.250	0.16	0.16	0.16	0.16	0.16
21.500	0.16	0.16	0.16	0.16	0.16
21.750	0.16	0.16	0.16	0.16	0.16
22.000	0.16	0.15	0.15	0.15	0.15
22.250	0.15	0.15	0.15	0.15	0.15
22.500	0.15	0.15	0.15	0.15	0.15
22.750	0.15	0.15	0.15	0.15	0.15
23.000	0.15	0.15	0.15	0.15	0.14
23.250	0.14	0.14	0.14	0.14	0.14
23.500	0.14	0.14	0.14	0.14	0.14
23.750	0.14	0.14	0.14	0.14	0.14
24.000	0.14	(N/A)	(N/A)	(N/A)	(N/A)

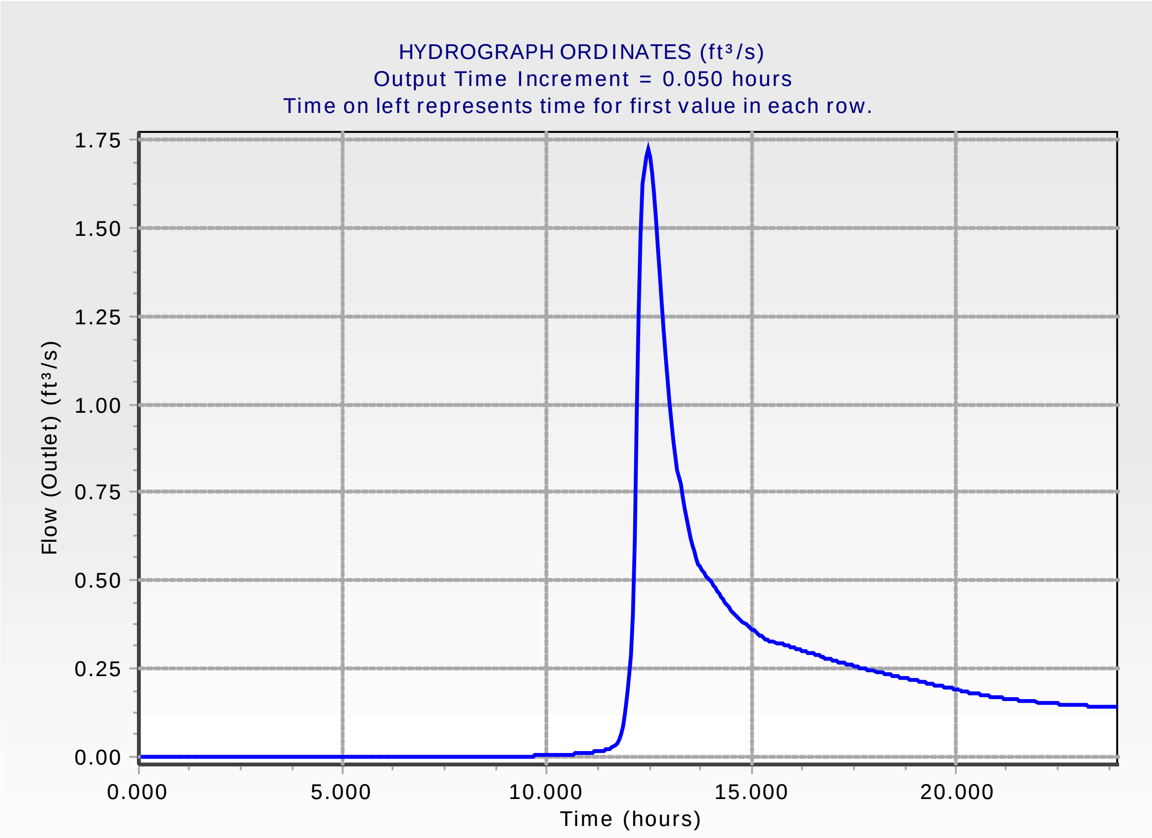
NPT Transition Station #1

Subsection: Pond Routed Hydrograph (total out)

Return Event: 2 years

Label: Detention Pond (OUT)

Storm Event: 2 Year Storm



Subsection: Pond Routed Hydrograph (total out) Return Event: 10 years
Label: Detention Pond (OUT) Storm Event: 10 Year Storm

Peak Discharge	5.21 ft³/s
Time to Peak	12.350 hours
Hydrograph Volume	0.792 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)
7.300	0.00	0.00	0.00	0.00	0.00
7.550	0.00	0.00	0.00	0.00	0.00
7.800	0.00	0.00	0.00	0.00	0.00
8.050	0.00	0.00	0.00	0.00	0.00
8.300	0.00	0.00	0.00	0.00	0.00
8.550	0.00	0.00	0.00	0.01	0.01
8.800	0.01	0.01	0.01	0.01	0.01
9.050	0.01	0.01	0.01	0.01	0.01
9.300	0.01	0.01	0.01	0.01	0.01
9.550	0.01	0.01	0.01	0.01	0.01
9.800	0.01	0.01	0.01	0.01	0.01
10.050	0.01	0.01	0.02	0.02	0.02
10.300	0.02	0.02	0.02	0.02	0.02
10.550	0.02	0.02	0.02	0.02	0.02
10.800	0.02	0.03	0.03	0.03	0.03
11.050	0.03	0.03	0.03	0.03	0.04
11.300	0.04	0.04	0.04	0.05	0.05
11.550	0.05	0.06	0.07	0.09	0.11
11.800	0.15	0.21	0.31	0.70	1.51
12.050	2.32	3.09	3.77	4.35	4.80
12.300	5.08	5.21	5.19	5.07	4.87
12.550	4.62	4.36	4.09	3.81	3.55
12.800	3.29	3.03	2.79	2.58	2.39
13.050	2.22	2.07	1.93	1.81	1.70
13.300	1.60	1.52	1.44	1.37	1.31
13.550	1.25	1.20	1.16	1.11	1.08
13.800	1.04	1.01	0.98	0.95	0.93
14.050	0.90	0.88	0.86	0.84	0.82
14.300	0.80	0.78	0.77	0.75	0.74
14.550	0.73	0.71	0.70	0.69	0.69
14.800	0.68	0.67	0.66	0.65	0.65
15.050	0.64	0.63	0.63	0.62	0.61
15.300	0.61	0.60	0.60	0.59	0.58
15.550	0.58	0.57	0.57	0.56	0.55
15.800	0.55	0.54	0.54	0.54	0.53
16.050	0.53	0.52	0.52	0.52	0.51
16.300	0.51	0.50	0.50	0.49	0.49
16.550	0.49	0.48	0.48	0.47	0.47
16.800	0.47	0.46	0.46	0.46	0.45
17.050	0.45	0.45	0.45	0.44	0.44
17.300	0.44	0.43	0.43	0.43	0.43
17.550	0.42	0.42	0.42	0.42	0.41
17.800	0.41	0.41	0.41	0.41	0.40
18.050	0.40	0.40	0.40	0.39	0.39
18.300	0.39	0.39	0.38	0.38	0.38
18.550	0.38	0.38	0.37	0.37	0.37

Subsection: Pond Routed Hydrograph (total out)
Label: Detention Pond (OUT)

Return Event: 10 years
Storm Event: 10 Year Storm

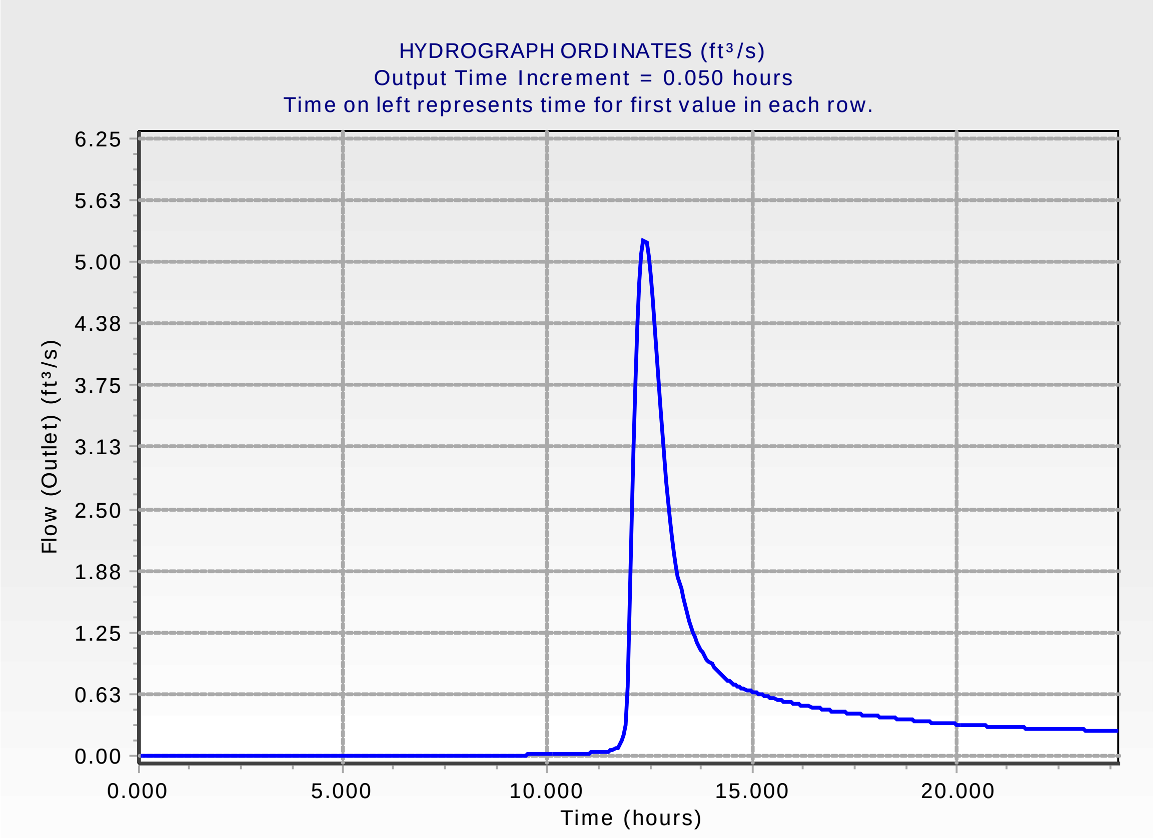
HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.800	0.37	0.36	0.36	0.36	0.36
19.050	0.35	0.35	0.35	0.35	0.35
19.300	0.34	0.34	0.34	0.34	0.33
19.550	0.33	0.33	0.33	0.33	0.33
19.800	0.32	0.32	0.32	0.32	0.32
20.050	0.32	0.32	0.32	0.32	0.31
20.300	0.31	0.31	0.31	0.31	0.31
20.550	0.31	0.30	0.30	0.30	0.30
20.800	0.30	0.30	0.30	0.30	0.30
21.050	0.29	0.29	0.29	0.29	0.29
21.300	0.29	0.29	0.29	0.29	0.29
21.550	0.28	0.28	0.28	0.28	0.28
21.800	0.28	0.28	0.28	0.28	0.28
22.050	0.28	0.28	0.28	0.27	0.27
22.300	0.27	0.27	0.27	0.27	0.27
22.550	0.27	0.27	0.27	0.27	0.27
22.800	0.27	0.27	0.27	0.26	0.26
23.050	0.26	0.26	0.26	0.26	0.26
23.300	0.26	0.26	0.26	0.26	0.26
23.550	0.26	0.26	0.26	0.26	0.26
23.800	0.26	0.25	0.25	0.25	0.25

NPT Transition Station #1

Subsection: Pond Routed Hydrograph (total out)
Label: Detention Pond (OUT)

Return Event: 10 years
Storm Event: 10 Year Storm



Peak Discharge	11.48 ft³/s
Time to Peak	12.350 hours
Hydrograph Volume	1.557 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)
5.750	0.00	0.00	0.00	0.00	0.00
6.000	0.00	0.00	0.00	0.00	0.00
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	0.01
7.000	0.01	0.01	0.01	0.01	0.01
7.250	0.01	0.01	0.01	0.01	0.01
7.500	0.01	0.01	0.01	0.01	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	0.02	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	0.03	0.03	0.03	0.03
9.750	0.03	0.03	0.03	0.03	0.03
10.000	0.03	0.03	0.03	0.03	0.04
10.250	0.04	0.04	0.04	0.04	0.04
10.500	0.04	0.04	0.05	0.05	0.05
10.750	0.05	0.06	0.06	0.07	0.07
11.000	0.08	0.08	0.09	0.10	0.11
11.250	0.12	0.13	0.14	0.16	0.17
11.500	0.19	0.21	0.23	0.27	0.32
11.750	0.50	0.99	1.69	2.65	3.81
12.000	5.07	6.44	7.19	7.93	8.58
12.250	10.02	11.25	11.48	11.07	10.28
12.500	9.35	8.70	8.49	8.22	7.89
12.750	7.55	7.20	6.86	6.52	5.98
13.000	5.45	4.98	4.56	4.20	3.88
13.250	3.59	3.34	3.10	2.89	2.70
13.500	2.54	2.40	2.28	2.17	2.08
13.750	1.99	1.91	1.84	1.78	1.72
14.000	1.67	1.62	1.57	1.53	1.49
14.250	1.45	1.42	1.38	1.35	1.33
14.500	1.30	1.28	1.26	1.24	1.22
14.750	1.20	1.19	1.17	1.16	1.14
15.000	1.13	1.12	1.10	1.09	1.08
15.250	1.07	1.06	1.05	1.04	1.02
15.500	1.01	1.00	0.99	0.98	0.97
15.750	0.96	0.95	0.94	0.93	0.91
16.000	0.90	0.89	0.88	0.87	0.86
16.250	0.85	0.84	0.83	0.82	0.81
16.500	0.81	0.80	0.79	0.78	0.78
16.750	0.77	0.77	0.76	0.76	0.75
17.000	0.75	0.74	0.74	0.73	0.73

Subsection: Pond Routed Hydrograph (total out)
Return Event: 50 years
Label: Detention Pond (OUT)
Storm Event: 50 Year Storm

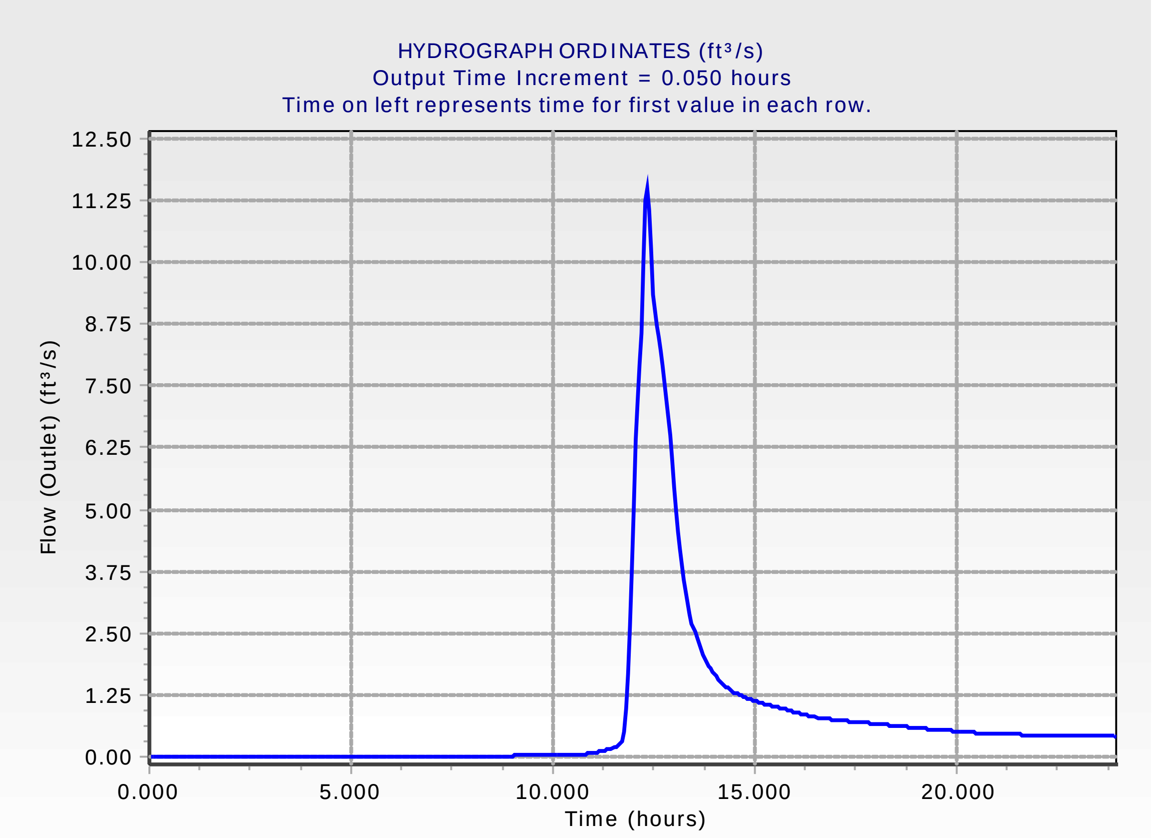
HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
17.250	0.73	0.72	0.72	0.71	0.71
17.500	0.71	0.70	0.70	0.69	0.69
17.750	0.69	0.68	0.68	0.67	0.67
18.000	0.67	0.66	0.66	0.65	0.65
18.250	0.65	0.64	0.64	0.63	0.63
18.500	0.63	0.62	0.62	0.61	0.61
18.750	0.61	0.60	0.60	0.59	0.59
19.000	0.59	0.58	0.58	0.57	0.57
19.250	0.57	0.56	0.56	0.55	0.55
19.500	0.55	0.54	0.54	0.54	0.54
19.750	0.53	0.53	0.53	0.52	0.52
20.000	0.52	0.51	0.51	0.51	0.50
20.250	0.50	0.50	0.49	0.49	0.49
20.500	0.48	0.48	0.48	0.48	0.47
20.750	0.47	0.47	0.47	0.47	0.46
21.000	0.46	0.46	0.46	0.46	0.46
21.250	0.46	0.45	0.45	0.45	0.45
21.500	0.45	0.45	0.45	0.45	0.45
21.750	0.44	0.44	0.44	0.44	0.44
22.000	0.44	0.44	0.44	0.44	0.44
22.250	0.44	0.43	0.43	0.43	0.43
22.500	0.43	0.43	0.43	0.43	0.43
22.750	0.43	0.43	0.43	0.42	0.42
23.000	0.42	0.42	0.42	0.42	0.42
23.250	0.42	0.42	0.42	0.42	0.42
23.500	0.42	0.41	0.41	0.41	0.41
23.750	0.41	0.41	0.41	0.41	0.41
24.000	0.41	(N/A)	(N/A)	(N/A)	(N/A)

NPT Transition Station #1

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

Label: Detention Pond (OUT) Storm Event: 50 Year Storm



Subsection: Pond Routed Hydrograph (total out)
Label: Detention Pond (OUT)

Return Event: 100 years
Storm Event: 100 Year Storm

Peak Discharge	17.11 ft³/s
Time to Peak	12.300 hours
Hydrograph Volume	2.032 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)
5.100	0.00	0.00	0.00	0.00	0.00
5.350	0.00	0.00	0.00	0.00	0.00
5.600	0.00	0.00	0.00	0.00	0.00
5.850	0.00	0.00	0.00	0.00	0.00
6.100	0.00	0.00	0.01	0.01	0.01
6.350	0.01	0.01	0.01	0.01	0.01
6.600	0.01	0.01	0.01	0.01	0.01
6.850	0.01	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	0.02	0.02	0.02	0.02	0.02
8.100	0.02	0.02	0.02	0.02	0.02
8.350	0.02	0.02	0.02	0.02	0.02
8.600	0.02	0.02	0.02	0.02	0.02
8.850	0.03	0.03	0.03	0.03	0.03
9.100	0.03	0.03	0.03	0.03	0.03
9.350	0.03	0.03	0.03	0.03	0.04
9.600	0.04	0.04	0.04	0.04	0.04
9.850	0.04	0.04	0.04	0.04	0.05
10.100	0.05	0.05	0.05	0.06	0.06
10.350	0.07	0.07	0.07	0.08	0.09
10.600	0.09	0.10	0.11	0.11	0.12
10.850	0.13	0.14	0.15	0.16	0.17
11.100	0.19	0.20	0.22	0.23	0.25
11.350	0.27	0.29	0.32	0.37	0.46
11.600	0.56	0.81	1.13	1.56	2.15
11.850	2.97	4.08	5.48	6.82	7.83
12.100	8.82	12.89	15.52	16.82	17.11
12.350	16.62	15.58	14.21	12.68	11.25
12.600	9.96	8.81	8.57	8.32	8.01
12.850	7.68	7.34	7.01	6.69	6.32
13.100	5.79	5.33	4.91	4.55	4.23
13.350	3.94	3.69	3.47	3.26	3.07
13.600	2.91	2.76	2.64	2.52	2.42
13.850	2.33	2.24	2.17	2.10	2.03
14.100	1.97	1.92	1.86	1.82	1.77
14.350	1.73	1.69	1.66	1.62	1.60
14.600	1.57	1.54	1.52	1.50	1.48
14.850	1.46	1.44	1.42	1.41	1.39
15.100	1.38	1.36	1.35	1.33	1.32
15.350	1.30	1.29	1.27	1.26	1.25
15.600	1.23	1.22	1.21	1.19	1.18
15.850	1.16	1.15	1.14	1.12	1.11
16.100	1.10	1.08	1.07	1.06	1.04
16.350	1.03	1.02	1.01	1.00	0.99

Subsection: Pond Routed Hydrograph (total out)
Return Event: 100 years
Label: Detention Pond (OUT)
Storm Event: 100 Year Storm

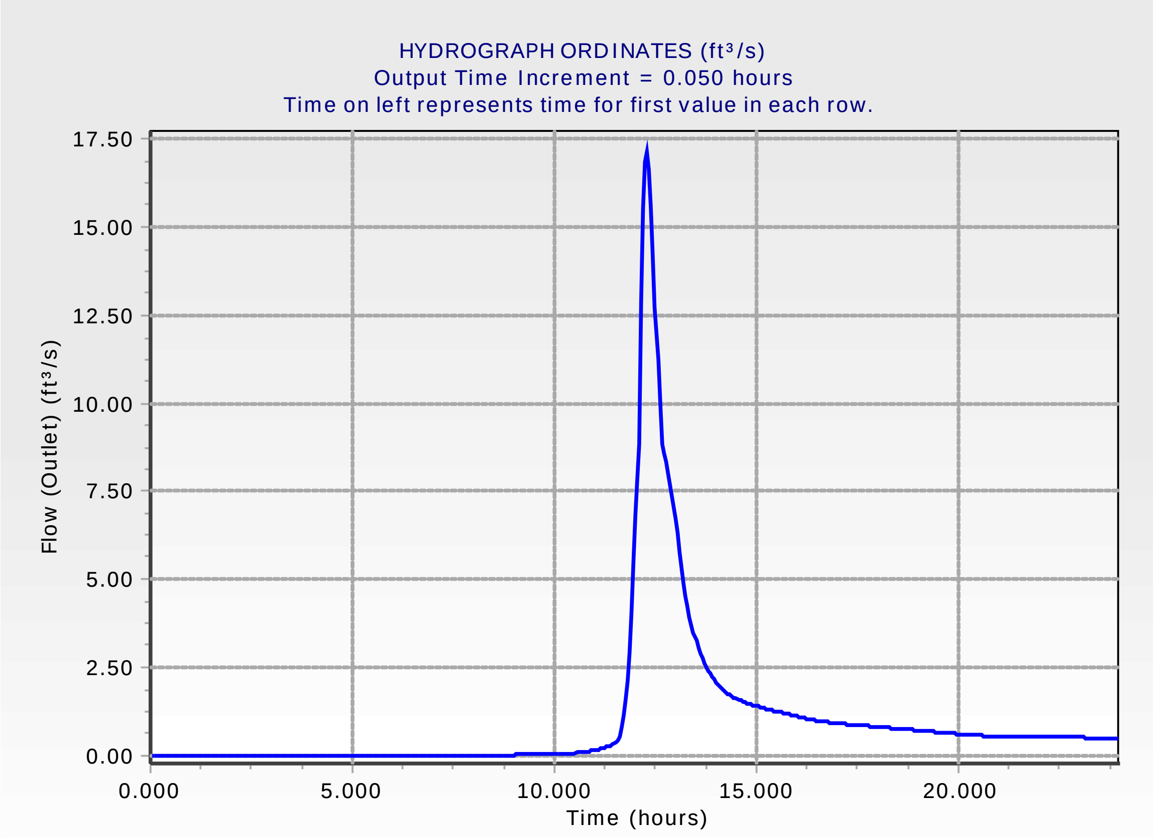
HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
16.600	0.98	0.97	0.97	0.96	0.95
16.850	0.94	0.94	0.93	0.93	0.92
17.100	0.92	0.91	0.90	0.90	0.89
17.350	0.89	0.88	0.88	0.87	0.87
17.600	0.86	0.86	0.85	0.85	0.84
17.850	0.84	0.83	0.83	0.82	0.82
18.100	0.81	0.81	0.80	0.80	0.79
18.350	0.79	0.78	0.78	0.77	0.77
18.600	0.76	0.76	0.75	0.75	0.74
18.850	0.74	0.73	0.73	0.72	0.72
19.100	0.71	0.71	0.70	0.70	0.69
19.350	0.69	0.68	0.68	0.67	0.67
19.600	0.66	0.66	0.65	0.65	0.64
19.850	0.64	0.63	0.63	0.62	0.62
20.100	0.61	0.61	0.60	0.60	0.59
20.350	0.59	0.58	0.58	0.58	0.57
20.600	0.57	0.57	0.57	0.56	0.56
20.850	0.56	0.56	0.56	0.56	0.55
21.100	0.55	0.55	0.55	0.55	0.55
21.350	0.55	0.55	0.55	0.55	0.55
21.600	0.54	0.54	0.54	0.54	0.54
21.850	0.54	0.54	0.54	0.54	0.54
22.100	0.54	0.54	0.53	0.53	0.53
22.350	0.53	0.53	0.53	0.53	0.53
22.600	0.53	0.53	0.53	0.52	0.52
22.850	0.52	0.52	0.52	0.52	0.52
23.100	0.52	0.52	0.52	0.52	0.51
23.350	0.51	0.51	0.51	0.51	0.51
23.600	0.51	0.51	0.51	0.51	0.50
23.850	0.50	0.50	0.50	0.50	(N/A)

NPT Transition Station #1

Subsection: Pond Routed Hydrograph (total out) Return Event: 100 years

Label: Detention Pond (OUT) Storm Event: 100 Year Storm



NPT Transition Station #1

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APPENDIX C – HYDRAULIC AND STABILITY CALCULATIONS

Worksheet for Swale A - 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.04700	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	6.92	ft^3/s

Results

Normal Depth	0.70	ft
Flow Area	2.87	ft^2
Wetted Perimeter	6.43	ft
Hydraulic Radius	0.45	ft
Top Width	6.20	ft
Critical Depth	0.55	ft
Critical Slope	0.12829	ft/ft
Velocity	2.41	ft/s
Velocity Head	0.09	ft
Specific Energy	0.79	ft
Froude Number	0.62	
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	0.55	ft
Channel Slope	0.04700	ft/ft
Critical Slope	0.12829	ft/ft

Worksheet for Swale A - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.04700	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	20.09	ft³/s

Results

Normal Depth	1.15	ft
Flow Area	6.31	ft²
Wetted Perimeter	9.30	ft
Hydraulic Radius	0.68	ft
Top Width	8.93	ft
Critical Depth	0.95	ft
Critical Slope	0.11095	ft/ft
Velocity	3.19	ft/s
Velocity Head	0.16	ft
Specific Energy	1.31	ft
Froude Number	0.67	
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	1.15	ft
Critical Depth	0.95	ft
Channel Slope	0.04700	ft/ft
Critical Slope	0.11095	ft/ft

Worksheet for Swale B - 10-Year

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00800	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	1.15	ft³/s

Results

Normal Depth	0.33	ft
Flow Area	1.00	ft²
Wetted Perimeter	4.11	ft
Hydraulic Radius	0.24	ft
Top Width	4.00	ft
Critical Depth	0.20	ft
Critical Slope	0.05584	ft/ft
Velocity	1.15	ft/s
Velocity Head	0.02	ft
Specific Energy	0.35	ft
Froude Number	0.41	
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	0.33	ft
Critical Depth	0.20	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.05584	ft/ft

Worksheet for Swale B - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00800	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	2.19	ft³/s

Results

Normal Depth	0.47	ft
Flow Area	1.58	ft²
Wetted Perimeter	4.95	ft
Hydraulic Radius	0.32	ft
Top Width	4.80	ft
Critical Depth	0.29	ft
Critical Slope	0.05046	ft/ft
Velocity	1.38	ft/s
Velocity Head	0.03	ft
Specific Energy	0.50	ft
Froude Number	0.42	
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	0.47	ft
Critical Depth	0.29	ft
Channel Slope	0.00800	ft/ft
Critical Slope	0.05046	ft/ft

Worksheet for Swale C - 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.08700	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	1.38	ft³/s

Results

Normal Depth	0.19	ft
Flow Area	0.49	ft²
Wetted Perimeter	3.21	ft
Hydraulic Radius	0.15	ft
Top Width	3.15	ft
Critical Depth	0.22	ft
Critical Slope	0.05423	ft/ft
Velocity	2.79	ft/s
Velocity Head	0.12	ft
Specific Energy	0.31	ft
Froude Number	1.24	
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	0.19	ft
Critical Depth	0.22	ft
Channel Slope	0.08700	ft/ft
Critical Slope	0.05423	ft/ft

Worksheet for Swale C - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.08700	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	2.65	ft³/s

Results

Normal Depth	0.27	ft
Flow Area	0.78	ft²
Wetted Perimeter	3.74	ft
Hydraulic Radius	0.21	ft
Top Width	3.65	ft
Critical Depth	0.32	ft
Critical Slope	0.04903	ft/ft
Velocity	3.41	ft/s
Velocity Head	0.18	ft
Specific Energy	0.46	ft
Froude Number	1.31	
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	0.27	ft
Critical Depth	0.32	ft
Channel Slope	0.08700	ft/ft
Critical Slope	0.04903	ft/ft

Worksheet for Swale D - 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.02000	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	0.13	ft³/s

Results

Normal Depth	0.08	ft
Flow Area	0.17	ft²
Wetted Perimeter	2.48	ft
Hydraulic Radius	0.07	ft
Top Width	2.45	ft
Critical Depth	0.05	ft
Critical Slope	0.08288	ft/ft
Velocity	0.77	ft/s
Velocity Head	0.01	ft
Specific Energy	0.08	ft
Froude Number	0.52	
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	0.08	ft
Critical Depth	0.05	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.08288	ft/ft

Worksheet for Swale D - 100-Year

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.02000	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	0.30	ft³/s

Results

Normal Depth	0.12	ft
Flow Area	0.29	ft²
Wetted Perimeter	2.77	ft
Hydraulic Radius	0.10	ft
Top Width	2.73	ft
Critical Depth	0.09	ft
Critical Slope	0.07055	ft/ft
Velocity	1.04	ft/s
Velocity Head	0.02	ft
Specific Energy	0.14	ft
Froude Number	0.56	
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	0.12	ft
Critical Depth	0.09	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.07055	ft/ft

Worksheet for Swale E - 10-Year

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.09000	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	6.27	ft³/s

Results

Normal Depth	0.57	ft
Flow Area	2.10	ft²
Wetted Perimeter	5.59	ft
Hydraulic Radius	0.38	ft
Top Width	5.41	ft
Critical Depth	0.52	ft
Critical Slope	0.13007	ft/ft
Velocity	2.98	ft/s
Velocity Head	0.14	ft
Specific Energy	0.71	ft
Froude Number	0.84	
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	0.57	ft
Critical Depth	0.52	ft
Channel Slope	0.09000	ft/ft
Critical Slope	0.13007	ft/ft

Worksheet for Swale E - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.09000	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	18.48	ft³/s

Results

Normal Depth	0.96	ft
Flow Area	4.66	ft²
Wetted Perimeter	8.05	ft
Hydraulic Radius	0.58	ft
Top Width	7.74	ft
Critical Depth	0.91	ft
Critical Slope	0.11220	ft/ft
Velocity	3.97	ft/s
Velocity Head	0.24	ft
Specific Energy	1.20	ft
Froude Number	0.90	
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	0.96	ft
Critical Depth	0.91	ft
Channel Slope	0.09000	ft/ft
Critical Slope	0.11220	ft/ft

Worksheet for Swale F - 10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00200	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	7.65	ft³/s

Results

Normal Depth	0.73	ft
Flow Area	7.39	ft²
Wetted Perimeter	12.59	ft
Hydraulic Radius	0.59	ft
Top Width	12.36	ft
Critical Depth	0.29	ft
Critical Slope	0.04641	ft/ft
Velocity	1.03	ft/s
Velocity Head	0.02	ft
Specific Energy	0.74	ft
Froude Number	0.24	
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	0.73	ft
Critical Depth	0.29	ft
Channel Slope	0.00200	ft/ft
Critical Slope	0.04641	ft/ft

Worksheet for Swale F - 100-Year

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.00200	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	22.59	ft³/s

Results

Normal Depth	1.31	ft
Flow Area	15.69	ft²
Wetted Perimeter	16.31	ft
Hydraulic Radius	0.96	ft
Top Width	15.88	ft
Critical Depth	0.58	ft
Critical Slope	0.03816	ft/ft
Velocity	1.44	ft/s
Velocity Head	0.03	ft
Specific Energy	1.35	ft
Froude Number	0.26	
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	1.31	ft
Critical Depth	0.58	ft
Channel Slope	0.00200	ft/ft
Critical Slope	0.03816	ft/ft

Worksheet for Swale F - WQF

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.150	
Channel Slope	0.00200	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	8.00	ft
Discharge	0.36	ft³/s

Results

Normal Depth	0.25	ft
Flow Area	2.18	ft²
Wetted Perimeter	9.58	ft
Hydraulic Radius	0.23	ft
Top Width	9.49	ft
Critical Depth	0.04	ft
Critical Slope	0.97013	ft/ft
Velocity	0.17	ft/s
Velocity Head	0.00	ft
Specific Energy	0.25	ft
Froude Number	0.06	
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	0.25	ft
Critical Depth	0.04	ft
Channel Slope	0.00200	ft/ft
Critical Slope	0.97013	ft/ft

Worksheet for Swale G -10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.069	
Channel Slope	0.33000	ft/ft
Left Side Slope	1000.00	ft/ft (H:V)
Right Side Slope	1000.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	0.83	ft³/s

Results

Normal Depth	0.03	ft
Flow Area	1.03	ft²
Wetted Perimeter	64.20	ft
Hydraulic Radius	0.02	ft
Top Width	64.20	ft
Critical Depth	0.03	ft
Critical Slope	0.27103	ft/ft
Velocity	0.81	ft/s
Velocity Head	0.01	ft
Specific Energy	0.04	ft
Froude Number	1.12	
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	0.03	ft
Critical Depth	0.03	ft
Channel Slope	0.33000	ft/ft
Critical Slope	0.27103	ft/ft

Worksheet for Swale G - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.069	
Channel Slope	0.33000	ft/ft
Left Side Slope	1000.00	ft/ft (H:V)
Right Side Slope	1000.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	1.55	ft³/s

Results

Normal Depth	0.04	ft
Flow Area	1.69	ft²
Wetted Perimeter	82.22	ft
Hydraulic Radius	0.02	ft
Top Width	82.22	ft
Critical Depth	0.04	ft
Critical Slope	0.24917	ft/ft
Velocity	0.92	ft/s
Velocity Head	0.01	ft
Specific Energy	0.05	ft
Froude Number	1.13	
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	0.04	ft
Critical Depth	0.04	ft
Channel Slope	0.33000	ft/ft
Critical Slope	0.24917	ft/ft

Worksheet for Swale H -10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.01000	ft/ft
Left Side Slope	8.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	1.86	ft³/s

Results

Normal Depth	0.51	ft
Flow Area	1.42	ft²
Wetted Perimeter	5.71	ft
Hydraulic Radius	0.25	ft
Top Width	5.59	ft
Critical Depth	0.37	ft
Critical Slope	0.05311	ft/ft
Velocity	1.31	ft/s
Velocity Head	0.03	ft
Specific Energy	0.54	ft
Froude Number	0.46	
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	0.51	ft
Critical Depth	0.37	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.05311	ft/ft

Worksheet for Swale H - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.045	
Channel Slope	0.01000	ft/ft
Left Side Slope	8.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	5.57	ft³/s

Results

Normal Depth	0.77	ft
Flow Area	3.24	ft²
Wetted Perimeter	8.61	ft
Hydraulic Radius	0.38	ft
Top Width	8.44	ft
Critical Depth	0.58	ft
Critical Slope	0.04589	ft/ft
Velocity	1.72	ft/s
Velocity Head	0.05	ft
Specific Energy	0.81	ft
Froude Number	0.49	
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	0.77	ft
Critical Depth	0.58	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.04589	ft/ft

Worksheet for Swale I -10-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.069	
Channel Slope	0.00500	ft/ft
Left Side Slope	8.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	1.86	ft^3/s

Results

Normal Depth	0.68	ft
Flow Area	2.54	ft^2
Wetted Perimeter	7.63	ft
Hydraulic Radius	0.33	ft
Top Width	7.48	ft
Critical Depth	0.37	ft
Critical Slope	0.12488	ft/ft
Velocity	0.73	ft/s
Velocity Head	0.01	ft
Specific Energy	0.69	ft
Froude Number	0.22	
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	0.68	ft
Critical Depth	0.37	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.12488	ft/ft

Worksheet for Swale I - 100-Year

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.069	
Channel Slope	0.00500	ft/ft
Left Side Slope	8.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	0.00	ft
Discharge	5.57	ft³/s

Results

Normal Depth	1.03	ft
Flow Area	5.79	ft²
Wetted Perimeter	11.51	ft
Hydraulic Radius	0.50	ft
Top Width	11.28	ft
Critical Depth	0.58	ft
Critical Slope	0.10788	ft/ft
Velocity	0.96	ft/s
Velocity Head	0.01	ft
Specific Energy	1.04	ft
Froude Number	0.24	
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	1.03	ft
Critical Depth	0.58	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.10788	ft/ft

Channel Stablity Calculations

Swale	10-Year Swale Flow (cfs)	10-Year Swale Depth (ft)	10-Year Swale Peak Velocity (fps)	Maximum Channel Slope (%)	Channel Shear Stress*
A	6.92	0.70	2.41	0.05	2.05
B	1.15	0.33	1.15	0.01	0.16
C	1.38	0.19	2.79	0.09	1.03
D	0.13	0.08	0.77	0.02	0.10
E	6.27	0.57	2.98	0.09	3.20
F	7.65	0.73	1.03	0.002	0.09
G	0.83	0.03	0.81	0.33	0.62
H	1.86	0.51	1.31	0.01	0.32
I	1.86	0.68	0.73	0.005	0.21

*Channel Stress = Depth (ft) X Slope (ft/ft) X Unit weight of water (lb/ft3)

Spillway Stablity Calculations

Swale	100-Year Swale Flow (cfs)	100-Year Swale Depth (ft)	100-Year Swale Peak Velocity (fps)	Maximum Channel Slope (%)	Channel Shear Stress*
Spillway	1.98	0.17	1.06	0.500	5.20

*Spillway Stress = Depth (ft) X Slope (ft/ft) X Unit weight of water (lb/ft3)

Worksheet for Emergency Spillway

Project Description

Solve For	Discharge

Input Data

Headwater Elevation		1161.77	ft
Crest Elevation		1161.60	ft
Tailwater Elevation		1160.00	ft
Crest Surface Type	Gravel		
Crest Breadth		11.00	ft
Crest Length		11.00	ft

Results

Discharge	1.98	ft³/s
Headwater Height Above Crest	0.17	ft
Tailwater Height Above Crest	-1.60	ft
Weir Coefficient	2.57	US
Submergence Factor	1.00	
Adjusted Weir Coefficient	2.57	US
Flow Area	1.87	ft²
Velocity	1.06	ft/s
Wetted Perimeter	11.34	ft
Top Width	11.00	ft

Culvert Calculator Report
Drainline A1 - 10-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	0.68	
Computed Headwater Eleva	1,161.29	ft	Discharge	6.92	cfs
Inlet Control HW Elev.	1,161.23	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,161.29	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.75	ft
Slope Type	Steep		Normal Depth	0.73	ft
Flow Regime	Supercritical		Critical Depth	0.93	ft
Velocity Downstream	6.47	ft/s	Critical Slope	0.004045	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,161.29	ft	Upstream Velocity Head	0.36	ft
Ke	0.20		Entrance Loss	0.07	ft

Inlet Control Properties

Inlet Control HW Elev.	1,161.23	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline A1 - 100-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	1.33	
Computed Headwater Eleva	1,162.59	ft	Discharge	20.09	cfs
Inlet Control HW Elev.	1,162.59	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,162.55	ft	Control Type	Inlet Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	1.42	ft
Slope Type	Steep		Normal Depth	1.38	ft
Flow Regime	Supercritical		Critical Depth	1.61	ft
Velocity Downstream	8.44	ft/s	Critical Slope	0.006953	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,162.55	ft	Upstream Velocity Head	0.85	ft
Ke	0.20		Entrance Loss	0.17	ft

Inlet Control Properties

Inlet Control HW Elev.	1,162.59	ft	Flow Control	Submerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline A1 - 25-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	0.89	
Computed Headwater Eleva	1,161.71	ft	Discharge	11.01	cfs
Inlet Control HW Elev.	1,161.65	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,161.71	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.97	ft
Slope Type	Steep		Normal Depth	0.94	ft
Flow Regime	Supercritical		Critical Depth	1.19	ft
Velocity Downstream	7.25	ft/s	Critical Slope	0.004591	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,161.71	ft	Upstream Velocity Head	0.50	ft
Ke	0.20		Entrance Loss	0.10	ft

Inlet Control Properties

Inlet Control HW Elev.	1,161.65	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline A2 - 10-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	0.74	
Computed Headwater Eleva	1,161.41	ft	Discharge	8.07	cfs
Inlet Control HW Elev.	1,161.35	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,161.41	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.81	ft
Slope Type	Steep		Normal Depth	0.79	ft
Flow Regime	Supercritical		Critical Depth	1.01	ft
Velocity Downstream	6.72	ft/s	Critical Slope	0.004173	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,161.41	ft	Upstream Velocity Head	0.40	ft
Ke	0.20		Entrance Loss	0.08	ft

Inlet Control Properties

Inlet Control HW Elev.	1,161.35	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline A2 - 100-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	1.48	
Computed Headwater Eleva	1,162.88	ft	Discharge	22.28	cfs
Inlet Control HW Elev.	1,162.88	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,162.77	ft	Control Type	Inlet Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	1.53	ft
Slope Type	Steep		Normal Depth	1.50	ft
Flow Regime	Supercritical		Critical Depth	1.68	ft
Velocity Downstream	8.66	ft/s	Critical Slope	0.007897	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,162.77	ft	Upstream Velocity Head	0.97	ft
Ke	0.20		Entrance Loss	0.19	ft

Inlet Control Properties

Inlet Control HW Elev.	1,162.88	ft	Flow Control	Submerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline A2 - 25-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,164.92	ft	Headwater Depth/Height	0.96	
Computed Headwater Eleva	1,161.85	ft	Discharge	12.51	cfs
Inlet Control HW Elev.	1,161.80	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,161.85	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,159.92	ft	Downstream Invert	1,159.49	ft
Length	43.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	1.05	ft
Slope Type	Steep		Normal Depth	1.01	ft
Flow Regime	Supercritical		Critical Depth	1.27	ft
Velocity Downstream	7.48	ft/s	Critical Slope	0.004850	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,161.85	ft	Upstream Velocity Head	0.55	ft
Ke	0.20		Entrance Loss	0.11	ft

Inlet Control Properties

Inlet Control HW Elev.	1,161.80	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline B - 10-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,145.15	ft	Headwater Depth/Height	0.65	
Computed Headwater Eleva	1,142.64	ft	Discharge	6.27	cfs
Inlet Control HW Elev.	1,142.58	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,142.64	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,141.35	ft	Downstream Invert	1,140.46	ft
Length	89.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.69	ft
Slope Type	Steep		Normal Depth	0.69	ft
Flow Regime	Supercritical		Critical Depth	0.89	ft
Velocity Downstream	6.53	ft/s	Critical Slope	0.003986	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,142.64	ft	Upstream Velocity Head	0.34	ft
Ke	0.20		Entrance Loss	0.07	ft

Inlet Control Properties

Inlet Control HW Elev.	1,142.58	ft	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline B - 100-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,145.15	ft	Headwater Depth/Height	1.24	
Computed Headwater Eleva	1,143.83	ft	Discharge	18.48	cfs
Inlet Control HW Elev.	1,143.82	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,143.83	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,141.35	ft	Downstream Invert	1,140.46	ft
Length	89.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	1.31	ft
Slope Type	Steep		Normal Depth	1.30	ft
Flow Regime	Supercritical		Critical Depth	1.55	ft
Velocity Downstream	8.49	ft/s	Critical Slope	0.006373	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,143.83	ft	Upstream Velocity Head	0.78	ft
Ke	0.20		Entrance Loss	0.16	ft

Inlet Control Properties

Inlet Control HW Elev.	1,143.82	ft	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline B - 25-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,145.15	ft	Headwater Depth/Height	0.85	
Computed Headwater Eleva	1,143.05	ft	Discharge	10.09	cfs
Inlet Control HW Elev.	1,142.99	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,143.05	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,141.35	ft	Downstream Invert	1,140.46	ft
Length	89.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.90	ft
Slope Type	Steep		Normal Depth	0.89	ft
Flow Regime	Supercritical		Critical Depth	1.14	ft
Velocity Downstream	7.38	ft/s	Critical Slope	0.004446	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,143.05	ft	Upstream Velocity Head	0.47	ft
Ke	0.20		Entrance Loss	0.09	ft

Inlet Control Properties

Inlet Control HW Elev.	1,142.99	ft	Flow Control	N/A	
Inlet Type	Groove end projecting		Area Full	3.1	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline C - 10-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,158.00	ft	Headwater Depth/Height	2.32	
Computed Headwater Eleva	1,158.98	ft	Discharge	3.21	cfs
Inlet Control HW Elev.	1,156.53	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,158.98	ft	Control Type	Outlet Control	

Grades

Upstream Invert	1,155.50	ft	Downstream Invert	1,155.25	ft
Length	25.00	ft	Constructed Slope	-0.100000	ft/ft

Hydraulic Profile

Profile	CompositeA2PressureProfile		Depth, Downstream	0.68	ft
Slope Type	Adverse		Normal Depth	0.00	ft
Flow Regime	Subcritical		Critical Depth	0.68	ft
Velocity Downstream	4.10	ft/s	Critical Slope	0.004414	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,158.98	ft	Upstream Velocity Head	0.05	ft
Ke	0.20		Entrance Loss	0.01	ft

Inlet Control Properties

Inlet Control HW Elev.	1,156.53	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	1.8	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline C - 100-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,158.00	ft	Headwater Depth/Height	2.36	
Computed Headwater Eleva	1,159.05	ft	Discharge	15.75	cfs
Inlet Control HW Elev.	1,159.05	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,158.68	ft	Control Type	Inlet Control	

Grades

Upstream Invert	1,155.50	ft	Downstream Invert	1,155.25	ft
Length	25.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	CompositeM2PressureProfile		Depth, Downstream	1.42	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.42	ft
Velocity Downstream	9.10	ft/s	Critical Slope	0.016576	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,158.68	ft	Upstream Velocity Head	1.23	ft
Ke	0.20		Entrance Loss	0.25	ft

Inlet Control Properties

Inlet Control HW Elev.	1,159.05	ft	Flow Control	Submerged	
Inlet Type	Groove end projecting		Area Full	1.8	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
Drainline C - 25-Year

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,158.00	ft	Headwater Depth/Height	1.01	
Computed Headwater Eleva	1,157.02	ft	Discharge	6.59	cfs
Inlet Control HW Elev.	1,156.99	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,157.02	ft	Control Type	Entrance Control	

Grades

Upstream Invert	1,155.50	ft	Downstream Invert	1,155.25	ft
Length	25.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile

Profile	S2		Depth, Downstream	0.85	ft
Slope Type	Steep		Normal Depth	0.82	ft
Flow Regime	Supercritical		Critical Depth	0.99	ft
Velocity Downstream	6.39	ft/s	Critical Slope	0.005566	ft/ft

Section

Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Corrugated HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties

Outlet Control HW Elev.	1,157.02	ft	Upstream Velocity Head	0.44	ft
Ke	0.20		Entrance Loss	0.09	ft

Inlet Control Properties

Inlet Control HW Elev.	1,156.99	ft	Flow Control	Unsubmerged	
Inlet Type	Groove end projecting		Area Full	1.8	ft²
K	0.00450		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	3	
C	0.03170		Equation Form	1	
Y	0.69000				

Worksheet for Drainline A Grate - 25-Year

Project Description

Solve For	Spread

Input Data

Discharge	1.32	ft³/s
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	2.00	ft
Local Depression	0.00	in
Local Depression Width	0.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	20.00	%

Results

Spread	2.93	ft
Depth	0.16	ft
Wetted Perimeter	2.98	ft
Top Width	2.93	ft
Open Grate Area	2.88	ft²
Active Grate Weir Length	7.20	ft

Worksheet for Drainline A Grate - 100-Year

Project Description

Solve For	Spread

Input Data

Discharge	2.02	ft³/s
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	2.00	ft
Grate Width	2.00	ft
Grate Length	2.00	ft
Local Depression	0.00	in
Local Depression Width	0.00	ft
Grate Type	P-50 mm (P-1-7/8")	
Clogging	20.00	%

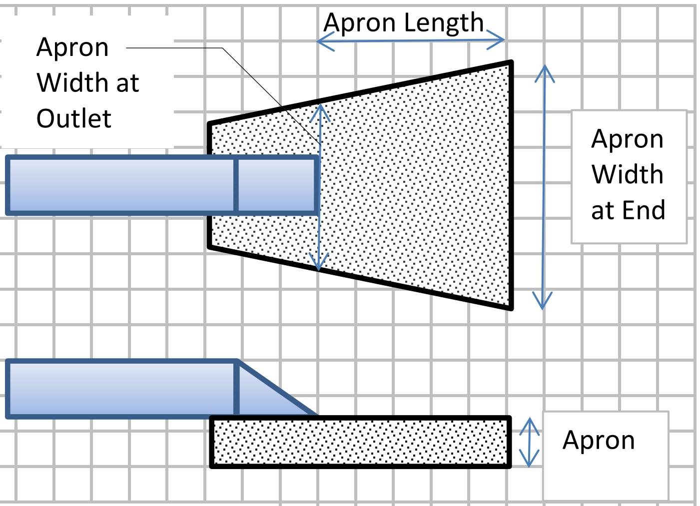
Results

Spread	3.24	ft
Depth	0.21	ft
Wetted Perimeter	3.30	ft
Top Width	3.24	ft
Open Grate Area	2.88	ft²
Active Grate Weir Length	7.20	ft

BURNS McDONNELL	Client	*NU / PSNH*		Page *1*	of
	Project	*Northern Pass*	Date *09/02/15*	Made By *J Sirhall*	
		Transition Station #1		Checked By *K Baragar*	
		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	DL-A	DL-B	DL-C
Design Storm (YR)	25-yr	25-yr	25-yr
Defined Channel (yes/no)	No	Yes	No
Channel Width (ft)	N/A	10	N/A
Pipe Dia (in)	24	24	18
Tail Water (ft)	1.04	0.3	0.41
	TW>=0.5D	TW<0.5D	TW<0.5D
Flow (Q), cfs	12.51	10.09	6.59
Apron Width (outlet) ft	6	10	4.5
Apron Length, ft	27.27	20.42	16.96
Apron Width (end) ft	16.91	26.42	21.46
Apron Width, (channel), ft	N/A	10	N/A
Median Stone dia. (D50), inches	6	8.0746	6
Apron Depth, inches	18	24.224	18

APPENDIX D – NH DES WORKSHEETS

STORMWATER POND DESIGN CRITERIA (Env-Wq 1508.03)

Type/Node Name: **Wet Extended Detention Basin**

Enter the type of stormwater pond (e.g., Wet Pond) and the node name in the drainage analysis, if applicable

11.39	ac	A = Area draining to the practice	
0.32	ac	A_I = Impervious area draining to the practice	
0.03	decimal	I = percent impervious area draining to the practice, in decimal form	
0.08	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.86	ac-in	WQV= 1” x Rv x A	
3,113	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	
311	cf	10% x WQV (check calc for sediment forebay and micropool volume)	
1,556	cf	50% x WQV (check calc for extended detention volume)	
997	cf	V_{SED} = sediment forebay volume	**← ≥ 10%WQV**
7,749	cf	V_{PP} = permanent pool volume (volume below the lowest invert of the outlet structure)	
NA	cf	V_{ED} = WQV - V_{PP} = extended detention volume	**← ≤ X%[1] WQV**
N/A		E_{ED} = elevation of V_{ED} (attach stage-storage table)	
-	cfs	$2Q_{avg}$ = 2* V_{ED} / 24 hrs * (1hr / 3600 sec) (used to check against Q_{EDmax} below)	
0.15	cfs	Q_{EDmax} = discharge at the E_{ED} (attach stage-discharge table)	**← <$2Q_{avg}$**
-	hours	T_{ED} = drawdown time of extended detention = $2V_{ED}/Q_{EDmax}$	**← ≥ 24-hrs**
3.00	:1	Pond side slopes	**← ≥3:1**
3.00	ft	Average permanent pool depth	**← 3 - 6 ft**
3.75	ft	Maximum depth of permanent pool	**← ≤ 8 ft**
115.00	ft	Length of the flow path between the inlet and outlet at mid-depth	
37.00	ft	Average Width ([average of the top width + average bottom width]/2)	
3.11	:1	Length to Average Width ratio	**← ≥ 3:1**
Yes	Yes/No	The perimeter should be curvilinear.	
Yes	Yes/No	The inlet and outlet should be located as far apart as possible.	
Yes	Yes/No	Is there a manually-controlled drain provided to dewater the pond over a 24hr period?	
If no state why:			
Inspection/Repair		What mechanism is proposed to prevent the outlet structure from clogging (applicable for orifices/weirs with a dimension of ≤6”)?	
1,160.92	ft	Peak elevation of the 50-year storm event	
1,162.60	ft	Berm elevation of the pond	
YES		50 peak elevation ≤ the berm elevation?	**← yes**

Qualified professional that developed the planting plan:

Name, Profession:

1. "X" varies depending on type of stormwater pond design. See NH Stormwater Manual, Vol.2, Ch.4-3, Section 1, for the design permanent pool volumes and extended detention volumes.

Designer's Notes:

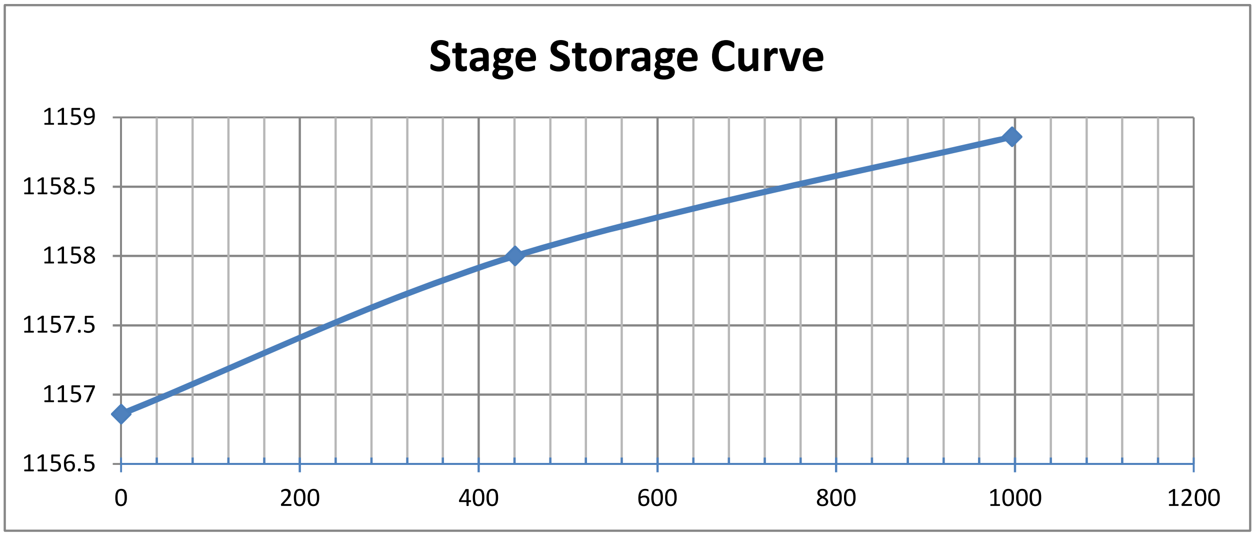
BURNS McDONNELL

Client *Eversource* Page ______ of ______
Project *Northern Pass* Date 10/17/16 Made By *R. Reed*
Transition Station #1 Checked By ______
Sediment Forebay - Stage-Storage Table Preliminary ______ Final ______

Stage/Storage Table

ELEV (FT.)	AREA (S.F.)	AVERAGE AREA (S.F.)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME		
				INCREMENTAL	TOTAL (CF)	Total Ac-Ft
1156.86	260			0	0	0
1158	513	386.5	1.14	441	441	0.0101
1158.86	780	646.5	0.86	556	997	0.0229

Stage Storage Curve



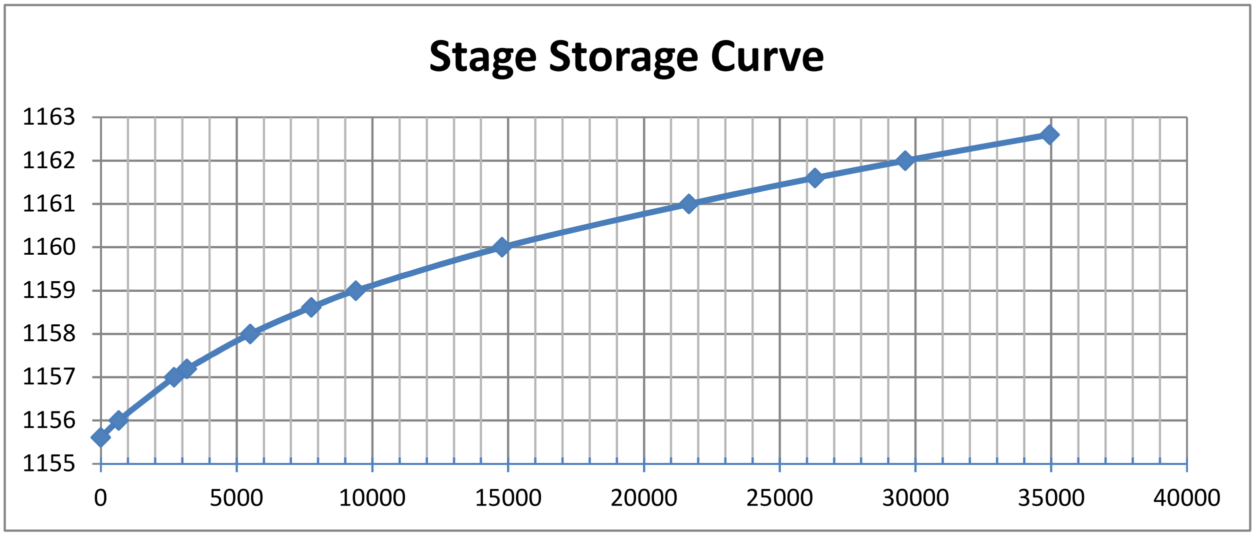
BURNS McDONNELL

Client *Eversource* Page ____ of ____
Project *Northern Pass* Date 08/05/16 Made By *R. Reed*
Transition Station #1 Checked By ____
Detention Basin - Stage-Storage Table Preliminary ____ Final ____

Stage/Storage Table

ELEV (FT.)	AREA (S.F.)	AVERAGE AREA (S.F.)	DIFFERENCE IN ELEVATION (FT.)	STORAGE VOLUME		
				INCREMENTAL	TOTAL (CF)	Total Ac-Ft
1155.61	1604			0	0	0
1156	1778	1691	0.39	659	659	0.02
1157	2280	2029	1	2029	2688	0.06
1157.19	2711	2495.5	0.19	474	3163	0.07
1158	3350	2815	1	2815	5503	0.13
1158.61	4006	3143	1.61	5060	7749	0.18
1159	4396	4201	0.39	1638	9387	0.22
1160	6363	5379.5	1	5380	14767	0.34
1161	7424	6893.5	1	6894	21660	0.50
1161.6	8052	7738	0.6	4643	26303	0.60
1162	8531	8291.5	0.4	3317	29620	0.68
1162.6	9205	8628.5	1	8629	34931	0.80

Stage Storage Curve



TREATMENT SWALE DESIGN CRITERIA (Env-Wq 1508.07)

Node Name: **Drainline B/Swale F Treatment Swale**

Enter the node name in the drainage analysis (e.g., reach TS 5), if applicable

Yes	Yes/No	Have you reviewed the restrictions on unlined swales outlined in Env-Wq 1508.07(b)?	
No	Yes/No	Is the system lined?	
11.30	ac	A = Area draining to the practice	
0.35	ac	A_I = Impervious area draining to the practice	
22.7	minutes	T_c = Time of Concentration	
0.03	decimal	I = percent impervious area draining to the practice, in decimal form	
0.08	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
0.88	ac-in	WQV= 1" x Rv x A	
3,194	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12")	
1	inches	P = amount of rainfall. For WQF in NH, P = 1".	
0.08	inches	Q = water quality depth. Q = WQV/A	
80	unitless	CN = unit peak discharge curve number. CN =1000/(10+5P+10Q–10*[Q^2 + 1.25*Q*P]$^{0.5}$)	
2.56	inches	S = potential maximum retention. S = (1000/CN) - 10	
0.513	inches	Ia = initial abstraction. Ia = 0.2S	
260	cfs/mi^2/in	qu = unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III	
0.36	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac	
109.00	feet	L = swale length [1]	← **≥ 100'**
8.00	feet	w = bottom of the swale width[2]	← **0 - 8 feet** [2]
1,135.00	feet	E_{SHWT} = elevation of SHWT. If none found, use the lowest elev. of test pit	
1,140.39	feet	E_{BTM} = elevation of the bottom of the practice	← **≥ E_{SHWT}**
3.0	:1	SS_{RIGHT} = right Side slope	← **≥3:1**
3.0	:1	SS_{LEFT} = left Side slope	← **≥3:1**
0.002	ft/ft	S = slope of swale in decimal form[3]	← **0.005 - .05**
3.0	inches	d = flow depth in swale at WQF (attach stage-discharge table)[4]	← **≤ 4"**
0.15	unitless	d must be < 4", therefore Manning's n = 0.15	
2.19	ft^2	Cross-sectional area check (assume trapezoidal channel)	
9.58	feet	Check wetted perimeter	
0.36	cfs	WQF_{check}.[5]	← **WQF_{check} = WQF**
2%		Percent difference between WQF_{check} and WQF [5]	← **+/- 10%**
11	minutes	HRT = hydraulic residence time during the WQF	← **≥ 10 min**
1,141.19	ft	Peak elevation of the 10-year storm event	
1,143.90	ft	Elevation of the top of the swale	
YES	Yes/No	10 peak elevation ≤ the top of swale	← **yes**

1. Any portion of the swale that is in a roadside ditch shall not count towards the swale length.
2. Widths up to 16' allowed if a dividing berm or structure is used such that neither width is more than 8'.
3. If > 0.02 (2%) then check dams are required. No additional detention time is credited for check dams.
4. If a detention structure is used immediately upstream of the swale, the flow depth in the swale shall be no greater than 4" during the peak of the 2-yr storm, 24-hour storm event.
5. The WQF_{check} & WQF should be near equal (within 10%) to confirm that you have selected the correct depth off the stage-discharge table. If the depth is not accurate the HRT will be incorrect.

Designer's Notes:

Depth	Q	Area	Veloc	Wp
(ft)	(cfs)	(sqft)	(ft/s)	(ft)
0.20	0.248	1.720	0.14	9.26
0.40	0.809	3.680	0.22	10.53
0.60	1.637	5.880	0.28	11.79
0.80	2.729	8.320	0.33	13.06
1.00	4.086	11.00	0.37	14.32
1.20	5.718	13.92	0.41	15.59
1.40	7.635	17.08	0.45	16.85
1.60	9.846	20.48	0.48	18.12
1.80	12.36	24.12	0.51	19.38
2.00	15.20	28.00	0.54	20.65

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"
0.39	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
0.13	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.08	inches	Rd = weighted groundwater recharge depth	
0.039	ac-in	GRV = AI * Rd	
142	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):

Ground Water Recharge requirements will be met with the permanent pool in the storm water pond

BURNS McDONNELL

Client *Eversource*
Project *Northern Pass*
Date
Transition Station #1
Impervious Area Summary

Page *1* of
Made By
Checked By
Preliminary
Final

BMP: Stormwater Pond

A_I = Impervious area draining to the practice = 0.32 ac

(Contributing watersheds: Area A, Area B, Area G)

0.25 ac	Asphalt Pavement
0.01 ac	Station (roof tops and concrete foundation)
0.06 ac	Water (portion of the detention basin-not required for WQV -0.01 ac)
0.32 ac	**TOTAL Impervious Area Contributing to BMP: Stormwater Pond**

BMP: Treatment Swale

A_I = Impervious area draining to the practice = 0.35 ac

(Contributing watersheds: Area C, Area E, partial Area F)

0.35 ac	Asphalt Pavement (Note that a portion of Area F impervious (-0.030 ac of Trostle Lane) does not drain to the BMP)
0.35 ac	**TOTAL Impervious Area Contributing to BMP: Treatment Swale**

APPENDIX E – INSPECTION AND MAINTENANCE PLAN

Northern Pass Transmission Project
Transition Station #1

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 station is located on Eversource owned property on Old Canaan Road, Pittsburg, NH 03592

Purpose & Goals

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.

Responsible Parties

Eversource will be responsible for implementing the O&M Plan.

Eversource
13 Legends Drive
Hooksett, NH 03106

Maintenance Logs and Checklists

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.

Forms

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

Training

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 outside the station perimeter fence adjacent to earthwork cut areas of the site and in earthen slope benches. These underdrains discharge to culvert crossing under access road. 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.

Storm Drainage System:
Onsite storm drainage system including conveyance pipes, flared end sections, 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, catch basins, and riprap outlet protection.

Outfalls:
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.

Wet Extended Detention Basin:
The wet extended detention basin attenuates stormwater, provides water quality and groundwater recharge and consists of numerous components including a sediment forebay, outlet control structure, trash rack, outlet pipe, emergency spillway, anti-seep collar, permanent pond 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 embankments, outlet structures, and appurtenances.
- Inspect for erosion, sediment accumulation, vegetation loss, and presence of invasive species
- Inspection of permanent pond 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.

Station Yard Stone:

The station yard stone within the station yard 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

not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was New Hampshire State Plane Zone (FIPS zone 2800). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the National Agriculture Imagery Program. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2009.

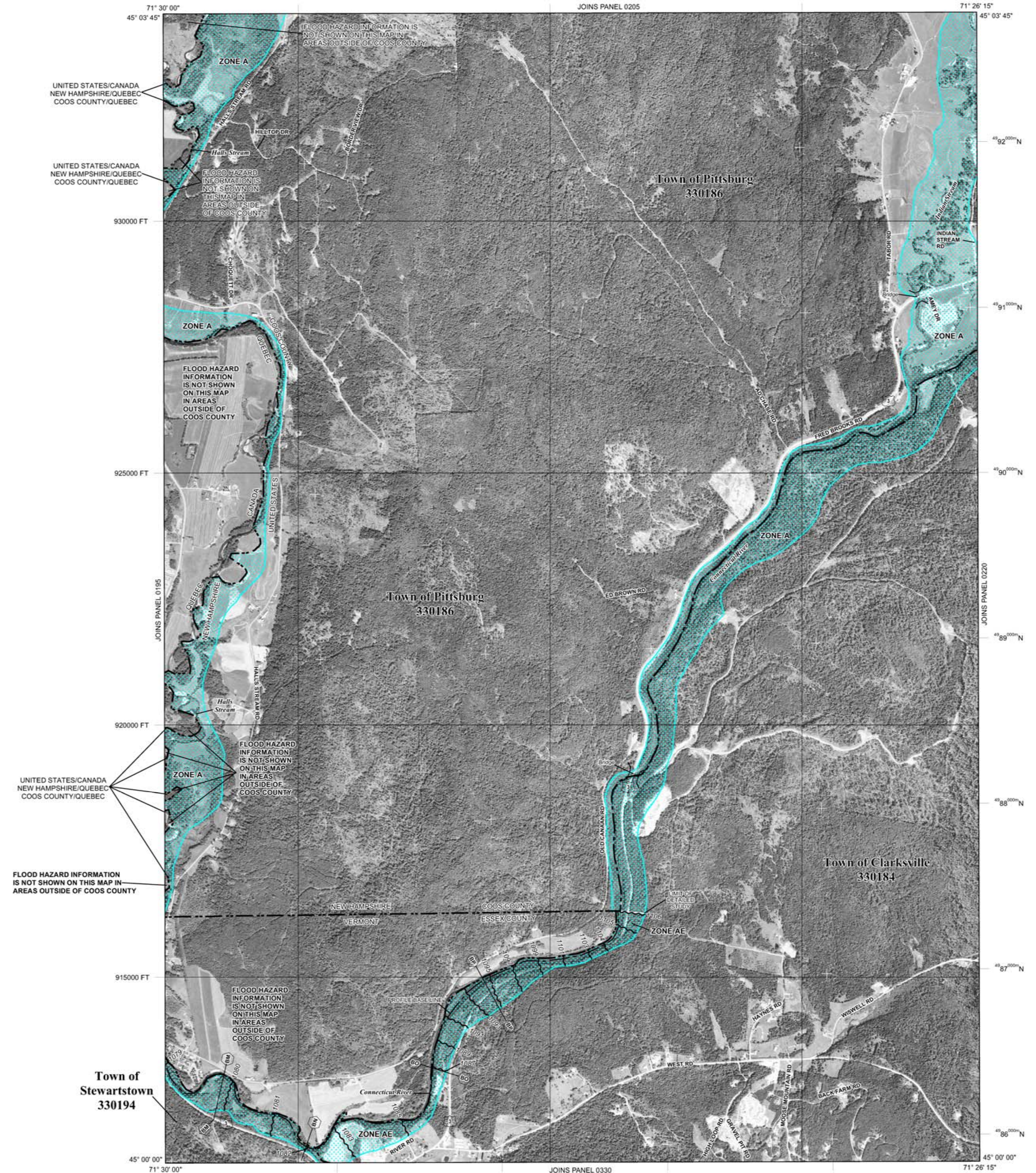
The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▩ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▧ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———	1% Annual Chance Floodplain Boundary
———	0.2% Annual Chance Floodplain Boundary
— —	Floodway boundary
— — —	Zone D boundary
• • • • • • • • • • • •	CBRS and OPA boundary
←	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

Ⓐ——Ⓐ	Cross section line
㉓- - - - - -㉓	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
3100000 FT	5000-foot ticks: New Hampshire State Plane Zone (FIPS Zone 2800), Transverse Mercator projection
$^{48}89^{000m}$ N	1000-meter Universal Transverse Mercator grid values, zone 19
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

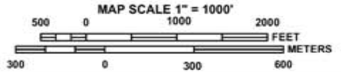
EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
February 20, 2013

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N



NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0215D

FIRM
FLOOD INSURANCE RATE MAP
COOS COUNTY,
NEW HAMPSHIRE
(ALL JURISDICTIONS)

PANEL 215 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CLARKSVILLE, TOWN OF	330184	0215	D
PITTSBURG, TOWN OF	330186	0215	D
STEWARTSTOWN, TOWN OF	330194	0215	D

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
33007C0215D

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

Table of Contents

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.

Site Features

Soil Survey Locations

NH Political Boundaries

NH State Line

1:40,000

Note: Detailed soil survey maps are provided in Appendix D
Data provided by: GRANIT & ESRI

N

0 0.5 1 2 Kilometers

0 0.5 1 2 Miles

Figure 1. Site Location Transition Stations

Northern Pass
New Hampshire, USA

NORMANDEAU
environmental consultants

Normandeau Associates
25 Nashua Road
Bedford, NH USA
03110

C:\Npass\MXD\NP_SoilsLocation_North_020215.mxd

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.

4.1 Station 1, Pittsburgh

Overview

The Station 1 site is located within the Connecticut River Valley and is within ¼ mile of the Connecticut River, which is a Designated River, managed and protected in accordance with RSA 483, The Rivers Management and Protection Act. The site is wooded on a south facing slope draining to the river. Timber harvesting has occurred within the last 10-15 years resulting in an early successional, deciduous forest crisscrossed by old skidder tracks.

The site is moderately steep (15 to 25% slopes) to steep (25 to 50% slopes) near the Old Canaan Road and strongly sloping (8 to 15% slopes) as one moves upslope away from the road. The west side of the site is bedrock controlled with bedrock outcrops and shallow to bedrock soils while the east side tends to have deeper soils with bedrock greater than 60 inches from the soil surface. Wetland conditions have been enhanced by skidder tracks and harvesting activities that have compacted soil structure, decreasing the infiltration rate. Erosion within the wetlands has also exposed stony surfaces.

Soil Mapping Results

Normandeau conducted a field review of the Pittsburgh site on July 10th and 21st, 2014. The final survey area is 6 acres. Six map units have been identified within the site. All are formed within glacial till parent material with the exception of Stetson, which formed in glaciofluvial deposits along the banks of the Connecticut River. Table 4-1 summarizes the map units and their physical characteristics identified within the project site. Slope phases are not provided in Table 4-1 but are included in the detailed summary on each map unit provided in Appendix A.

A total of 28 test pits were evenly distributed across the site and located with a Trimble® GPS. The wetland boundary had been previously flagged and located in the field by Normandeau Associates, Inc..

Table 4-1. Station 1, Pittsburgh- 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
90-Tunbridge-Lyman Complex	C/A/D	>40	0-40	W	0.6-6.0	rock
123-Telos	C	≤15	>60	SP	0.02-0.2	
126-Chesuncook	C	15-40	>60	MW	0.02-0.2	
399/RK- Rock outcrop	unknown	unknown	0	unknown	unknown	rock
564-Plaisted	C	>40	>60	W	0.06-2.0	
590-Cabot	D	Surface to 12	>60	P	0.06-0.2	P[2]

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:
   P- poorly drained; SP- somewhat poorly drained; MW- moderately well drained
   W- well drained; SE- somewhat excessively drained.

Tunbridge fine sandy loam and Lyman loam are bedrock controlled soils. Tunbridge soils are moderately deep with bedrock within 40 inches of the soil surface. Lyman soils are shallow with bedrock within 20 inches of the soil surface. Bedrock outcrops were mapped within the vicinity of this map unit.

Plaisted silt loam is well drained with a seasonal water table greater than 40 inches from the soil surface. Chesuncook silt loam is moderately well drained with a seasonal water table within 15 to 40 inches of the soil surface. Telos silt loam is somewhat poorly drained with a seasonal water table within 15 inches of the soil surface due to the presence of dense lodgement till.

Cabot, very stony, silt loam is poorly drained with dense lodgement till in the substratum. Free water is commonly at or near the surface to result in hydric conditions.

Summary

Limitations to development within the site include wetlands, steep slopes, shallow to bedrock conditions and shallow to moderately shallow dense lodgement till. The eastern side of the site is more gently sloping with deeper soils compared to the bedrock controlled western portion of the site. Proposed access routes should be designed to ensure sheet flow drainage across the route to minimize concentration of spring runoff.

4.2 Station 2, Clarksville North

Overview

The site is located within the Connecticut River Valley and is within ¼ mile of the Connecticut River, which is a Designated River, managed and protected in accordance with RSA 483, The Rivers Management and Protection Act. The proposed site is part of an active gravel pit operation on the western slope of a hill overlooking the Connecticut River. At the time of a site visit in July 2014 material was being excavated and sorted. Access to the site is from US Route 3 along a gravel road. The site is on a steep hillside; Route 3 is at an elevation of approximately 1260 feet and the eastern edge of the site is at an elevation of approximately 1300 feet. The proposed site is bordered by undisturbed forest.

Soil Mapping Results

Normandeau conducted an examination of soils within the western half of the site on July 9, 2014. A second site visit was conducted to review the eastern half of the site on December 23, 2014. The final survey area is approximately 9 acres in size. Sixteen test pits were dug throughout the site. Eight map units have been identified within the site. Madawaska and Stetson are formed within glacial fluvial parent material. Dixmont and Cabot are formed within glacial till. Table 4-2a summarizes the map units and their physical characteristics identified within the project site. Slope phases are not provided but are included in the detailed summary on each map unit provided in Appendix A.

5.0 References

Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. 1998. Field book for describing and sampling soils. Natural Resources Conservation Service, USDA, National Soil Survey Center, Lincoln, NE.

Society of Soil Scientists of Northern New England. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

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Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Accessed July and August 2014.Available online at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

USDA Natural Resources Conservation Service. 2011. New Hampshire State-Wide Numerical Soils Legend. Issue #10. Durham, NH.

Appendix A

Map Unit Descriptions

MAP UNIT DESCRIPTION

Map Unit:	**Cabot silt loam, very stony**
Map Unit Symbol:	**590B**
Classification:	Loamy, mixed, active, nonacid, frigid, shallow Typic Humaquepts

DESCRIPTION AND MORPHOLOGY

Landform:	Glaciated upland
Landscape Position:	Hillslopes, depressions
Parent Material:	Basal till
Slope Gradient Range:	B: 1 to 8%
Typical Profile Description:	**Surface Layer:** Black very fine sandy loam, friable, 0-9”. **Subsurface Layer**: Very dark brown very fine sandy loam, friable, 7-15”. **Subsoil Layer**: Gravelly to very gravelly olive very fine sandy loam, firm at 20”, redox features at 15”, 15-32”. **Substratum**: Gravelly, dark olive gray coarse sandy loam, firm, 32-96” Extent of Excavation: 96”; (Reference: Pittsburgh TP 6).

PHYSICAL CHARACTERISTICS

Drainage Class:	Poorly drained
Depth to Water Table[1]:	Water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods.
Hydrologic Group[2]:	Group D:
Ksat[2]:	Capacity of the most limiting layer to transmit water: low to high, 0.06 to 0.2 in/hr,, (based on Cabot map unit number 589)
Hazard of Flooding:	None
Depth to Bedrock:	Very deep to bedrock
Surface Stoniness:	Stony to very stony

INCLUSIONS

Similar Soils:	Wonsqueak (VP),
Dissimilar Soils:	Telos (SP), Howland (MW), Dixmont (MW), Plaisted (W), Lyman (SE), Tunbridge (W), rock outcrop, Stetson (W),

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1 SSSNNE. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNE Special Publication No. 3. Durham, NH.

2. SSSNNE. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

MAP UNIT DESCRIPTION

Map Unit: **Chesuncook, very stony**
Map Unit Symbol: **126B, 126C, 126D, 126E**
Classification: Coarse-loamy, isotic, frigid Aquic Haplorthods

DESCRIPTION AND MORPHOLOGY

Landform: Till plains and ridges
Landscape Position: Strongly sloping to moderately steep knolls
Parent Material: Dense glacial till.
Slope Gradient Range: B: 3-8%; C: 8 to 15%; D: 15 to 25%
Typical Profile Description:

Surface Layer: Black silt loam, friable, 0-2".
Subsurface Layer: Eluviated horizon, dark gray silt loam, friable, 2-8".
Subsoil Layer: Spodic horizon, gravelly brown loam, friable, 8-19".
Substratum: Redox features were noted at 19 inches, dark olive gray gravelly silt loam subsoil, firm, 19-84". The percent of stones increase with depth.
Extent of excavation: 84"; (Reference: Pittsburgh TP 11).

PHYSICAL CHARACTERISTICS

Drainage Class: Moderately well drained
Depth to Water Table[1]: Water is removed from the soil somewhat slowly during periods of the year. Soil morphology indicating a seasonal water table is observed at fifteen inches to forty inches below the surface.
Hydrologic Group[2]: Group C
Ksat[2]: Capacity of the most limiting layer to transmit water: low to high is 0.02 to 0.2 in/hr.

Hazard of Flooding: None
Depth to Bedrock: > 60 inches
Surface Stoniness: Stony

INCLUSIONS

Similar Soils: Stetson (W)
Dissimilar Soils: Tunbridge (W), Telos (SP), Cabot (P), Tunbridge (W), Lyman (SE) rock outcrop

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[1] SSSNNE. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNE Special Publication No. 3. Durham, NH.

[2] SSSNNE. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

MAP UNIT DESCRIPTION

Map Unit: **Plaisted very fine sandy loam, very stony**
Map Unit Symbol: **564D**
Classification: Coarse-loamy, isotic, frigid Oxyaquic Haplorthods

DESCRIPTION AND MORPHOLOGY

Landform: Glaciated upland
Landscape Position: Hillslopes, ridges
Parent Material: Basal till
Slope Gradient Range: D: 15-25%
Typical Profile Description: **Surface Layer**: Very dark brown loam, friable, 0-7"
Subsurface Layer: Very dark grayish loam and dark brown loam, friable, 7-23".
Subsoil Layer: Dark brown very fine sandy loam, friable, 23-28".
Substratum: Very dark grayish brown very fine sandy loam, firm, 28-60".
Increasing stones, boulders with depth.
Extent of excavation: 60". (Reference: Station 1, TP 17)

PHYSICAL CHARACTERISTICS

Drainage Class: Well drained
Depth to Water Table[1]: Water is removed from the soil readily but not rapidly. The soil does not have a seasonal high water table within forty inches of the surface throughout the year.
Hydrologic Group[2]: Group C
Ksat[2]: Capacity of the most limiting layer to transmit water: low to high, 0.06 to 2 in/hr,,
Hazard of Flooding: None
Depth to Bedrock: Very deep to bedrock
Surface Stoniness: Stony

INCLUSIONS

Similar Soils: None
Dissimilar Soils: Telos (SP), Chesuncook (MW), Stetson (W), Lyman (SED), Tunbridge (WD), rock outcrop,

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1 SSSNNE. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNE Special Publication No. 3. Durham, NH.

2. SSSNNE. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

MAP UNIT DESCRIPTION

Map Unit: **Made Land- Disturbed Soil- Rock, Mapping Units**[1]

299- Udorthents, smoothed
300- Udipsamments
399- Rock Outcrop
400- Udorthents, sand or gravelly
500- Udorthents, loamy
727- Rubble land
799A - Urban land-Canton Complex

299- Udorthents, smoothed: land that has been cut and filled to create large level or nearly level areas such as building lots and roads. Soil material making up this area are generally from the surrounding area.

300- Udipsamments: soils are characterized by textures of loamy fine sand to sand and gravel. Commonly a sand pit. Inclusions: Udorthents, smoothed; Udorthents, sand or gravelly; rubble land

399- Rock outcrop: exposed bedrock.

400- Udorthents, sand or gravelly: soils include very gravelly sand, very gravelly loamy sand, sand or lamy sand that may have lenses of loamy very fine sand or finer. These soils that have been excavated for sand and gravel. Seasonal water table is generally greater than 40”. Inclusions: rubble land, Udorthents, smoothed, Udorthents loamy, Udipsamments.

500- Udorthents, loamy: soils have textures that are sandy loam, loam or silt loam. The areas have been excavated down to the loamy underlying material. Inclusions: Udipsamments, Udorthents sand or gravelly, Udorthents smoothed, rubble land.

727- Rubble land: stones, boulders and soil have been sorted and piled within excavated gravel pit or adjacent to made land.

799- Urban land-Canton Complex, see description from NRCS in Appendix C.

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[1] USDA Natural Resources Conservation Service. 2011. New Hampshire State-Wide Numerical Soils Legend. Issue #10. Durham, NH.

MAP UNIT DESCRIPTION

Map Unit: **Telos,very stony**
Map Unit Symbol: **123B, 123C**
Classification: Loamy, isotic, frigid, shallow Aquic Haplorthods

DESCRIPTION AND MORPHOLOGY

Landform: Till plains and ridges
Landscape Position: Moderately steep slopes
Parent Material: Dense lodgement till.
Slope Gradient Range: B: 3-8%**;** C: 8 to 15%;
Typical Profile Description: **Surface Layer**: Very dark brown very fine sandy loam, friable, 0-7".
Subsurface Layer: Very dark gray very fine sandy loam, friable, 7-9".
Subsoil Layer: Dark brown very fine sandy loam, redox features begin at 14", 9-22".
Substratum: Dark brown gravelly very fine sandy loam, redox features, firm, 22-42".
Extent of excavation: 42"; Reference: Pittsburgh TP 3.

PHYSICAL CHARACTERISTICS

Drainage Class: Somewhat poorly drained
Depth to Water Table[1]: Water is removed slowly so that the soil is wet at a shallow depth for significant periods during the growing season. Soil morphology indicating a seasonal water table is observed at a depth less than fifteen inches below the surface. These soils are not hydric.
Hydrologic Group[2]: Group C
Ksat[2]: Capacity of the most limiting layer to transmit water: low to high is 0.02 to 0.2 in/hr.

Hazard of Flooding: None
Depth to Bedrock: Very deep
Surface Stoniness: Stony

INCLUSIONS

Similar Soils: Colonel (SP)
Dissimilar Soils: Cabot (P), Chesuncook (MW), Lyman (SE), Plaisted (W), Tunbridge (WD), rock outcrop

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[1] SSSNNE. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNE Special Publication No. 3. Durham, NH.

[2] SSSNNE. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

MAP UNIT DESCRIPTION

Map Unit: **Tunbridge-Lyman Complex- 90**
Tunbridge-Lyman-Rock Outcrop Complex- 61
Map Unit Symbol: **90B, 61B, 61C, 161D**
Classification: Lyman: Loamy, isotic, frigid Lithic Haplorthods
Tunbridge: Coarse-loamy, isotic, frigid Typic Haplorthods

DESCRIPTION AND MORPHOLOGY

Landform: Glaciated uplands
Landscape Position: Slopes and ridge lines
Parent Material: Coarse-loamy till
Slope Gradient Range: B: 3-8%; C: 8-15%; D: 15-25%
Typical Profile Description:
Surface Layer: Very dark brown loam, friable, 0-6".
Subsurface Layer: Very dark grayish brown loam, friable, 6-12".
Bedrock: 12-24".
Reference: Station 3, Stewartstown, TP 9

PHYSICAL CHARACTERISTICS

Drainage Class: Lyman: Somewhat excessively; Tunbridge: well
Depth to Water Table[1]**:** Well drained: Water is removed from the soil readily but not rapidly. The soil does not have a seasonal high water table within forty inches of the surface throughout the year. Somewhat excessively drained: Water is removed from the soil rapidly. The soils are commonly coarse textured and have high saturated hydrologic conductivity or are very shallow.
Hydrologic Group[2]**:** Lyman: A/D; Tunbridge: B
Ksat[1]**:** Capacity of the most limiting layer to transmit water: low to high, 0.6 to 6.0 in/hr.
Hazard of Flooding: None
Depth to Bedrock: Lyman: 10-20"; Tunbridge: 20-40".
Surface Stoniness: Nonstony

INCLUSIONS

Similar Soils:
Dissimilar Soils: Cabot (P), Telos (SW), Howland (MW), Plaisted (W), Stetson (W), Udorthents, Rubble land

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1 SSSNNE. 2011. Site-Specific Soil Mapping Standards for New Hampshire and Vermont. Version 4.0. SSSNNE Special Publication No. 3. Durham, NH.
2 SSSNNE. 2009. Ksat Values for New Hampshire Soils. SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

Appendix B

Soil Observation Logs Abbreviations

Abbreviation	Soil Texture	Consistence	Miscellaneous
S	Sandy		
FS	Fine Sand		
FSL	Fine Sandy Loam		
VFSL	Very Fine Sandy Loam		
CS	Coarse Sand		
GRY	Gravelly		
L	Loam		
SL	Sandy Loam		
FR		Friable	
EOE			Extent of Excavation

Appendix B-1

Station 1, Pittsburgh, Soil Test Pit Logs

Town, City, Plantation: Pittsburgh

Street, Road, Subdivision: Old Canaan Road

Owner or Applicant Name:

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 3 ☑ Test Pit ☐ Boring

_____" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	VFSL	Friable	10YR2/2	
6				
			7.5YR3/1	
			10YR3/3	
12				
18				7.5YR3/3 2%
24	gry VFSL	FIRM		
	cobbly, boulder			
30				
36				
42				
	EOE 42"			
48				

Soil Classification: ____ Profile ____ Condition | Slope ____ Percent | Limiting Factor ____" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: TElos very stony

Hydrologic Group:

Observation Hole # 4 ☒ Test Pit ☐ Boring

_____" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	VFSL	friable	10YR2/1	
6				
12			10YR3/3	
18				
	Vgry VFSL	Firm		
24				
30				
	lenses LVFS	friable	2.5Y3/2	
36				
		to firm with depth		
42				
	cobbly			
48		EOE 11'	no bedrock	

Soil Classification: ____ Profile ____ Condition | Slope ____ Percent | Limiting Factor ____" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Chesuncook very stony

Hydrologic Group:

Observation Hole # 5 ☒ Test Pit ☐ Boring

_____" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
			10YR2/1	
6	mucky	Loose		
	V.stony surface			
12				
	FSL	friable	2.5Y3/2	
18				
				2.5Y5/1
24	VFSL		2.5Y4/2	c, 5%
30				
36				
	gry VFSL			
		massive		
42	bouldery			
	EOE 84"			
48				

Soil Classification: ____ Profile ____ Condition | Slope ____ Percent | Limiting Factor ____" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Cabot

Hydrologic Group:

Observation Hole # 6 ☒ Test Pit ☐ Boring

_____" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	VFSL	Friable	10YR2/1	
6				
12			10YR2/2	
18				10YR3/4
			2.5Y4/3	2%
24		Firm		
30				
36	CSL	Friable	2.5Y3/2	
	increasing gravel with depth			
42				
	EOE 96"			
48				

Soil Classification: ____ Profile ____ Condition | Slope ____ Percent | Limiting Factor ____" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Cabot

Hydrologic Group:

Soil Scientist/Site Evaluator Signature

ME215
CSS/LSE#

7-10-14
Date

Town, City, Plantation: Pittsburgh

Street, Road, Subdivision: Old Canaan Road

Owner or Applicant Name:

SOIL PROFILE DESCRIPTION AND CLASSIFICATION

(Location of Observation Holes Shown Above)

Observation Hole # 7 ☒ Test Pit ☐ Boring

1" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	SL	Friable	10YR3/2	
6				
	gry fSL			
12				
		Firm	2.5Y3/2	
18				
24				
30	Ex. gry L			
36	Coarse gravel			
42	Stony boulder			
48	EOE 48"			

Soil Classification: ______ Profile ______ Condition

Slope: ______ Percent

Limiting Factor: ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Stetson very stony

Hydrologic Group:

Observation Hole # 8 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	VFSL	Friable	10YR2/1	
6	gry VFSL		10YR2/2	
12				
		firm (cemented)	2.5Y3/2	10YR3/3 5%
18				
24				
30	V.gry SL			
36	Stony some boulders			
42				
48	EOE 96"			

Soil Classification: ______ Profile ______ Condition

Slope: ______ Percent

Limiting Factor: ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Telos very stony

Hydrologic Group:

Observation Hole # 9 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	SiL	Friable	10YR2/1	
6				2.5Y4/1, 2%
			2.5Y 3/2	10YR3/3, 2%
12	lenses of sand Loam gry	Firm	mixed colors, sand grains	
18				
24				
30				
36				7.5YR3/2 2%
	SiL vi gry		5Y3/2	
42				
48	EOE 96"			

Soil Classification: ______ Profile ______ Condition

Slope: ______ Percent

Limiting Factor: ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Cabot

Hydrologic Group:

Observation Hole # 10 ☒ Test Pit ☐ Boring

1" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0			10YR3/1	
	L	Friable		
6	FSL		7.5YR2.5/2	
12				
			10YR3/2	
18	gry FSL	FIRM	2.5Y3/1	7.5YR3/3 2%
24	SiL Stoney gry		2.5Y3/2	
30				
36				
42	EOE 48"			
48				

Soil Classification: ______ Profile ______ Condition

Slope: ______ Percent

Limiting Factor: ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Telos very stony

Hydrologic Group:

Soil Scientist/Site Evaluator Signature

CSS/LSE#: ME215

Date: 7-10-14

Town, City, Plantation: Pittsburgh

Street, Road, Subdivision: Old Canaan Road

Owner or Applicant Name:

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 11 ☑ Test Pit ☐ Boring

2" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	gry SiL	friable	10YR4/1	
6				
12	Loam		7.5YR2.5/2	
18				
24	SiL gry	Firm	7.5Y 3/2	7.5YR3/3 2%
30	increase stones with depth		↓	↓
36		V. firm		
42				
48	EOE 90"			

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth

☐ Groundwater
☐ Restrictive Layer
☐ Bedrock

Soil Series Name: Chesuncook stony

Hydrologic Group:

Observation Hole # 12 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	sapric material	friable	10YR2/1	
6				
12	SiL			
18			2.5Y3/2	
24	V. gry SiL		5Y3/1	
30		V. firm		7.5YR3/3 5%
36				
42				
48	EOE	60"		

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth

☐ Groundwater
☐ Restrictive Layer
☐ Bedrock

Soil Series Name: Cabot, very stony

Hydrologic Group:

Observation Hole # 13 ☒ Test Pit ☐ Boring

1" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	SiL	friable	10YR2/2	
6	↓	↓		
12				7.5YR3/2 5%
18			5Y4/1	
24			↓	↓
30	Bedrock			
36				
42				
48				

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth

☐ Groundwater
☐ Restrictive Layer
☐ Bedrock

Soil Series Name: Cabot variant

Hydrologic Group:

Observation Hole # 14 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	V. gry SiL	friable	10YR2/1	
6			10YR3/2	
12	gry VFSL		7.5YR3/2	
18	gry VFSL	firm	10YR3/2	7.5YR3/3 15%
24			2.5Y3/1	
30				
36				
42				
48	EOE	60"		

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth

☐ Groundwater
☐ Restrictive Layer
☐ Bedrock

Soil Series Name: Chesuncook stony

Hydrologic Group:

Soil Scientist/Site Evaluator Signature

ME 215
CSS/~~LSE~~#

7-10-14
Date

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Pittsburgh	Old Canaan Road	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 15 ☒ Test Pit ☐ Boring

2 " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	SiL	Friable	10YR2/2	
6	Stony surface			
			2.5Y4/2 3/2	10YR3/2 10%
12				
18				
		firm	2.5Y4/2	2.5Y3/2 2%
24				
	gry SiL		10Y4/1	10YR3/3 20%
30				
36				
42	Very stony, bouldery on surface			
	EOE 60"			
48				

Soil Classification ____ Profile ____ Condition

Slope ____ Percent

Limiting Factor ____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Cabot

Hydrologic Group:

Observation Hole # 16 ☒ Test Pit ☐ Boring

____ " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	Loam	friable	7.5YR2.5/1	
6				
			7.5YR2.5/2	
12	gry SL	firm	7.5YR2.5/3	
	stony			
18				
			10YR2/2	
24				
30				
36				
42				
	EOE 48"			
48				

Soil Classification ____ Profile ____ Condition

Slope ____ Percent

Limiting Factor ____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Chesuncook

Hydrologic Group:

Observation Hole # 17 ☒ Test Pit ☐ Boring

____ " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	Loam	friable	10YR2/2	
6				
			10YR3/2 7.5YR3/3	
12				
18				
24				
	VFSL		10YR3/3	
30		Firm	10YR3/2	
36				
42	increasing stones, boulders with depth			
	EOB 60"			
48				

Soil Classification ____ Profile ____ Condition

Slope ____ Percent

Limiting Factor ____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Plaisted

Hydrologic Group:

Observation Hole # 19 ☒ Test Pit ☐ Boring

____ " Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0				
	Slaty FSL	friable	10YR2/1	
6				
	VFSL			
12				
18				
24				
	Decomposing rock			
30				
36	Bedrock - slaty			
42	EOE 34"			
48				

Soil Classification ____ Profile ____ Condition

Slope ____ Percent

Limiting Factor ____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Tunbridge

Hydrologic Group:

Jennifer West
Soil Scientist/Site Evaluator Signature

MB 215
CSS/~~LSE#~~

7-21-14
Date

Town, City, Plantation: Pittsburgh

Street, Road, Subdivision: Old Canaan Road

Owner or Applicant Name:

SOIL PROFILE DESCRIPTION AND CLASSIFICATION

(Location of Observation Holes Shown Above)

Observation Hole # 21 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	VFSL	Friable	10YR2/2	
6				
12			7.5YR3/3	
18				
24		Firm	7.5YR3/2	
30				
36	Bedrock			
42				
48				

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Tunbridge

Hydrologic Group:

Observation Hole # 24 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	Loam	Friable	10YR2/2	
6	vgry FSL			
12	Stony		10YR3/2	7.5YR4/3 15%
18	Loam		10YR3/3	
24				
30	SiL		2.5Y3/3	10YR3/3 2%
36				
42				
48				

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Cabot variant

Hydrologic Group:

Observation Hole # 26 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	V. Stony	Friable	10YR2/2	
6	FSL		7.5YR3/3	
12				
18	Bedrock			
24				
30				
36				
42				
48				

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Lyman - Tunbridge

Hydrologic Group:

Observation Hole # 27 ☒ Test Pit ☐ Boring

______" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0	Stony Loam	Friable	10YR2/2	
6				7.5YR3/3 Oxid. Rhizosphere
12				
18	gry FSL Stony	Firm	2.5Y3/2	2.5Y4/2 2%
24				
30				
36				
42	EOE 56"			
48				

Soil Classification ______ Profile ______ Condition

Slope ______ Percent

Limiting Factor ______" Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Chesuncook

Hydrologic Group:

Soil Scientist/Site Evaluator Signature

ME 215

CSS/~~LSE~~#

7-21-14

Date

Town, City, Plantation	Street, Road, Subdivision	Owner or Applicant Name
Pittsburgh	Old Canaan Road	

SOIL PROFILE DESCRIPTION AND CLASSIFICATION **(Location of Observation Holes Shown Above)**

Observation Hole # 2B ☒ Test Pit ☐ Boring

_____" Depth of organic horizon above mineral soil

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0				
6	SiL	friable	10YR2/2	
12				
18			2.5Y 3/2	10YR3/4 2%
24	gry SiL stones	firm		
30				
36				
	stony surface			
42				
	EOE 51" at large boulder			
48				

Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	
			"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Soil Series Name: Telos, very stony

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:

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 West
Soil Scientist/Site Evaluator Signature

MB 215
CSS/~~LSE~~#

7-21-14
Date

Appendix C

NRCS Soil Map Unit Descriptions

Coos County Area, New Hampshire

61D—Tunbridge-Lyman-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2trpk
Elevation: 520 to 1,970 feet
Mean annual precipitation: 31 to 95 inches
Mean annual air temperature: 27 to 52 degrees F
Frost-free period: 60 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Tunbridge, very stony, and similar soils: 40 percent
Lyman, very stony, and similar soils: 29 percent
Rock outcrop: 18 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunbridge, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Mountaintop, mountainflank, side slope, crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 3 inches: moderately decomposed plant material
Oa - 3 to 5 inches: highly decomposed plant material
E - 5 to 8 inches: fine sandy loam
Bhs - 8 to 11 inches: fine sandy loam
Bs - 11 to 26 inches: fine sandy loam
BC - 26 to 28 inches: fine sandy loam
R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

Description of Lyman, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Mountaintop, mountainflank, crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loam
E - 3 to 5 inches: fine sandy loam
Bhs - 5 to 7 inches: loam
Bs1 - 7 to 11 inches: loam
Bs2 - 11 to 18 inches: channery loam
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 11 to 24 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Mountaintop, mountainflank, crest, side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Igneous and metamorphic rock

Typical profile
R - 0 to 10 inches: bedrock

Properties and qualities
Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Peru, very stony
Percent of map unit: 6 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Mountainflank, mountaintop, side slope, crest
Microfeatures of landform position: Open depressions, open depressions
Down-slope shape: Concave
Across-slope shape: Concave

Moosilauke, very stony
Percent of map unit: 4 percent
Landform: Mountains, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Mountaintop, mountainflank, side slope, crest
Microfeatures of landform position: Open depressions, open depressions
Down-slope shape: Concave
Across-slope shape: Concave

Monadnock, very stony
Percent of map unit: 3 percent
Landform: Hills, mountains
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Mountaintop, mountainflank, side slope, crest
Down-slope shape: Convex

Across-slope shape: Convex

Data Source Information

Soil Survey Area: Coos County Area, New Hampshire
Survey Area Data: Version 20, Sep 15, 2014

Coos County Area, New Hampshire

61E—Tunbridge-Lyman-Rock outcrop complex, 25 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2trph
Elevation: 430 to 2,490 feet
Mean annual precipitation: 31 to 95 inches
Mean annual air temperature: 27 to 52 degrees F
Frost-free period: 60 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Tunbridge, very stony, and similar soils: 42 percent
Lyman, very stony, and similar soils: 31 percent
Rock outcrop: 17 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunbridge, Very Stony

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 3 inches: moderately decomposed plant material
Oa - 3 to 5 inches: highly decomposed plant material
E - 5 to 8 inches: fine sandy loam
Bhs - 8 to 11 inches: fine sandy loam
Bs - 11 to 26 inches: fine sandy loam
BC - 26 to 28 inches: fine sandy loam
R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 25 to 60 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C

Description of Lyman, Very Stony

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loam
E - 3 to 5 inches: fine sandy loam
Bhs - 5 to 7 inches: loam
Bs1 - 7 to 11 inches: loam
Bs2 - 11 to 18 inches: channery loam
R - 18 to 28 inches: bedrock

Properties and qualities

Slope: 25 to 60 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 11 to 24 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 14.03 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, free face, free face, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 10 inches: bedrock

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to very high (0.00 to 14.17 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Peru, very stony

Percent of map unit: 6 percent
Landform: Mountains, hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Mountainflank, side slope
Microfeatures of landform position: Open depressions, open depressions
Down-slope shape: Concave
Across-slope shape: Concave

Moosilauke, very stony

Percent of map unit: 3 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Mountainflank, side slope
Microfeatures of landform position: Open depressions, open depressions
Down-slope shape: Concave
Across-slope shape: Concave

Monadnock, very stony

Percent of map unit: 1 percent
Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Data Source Information

Soil Survey Area: Coos County Area, New Hampshire
Survey Area Data: Version 20, Sep 15, 2014

Coos County Area, New Hampshire

560C—Tunbridge-Plaisted-Lyman complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9dvt
Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days
Farmland classification: Farmland of local importance

Map Unit Composition

Tunbridge and similar soils: 50 percent
Plaisted and similar soils: 15 percent
Lyman and similar soils: 15 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 2 inches: silt loam
H2 - 2 to 25 inches: silt loam
H3 - 25 to 34 inches: cobbly fine sandy loam
R - 34 to 38 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
H1 - 1 to 4 inches: fine sandy loam
H2 - 4 to 13 inches: fine sandy loam
H3 - 13 to 16 inches: gravelly fine sandy loam
R - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D

Description of Plaisted

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Lodgment till derived from schist and phyllite

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
H1 - 2 to 29 inches: silt loam
H2 - 29 to 65 inches: very fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Natural drainage class: Well drained

Runoff class: Medium
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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Minor Components

Howland

Percent of map unit: 8 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Cabot

Percent of map unit: 4 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Bangor

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Lombard

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Data Source Information

Soil Survey Area: Coos County Area, New Hampshire
Survey Area Data: Version 20, Sep 15, 2014

Coos County Area, New Hampshire

560D—Tunbridge-Plaisted-Lyman complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9dvv
Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Tunbridge and similar soils: 40 percent
Plaisted and similar soils: 25 percent
Lyman and similar soils: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 2 inches: silt loam
H2 - 2 to 25 inches: silt loam
H3 - 25 to 34 inches: cobbly fine sandy loam
R - 34 to 38 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 6.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B

Description of Plaisted

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Lodgment till derived from schist and phyllite

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
H1 - 2 to 29 inches: silt loam
H2 - 29 to 65 inches: very fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: High
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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
H1 - 1 to 4 inches: fine sandy loam
H2 - 4 to 13 inches: fine sandy loam
H3 - 13 to 16 inches: gravelly fine sandy loam
R - 16 to 20 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained

Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D

Minor Components

Howland

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Lombard

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 3 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Dixmont

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex

Bangor

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

Across-slope shape: Convex

Data Source Information

Soil Survey Area: Coos County Area, New Hampshire
Survey Area Data: Version 20, Sep 15, 2014

Coos County Area, New Hampshire

567C—Howland silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9dwd
Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Howland and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Howland

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Basal till derived from schist and phyllite

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
H1 - 1 to 3 inches: silt loam
H2 - 3 to 24 inches: gravelly silt loam
H3 - 24 to 65 inches: gravelly silt loam

Properties and qualities

Slope: 8 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
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 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C

Minor Components

Plaisted

Percent of map unit: 10 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

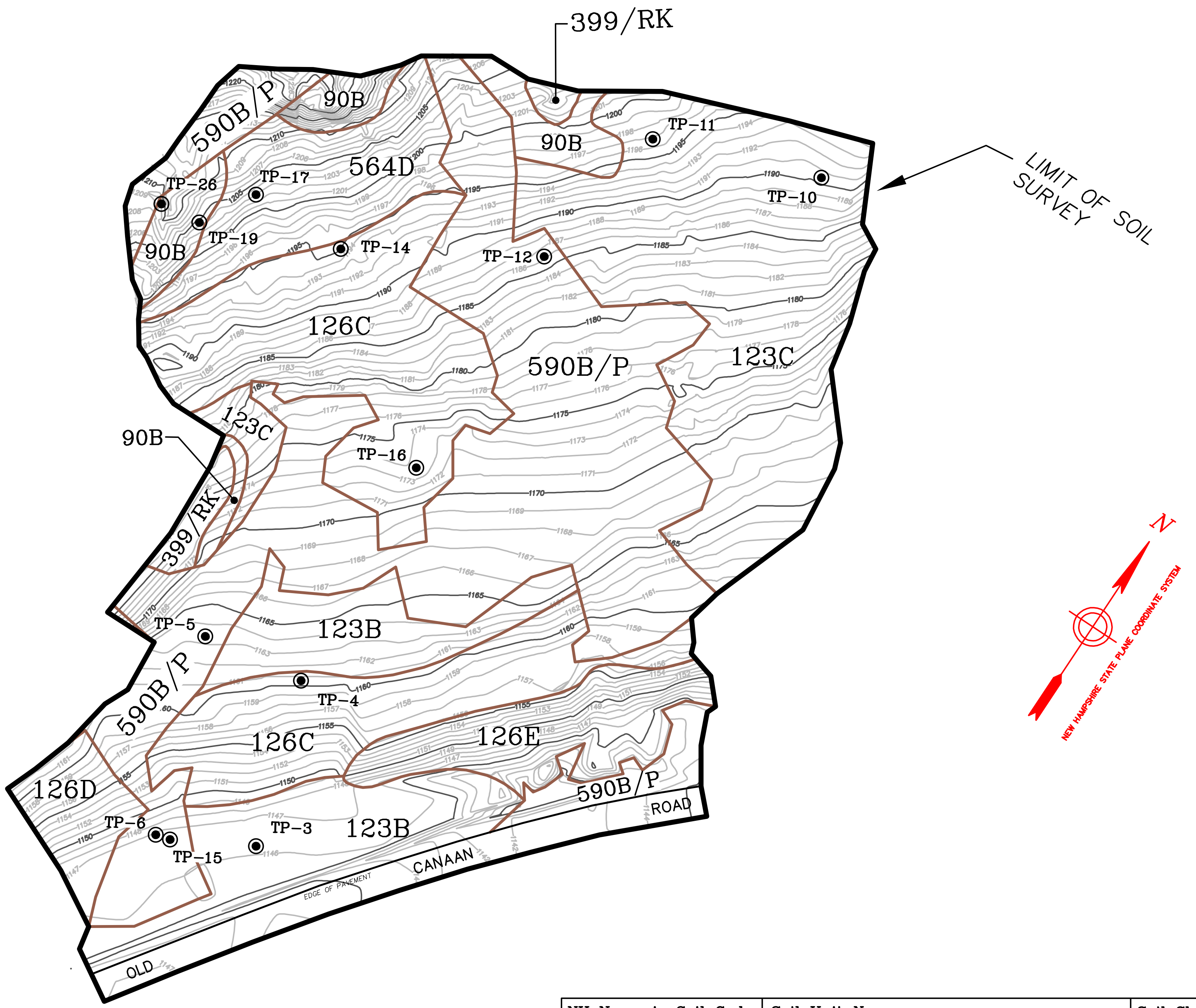
Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

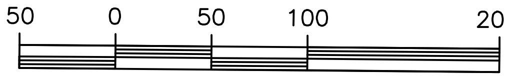
Data Source Information

Soil Survey Area: Coos County Area, New Hampshire
Survey Area Data: Version 20, Sep 15, 2014

Appendix D

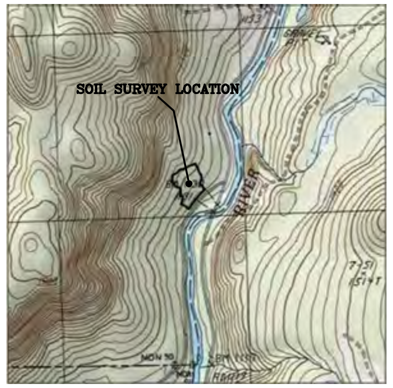
Soil Survey Maps





NH Numeric Soil Code	Soil Unit Name	Soil Slope %	Hyd. Group
90B	Tunbridge–Lyman Complex	1–8	C/A/D
123B	Telos, very stony	3–8	C
123C	Telos, very stony	8–15	C
126C	Chesuncook, very stony	8–15	C
126D	Chesuncook, very stony	15–25	C
126E	Chesuncook, very stony	25–45	C
399/RK	Rock Outcrop	1–45	unknown
564D	Plaisted very fine sandy loam, very stony	15–25	C
590B/P	Cabot gravelly silt loam, very stony	1–8	D

STATE OF MAINE
JENNIFER WEST
NO. 215
CERTIFIED SOIL SCIENTIST



LOCUS MAP

1:10,000

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., IAN BROADWATER (MECSS 305) & JENNIFER WEST (MECSS 215), CERTIFIED SOIL SCIENTIST ON JULY 10 & 21, 2014.

LEGEND

━━━	–Soil Survey Boundary
───	–Soil Boundary
345 ── 345 ──	–Index Contour
343 ── 343 ──	–Intermediate Contour
───	–Road

Transition Station #1
Pittsburg, 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_TransitionSites_SOIL_020215	JCB	02.02.15

SHEET 1 OF 1

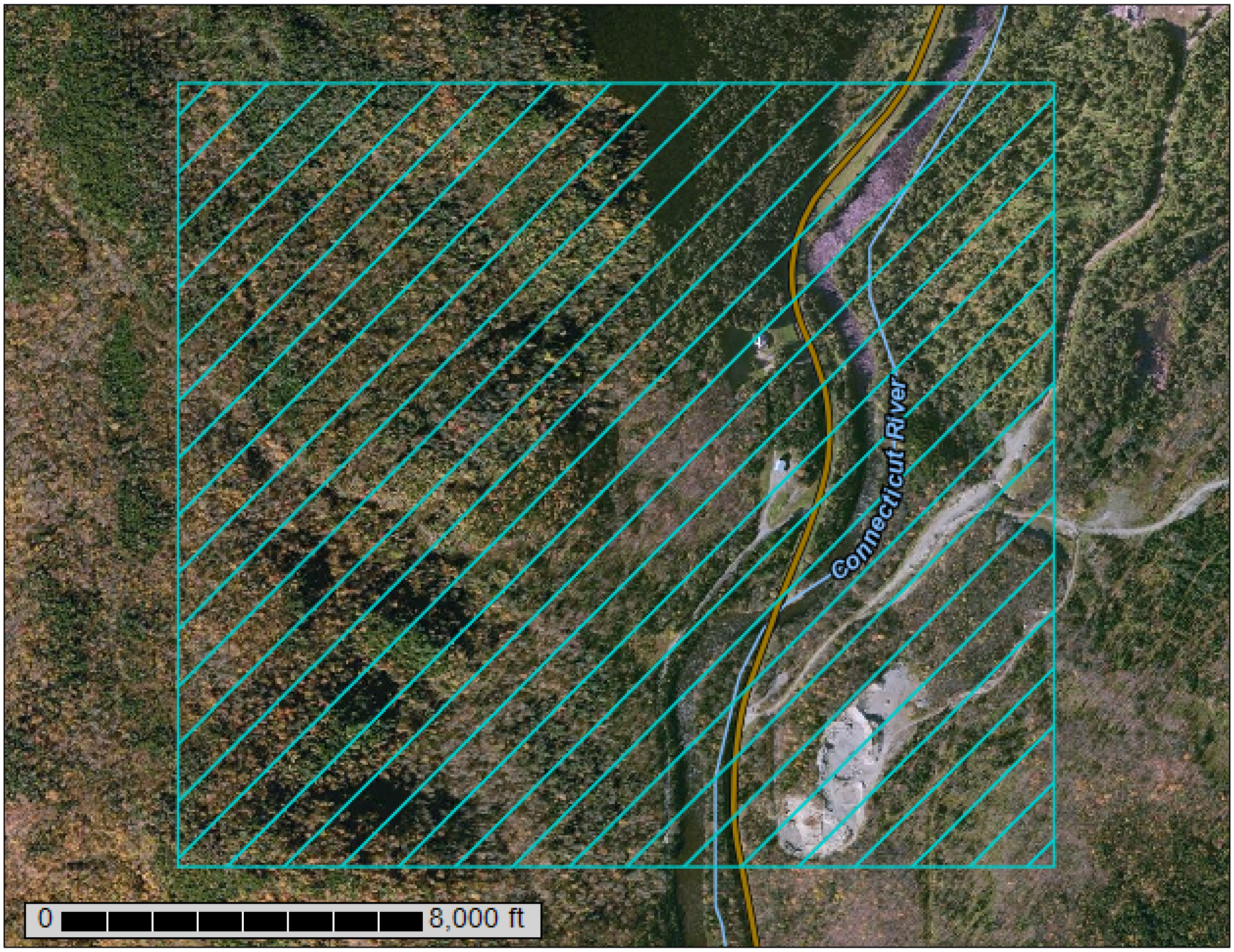
United States
Department of
Agriculture

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

Coos County Area, New Hampshire



January 14, 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://soils.usda.gov/sqi/) 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://soils.usda.gov/contact/state_offices/).

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 Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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.

Soil Map

Map Scale: 1:4,070 if printed on C landscape (22" x 17") sheet.

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: Coos County Area, New Hampshire
Survey Area Data: Version 18, Sep 21, 2012

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

Date(s) aerial images were photographed: Aug 19, 2010—Jul 16, 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

Coos County Area, New Hampshire (NH607)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
14B	Sheepscot cobbly very fine sandy loam, 1 to 8 percent slopes	4.7	1.1%
28B	Madawaska very fine sandy loam, 3 to 8 percent slopes	1.9	0.5%
61D	Tunbridge-Lyman-Rock outcrop complex, 15 to 25 percent slopes	48.0	11.8%
61E	Tunbridge-Lyman-Rock outcrop complex, 25 to 35 percent slopes	137.6	33.7%
433A	Grange silt loam, 0 to 5 percent slopes	5.1	1.3%
523B	Stetson fine sandy loam, 3 to 8 percent slopes	9.6	2.3%
523C	Stetson fine sandy loam, 8 to 15 percent slopes	12.9	3.2%
523E	Stetson fine sandy loam, 15 to 60 percent slopes	38.4	9.4%
560D	Tunbridge-Plaisted-Lyman complex, 15 to 25 percent slopes	4.7	1.1%
561C	Tunbridge-Plaisted-Lyman complex, 8 to 15 percent slopes, very stony	51.2	12.5%
564E	Plaisted very fine sandy loam, 25 to 35 percent slopes, very stony	4.6	1.1%
573C	Bangor silt loam, 8 to 15 percent slopes, very stony	6.5	1.6%
573D	Bangor silt loam, 15 to 25 percent slopes, very stony	19.0	4.6%
573E	Bangor silt loam, 25 to 35 percent slopes, very stony	2.1	0.5%
579C	Dixmont very fine sandy loam, 8 to 15 percent slopes, very stony	14.5	3.6%
579D	Dixmont very fine sandy loam, 15 to 25 percent slopes, very stony	11.1	2.7%
590B	Cabot gravelly silt loam, 3 to 8 percent slopes, very stony	3.7	0.9%
590C	Cabot gravelly silt loam, 8 to 15 percent slopes, very stony	7.9	1.9%
633A	Pemi silt loam, 0 to 5 percent slopes	8.3	2.0%

Coos County Area, New Hampshire (NH607)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
670D	Tunbridge-Berkshire-Lyman complex, 15 to 25 percent slopes	0.4	0.1%
895A	Bucksport muck, 0 to 1 percent slopes	3.8	0.9%
W	Water	12.4	3.0%
Totals for Area of Interest		**408.4**	**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.

Coos County Area, New Hampshire

14B—Sheepscot cobbly very fine sandy loam, 1 to 8 percent slopes

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Sheepscot and similar soils: 85 percent
Minor components: 15 percent

Description of Sheepscot

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Properties and qualities

Slope: 1 to 8 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 5.95 in/hr)
Depth to water table: About 18 to 30 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): 2e
Hydrologic Soil Group: B

Typical profile

0 to 3 inches: Slightly decomposed plant material
3 to 12 inches: Cobbly very fine sandy loam
12 to 21 inches: Very stony fine sandy loam
21 to 65 inches: Extremely gravelly sand

Minor Components

Naumburg

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Croghan

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Colton

Percent of map unit: 3 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Grange

Percent of map unit: 2 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Madawaska

Percent of map unit: 2 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Waumbek

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Adams

Percent of map unit: 1 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

28B—Madawaska very fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 790 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Madawaska and similar soils: 85 percent
Minor components: 15 percent

Description of Madawaska

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy outwash over sandy and/or gravelly outwash derived from granite and gneiss or schist

Properties and qualities

Slope: 3 to 8 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 1.98 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2w
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Very fine sandy loam
8 to 30 inches: Very fine sandy loam
30 to 65 inches: Fine sand

Minor Components

Groveton

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Grange
Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Searsport
Percent of map unit: 2 percent
Landform: Outwash terraces, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Nicholville
Percent of map unit: 2 percent
Landform: Lake terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Croghan
Percent of map unit: 2 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

61D—Tunbridge-Lyman-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Elevation: 820 to 6,290 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 30 to 46 degrees F
Frost-free period: 30 to 135 days

Map Unit Composition

Tunbridge and similar soils: 45 percent
Lyman and similar soils: 30 percent
Rock outcrop: 15 percent
Minor components: 10 percent

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 15 to 25 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: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Silt loam
2 to 25 inches: Silt loam
25 to 34 inches: Cobbly fine sandy loam
34 to 38 inches: Unweathered bedrock

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Properties and qualities

Slope: 15 to 25 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: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland

Land capability (nonirrigated): 7s
Hydrologic Soil Group: C/D

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 13 inches: Fine sandy loam
13 to 16 inches: Gravelly fine sandy loam
16 to 20 inches: Unweathered bedrock

Description of Rock Outcrop

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Minor Components

Moosilauke

Percent of map unit: 5 percent
Landform: Ground moraines, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave

Monadnock

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Peacham

Percent of map unit: 1 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave

61E—Tunbridge-Lyman-Rock outcrop complex, 25 to 35 percent slopes

Map Unit Setting

Elevation: 820 to 6,290 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 30 to 46 degrees F
Frost-free period: 30 to 135 days

Map Unit Composition

Tunbridge and similar soils: 45 percent
Lyman and similar soils: 30 percent
Rock outcrop: 15 percent
Minor components: 10 percent

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 25 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: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Silt loam
2 to 25 inches: Silt loam
25 to 34 inches: Cobbly fine sandy loam
34 to 38 inches: Unweathered bedrock

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Properties and qualities

Slope: 25 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: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C/D

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 13 inches: Fine sandy loam
13 to 16 inches: Gravelly fine sandy loam
16 to 20 inches: Unweathered bedrock

Description of Rock Outcrop

Properties and qualities

Slope: 25 to 35 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Minor Components

Moosilauke

Percent of map unit: 5 percent
Landform: Depressions, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Monadnock

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Peacham

Percent of map unit: 1 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

433A—Grange silt loam, 0 to 5 percent slopes

Map Unit Setting

Elevation: 790 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Grange and similar soils: 85 percent
Minor components: 15 percent

Description of Grange

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 1.98 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Farmland classification: Farmland of local importance
Land capability (nonirrigated): 4w
Hydrologic Soil Group: C

Typical profile

0 to 6 inches: Silt loam
6 to 27 inches: Silt loam
27 to 65 inches: Sand

Minor Components

Madawaska

Percent of map unit: 7 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Pemi

Percent of map unit: 5 percent
Landform: Lake terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Wonsqueak

Percent of map unit: 3 percent
Landform: Depressions, bogs, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

523B—Stetson fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 820 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Stetson and similar soils: 85 percent
Minor components: 15 percent

Description of Stetson

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

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 high to high (0.60 to 6.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 2s
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Fine sandy loam
8 to 18 inches: Gravelly fine sandy loam
18 to 28 inches: Very gravelly sandy loam
28 to 65 inches: Very gravelly sand

Minor Components

Masardis

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Sheepscot

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Adams

Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear

Groveton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

523C—Stetson fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

Elevation: 820 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Stetson and similar soils: 85 percent
Minor components: 15 percent

Description of Stetson

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

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 high to high (0.60 to 6.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Fine sandy loam

8 to 18 inches: Gravelly fine sandy loam
18 to 28 inches: Very gravelly sandy loam
28 to 65 inches: Very gravelly sand

Minor Components

Masardis
Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Sheepscot
Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Adams
Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Groveton
Percent of map unit: 1 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

523E—Stetson fine sandy loam, 15 to 60 percent slopes

Map Unit Setting

Elevation: 820 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Stetson and similar soils: 85 percent
Minor components: 15 percent

Description of Stetson

Setting

Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Outwash

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well 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 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Fine sandy loam
8 to 18 inches: Gravelly fine sandy loam
18 to 28 inches: Very gravelly sandy loam
28 to 65 inches: Very gravelly sand

Minor Components

Masardis

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear

Colton

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Adams

Percent of map unit: 4 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear

Across-slope shape: Linear

Groveton

Percent of map unit: 1 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear

560D—Tunbridge-Plaisted-Lyman complex, 15 to 25 percent slopes

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Tunbridge and similar soils: 40 percent
Plaisted and similar soils: 25 percent
Lyman and similar soils: 20 percent
Minor components: 15 percent

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 15 to 25 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: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Silt loam

2 to 25 inches: Silt loam
25 to 34 inches: Cobbly fine sandy loam
34 to 38 inches: Unweathered bedrock

Description of Plaisted

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Lodgment till derived from schist and phyllite

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 18 to 39 inches to densic material
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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 29 inches: Silt loam
29 to 65 inches: Very fine sandy loam

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: C/D

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 13 inches: Fine sandy loam
13 to 16 inches: Gravelly fine sandy loam
16 to 20 inches: Unweathered bedrock

Minor Components

Howland

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Lombard

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 3 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Dixmont

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex

Bangor

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

561C—Tunbridge-Plaisted-Lyman complex, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Tunbridge and similar soils: 40 percent
Lyman and similar soils: 20 percent
Plaisted and similar soils: 20 percent
Minor components: 20 percent

Description of Tunbridge

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

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: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Silt loam
2 to 25 inches: Silt loam
25 to 34 inches: Cobbly fine sandy loam
34 to 38 inches: Unweathered bedrock

Description of Plaisted

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Lodgment till derived from schist and phyllite

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 18 to 39 inches to densic material
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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 29 inches: Silt loam
29 to 65 inches: Very fine sandy loam

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

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: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland

Land capability (nonirrigated): 6s
Hydrologic Soil Group: C/D

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 13 inches: Fine sandy loam
13 to 16 inches: Gravelly fine sandy loam
16 to 20 inches: Unweathered bedrock

Minor Components

Howland

Percent of map unit: 6 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Lombard

Percent of map unit: 6 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Peacham

Percent of map unit: 3 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

564E—Plaisted very fine sandy loam, 25 to 35 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Plaisted and similar soils: 85 percent
Minor components: 15 percent

Description of Plaisted

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Lodgment till derived from schist and phyllite

Properties and qualities

Slope: 25 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 18 to 39 inches to densic material
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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 29 inches: Silt loam
29 to 65 inches: Very fine sandy loam

Minor Components

Howland

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Tunbridge

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 3 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Bangor

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

573C—Bangor silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Bangor and similar soils: 85 percent
Minor components: 15 percent

Description of Bangor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from phyllite

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 high to high (0.20 to 2.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Farmland classification: Farmland of local importance
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 12 inches: Silt loam
12 to 23 inches: Gravelly silt loam
23 to 65 inches: Gravelly silt loam

Minor Components

Dixmont

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 3 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Berkshire

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Plaisted

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Tunbridge

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

573D—Bangor silt loam, 15 to 25 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Bangor and similar soils: 85 percent
Minor components: 15 percent

Description of Bangor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from phyllite

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 high to high (0.20 to 2.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: B

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 12 inches: Silt loam
12 to 23 inches: Gravelly silt loam
23 to 65 inches: Gravelly silt loam

Minor Components

Dixmont

Percent of map unit: 5 percent

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot
Percent of map unit: 3 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Berkshire
Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Plaisted
Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Tunbridge
Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

573E—Bangor silt loam, 25 to 35 percent slopes, very stony

Map Unit Setting
Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition
Bangor and similar soils: 85 percent
Minor components: 15 percent

Description of Bangor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from phyllite

Properties and qualities

Slope: 25 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): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7s
Hydrologic Soil Group: B

Typical profile

0 to 2 inches: Moderately decomposed plant material
2 to 12 inches: Silt loam
12 to 23 inches: Gravelly silt loam
23 to 65 inches: Gravelly silt loam

Minor Components

Dixmont

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex

Berkshire

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Tunbridge

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 2 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Plaisted

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

579C—Dixmont very fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Dixmont and similar soils: 85 percent
Minor components: 15 percent

Description of Dixmont

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from schist and phyllite

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: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.58 to 1.98 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: High (about 11.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 3 inches: Very fine sandy loam
3 to 19 inches: Very fine sandy loam
19 to 65 inches: Silt loam

Minor Components

Bangor

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Sunapee

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Cabot

Percent of map unit: 3 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Berkshire

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

579D—Dixmont very fine sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting

Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F

Frost-free period: 90 to 135 days

Map Unit Composition

Dixmont and similar soils: 85 percent
Minor components: 15 percent

Description of Dixmont

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from schist and phyllite

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: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.58 to 1.98 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: C

Typical profile

0 to 3 inches: Very fine sandy loam
3 to 19 inches: Very fine sandy loam
19 to 65 inches: Silt loam

Minor Components

Bangor

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Sunapee

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Berkshire

Percent of map unit: 3 percent

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Cabot

Percent of map unit: 2 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

590B—Cabot gravelly silt loam, 3 to 8 percent slopes, very stony

Map Unit Setting

Elevation: 790 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Cabot and similar soils: 85 percent
Minor components: 15 percent

Description of Cabot

Setting

Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Basal till derived from schist and phyllite

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 14 to 39 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.05 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 3.0 inches)

Interpretive groups

Farmland classification: Farmland of local importance
Land capability (nonirrigated): 6s

Hydrologic Soil Group: D

Typical profile

0 to 9 inches: Gravelly silt loam
9 to 14 inches: Gravelly loam
14 to 65 inches: Gravelly silt loam

Minor Components

Howland

Percent of map unit: 8 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Peacham

Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave

Wonsqueak

Percent of map unit: 2 percent
Landform: Swamps, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

590C—Cabot gravelly silt loam, 8 to 15 percent slopes, very stony

Map Unit Setting

Elevation: 790 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Cabot and similar soils: 85 percent
Minor components: 15 percent

Description of Cabot

Setting

Landform: Hillslopes, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Side slope, base slope

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Basal till derived from schist and phyllite

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 14 to 39 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.05 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 3.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: D

Typical profile

0 to 9 inches: Gravelly silt loam
9 to 14 inches: Gravelly loam
14 to 65 inches: Gravelly silt loam

Minor Components

Howland

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Peacham

Percent of map unit: 5 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Tunbridge

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Plaisted

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

Across-slope shape: Convex

Wonsqueak

Percent of map unit: 1 percent
Landform: Depressions, bogs, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

633A—Pemi silt loam, 0 to 5 percent slopes

Map Unit Setting

Elevation: 790 to 2,300 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Pemi and similar soils: 85 percent
Minor components: 15 percent

Description of Pemi

Setting

Landform: Lake terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Lacustrine

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly 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 0 to 10 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very high (about 13.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4w
Hydrologic Soil Group: C

Typical profile

0 to 5 inches: Moderately decomposed plant material
5 to 14 inches: Silt loam

14 to 21 inches: Very fine sandy loam
21 to 65 inches: Stratified silt loam

Minor Components

Grange
Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Nicholville
Percent of map unit: 5 percent
Landform: Lake terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Wonsqueak
Percent of map unit: 5 percent
Landform: Swamps, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

670D—Tunbridge-Berkshire-Lyman complex, 15 to 25 percent slopes

Map Unit Setting
Elevation: 820 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition
Tunbridge and similar soils: 45 percent
Berkshire and similar soils: 20 percent
Lyman and similar soils: 15 percent
Minor components: 20 percent

Description of Tunbridge

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 15 to 25 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: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C

Typical profile

0 to 2 inches: Silt loam
2 to 25 inches: Silt loam
25 to 34 inches: Cobbly fine sandy loam
34 to 38 inches: Unweathered bedrock

Description of Berkshire

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from granite and gneiss

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 4 inches: Moderately decomposed plant material
4 to 10 inches: Fine sandy loam
10 to 24 inches: Very fine sandy loam
24 to 65 inches: Very fine sandy loam

Description of Lyman

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Ablation till derived from mica schist and/or ablation till derived from granite and gneiss

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: About 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: C/D

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 4 inches: Fine sandy loam
4 to 13 inches: Fine sandy loam
13 to 16 inches: Gravelly fine sandy loam
16 to 20 inches: Unweathered bedrock

Minor Components

Sunapee

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Peru

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

Monadnock

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex

Marlow

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Skerry

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave

895A—Bucksport muck, 0 to 1 percent slopes

Map Unit Setting

Elevation: 790 to 2,490 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 90 to 135 days

Map Unit Composition

Bucksport and similar soils: 75 percent
Minor components: 25 percent

Description of Bucksport

Setting

Landform: Depressions, bogs, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organics

Properties and qualities

Slope: 0 to 1 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 12 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Available water capacity: Very high (about 20.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7w
Hydrologic Soil Group: D

Typical profile

0 to 2 inches: Mucky peat
2 to 14 inches: Mucky peat
14 to 54 inches: Mucky peat
54 to 72 inches: Mucky peat

Minor Components

Searsport

Percent of map unit: 5 percent
Landform: Depressions, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Peacham

Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Concave

Pondicherry

Percent of map unit: 5 percent
Landform: Swamps, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Wonsqueak

Percent of map unit: 5 percent
Landform: Swamps, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Rumney

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave

Vassalboro

Percent of map unit: 1 percent
Landform: Depressions, bogs, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

W—Water

Map Unit Composition

Water: 100 percent

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APPENDIX H – GEOTECHNICAL REPORT (BY OTHERS)

Geotechnical Engineering Report

Transition Station #1 Project
Northern Pass Transmission Line
Pittsburg, New Hampshire

December 16, 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 16, 2016

PAR Electrical Contractors, Inc.
60 Fuller Road
Chicopee, Massachusetts 01020

Attention: Ms. Stephanie Labbe
Project Manager

Re: Geotechnical Engineering Report
Transition Station #1 Project – Northern Pass Transmission Line
Pittsburg, 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

JAY
T.
McGINNIS
No. 14656

12/16/16

Sean T. Kearney

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 thirteen (13) Standard Penetration Test (SPT) borings, drilled to a maximum depth of approximately 50 feet.
- Three 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 at the site generally included a layer of topsoil, glaciofluvial deposits, glacial till (ablation till), and bedrock. Test borings performed by others in the vicinity of the project site reported similar conditions to those encountered during the exploration program presented herein.
- With the exception of borings BH 108 and BH 110, groundwater was encountered in each of the borings. Based on groundwater depths encountered and reported in both the QS and Haley & Aldrich test borings, we anticipate that groundwater will exist at a depth ranging from 0 (i.e. the ground surface) to 10 feet below existing grades across the site.
- In general, the subsurface conditions encountered at the site are suitable for the proposed construction with considerations presented herein.
- Due to relatively very dense/hard glaciofluvial soils encountered at relatively shallow depths in the area of the planned structures and the possible presence of cobbles/boulders at shallow depths in other areas of the project site, drilled shafts are recommended for support of the bus support/pole structures.
- Controlled structural fill and/or the onsite soils (glaciofluvial deposits) will provide suitable support for the transformer pad designed 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 soil in the vicinity of BH 105 exhibit "aggressive" corrosion properties.
- We anticipate that the planned cut and fill slopes will exhibit a factor of safety (FoS) of 1.3 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 Substation, Deerfield Substation, and Scobie Pond Substation) are located along the southern portion of the corridor. The information presented herein is for the Transition Station #1 located approximately 1 mile north-northwest of Clarksville, New Hampshire (see Site Location Map - Figure 2).

The Transition Station #1 site is undeveloped and wooded. Within the transition station pad footprint, the ground surface elevations range from approximately 1169 feet to 1187 feet. Maximum depths of cut and fill of approximately 20 feet and 2 feet, respectively, will be required to develop the planned finished grade elevations of 1166 to 1172 feet. Development will include construction of cut slopes with a planned configuration of 3 (Horizontal) to 1 (Vertical) along the southwest, northwest, and northeast sides of the site. A small fill slope with a 3H to 1V configuration will be constructed along the pad's southeast side between it and a planned storm water basin. Along the south side of the basin, a small slope with a planned configuration of 2H to 1V with a riprap facing will be constructed. No retaining walls or asphalt pavements are planned.

New structures within the transition station footprint are anticipated to consist of a transformer pad, a bus support structure, and possibly 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) the bus structure will require deep foundation support to resist shear and overturning loads, 2) the transformer pad 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 test boring data within and immediately adjacent to the Transition Station #1 footprint. Also, one document provided GIS information containing general surficial and bedrock geology information in the area of the Transition Station #1 site. The specific documents included as reference by QS herein are listed below.

- Haley & Aldrich, Inc.; *Geotechnical Data Report - Route 3/Connector River Crossing: Northern Pass Transmission Project*; February 21, 2014.
- Terracon Consultants, Inc.; *Report of Expected Geotechnical Conditions*: Northern Pass Project; July 10, 2015.

Although data from these two reports was not specifically used in development of the recommendations presented in Section 6.0 of this report, selected information 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 purposes of our involvement on Transition Station #1 phase of the project were as follows: 1) provide general descriptions of the subsurface conditions encountered at the transition station 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 transition station 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 thirteen (13) geotechnical borings within the area of the proposed transition station;
3) performed field infiltration testing services at three (3) locations within the proposed basin areas;
4) supervised a laboratory testing program on selected soil and rock core 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 QS boring logs, rock core photos, laboratory test results, infiltration test results, summary of geotechnical design parameters, and slope stability analysis outputs are provided in Appendices B through G.

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 thirteen (13) Standard Penetration Test (SPT) borings performed at the approximate locations shown on the attached QS Boring Location Plan (see Figure 3) and summarized in Table 1 below. For reference, the location of three Haley & Aldrich's (H&A) borings (HA-5, HA-6 & HA-7) that exist within or adjacent to the Transition Station #1 site are illustrated in Figure 4. The QS 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 *NPTT104-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 101	10	1148.7	45.02149722	-71.46548056
BH 102	13	1164.7	45.02172222	-71.46584167
BH 103	15	1169.9	45.02200556	-71.46572778
BH 104	15	1168.9	45.02231667	-71.46516111
BH 105	22	1176.7	45.02241944	-71.46548889
BH 106	48	1186.9	45.02228889	-71.46605833
BH 107	11	1180.9	45.02261111	-71.46549444
BH 108	27	1196.1	45.02230000	-71.46638889
BH 109	36	1188.2	45.02263056	-71.46576667
BH 110	25	1209.2	45.02256389	-71.46643333
INF 101	14	1163.7	45.02194444	-71.46533333
INF 102	12.5	1162.7	45.02200833	-71.46522222
INF 103	10	1145.2	45.02160833	-71.46511389

Note: Elevation information is NAVD88

Test borings were performed by S.W. Cole Engineering, Inc. (S.W. Cole) utilizing a CME 850 drill rig equipped with a 140-lb automatic drop hammer falling 30 inches. The drilling methods utilized for this investigation consisted of solid stem augers, hollow stem augers, and rotary drive and wash (wet rotary). Standard penetration testing was performed in general accordance with ASTM D1586 and at approximate 2-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter. The number of hammer blows required to advance the sample 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 50 blows are required to drive the sampler over a 6-inch increment, or the sampler is observed not to penetrate after 50 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 50 blows, the N-value is reported as 50/0. Otherwise, the depth of penetration after 50 blows is reported in inches (i.e. 50/5, 50/2, 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. The rock core was 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 B and C, 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 Londonderry and Manchester (New Hampshire) 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 Transition Station #1 site. A summary of the laboratory testing results and accompanying laboratory test data reports are provided in Appendix D.

Table 2 – Laboratory Test Summary

Test	ASTM/AASHTO	No. of Test Performed
Moisture Content	D2216	24
Sieve Analysis	D422	3
Percent Passing No. 200 Sieve	D1140	7
Atterberg Limits	D4318	3
Modified Proctor	D1557	3
Unconfined Comp. Strength of Rock	D7102	3
pH of Soil	G51	2
Soluble Chloride	--	2
Soluble Sulfate	--	2
Resistivity	T188	2

4.3 FIELD INFILTRATION TESTING

Three infiltration (INF) test borings were conducted (designated INF 101, INF 102, and INF 103) 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 its termination depth. Following completion of each INF test boring, an offset borehole was drilled and PVC casing was installed to the approximate planned bottom of the basin for field infiltration testing. At some time following completion of drilling, field infiltration tests were performed by Quanta Subsurface. The results of the field infiltration tests are provided in Appendix E. 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 of the White Mountains 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 surficial soil in the area of the Transition Station #1 site is mapped as ablation till (Figure 3; Terracon, 2015).

Bedrock in the White Mountains are comprised of folded and faulted Paleozoic sedimentary and volcanic rocks that have been regionally metamorphosed and intruded by large and small bodies of plutonic rocks. The grade of metamorphism ranges from the chlorite zone at one extreme to the sillimanite zone at the other (Billings, 1980). The majority of the rocks mapped in this region consist of schist, phyllites, limestone, and quartzite. As shown in Figure 5 (Bedrock Geology Map), extrapolation of information provided in the *Geologic Map and Structure Sections of the Dixville Quadrangle* (1963) indicates that bedrock underlying the Transition Station #1 site consist of the Gile Mountain Formation described as phyllite and micaceous quartzite.

5.3 SITE SUBSURFACE CONDITIONS

The subsurface conditions encountered in the test borings generally included a layer of topsoil, glaciofluvial deposits, glacial till (ablation till), and bedrock. Test borings performed by Haley & Aldrich (provided in Appendix A) in the vicinity of the Transition Station #1 site reported generally similar conditions of glaciofluvial and/or glacial till deposits consisting of very dense sands and gravels underlain by bedrock described as fresh to slightly weathered phyllite (Haley & Aldrich, 2014). A summary of the subsurface materials encountered in the exploration described herein is provided below and in Table 3, and specific data are shown on the QS boring logs provided in Appendix B.

Topsoil

Material described as topsoil was encountered at the ground surface in each of the test borings. The thickness of the topsoil ranged from 1 to 2 feet. The sampled topsoil was described as lean CLAY (CL) or SILT (ML) with trace amounts of organics and varying amounts of sand. 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.

Glaciofluvial Deposits

The glaciofluvial deposits are described as sands and gravels with minor amounts of silt and clay (eroded glacial till) that were deposited within high energy meltwater channels draining into the valleys. Glaciofluvial materials were encountered in each test boring and were generally described as silty SAND (SM), silty GRAVEL (GM), or SILT (ML) with varying amounts of sand. Zones of cobbles and boulders were present at several locations. Field N-values obtained within the glaciofluvial material ranged from 6 bpf to 50 blows per 5 inches of penetration (i.e. 50/5”) with a typical N-value ranging from 10 to 35 bpf.

Glacial Till

Glacial till was encountered below glaciofluvial deposits at seven (7) boring locations: BH102, BH 103, BH 105, BH 106, BH 107, INF 101 and INF 102. 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. Boulders of varying size are common within till deposits. Sampled till was generally described as sandy silty SAND (SM), sandy SILT (ML), and SILT (ML). Field N-values obtained within the till material ranged from 44 bpf to 50 blows per 5 inches of penetration.

Refusal Conditions/Bedrock

Bedrock and/or auger refusal was encountered in eight (8) test borings. 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. In test borings BH 102, BH 103, BH 107, and INF 102 auger refusal was encountered and coring was not performed to confirm the nature of the auger refusal material. However, based on the soil conditions and depths to bedrock encountered in adjacent borings within the site, QS anticipates that the auger refusal conditions in these borings are indicative of the bedrock surface.

One rock type was identified in the test borings: PHYLLITE. The unit is described as fresh to highly weathered, fine grained, very weak to strong, PHYLLITE. The unit exhibited a weathered zone transitioning from highly weathered to fresh or slightly weathered bedrock with the upper 1 to 5 feet of the bedrock surface.

Groundwater

Groundwater levels were measured using a tape measure in each boring. With the exception of borings BH 108 and BH 110, groundwater was encountered in each of the borings. Borings BH 108 and BH 110 have the highest ground surface elevations and are the furthest borings from the transition station pad; we expect that the lack of groundwater data at these two locations was the result of introduction of water to facilitate drilling required below a depth of 9 feet.

Where encountered, groundwater depths ranged from 0 (i.e. at the ground surface) to 9.7 feet below the existing ground surface. Where ground water was reported near the ground surface (BH 104, BH 105 and BH 109), a flowing drainage feature existed immediately adjacent to the boring area. Therefore, the high groundwater depths may have be the result of water infiltration into the boreholes from or near the surface. Fluctuations in 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 101	1148.7	7.5	BT	0 - 1	Topsoil	ML	-
				1 - 2	Glaciofluvial Deposits	SM	7
				2 - 5		SM	50/6” - 50/4”
				5 - 10		SM	20 - 23
BH 102	1164.7	1.0	AR	0 - 1	Topsoil	CL	-
				1 - 2	Glaciofluvial Deposits	SM	6
				2 - 8		SM/GP-GM	15 - 39
				8 - 13	Till	SM	44
BH 103	1169.9	4.0	AR	0 - 1	Topsoil	CL	-
				1 - 2	Glaciofluvial Deposits	SM	4
				2 - 6		SM	10 - 14
				6 - 15	Till	SM/ML	47 - 53
BH 104	1168.9	0.3	BT	0 - 1	Topsoil	CL	-
				1 - 2	Glaciofluvial Deposits	SM	7
				2 - 4		SM	23
				4 - 8		GM	50/5”
				8 - 15		SM	28
BH 105	1176.7	0.0	BT	0 - 1.5	Topsoil	CL	2
				1.5 - 13	Glaciofluvial Deposits	SM/ML	6 - 19
				1.5 - 22	Till	SM	50 - 55
BH 106	1186.9	6.0	CT	0 - 1	Topsoil	CL	-
				1 - 2	Glaciofluvial Deposits	SM	8
				2 - 13		SM	17 - 52
				13 - 33	Till	SM/ML	47 - 50/5”
				33 - 50.8	Bedrock	F Phyllite	-

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 107	1180.9	3.0	AR	0 - 1	Topsoil	CL	4
				1 - 8.5	Glaciofluvial Deposits	SM	11 - 13
				8.5 - 11	Till	SM	53
				11 - 13.5	Bedrock	HW Phyllite	-
BH 108	1196.1	N.E.	CT	0 - 1	Topsoil	ML	-
				1 - 2	Glaciofluvial Deposits	SM	7
				2 - 8		SM	26 - 34
				8 - 27	Bedrock	F Phyllite	-
BH 109	1188.2	0.2	CT	0 - 1	Topsoil	CL	-
				1 - 20	Glaciofluvial Deposits	SM/GM	11 - 38
				20 - 21	Bedrock	HW to CW Phyllite	50/2”
				21 - 36		F Phyllite	-
BH 110	1209.2	N.E.	CT	0 - 1	Topsoil	CL	6
				1 - 8	Glaciofluvial Deposits	SM	29 - 33
				8 - 10	Bedrock	HW Phyllite	50/6”
				10 - 25		F Phyllite	-
INF 101	1163.7	6.5	BT	0 - 1	Topsoil	CL	-
				1 – 2	Glaciofluvial Deposits	SM	5
				2 - 11		GM	32 - 89
				11 - 14	Till	SP-SM/SM	35 - 47
INF 102	1162.7	7.4	AR	0 - 1	Topsoil	CL	-
				1 – 6	Glaciofluvial Deposits	SM/GM/SP-SM	10 - 24
				6 - 10.5		GM/SP	32 - 33
				10.5 - 12.5	Till	SM	45 - 50/3”
INF 103	1145.2	9.7	BT	0 - 1	Topsoil	ML	3
				1 - 4	Glaciofluvial Deposits	SM	17
				4 - 10		SM/ML	49 - 50/4”

[1] Reported groundwater levels were measured at the time 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)
CT = Coring Terminated
AR = Auger or Roller Bit Refusal

6.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS

6.1 GENERAL

The following sections present our geotechnical recommendations for design and construction of the transition station. 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. It should be noted that areas of standing surface water and small streams of flowing water were observed at the surface in multiple areas within the project site.

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. 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 site has been properly prepared, at-grade construction may proceed.

6.3 CONTROLLED STRUCTURAL FILL

The majority of the project site will require excavation/cut to achieve the planned finished grades. Where required, controlled structural fill may consist of the non-organic, on-site soils (including glaciofluvial and till soils). Based on laboratory testing on bulk samples obtained from other transition stations and substations 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, 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 Transition Station #1 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 transition station pad will predominately consist of cut slopes with a configuration of 3H to 1V and a maximum unbenched height of 30 feet. Using the computer program SLIDE 7.0 (RocScience), stability analyses were performed on two cut slope sections in the vicinity of borings BH 102/BH 103 and BH 109. The BH 102 and BH 109 cut slopes were models with a configuration of 3(H) to 1(V) and a height of 20 feet and 24 feet, respectively. Based on the results of the SLIDE analyses (see Appendix G – Outputs 1 and 2), we anticipate that planned 3(H) to 1(V) cut slopes will exhibit a factor of safety (FoS) of 1.3 or greater for global stability if constructed in accordance with the recommendations presented herein.

A small 2(H) to 1(V) fill slope with a rip-rap face and a height of less than 6 feet is also planned as part of the basin located immediately southeast of the transition station pad. We anticipate that planned 3(H) to 1(V) fill slopes less than 10 feet in height and the 2(H) to 1(V) slope with rip rap face will exhibit a factor of safety (FoS) of greater than 1.3 for global stability. We recommend that the protective rip-rap layer have a minimum thickness of 1.5 feet, be underlain by a separation geotextile to minimum soil intrusion into the rip-rap, and be keyed into the subgrade at the slope's toe a minimum of 1.5 feet. The separation geotextile fabric used should have an equivalent opening size of equal to or greater than the US No 50 sieve, a minimum tensile strength at 20 percent strain of 30 pounds/linear inch, and a minimum puncture strength of 80 pounds.

6.5 GROUNDWATER CONDITIONS

6.5.1 General

Based on the data obtained during our exploration program, we anticipate that groundwater will be encountered during expected earthwork or shallow foundation excavations at the site. Based on groundwater depths encountered and reported in both the QS and Haley & Aldrich test borings, we anticipate that groundwater will exist at a depth ranging from 0 (i.e. the ground surface) to 10 feet below existing grades across the site. Fluctuation of the groundwater surface due to seasonal precipitation and immediately after precipitation events should be expected.

6.5.2 Basin Estimated Seasonal High Water Table (ESHWT)

Borings INF 101, INF 102, and INF 103 were performed to characterize the subsurface conditions to a depth of approximately 4 to 5 feet below the planned 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 B, and the results of infiltration tests performed immediately adjacent to each boring are provided in Appendix E. Table 5 below presents a summary of the interpreted ESHWT at each boring location as well as pertinent information required for design of the basins.

Table 5 – Basin Summary Information

Description	Boring INF 101	Boring INF 102	Boring INF 103
Infiltration Planned Bottom Elev. (ft)	1155.6	1155.6	1140.4
Encountered Very Dense/Very Hard Soil Elev. (ft)	1160	1151	1139
Encountered Bedrock Elev. (ft)	N.E.	1150	N.E.
Encountered Groundwater Elev. (ft)	1157	1155	1135
Highest Elevation of Observed Redox Features	N.E.	N.E.	N.E.
USDA Textural Class (with 5 ft of Basin Bottom)	Sandy Clay Loam	Sandy Clay Loam	Clay
Estimated Seasonal High Water Table (ESHWT) Elev. (ft)	1157	1155	1135
Infiltration Test Elevation (ft)	1153	1152	1139
Average Infiltration Rate at Test Elevation (in/hr)	0.0	5.0	4.2

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) Noted elevations are estimates and should be considered approximate.
5) The average infiltration rate presented is based on field measurements; a factor of safety has not been applied.
6) Drilling contractor flushed the infiltration test boreholes with water following test casing installation. The water level measurements obtained at INF 101 and 102 at the time of the infiltration testing are not anticipated to represent the stabilized groundwater level. See the INF 101 and 102 boring logs for the appropriate groundwater levels.

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 F. The recommended strength parameters for soil and highly weathered bedrock (HWR) were developed based on consideration of lab test results and established correlations with SPT data.

For bedrock described as slightly 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 30 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 F.

6.7 BUS SUPPORT STRUCTURE/POLE FOUNDATION DESIGN AND CONSTRUCTION

6.7.1 General

Foundation support for the bus support structure (including ancillary pole structures) is anticipated to require deep foundations to resist shear and overturning loads. Driven pile, helical pile, and drilled shaft foundation options were considered for support of the bus structure. We anticipate that very dense/hard till soil may be encountered within 10 feet of the planned finished grade. In addition, based on conditions encountered in other borings within the station pad area the existence of cobbles and boulders is a possibly. Therefore, some amount of pre-drilling would be expected to facilitate installation of driven and helical piles. Considering this and the conditions encountered in boring BH 105, we recommend that support for the bus support/pole structures consist of drilled shafts at the Transition Station #1 site.

6.7.2 Drilled Shaft Foundations

Based on the subsurface conditions encountered in the area of BH 105, a top of finished grade elevation of about 1172 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 6 and 7, respectively, be used for design of drilled shaft foundations. Total settlement of drilled shaft foundations designed per the recommendations provided below is estimated to be less than 1 inch.

Table 6 – Recommended Drilled Shaft Axial Design Parameters

Sublayer Description	Sublayer Depth (ft)		Material USCS Description	Allowable Skin Friction (Comp.) (psf)	Allowable Skin Friction (Uplift) (psf)	Allowable End Bearing (psf)
	Top	Bottom				
Topsoil/GFD	0	5	CL/SM	REMOVED		
Glaciofluvial Deposits	5	10	SM/ML	IGNORE		
	10	13	ML	80	60	-
Till	13+	-	SM	775	650	20,000

Notes:

1) Approximately 5 feet of soil will be removed in the area of BH 105 to bring the area to the planned finished grade of 1172 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 7 – Recommended Drilled Shaft Lateral (LPILE) Design Parameters

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.									
Topsoil/Till	0	5	CL/SM	REMOVED							
Glaciofluvial Deposits	5	8	SM/ML	53	31	45	-	-	-	-	-
	8	13	ML	53	27	10	-	-	-	-	-
Till	13+	-	SM	73	41	161	-	-	-	-	-

Note:

1) Use of the Reese (Sand) constitutive model is recommended for each sublayer.

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 12 feet is recommended to adequately resist uplift created due to adfreeze forces within the frost zone.
- 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.
- Based on groundwater depths encountered and reported in QS test borings, we anticipate that groundwater will exist within 5 feet of the planned finished grade.

6.7.3 Drilled Shaft Construction

Temporary wall support through 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 Pad

Where planned (vicinity of BH 105), we anticipate that approximately 5 feet of cut will be required to develop the planned finished grades in the area of the transformer pad. Therefore, we expect the transformer pad to be supported on medium dense and stiff glaciofluvial deposits silty sands and sandy silts. If the transformer equipment and ancillary connections are susceptible to vertical movement resulting from frost action, then the silty sand/sandy silt material 4 feet below the transformer pad (and to a distance of 2 feet laterally beyond the pad edges) should be removed and replaced with a clean sand or gravel meeting the requirements of NHDOT Standard Specification Section 209.

Controlled structural fill material placed in accordance with recommendations provided in herein and/or the existing glaciofluvial deposits underlying the site 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 about ½ inch.

6.8.2 Single-Story Equipment Structures

Should single-story buildings be required to house equipment operated at the transition station, they may be supported on shallow foundations bearing on approved glaciofluvial silty sands and sandy silts or newly placed 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 glaciofluvial soils or newly 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, loose to medium dense, fine grained sands and silty sands is not anticipated to be a design concern for the Transition Station #1 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 Transition Station #1 site.

6.11 CORROSION CONSIDERATIONS

Two bulk samples obtained in borings BH 105 and BH 106 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 7 below.

Table 7 – Laboratory Corrosivity Test Results

Boring No.	Sample Type & Depth (ft)	pH	Chloride (ug/g)	Sulfate (ug/g)	Electrical Resistivity (ohm-cm)
BH 105	BULK (1 - 6)	5.8	< 6.8	< 6.8	1,900
BH 106	BULK (5 - 15)	5.4	< 5.9	12	6,900

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 material collected from BH 106 can be considered to be “non-aggressive”. However, the sample obtained from BH 105 should be considered as “aggressive”. Based on corrosivity testing performed at various locations along the Northern Pass Transmission corridor, we anticipate that the BH 105 material represents an isolated condition. However, we recommend that underground utilities installed in the area of BH 105 be designed assuming an “aggressive” corrosion environment. In addition, cut material originating from the BH 105 area should be used in locations on the transition corridor where underground utilities and foundations are not planned.

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 Transition Station #1 project near Clarksville, 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.

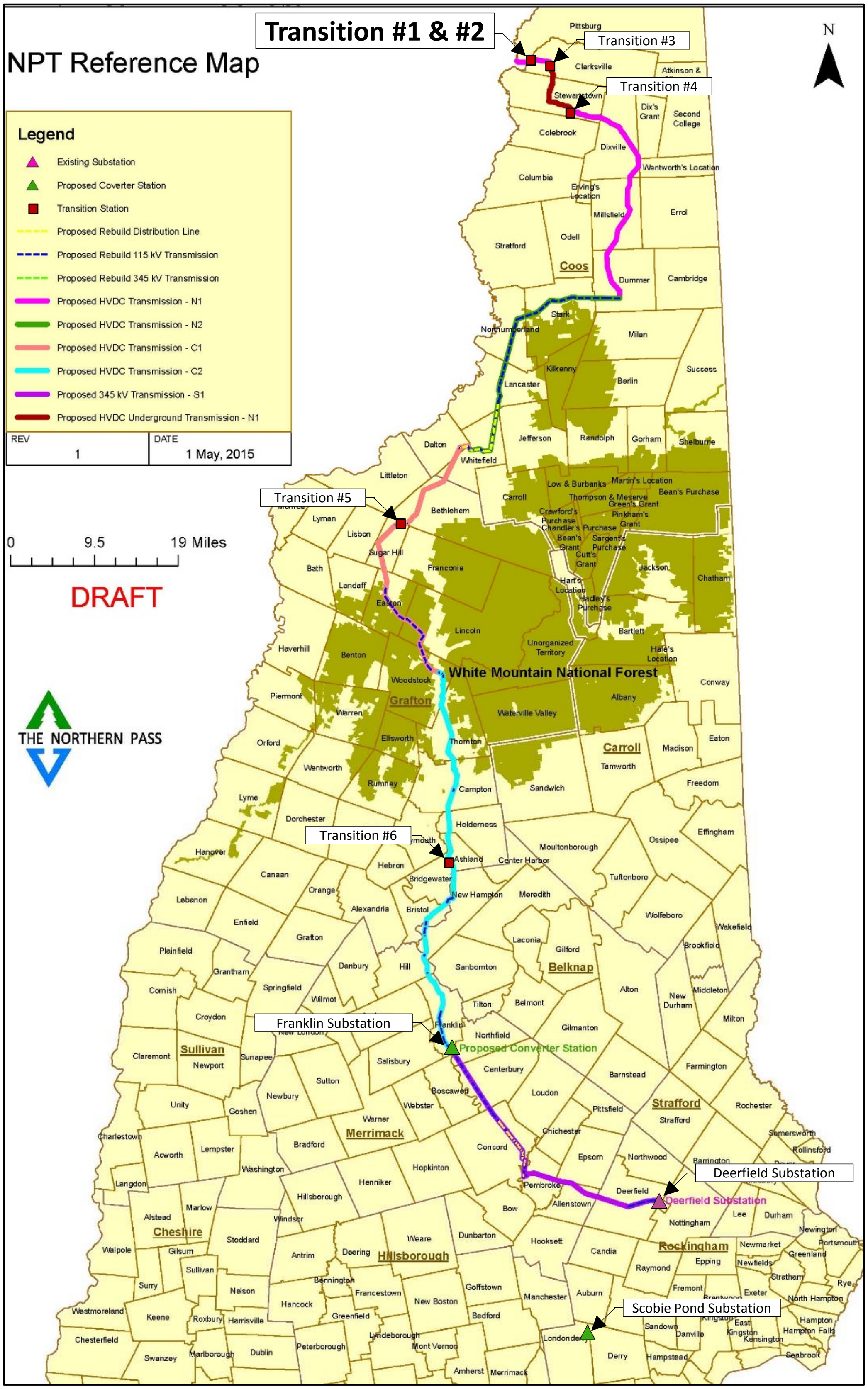
In the event that changes are made in the design or location of the project, the recommendations presented in the report shall not be considered valid unless the changes are reviewed by Quanta Subsurface and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted 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

- Haley & Aldrich, Inc.; *Geotechnical Data Report - Route 3/Connector River Crossing: Northern Pass Transmission Project*; February 21, 2014.
- 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; *Geologic Map and Structure Sections of the Dixville Quadrangle New Hampshire*, Plate 1; Scale 1:62,500; 1963.
- 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

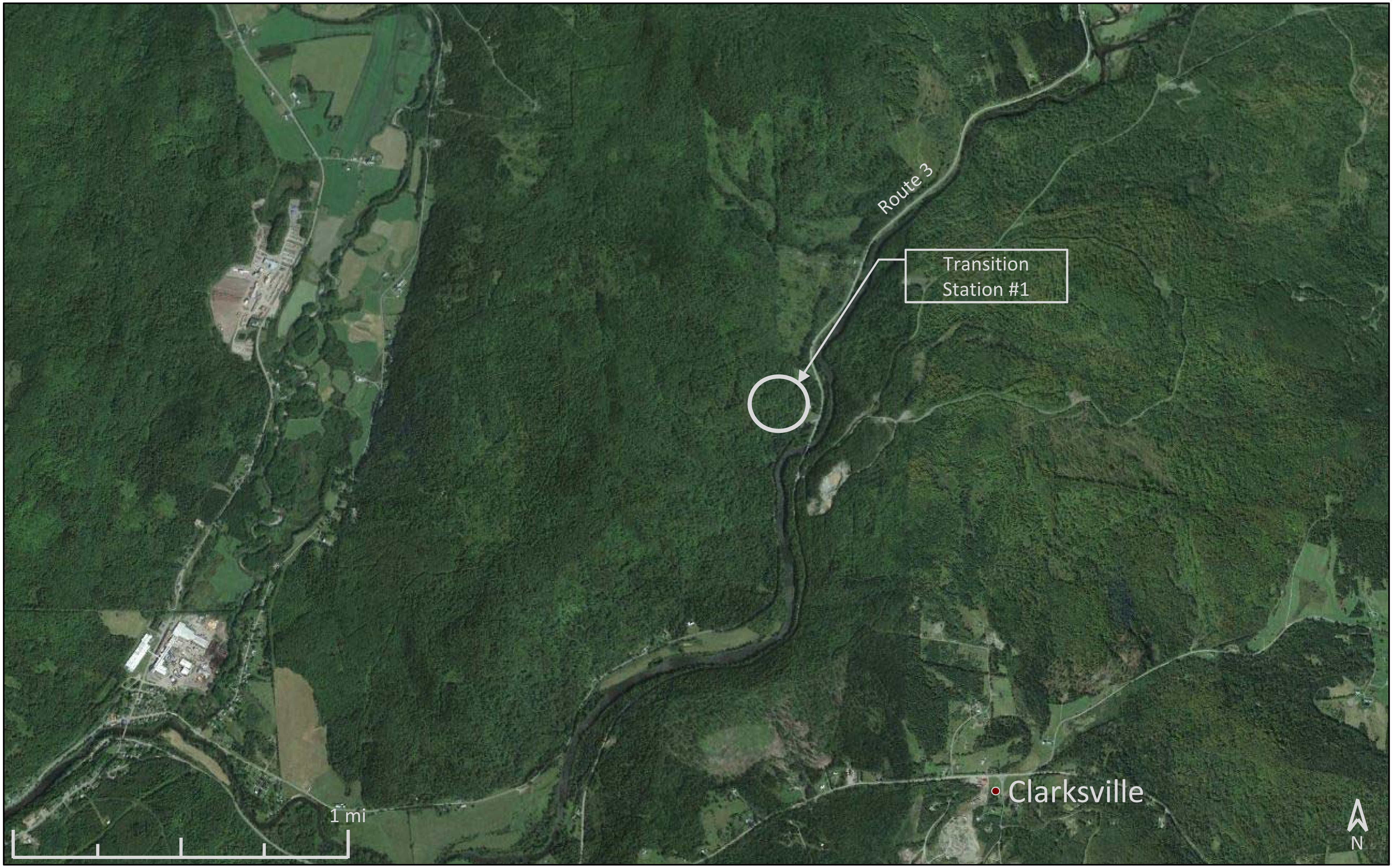


Project No.: 16004 Date: December 2016

Figure 1
Site Vicinity Plan

Northern Pass TL – Transition Station #1
Geotechnical Investigation

QUANTA SUBSURFACE
Engineering – Construction



Base Map: Google Earth, 2016.

Project No.: 16004

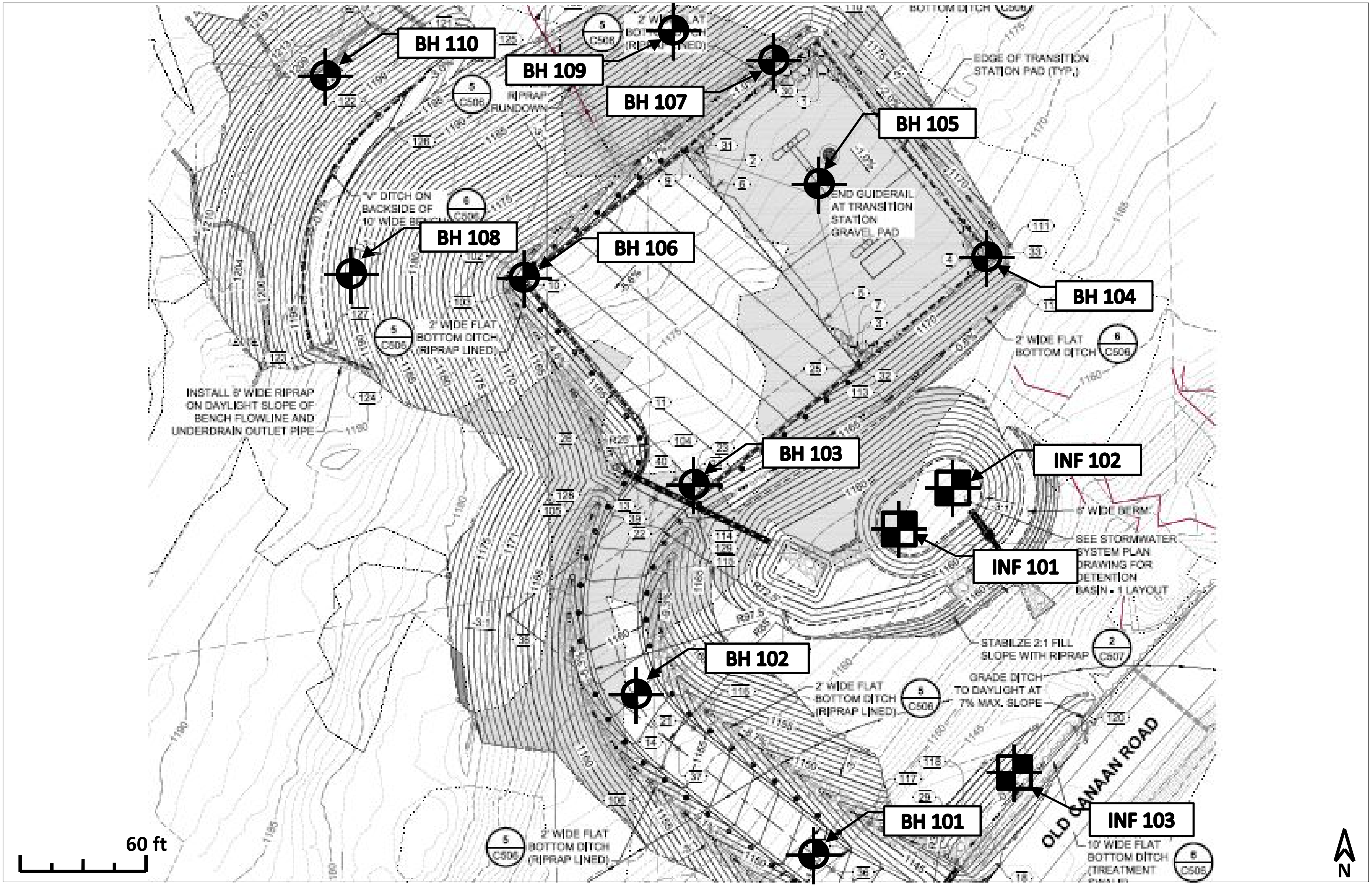
Date: December 2016

Figure 2

Site Location Map

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Transition Station #1
Geotechnical Investigation



Base Map: Transition Station #1: NPTT104-C101-Geotech.dwg

Quanta Subsurface Boring Location, August/September 2016

Quanta Subsurface Infiltration Location, August/September 2016

Figure 3

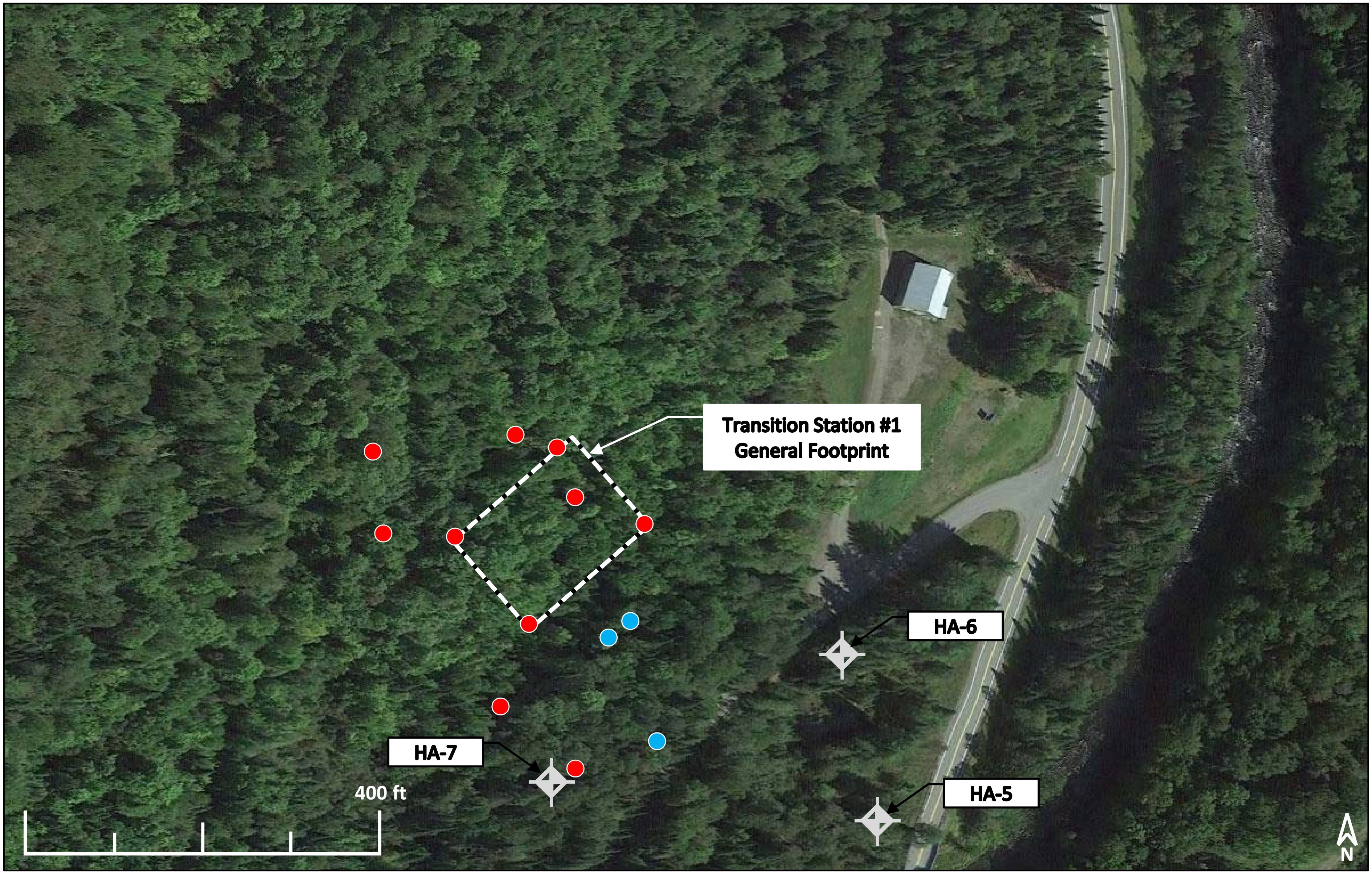
QS Boring Location Plan

Project No.: 16004

Date: December 2016

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Transition Station #1
Geotechnical Investigation



Base Map: Google Earth, 2016.
Haley & Aldrich Boring Locations: Haley & Aldrich, Inc.; Geotechnical Data Report - Route 3/Connector River Crossing: Northern Pass Transmission Project; February 21, 2014 (Figure 3).

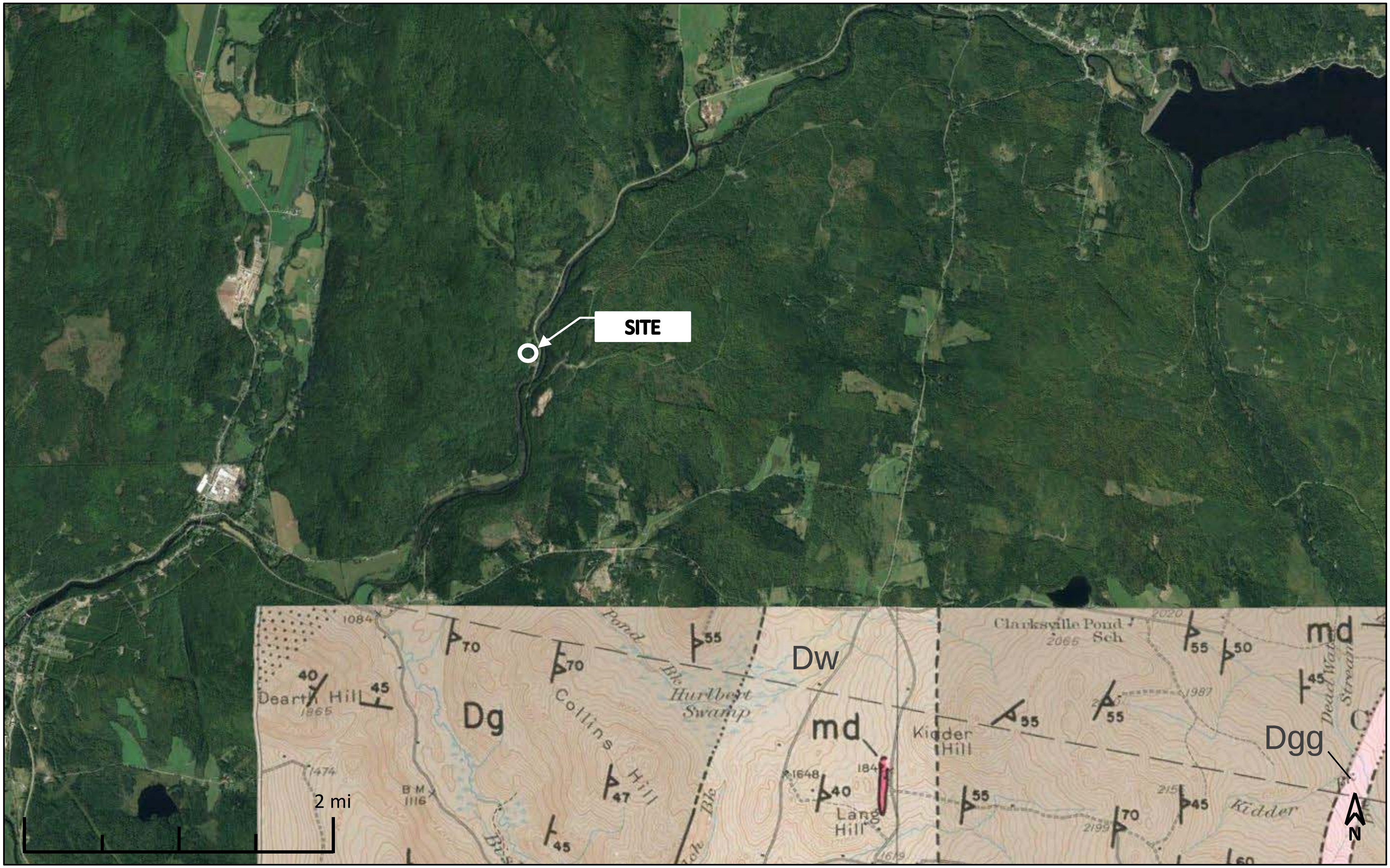
- ✥ **Haley & Aldrich, Inc. Boring Location, February 2014 (Approximated from the Ref. Boring Location Plan)**
- 🔴 **Quanta Subsurface Boring Location, August/September 2016 (see Figure 3)**
- 🔵 **Quanta Subsurface Infiltration Location, August/September 2016 (see Figure 3)**

Figure 4
H&A Boring Location Plan

Date: December 2016
Project No.: 16004

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Transition Station #1
Geotechnical Investigation



Base Map: New Hampshire Department of Resources and Economic Development, *Geologic Map and Structure Sections of the Dixville Quadrangle New Hampshire (Plate 1)*

Legend:

Dg **Gile Mountain Formation – Phyllite/Micaceous Quartzite/Schist**

Dw **Waits River Formation – Phyllite/Micaceous Quartzite**

Dgg **Gile Mountain Formation – Greenstone and Amphibolite Lenses**

md **Epidote Amphibolite/Amphibolite**

Figure 5

Bedrock Geologic Map

Project No.: 16004

Date: December 2016

QUANTA
SUBSURFACE
Engineering – Construction

Northern Pass TL – Transition Station #1
Geotechnical Investigation

Appendix A
Haley & Aldrich Boring Logs

HALEY& ALDRICH

TEST BORING REPORT

Boring No. HA-5

Project	NORTHERN PASS, PITTSBURG-CLARKSVILLE-STEWARTSTOWN, NEW HAMPSHIRE	File No.	40460-004
Client	BURNS & MCDONNELL	Sheet No.	1 of 4
Contractor	NEW HAMPSHIRE BORING, INC.	Start	December 4, 2013
		Finish	December 9, 2013
		Driller	W. Hoeckele
		H&A Rep.	S. Shay
		Elevation	1126.0 (est.)
		Datum	NAVD 88
		Location	See Plan

	Casing	Sampler	Barrel
Type	HW	S	NX
Inside Diameter (in.)	4.0	1 3/8	2.0
Hammer Weight (lb)	300	140	-
Hammer Fall (in.)	24	30	-

Drilling Equipment and Procedures

Rig Make & Model: Diedrich D-50 Track
Bit Type: Roller Bit
Drill Mud: None
Casing: HW Drive to 44.8 ft
Hoist/Hammer: Winch Safety Hammer
PID Make & Model: None

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	8 8 6 20	S1 8	0.0 2.0		SM	Medium dense dark brown grading to brown silty SAND with gravel (SM), mps 1 cm, no structure, no odor, moist. Top 6 inches up to 10% rootlets with forest mat debris -ALLUVIAL/FLOOD PLAIN DEPOSITS-		15	10	15	40	20				
5	6 8 9 50	S2 12	4.0 6.0		SM	Medium dense olive-brown silty SAND (SM), mps 1.2 cm, stratified and occasional sorted interbedded coarse sand lenses, no odor, wet		10	5	5	35	45				
				1118.0 8.0												
10	77 120	S3 7	9.0 10.0		GP	Very dense dark olive-brown poorly graded GRAVEL with sand (GP), mps 2.8 cm, no structure, no odor, wet, occasional brown fine sand pockets. Both rounded and angular gravel pieces present	35	25	20	10	5	5				
15	140	S4 3	14.0 14.5		GP	Similar to S3 above, both rounded and angular gravel pieces present -GLACIOFLUVIAL DEPOSITS-	35	25	20	10	5	5				
20	100/2"	S5 2	19.0 19.2		GP	Similar to above except change in fine gravel content	10	40	20	15	10	5				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
12/5/2013	07:10	16	24.0	31.0	9.0
12/5/2013	15:45	3	44.8	55.0	9.3
12/9/2013	12:00	72	44.8	70.0	7.8

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary

Samples 11S, 7C

Boring No. HA-5

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-5
File No. 40460-004
Sheet No. 2 of 4

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20																
				1104.0 22.0												
	110	S6 6	24.0 24.5		SP	Very dense dark olive-brown poorly graded SAND with gravel (SP), mps 2 cm, no structure, no odor, wet, gravel pieces frequently highly to completely weathered	10	15	30	30	10	5				
25						-GLACIOFLUVIAL DEPOSITS-										
	125	S7 6	29.0 29.5		SP	Very dense dark olive-brown poorly graded SAND with gravel and residual soil from completely weathered rock, residual soil portions friable, no odor, wet	10	10	20	25	30	5				
30																
				1094.0 32.0												
	100	S8 5	34.0 34.5		SP-SM	Very dense dark olive-brown poorly graded SAND with silt and gravel (SP-SM), mps 2 cm, no structure, no odor, wet	5	10	20	30	25	10				
35						-GLACIOFLUVIAL DEPOSITS-										
	120	S9 6	39.0 39.5		SP-SM	Similar to S8 above	5	10	20	30	25	10				
40				1086.0 40.0		Note: SILT with sand at bottom 10 inches of 3 inch diameter spoon drive when collecting geothermal sample.										
	52 102	S10 6	41.0 42.0		ML	Very dense dark olive-brown SILT with sand (ML), mps <0.1 mm, frequent partings, no odor, wet -GLACIOLACUSTRINE DEPOSITS-					25	75	R	L	N	L
	110	S11 4	44.0 44.5	1081.2 44.8	ML	Very dense dark olive-brown and olive-gray SILT with sand (ML), mps < 0.1 mm, frequent partings and varves, no odor, wet TOP OF BEDROCK 44.8 FT Note: Advanced borehole with roller bit to 45.0 ft prior to coring. SEE CORE BORING REPORT FOR ROCK DETAILS					20	80	R	L	L	L
45																

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-5

CORE BORING REPORT

Boring No. HA-5
File No. 40460-004
Sheet No. 3 of 4

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weath-ering	Elev./Depth (ft)	Visual Description and Remarks
								SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
45	8	C1	45.0 50.0	60 59	100 98	Fresh		Very hard, fresh, gray, aphanitic, graphitic PHYLLITE. Foliation extremely thin to thin where discernible. Joints moderate to wide, dipping at low to moderate angles, rough, planar, generally fresh, tight. Graphitic/metallic film on wash water throughout drilling. Minimal water loss.
	8							
	6							
	7							
	8							
50	5	C2	50.0 55.0	60 56	100 93	Fresh		Similar to above. Bottom core damage upon removal from core barrel.
	5							
	5							
	6							
	6							
55	6	C3	55.0 60.0	60 59	100 98	Fresh		Similar to above. Single low angle joint in middle of core slightly weathered surfaces.
	6							
	6							
	5							
	6							
60	6	C4	60.0 65.0	60 60	100 100	Fresh		Similar to above, highly foliated, horizontal drill breaks.
	6							
	6							
	7							
	6							
65	6	C5	65.0 70.0	60 59	100 98	Fresh		Similar to above, general foliation trend at moderate to high angles.
	5							
	5							
	5							
	6							
70	6	C6	70.0 75.0	60 60	100 100	Fresh		Similar to above, highly foliated bottom 2 ft of core with irregular coarse grained quartz inclusions.
	6							
	7							
	8							
	8							
75								

HALEY& ALDRICH

CORE BORING REPORT

Boring No. HA-5
File No. 40460-004
Sheet No. 4 of 4

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD		Weath- ering	Elev./ Depth (ft)	Visual Description and Remarks
				in.	%			
75	6	C7	75.0 80.0	60 53	100 88	Fresh		Similar to above, except foliation not apparent, frequent vertical fractures confined to middle 1.5 ft of core. Note: Graphitic/metallic film on wash water C1 - C7. Minimal water loss at approximately 100 gallon C1 - C7.
	6							
	8							
	8							
	7							
80							1046.0 80.0	BOTTOM OF EXPLORATION 80.0 FT
85								
90								
95								
100								
105								

HALEY& ALDRICH

TEST BORING REPORT

Boring No. HA-6 (OW)

Project	NORTHERN PASS, PITTSBURG-CLARKSVILLE-STEWARTSTOWN, NEW HAMPSHIRE	File No.	40460-004
Client	BURNS & MCDONNELL	Sheet No.	1 of 3
Contractor	NEW HAMPSHIRE BORING, INC.	Start	December 2, 2013
		Finish	December 3, 2013
		Driller	W. Hoeckele
		H&A Rep.	S. Shay
		Elevation	1149.5 (est.)
		Datum	NAVD 88
		Location	See Plan

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HW	S	NX	Rig Make & Model: Diedrich D-50 Track Bit Type: Roller Bit Drill Mud: None Casing: HW Drive to 24 ft Hoist/Hammer: Winch Safety Hammer PID Make & Model: None
Inside Diameter (in.)	4.0	1 3/8	2.0	
Hammer Weight (lb)	300	140	-	
Hammer Fall (in.)	24	30	-	

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	5 8	S1 3	0.0 1.0		1149.0 0.5	SM/OL	Medium dense dark brown silty SAND with organic soil (SM/OL), up to 50% forest mat debris -TOPSOIL-				25	25	50				
	8 14	S1A 8	1.0 2.0			ML	Medium dense orange-brown SILT with sand (ML), mps 8 mm, no structure, no odor, moist -SUBSOIL-					25	75				
					1146.5 3.0												
5	39 60 41 40	S2 16	4.0 6.0			GM	Very dense brown silty GRAVEL with sand (GM), mps 2 cm, irregular stratification with occasional dark brown silt pods, no odor, moist -GLACIOFLUVIAL DEPOSITS-	40	10	10	10	10	20				
					1141.5 8.0												
10	29 30 41 40	S3 15	9.5 11.5			SP-SM	Very dense dark olive-brown poorly graded SAND with silt and gravel (SP-SM), mps 2 cm, no structure, no odor, moist, gravel frequently highly weathered	5	15	20	30	20	10				
15	38 45 90 99	S4 6	14.0 16.0			SM	Very dense dark olive-brown silty SAND with gravel (SM), mps 2 cm, no structure, no odor, moist, gravel frequently highly weathered -GLACIOFLUVIAL DEPOSITS-	10	25	10	25	15	15				
					1132.0 17.5		Note: Slight change in drilling at 17.5 ft when advancing borehole with roller bit ahead of casing.										
20	42	S5	19.5			SM	Very dense dark olive-brown silty SAND with gravel (SM), mps 2 cm,	5	15	15	25	15	25				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Bottom of Hole	Water
12/3/2013	13:05	0.5	24.0	33.0	7.9

Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram

◫	Riser Pipe
▤	Screen
⁘	Filter Sand
⁂	Cuttings
▩	Grout
△	Concrete
▧	Bentonite Seal

Summary

Samples 9S, 1C

Boring No. **HA-6 (OW)**

Field Tests: **Dilatancy**: R - Rapid S - Slow N - None **Plasticity**: N - Nonplastic L - Low M - Medium H - High
Toughness: L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

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TEST BORING REPORT

Boring No. HA-6 (OW)
File No. 40460-004
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel		Sand				Field Test			
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
20	96 110	14	21.0				moderately well bonded, no odor, wet, gravel frequently highly to completely weathered										
					1127.0 22.5												
	82 108	S6 12	24.0 25.0			ML	Very dense dark olive-brown sandy SILT (ML), mps 9 mm, very well bonded, no odor, moist, gravel frequently weathered		5	10	15	20	50				
25																	
30	100/2"	S7 2	29.5 29.7			ML	Very dense dark olive-brown sandy SILT with gravel (ML), mps 3 cm, well bonded, no odor, wet, gravel frequently weathered Thermal sample note: 29.5 - 29.7 ft SPT refusal then 29.7 - 31 ft using 3 inch spoon/300 lb hammer, then advanced roller bit to 31.5 ft and drove extra 3 inch spoon/300 lb hammer from 31.5 - 33.0 ft to obtain 5 lbs of soil. See S7 for soil description to 33.0 ft.	5	10	5	15	15	50				
					1116.5 33.0		-GLACIAL TILL DEPOSITS-										
	128	S8 6	34.0 34.5			SP-SM	Very dense dark olive-brown poorly graded SAND with silt and gravel (SP-SM), mps 2.5 cm, no structure, no odor, wet	10	20	30	15	15	10				
35					1114.5 35.0		TOP OF BEDROCK 35.0 FT Note: Advanced roller bit to 36.0 ft prior to coring. Change in drilling effort and wash water content at 35.0 ft. SEE CORE BORING REPORT FOR ROCK DETAILS										
40																	

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-6 (OW)

HALEY& ALDRICH

CORE BORING REPORT

Boring No. HA-6 (OW)
File No. 40460-004
Sheet No. 3 of 3

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD in.	Recovery/RQD %	Weath-ering	Well Dia-gram	Elev./ Depth (ft)	Visual Description and Remarks
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
	6	C1	36.0	57	95	Slight			Hard to moderately hard, slightly weathered, gray, aphanitic, PHYLLITE. Weak foliation top 2.9 ft grading abruptly to extremely foliated, very thin. Joints dipping at low angles, rough, planar, frequently discolored with brown staining, open. Non-calcareous from HCI test. Lost approximately 100 gallons of water during drilling. Graphitic/metallic film on wash tub water surface throughout core run. Taped borehole to check 3 inches of core snapped off at bottom of core run not recovered.
			41.0	50	83				
	9								
	7								
	8								
40	8								
						Slight		1108.5 41.0	BOTTOM OF EXPLORATION 41.0 FT
45									
50									
55									
60									
65									

HALEY & ALDRICH

TEST BORING REPORT

Boring No. HA-7 (OW)

Project NORTHERN PASS, PITTSBURG-CLARKSVILLE-STEWARTSTOWN, NEW HAMPSHIRE
Client BURNS & MCDONNELL
Contractor NEW HAMPSHIRE BORING, INC.

File No. 40460-004
Sheet No. 1 of 3
Start November 22, 2013
Finish November 23, 2013
Driller W. Hoeckele
H&A Rep. S. Shay
Elevation 1157.5 (est.)
Datum NAVD 88
Location See Plan

	Casing	Sampler	Barrel
Type	HW	S	NX
Inside Diameter (in.)	4.0	1 3/8	2.0
Hammer Weight (lb)	300	140	-
Hammer Fall (in.)	24	30	-

Drilling Equipment and Procedures
Rig Make & Model: Diedrich D-50 Track
Bit Type: Roller Bit
Drill Mud: None
Casing: HW Drive to 28.0 ft
Hoist/Hammer: Winch Safety Hammer
PID Make & Model: None

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
0	3 7	S1 6	0.0 1.0			OL/ OH	Loose dark brown sandy ORGANIC SOIL (OL/OH) with forest mat debris -TOPSOIL-					40	60				
	14 20	S1A 10	1.0 2.0		1156.5 1.0	ML	Medium dense orange-brown sandy SILT (ML), mps 4 mm, no structure, no odor, moist, top of sample light gray (gleyed) -SUBSOIL-			15	15	20	50				
					1154.5 3.0												
5	80 95 72	S2 9	4.0 5.5			SM	Very dense dark olive-brown silty SAND with gravel (SM), mps 2 cm, well bonded, no odor, moist	10	25	15	20	5	25				
10	30 60 76	S3 12	9.0 10.5			SM	Similar to S2 above	10	10	20	20	10	30				
							-GLACIAL TILL DEPOSITS-										
15	57 73 90	S4 9	14.0 15.5			SM	Similar to above including bonding, wet	5	10	10	10	25	40				
					1140.0 17.5												
20	100/3"	S5 3	19.0 19.2			ML	Very dense dark olive-brown sandy SILT (ML), mps 2 cm, very well bonded, no odor, moist	5	5	5	5	20	60				

Water Level Data

Date	Time	Elapsed Time (hr.)	Depth (ft) to: Bottom of Casing	Depth (ft) to: Bottom of Hole	Depth (ft) to: Water
11/23/2013	07:10	16	14.0	20.5	3.1
	Water	due to seal	in very dense till		

Sample ID
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

Well Diagram
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

Summary
Samples 7S, 4C

Boring No. HA-7 (OW)

Field Tests:
Dilatancy: R - Rapid S - Slow N - None
Toughness: L - Low M - Medium H - High
Plasticity: N - Nonplastic L - Low M - Medium H - High
Dry Strength: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) is determined by direct observation within the limitations of sampler size.**

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

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TEST BORING REPORT

Boring No. HA-7 (OW)
File No. 40460-004
Sheet No. 2 of 3

Depth (ft)	Sampler Blows per 6 in.	Sample No. & Rec. (in.)	Sample Depth (ft)	Well Diagram	Stratum Change Elev/Depth (ft)	USCS Symbol	VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION)	Gravel % Coarse	Gravel % Fine	Sand % Coarse	Sand % Medium	Sand % Fine	% Fines	Field Test Dilatancy	Field Test Toughness	Field Test Plasticity	Field Test Strength
20																	
							-GLACIAL TILL DEPOSITS-										
	120	S6 6	24.0 24.5			ML	Very dense dark olive-gray sandy SILT with gravel (ML), mps 2 cm, very well bonded, no odor, moist	5	10	5	5	15	60				
25																	
							TOP OF BEDROCK 28.0 FT										
					1129.5 28.0		Note: Change in drilling effort at 28.2 ft. Advanced roller bit to 29.0 ft. No recovery SEE CORE BORING REPORT FOR ROCK DETAILS										
	100/2"	NR	29.0 29.2														
30																	
35																	
40																	

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

Boring No. HA-7 (OW)

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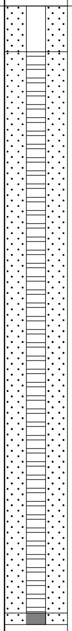
CORE BORING REPORT

Boring No. HA-7 (OW)
File No. 40460-004
Sheet No. 3 of 3

Depth (ft)	Drilling Rate (min./ft)	Run No.	Run Depth (ft)	Recovery/RQD		Weath-ering	Well Dia-gram	Elev./ Depth (ft)	Visual Description and Remarks
				in.	%				
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
	10/0.8'	C1	29.2 30.0	9.6 6	100 63	Slight			Hard, slightly weathered, gray, aphanitic PHYLLITE, short core run to collect thermal sample.
30	8	C2	30.0 34.0	40 11	83 23	Slight			Hard to moderately hard, slightly to moderately weathered, gray, aphanitic PHYLLITE. Very thin foliation dipping at high angles, joints generally at high angles along foliation planes with extreme conic and vertical fracturing, rough, planar, discolored, tight to open. Vertical fracturing may have impeded core from progressing inside core barrel. Noticeable graphitic film on wash water.
	12					Slight			
	12								
	15					Moder-ate			
	6	C3	34.0 37.8	45 30	99 66	Slight			Similar to above except slightly weathered and most of fracturing along, high angle foliation planes. Core barrel jammed at 37.8 ft.
35	8								
	7								
	10/0.8'								
	7	C4	37.8 40.0	26 22	98 83	Slight			Similar to above, slightly weathered. Stopped core run for well installation at 40.0 ft. Minimal water loss for C1 - C4.
	7								
40	3/0.2'							1117.5 40.0	BOTTOM OF EXPLORATION 40.0 FT
45									
50									
55									

Appendix B
QS Boring Logs

Quanta Subsurface
4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH 101

PAGE 1 OF 1

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16 **COMPLETED** 11/18/16

GROUND ELEVATION 1148.7 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02149722 **LONGITUDE** -71.46548056

DRILLING METHOD Solid Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** 7.5ft / Elev 1141.2ft

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS		FINES CONTENT (%)
									LIQUID LIMIT	PLASTICITY INDEX	
	0	SPT 1	63	2-3-4-8 (7)			TOPSOIL: Sandy SILT (ML), trace organics, moderate brown, moist, medium stiff, fine grained sand				
							GLACIOFLUVIAL: Silty SAND with gravel (SM), dark yellowish brown, moist, medium dense, fine to coarse grained gravel, fine grained sand, subangular				
		SPT 2	81	17-16-50/4"			-very dense with cobbles from 2 to 5 feet				
1145		SPT 3	100	50/6"							
	5										
		SPT 4	54	6-10-10-12 (20)			∇				
1140	10	SPT 5	83	12-11-12-14 (23)							

Bottom of Borehole at 10.0 feet

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4308 N Barker RD
Spokane Valley, WA 99027
Telephone: 509-892-9409

BORING NUMBER BH 102

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Transition Station #1
PROJECT NUMBER 16004
PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16
COMPLETED 11/18/16
GROUND ELEVATION 1164.7 ft
HOLE SIZE 6"
DRILLING CONTRACTOR SW Cole
LATITUDE 45.02172222
LONGITUDE -71.46584167
DRILLING METHOD Solid Stem Auger
DRILLING EQUIPMENT CME 850
SPT HAMMER Automatic
LOGGED BY S. Laing
CHECKED BY J.T. McGinnis
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 1.0ft / Elev 1163.7ft

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS		FINES CONTENT (%)
									LIQUID LIMIT	PLASTICITY INDEX	
	0						TOPSOIL: Lean CLAY (CL), trace organics, moderate brown, moist, medium stiff				
		SPT 1	54	2-3-3-5 (6)			∇ GLACIOFLUVIAL: Silty SAND with gravel (SM), light olive gray, moist, loose to dense, fine to coarse grained gravel, fine grained sand, subangular	24.7			
		SPT 2	50	16-17-22-4 (39)							
							- moderate yellowish brown and medium dense from 4 to 5 feet				18.1
1160	5	SPT 3	33	7-5-10-14 (15)			Poorly Graded GRAVEL with silt (GP-GM), moderate yellowish brown, moist, medium dense to dense, fine to coarse grained gravel, fine grained sand, subangular				
		SPT 4	63	14-13-18-10 (31)							
							TILL: Silty SAND with gravel (SM), moderate yellowish brown, moist, dense, fine to coarse grained gravel, fine grained sand, subangular				
1155	10	SPT 5	50	16-18-26-29 (44)							

Auger Refusal at 13.0 feet
Bottom of Borehole at 13.0 feet

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BORING NUMBER BH 103

PAGE 1 OF 1

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Transition Station #1
PROJECT NUMBER 16004
PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16 **COMPLETED** 11/18/16
GROUND ELEVATION 1169.9 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR SW Cole
LATITUDE 45.02200556 **LONGITUDE** -71.46572778
DRILLING METHOD Solid Stem Auger
DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic
LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 4.0ft / Elev 1165.9ft

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	50	1-2-2-4 (4)			TOPSOIL: Lean CLAY with sand (CL), trace organics, moderate brown, moist, soft, fine grained sand GLACIOFLUVIAL: Silty SAND with gravel (SM), moderate yellowish brown, moist, loose to medium dense, fine grained sand, subangular	19.9				
		SPT 2	58	5-7-7-9 (14)				13.8				
1165	5	SPT 3	63	4-5-5-5 (10)			∇ Silty SAND (SM), little gravel, moderate yellowish brown, wet, loose, fine grained sand, subangular					
		SPT 4	63	11-21-26-35 (47)			TILL: Sandy SILT (ML), moderate yellowish brown, moist, hard, fine grained sand				51.5	
1160	10	SPT 5	75	14-21-32-36 (53)			Silty SAND with gravel (SM), dark yellowish brown, moist, very dense, fine to coarse grained gravel, fine grained sand, subangular					
1155	15											Augered through bedrock from 14.5 to 15 feet.

Auger Refusal at 15.0 feet
Bottom of Borehole at 15.0 feet

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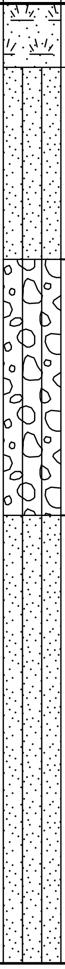
BORING NUMBER BH 104

PAGE 1 OF 1

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Transition Station #1
PROJECT NUMBER 16004
PROJECT LOCATION Pittsburg, New Hampshire
DATE STARTED 11/23/16 **COMPLETED** 11/23/16
GROUND ELEVATION 1168.9 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR SW Cole
LATITUDE 45.02231667 **LONGITUDE** -71.46516111
DRILLING METHOD Hollow Stem Auger/Wet Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic
LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** 0.3ft / Elev 1168.6ft



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	50	1-1-6-19 (7)			∇ TOPSOIL: Lean CLAY with sand (CL), little organics, moderate brown, wet, loose, fine grained sand					
							GLACIOFLUVIAL: Silty SAND (SM), little fine to coarse gravel, dark yellowish brown, moist, medium dense, fine grained sand, subangular					
		SPT 2	63	10-10-13-15 (23)								
1165		SPT 3	64	25-50/5"			Silty GRAVEL with sand (GM), dark yellowish brown, moist, very dense, fine to coarse grained gravel, fine grained sand, subangular					Rock coring performed from 5 to 10 feet to penetrate boulder(s).
	5						- boulder encountered from 5 to 6.3 feet					
1160							Silty SAND with gravel (SM), dusky yellowish brown, wet, medium dense, fine to coarse grained gravel, fine grained sand, subangular					
	10	SPT 4	29	6-10-18-13 (28)								
1155	15											

Bottom of Borehole at 15.0 feet

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Spokane Valley, WA 99027
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BORING NUMBER BH 105

PAGE 1 OF 2

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/23/16 **COMPLETED** 11/23/16

GROUND ELEVATION 1176.7 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02241944 **LONGITUDE** -71.46548889

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

▽ **AT TIME OF DRILLING** 0.0ft / Elev 1176.7ft

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 (%)	REMARKS
	0						▽					
1175		SPT 1	50	1-1-1-1 (2)			TOPSOIL: Lean CLAY with sand (CL), little fine to coarse gravel, trace organics, moderate brown, moist, soft, fine to coarse grained sand, subangular					A small stream located 8 to 10 feet from boring.
		SPT 2	33	3-6-13-10 (19)			GLACIOFLUVIAL: Silty SAND with gravel (SM), moderate yellowish brown, wet, medium dense to loose, fine to coarse grained gravel, fine to coarse grained sand, subangular	16.7				A bulk sample was obtained from 1 to 6 feet. w% = 33.1% LL = 33; PI = NP % fines = 43.3% Resistivity = 1,900 ohm-cm pH = 5.8
	5	SPT 3	75	5-5-5-5 (10)								
1170		SPT 4	75	5-6-8-10 (14)			Sandy SILT (ML), little fine to coarse gravel, moderate yellowish brown, wet, stiff to medium stiff, fine to coarse grained sand, subangular				53.6	
		SPT 5	67	7-4-2-3 (6)								
1165	10											
							TILL: Silty SAND with gravel (SM), moderate yellowish brown, wet, dense to very dense, fine to coarse grained gravel, fine to coarse grained sand, subangular					
1160	15	SPT 6	71	20-22-28-36 (50)								
	20	SPT		19-24-31-								

(Continued Next Page)

BORING NUMBER BH 105

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, 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		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
1155		⧗ 7	79	39 (55)		░						

Bottom of Borehole at 22.0 feet

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BORING NUMBER BH 106

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16

GROUND ELEVATION 1186.9 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02228889 **LONGITUDE** -71.46605833

DRILLING METHOD Solid Stem Auger/Wet Rotary

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** 6.0ft / Elev 1180.9ft

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	2-2-6-10 (8)			TOPSOIL: Lean CLAY with sand (CL), trace organics, moderate brown, moist, soft, fine grained sand	26.2				
1185							GLACIOFLUVIAL: Silty SAND with gravel (SM), moderate yellowish brown, moist, medium dense to dense, fine to coarse grained gravel, fine grained sand, subangular, gravel spotted with oxidation					
		SPT 2	67	14-17-20-31 (37)								
	5	SPT 3	67	12-12-13-9 (25)				10.5				A bulk sample was obtained from 5 to 15 feet. w% = 16.1% LL = 18; PI = NP % fines = 36.6% Resistivity = 6,900 ohm-cm pH = 5.4
						∇	- light olive gray from 6 to 13 feet					
1180		SPT 4	63	9-7-10-14 (17)								
							- very dense from 8 to 13 feet					
		SPT 5	63	16-19-33-41 (52)				11.9				
	10											
1175												
							TILL: Silty SAND (SM), trace fine gravel, light olive gray, moist, very dense, fine grained sand, subangular					
	15											
		SPT 6	100	34-50/6"				16.9				
1170												
	20											
		SPT 7	91	34-50/5"								

(Continued Next Page)

Quanta Subsurface
4308 N Barker RD
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Telephone: 509-892-9409

BORING NUMBER BH 106

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, 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
1165							TILL: Silty SAND (SM), trace fine gravel, light olive gray, moist, very dense, fine grained sand, subangular *(continued)*					
							SILT (ML), little fine sand, light olive gray, moist, hard					
1160	25	SPT 8	96	22-29-32-41 (61)							89.6	
							Silty SAND (SM), trace fine gravel, light olive gray, moist, dense, fine grained sand, subangular					
1155	30	SPT 9	83	14-20-27-34 (47)								
1150	35	RC 1	90 (90)				Roller Bit Refusal at 33 feet Begin Coring at 33 feet BEDROCK: Fresh (I), moderate dark gray, fine grained, medium weak (R2), excellent, PHYLLITE, foliated, graphitic with quartz and pyrite					
							- fine to medium grained and weak (R2) to medium strong (R3) from 38 to 43 feet					UCS at 38.4 feet = 5,062 psi
1145	40	RC 2	100 (100)									
	45						Fresh (I), moderate dark gray, fine grained, medium strong (R3), excellent, PHYLLITE, foliated, graphitic with quartz and pyrite					

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BORING NUMBER BH 106

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, 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											
1140		RC 3	94 (94)			▨	Fresh (I), moderate dark gray, fine grained, medium strong (R3), excellent, PHYLLITE, foliated, graphitic with quartz and pyrite *(continued)*					

Bottom of Borehole at 48.0 feet

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Engineering + Construction

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BORING NUMBER BH 107

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16

GROUND ELEVATION 1180.9 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02261111 **LONGITUDE** -71.46549444

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** 3.0ft / Elev 1177.9ft

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
1180	0	SPT 1	58	2-1-3-6 (4)			TOPSOIL: Lean CLAY with sand (CL), trace organics, moderate brown, moist, soft, fine grained sand GLACIOFLUVIAL: Silty SAND with gravel (SM), dusky yellowish brown, moist, loose to medium dense, fine to coarse grained gravel, fine grained sand, subangular					A bulk sample was obtained from 1 to 10 feet.
		SPT 2	67	7-6-5-6 (11)		∇		16.3				
	5	SPT 3	50	4-4-7-13 (11)			- wet from 4 to 8.5 feet	13.5				
1175		SPT 4	58	9-7-6-9 (13)				13.1				
	10	SPT 5	63	4-11-42-50 (53)			TILL: Silty SAND with gravel (SM), dark yellowish brown, wet, very dense, fine to coarse grained gravel, fine grained sand, subangular					Auger refusal condition was anticipated to be bedrock based on driller's observations.
1170												

Auger Refusal at 11.0 feet
Bottom of Borehole at 11.0 feet

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BORING NUMBER BH 107A

PAGE 1 OF 1

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16

GROUND ELEVATION 1180.9 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02261111 **LONGITUDE** -71.46549444

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **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
	0						Auger Probe to Refusal No Samples Obtained					Boring offest 4 feet from original location.
1180												
	5											
1175												
	10											
1170												Highly weathered bedrock was encountered at 11 feet.

Auger Refusal at 13.5 feet
Bottom of Borehole at 13.5 feet

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BORING NUMBER BH 108

CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Transition Station #1
PROJECT NUMBER 16004
PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16
GROUND ELEVATION 1196.1 ft **HOLE SIZE** 6"
DRILLING CONTRACTOR SW Cole
LATITUDE 45.0223 **LONGITUDE** -71.46638889
DRILLING METHOD Solid Stem Auger/Wet Rotary
DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic
LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis
GROUND WATER LEVEL:
NOTES
∇ **AT TIME OF DRILLING** Not Encountered (prior to rotary wash at 9 feet)

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
1195	0	SPT 1	13	2-3-4-6 (7)			TOPSOIL: Sandy SILT (ML), trace organics, moderate brown, wet, medium stiff, fine to medium grained sand GLACIOFLUVIAL: Silty SAND with gravel (SM), dark yellowish brown, moist, medium dense to dense, fine to coarse grained gravel, fine grained sand, subangular	30.0				A bulk sample was obtained from 1 to 10 feet. w% = 14.9% LL = 28; PI = NP % fines = 39.3%
		SPT 2	63	11-12-14-14 (26)				8.8				
	5	SPT 3	71	11-9-25-18 (34)				9.7				
1190		SPT 4	75	12-14-14-17 (28)								
		SPT 5	36	50/6"			BEDROCK: Highly weathered (IV), dark gray, fine grained, medium weak (R2), very poor, PHYLLITE					
1185	10											
1180	15	RC 1	84 (84)				Roller Bit Refusal at 12 feet Begin Coring at 12 feet Fresh (I), dark gray, fine grained, medium strong (R3), good, PHYLLITE, graphitic					
	20	RC 2	100 (100)				Fresh (I), dark gray, fine grained, medium strong (R3) to strong (R4), excellent, PHYLLITE, graphitic					

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BORING NUMBER BH 108

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, 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		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
1175						▨	Fresh (I), dark gray, fine grained, medium strong (R3) to strong (R4), excellent, PHYLLITE, graphitic *(continued)*					
	25	RC 3	100 (100)			▨						
1170						▨						

Bottom of Borehole at 27.0 feet

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BORING NUMBER BH 109

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16

GROUND ELEVATION 1188.2 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02263056 **LONGITUDE** -71.46576667

DRILLING METHOD Solid Stem Auger/Wet Rotary

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** 0.2ft / Elev 1188.0ft

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	29	4-5-6-11 (11)			∇ TOPSOIL: Lean CLAY with sand (CL), little coarse gravel, trace organics, moderate brown, moist, stiff, fine grained sand	21.3				
							GLACIOFLUVIAL: Silty SAND with gravel (SM), dark yellowish brown, moist, medium dense, fine to coarse grained gravel, fine grained sand, subangular					
1185		SPT 2	63	8-8-10-11 (18)				14.5				
	5	SPT 3	67	8-10-15-7 (25)								
		SPT 4	50	22-14-5-8 (19)								
1180		SPT 5	25	5-10-28-10 (38)			Silty GRAVEL with sand (GM), dark yellowish brown, moist, dense, fine to coarse grained gravel, fine grained sand, subangular					
	10											
1175							Silty SAND (SM), trace fine gravel, dusky yellowish brown, wet, medium dense, fine grained sand					
	15	SPT 6	71	9-10-14-14 (24)								
1170												
	20	SPT 7	75	50/2"			BEDROCK: Highly weathered (IV), moderate dark gray, fine grained, very weak (R1), very poor,					

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CLIENT PAR Electrical Contractors
PROJECT NAME Northern Pass TL - Transition Station #1
PROJECT NUMBER 16004
PROJECT LOCATION Pittsburg, 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		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
1165	25	RC 1	100 (100)			▨	PHYLLITE Roller Bit Refusal at 21 feet Begin Coring at 21 feet Fresh (I), dark gray, fine grained, medium weak (R2) to medium strong (R3), excellent, PHYLLITE, foliated, graphitic, quartz ribbons, spotty oxidized minerals					UCS at 22 feet = 3,107 psi
1160	30	RC 2	100 (100)			▨						
1155	35	RC 3	100 (100)			▨						

Bottom of Borehole at 36.0 feet

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BORING NUMBER BH 110

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 12/12/16 **COMPLETED** 12/12/16

GROUND ELEVATION 1209.2 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02256389 **LONGITUDE** -71.46643333

DRILLING METHOD Solid Stem Auger/Wet Rotary

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** Not Encountered (prior to rotary wash at 9 feet)

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	71	1-2-4-9 (6)			TOPSOIL: Lean CLAY with sand (CL), little organics, moderate brown, wet, soft, fine grained sand	32.1				
							GLACIOFLUVIAL: Silty SAND with gravel (SM), moderate yellowish brown, moist, medium dense to dense, fine to coarse grained gravel, fine grained sand, subangular					
		SPT 2	88	9-15-14-15 (29)				16.2				
1205	5	SPT 3	75	17-15-18-31 (33)								
							- cobbles encountered from 6 to 7 feet					
		SPT 4	100	20-50/6"								
							BEDROCK: Highly weathered (IV), dark gray, fine grained, very weak (R1), very poor, PHYLLITE					
1200	10						Roller Bit Refusal at 10 feet Begin Coring at 10 feet					
		RC 1	100 (100)				Fresh (I), dark gray, fine grained, very strong (R5), excellent, PHYLLITE, graphitic with scattered pyrite and quartz					UCS at 10.3 feet = 15,020 psi
1195	15	RC 2	100 (100)									
1190	20											

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BORING NUMBER BH 110

CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, 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		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
1185	25	RC 3	94 (95)			▨	Fresh (I), dark gray, fine grained, very strong (R5), excellent, PHYLLITE, graphitic with scattered pyrite and quartz *(continued)*					

Bottom of Borehole at 25.0 feet

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BORING NUMBER INF 101

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16

COMPLETED 11/18/16

GROUND ELEVATION 1163.7 ft

HOLE SIZE 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02194444

LONGITUDE -71.46533333

DRILLING METHOD Solid Stem Auger

DRILLING EQUIPMENT CME 850

SPT HAMMER Automatic

LOGGED BY S. Laing

CHECKED BY J.T. McGinnis

GROUND WATER LEVEL:

NOTES

▽ **AT TIME OF DRILLING** 6.5ft / Elev 1157.2ft

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	54	1-1-4-8 (5)			TOPSOIL: Lean CLAY (CL), little organics, moderate brown, moist, soft GLACIOFLUVIAL: Silty SAND with gravel (SM), dark yellowish brown, moist, medium dense, fine to coarse grained gravel, fine grained sand					Infiltration test casing installed in an adjacent borehole to a depth of approximately 11 feet.
1160		SPT 2	71	20-13-19-25 (32)			Silty GRAVEL with sand (GM), dark yellowish brown, moist, dense to very dense, fine to coarse grained gravel, fine grained sand					
	5	SPT 3	79	26-29-32-30 (61)								The ESHWT is at an approximate depth of 6.5 feet.
		SPT 4	78	21-39-50 (89)			▽ - wet from 6 to 11 feet					Auger refusal was encountered at 7.5 feet. The borehole was offset 2 feet and redrilled.
1155	10						- cobbles and boulders encountered from 7.5 to 10 feet					
		SPT 5	63	14-26-21-30 (47)			Silty SAND with gravel (SM), moderate to dark yellowish brown, wet, dense, fine to coarse grained gravel, fine to coarse grained sand	10.8			22.5	
1150		SPT 6	96	21-15-20-30 (35)								

Bottom of Borehole at 14.0 feet

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BORING NUMBER INF 102

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16 **COMPLETED** 11/18/16

GROUND ELEVATION 1162.7 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02200833 **LONGITUDE** -71.46522222

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

∇ **AT TIME OF DRILLING** 7.4ft / Elev 1155.3ft

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	3-5-5-6 (10)			TOPSOIL: Lean CLAY with sand (CL), little organics, moderate brown, wet, medium stiff, fine grained sand GLACIOFLUVIAL: Silty SAND with gravel (SM), moderate yellowish brown, moist, medium dense, fine grained sand					Infiltration test casing installed in an adjacent borehole to a depth of approximately 11 feet.
1160		SPT 2	71	11-12-12-19 (24)			Silty GRAVEL with sand (GM), dark yellowish brown, moist, medium dense, fine and coarse grained gravel, fine and coarse grained sand, subangular Poorly Graded SAND with silt and gravel (SP-SM), dark yellowish brown, moist, medium dense, fine and coarse grained gravel, fine to medium grained sand, subangular					A bulk sample was obtained from 1 to 10 feet.
	5	SPT 3	58	12-7-10-11 (17)								
1155		SPT 4	71	11-17-16-18 (33)			Silty GRAVEL with sand (GM), dark yellowish brown, wet, dense, fine and coarse grained gravel, fine to medium grained sand, subangular ∇ Poorly Graded SAND with gravel (SP), dark yellowish brown, wet, dense, fine and coarse grained gravel, fine to medium grained sand, subangular					The ESHWT is at an approximate depth of 7.5 feet.
	10	SPT 5	63	10-11-21-30 (32)								
		SPT 6	79	8-14-31-34 (45)			TILL: Silty SAND with gravel (SM), dark yellowish brown, moist, dense, fine and coarse grained gravel, fine grained sand, subangular	10.4			20.2	
		SPT 7	0	50/3"								

Auger Refusal at 12.5 feet
Bottom of Borehole at 12.5 feet

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BORING NUMBER INF 102A

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/18/16 **COMPLETED** 11/18/16

GROUND ELEVATION 1162.7 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02200833 **LONGITUDE** -71.46522222

DRILLING METHOD Hollow Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **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		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
	0						Auger Probe to Refusal No Samples Obtained					Boring was offset 5 feet from INF 102 location.
1160												
	5											
1155												
	10											Auger refusal condition was anticipated to be bedrock based on driller's observations.
1150												

Auger Refusal at 13.0 feet
Bottom of Borehole at 13.0 feet

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BORING NUMBER INF 103

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CLIENT PAR Electrical Contractors

PROJECT NAME Northern Pass TL - Transition Station #1

PROJECT NUMBER 16004

PROJECT LOCATION Pittsburg, New Hampshire

DATE STARTED 11/14/16 **COMPLETED** 11/14/16

GROUND ELEVATION 1145.0 ft **HOLE SIZE** 6"

DRILLING CONTRACTOR SW Cole

LATITUDE 45.02160833 **LONGITUDE** -71.46511389

DRILLING METHOD Solid Stem Auger

DRILLING EQUIPMENT CME 850 **SPT HAMMER** Automatic

LOGGED BY S. Laing **CHECKED BY** J.T. McGinnis

GROUND WATER LEVEL:

NOTES

▽ **AT TIME OF DRILLING** 9.7ft / Elev 1135.3ft

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONTENT (%)	ATTERBERG LIMITS		FINES CONTENT (%)	REMARKS
									LIQUID LIMIT	PLASTICITY INDEX		
1145	0											
		SPT 1	88	1-1-2-3 (3)			TOPSOIL: Silty SAND (SM), trace organics, moderate brown, moist, soft					Infiltration test casing installed in an adjacent borehole to a depth of approximately 6 feet.
							GLACIOFLUVIAL: Silty SAND (SM), moderate to dark yellowish brown, moist, loose to medium dense, fine grained sand, subrounded					
		SPT 2	88	9-8-9-9 (17)								
							SILT (ML), little fine sand, dark yellowish brown, moist, hard					
1140	5	SPT 3	71	3-14-35-42 (49)				24.7			91.3	
		SPT 4	100	50/4"			Silty SAND with gravel (SM), dark yellowish brown, moist, very dense, fine to coarse grained gravel, fine to medium grained sand, subrounded, with cobbles					
							- dense with no cobbles from 8 to 10 feet					
		SPT 5	71	25-17-32-16 (49)		▽						The ESHWT is at an approximate depth of 9.5 feet.
1135	10											

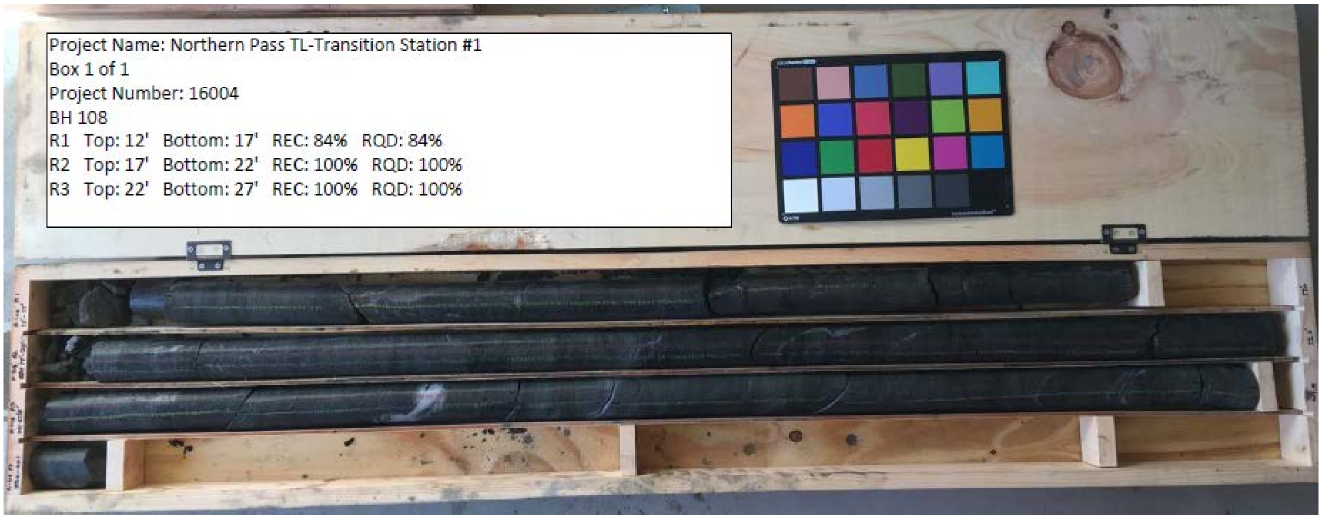
Bottom of Borehole at 10.0 feet

Appendix C
QS Rock Core Photographs

BH 106 Rock Core Photos

Project Name: Northern Pass TL-Transition Station #1
Box 1 of 1
Project Number: 16004
BH 106
R1 Top: 33' Bottom: 38' REC: 90% RQD: 90%
R2 Top: 38' Bottom: 43' REC: 100% RQD: 100%
R3 Top: 43' Bottom: 48' REC: 94% RQD: 94%

BH 108 Rock Core Photos



Project Name: Northern Pass TL-Transition Station #1
Box 1 of 1
Project Number: 16004
BH 108
R1 Top: 12' Bottom: 17' REC: 84% RQD: 84%
R2 Top: 17' Bottom: 22' REC: 100% RQD: 100%
R3 Top: 22' Bottom: 27' REC: 100% RQD: 100%

BH 109 Rock Core Photos

Project Name: Northern Pass TL-Transition Station #1
Box 1 of 1
Project Number: 16004
BH 109
R1 Top: 21' Bottom: 26' REC: 100% RQD: 100%
R2 Top: 26' Bottom: 31' REC: 100% RQD: 100%
R3 Top: 31' Bottom: 36' REC: 100% RQD: 100%

BH 110 Rock Core Photos

Project Name: Northern Pass TL-Transition Station #1
Box 1 of 1
Project Number: 16004
BH 110
R1 Top: 10' Bottom: 15' REC: 100% RQD: 100%
R2 Top: 15' Bottom: 20' REC: 100% RQD: 100%
R3 Top: 20' Bottom: 25' REC: 94% RQD: 95%

Appendix D
QS Laboratory Test Results

SUMMARY OF LAB TESTING RESULTS

NORTHERN PASS TRANSMISSION LINE PROJECT

TRANSITION STATION #1
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 102	S1	0-2	24.7																
BH 102	S3	4-6							18.1										
BH 103	S1	0-2	19.9																
BH 103	S2	2-4	13.8																
BH 103	S4	6-8							51.5										
BH 105	BULK	1-6	33.1						43.3	33	NP	NP	121.9^C	9.7^C		$< 6.8^A$	$< 6.8^A$	5.8^A	1,900
BH 105	S2	2-4	16.7																
BH 105	S4	6-8							53.6										
BH 106	S1	0-2	26.2																
BH 106	BULK	5-15'	16.1						36.6	18	NP	NP	132.2^C	8.7^C		$< 5.9^A$	12^A	5.4^A	6,900
BH 106	S3	4-6	10.5																
BH 106	S5	8-10	11.9																
BH 106	S6	15-16	16.9																
BH 106	S8	25-27							89.6										
BH 106	R1	38.2-38.6													$5,062^B$				
BH 107	S2	2-4	16.3																
BH 107	S3	4-6	13.5																
BH 107	S4	6-8	13.1																
BH 108	S1	0-2	30.0																
BH 108	BULK	1-10	14.9						39.3	28	NP	NP	127.8^C	8.5^C					
BH 108	S2	2-4	8.8																
BH 108	S3	4-6	9.7																
BH 109	S1	0-2	21.3																
BH 109	S2	2-4	14.5																
BH 109	R1	21.8-22.1													$3,107^B$				
BH 110	S1	0-2	32.1																
BH 110	S2	2-4	16.2																
BH 110	R1	10.1-10.4													$15,020^B$				
INF 101	S5	10-12	10.8		15.8	61.7	16.7	5.8											
INF 102	S6	10-12	10.4		32.8	47.1	15.2	5.0											
INF 103	S3	4-6	24.7		0.0	8.7	68.4	22.9											

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 Location: Various, NH
Client: Quanta Subsurface
Material Description: Multiple
Material Source: Transition Station 1

Project Number: 16-0600
Lab ID: Multiple
Date Received: 11/22/16
Date Completed: 12/01/16
Tested By: BLG

Lab ID	Nominal Maximum Aggregate Size	Material Description	Moisture Content
15345S	⅜"	BH-103, 0-2'	19.9%
15346S	⅜"	BH-103, 2-4'	13.8%
15348S	⅜"	BH-105, BULK, 1-6'	33.1%
15349S	⅜"	BH-105, 2-4'	16.7%
15351S	⅜"	BH-106, 0-2'	26.2%
15352S	⅜"	BH-106, BULK, 5-15'	16.1%
15353S	⅜"	BH-106, 4-6'	10.5%
15354S	⅜"	BH-106, 8-10'	11.9%
15355S	⅜"	BH-106, 15-16'	16.9%
15357S	⅜"	BH-107, 2-4'	16.3%

Comments:

Reviewed By: CBM

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:**	Multiple
Client:	Quanta Subsurface	**Date Received:**	11/22/16
Material Description:	Multiple	**Date Completed:**	12/01/16
Material Source:	Transition Station 1	**Tested By:**	BLG

Lab ID	Nominal Maximum Aggregate Size	Material Description	Moisture Content
15358S	⅜"	BH-107, 4-6'	13.5%
15359S	⅜"	BH-107, 6-8'	13.1%
15360S	⅜"	BH-108, 0-2'	30.0%
15361S	⅜"	BH-108, BULK, 1-10'	14.9%
15362S	⅜"	BH-108, 2-4'	8.8%
15363S	⅜"	BH-108, 4-6'	9.7%
15364S	⅜"	BH-109, 0-2'	21.3%
15365S	⅜"	BH-109, 2-4'	14.5%
15366S	⅜"	BH-110, 0-2'	32.1%
15367S	⅜"	BH-110, 2-4'	16.2%

Comments:

Reviewed By: CBM

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:**	Multiple
Client:	Quanta Subsurface	**Date Received:**	11/22/16
Material Description:	Multiple	**Date Completed:**	12/01/16
Material Source:	Transition Station 1	**Tested By:**	BLG

Lab ID	Nominal Maximum Aggregate Size	Material Description	Moisture Content
15368S	⅜"	INF-101, 10-12'	10.8%
15369S	⅜"	INF-102, 10-12'	10.4%
15370S	⅜"	INF-103, 4-6'	24.7%
1658S	⅜"	BH-102, 0-2'	24.7%

Comments:

Reviewed By: CBM

S.W.COLE
ENGINEERING, INC.

Percent Finer than No. 200 ASTM D1140

Project Number: 16-0600
Project Name: Northern Pass - Transition Station #1

Sample ID: 15347S
Sample Source: BH-103, 6-8'
Client Sample Description: ML

% Passing # 200: 51.5

Sample ID: 15348S
Sample Source: BH-105, BULK, 1-6'
Client Sample Description: SM

% Passing # 200: 43.3

Sample ID: 15350S
Sample Source: BH-105, 6-8'
Client Sample Description: ML

% Passing # 200: 53.6

Sample ID: 15352S
Sample Source: BH-106, BULK, 5-15'
Client Sample Description: SM

% Passing # 200: 36.6

Sample ID: 15356S
Sample Source: BH-106, 25-27'
Client Sample Description: ML

% Passing # 200: 89.6

S.W.COLE ENGINEERING, INC.

Percent Finer than No. 200 ASTM D1140

Project Number: 16-0600
Project Name: Northern Pass - Transition Station #1

Sample ID: 15361S
Sample Source: BH-108, BULK, 1-10'
Client Sample Description: SM

% Passing # 200: 39.3

Sample ID: 1659M
Sample Source: BH-102, 4-6'
Client Sample Description: SM

% Passing # 200: 18.1

S.W.COLE
ENGINEERING, INC.

Report of Hydrometer

ASTM D422-63 (07)

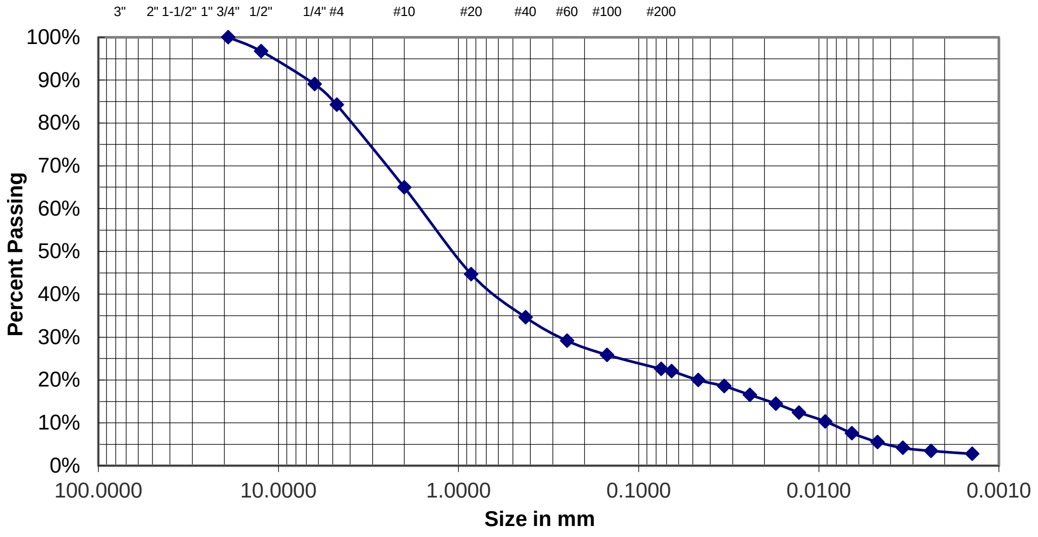
Project Name:	Northern Pass Transmission Line		**Project Number:**	16-0600
Project Location:	Various, NH		**Lab ID:**	15368S
Client:	SWCOLE Explorations, LLC		**Date Received:**	11/22/2016
Material Description:	SM		**Date Completed:**	12/1/2016
Material Source:	INF-101, 10-12'		**Tested By:**	BLG

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	**97**	
¼"	6.3	**89**	
No. 4	4.75	**84**	
No. 10	2	**65**	
No. 20	0.85	**45**	
No. 40	0.425	**35**	
No. 60	0.25	**29**	
No. 100	0.15	**26**	
No. 200	0.075	**22.6**	
	0.02		

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06551	**22.1**
0.04673	**20.0**
0.03347	**18.6**
0.03347	**18.6**
0.02416	**16.5**
0.01729	**14.5**
0.01288	**12.4**
0.00921	**10.3**
0.00655	**7.6**
0.00471	**5.5**
0.00341	**4.1**
0.00238	**3.4**
0.00141	**2.8**



Particle Distribution:	Gravel (3" - No. 4)	**15.8%**	Fines (0.074 -0.005)	**16.7%**
	Sand (No. 4 - No. 200)	**61.7%**	Clay (<0.005)	**5.8%**

CBM

Comments:

Reviewed By

S.W.COLE
ENGINEERING, INC.

Report of Hydrometer

ASTM D422-63 (07)

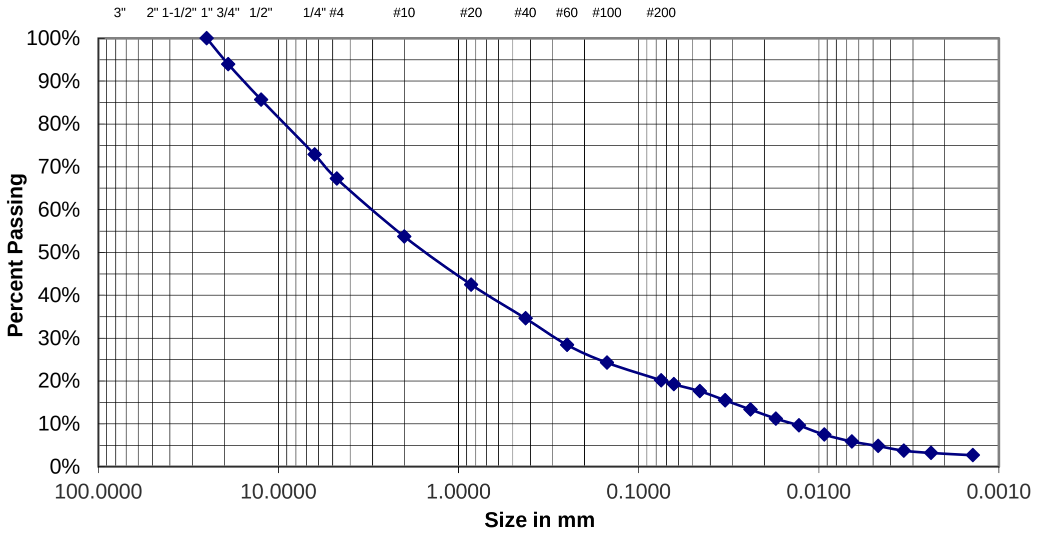
Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15369S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/2016
Material Description:	SM	**Date Completed:**	12/1/2016
Material Source:	INF-102, 10-12'	**Tested By:**	BLG

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	**94**	
½"	12.5	**86**	
¼"	6.3	**73**	
No. 4	4.75	**67**	
No. 10	2	**54**	
No. 20	0.85	**42**	
No. 40	0.425	**35**	
No. 60	0.25	**28**	
No. 100	0.15	**24**	
No. 200	0.075	**20.2**	
	0.02		

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.06375	**19.2**
0.04570	**17.6**
0.03304	**15.5**
0.03304	**15.5**
0.02397	**13.3**
0.01729	**11.2**
0.01288	**9.6**
0.00931	**7.5**
0.00655	**5.9**
0.00468	**4.8**
0.00338	**3.7**
0.00238	**3.2**
0.00139	**2.7**



Particle Distribution:	Gravel (3" - No. 4)	**32.8%**	Fines (0.074 -0.005)	**15.2%**
	Sand (No. 4 - No. 200)	**47.1%**	Clay (<0.005)	**5.0%**

Comments:

CBM

Reviewed By

Report of Hydrometer

ASTM D422-63 (07)

Project Name: Northern Pass Transmission Line
Project Location: Various, NH
Client: SWCOLE Explorations, LLC
Material Description: ML
Material Source: INF-103, 4-6'

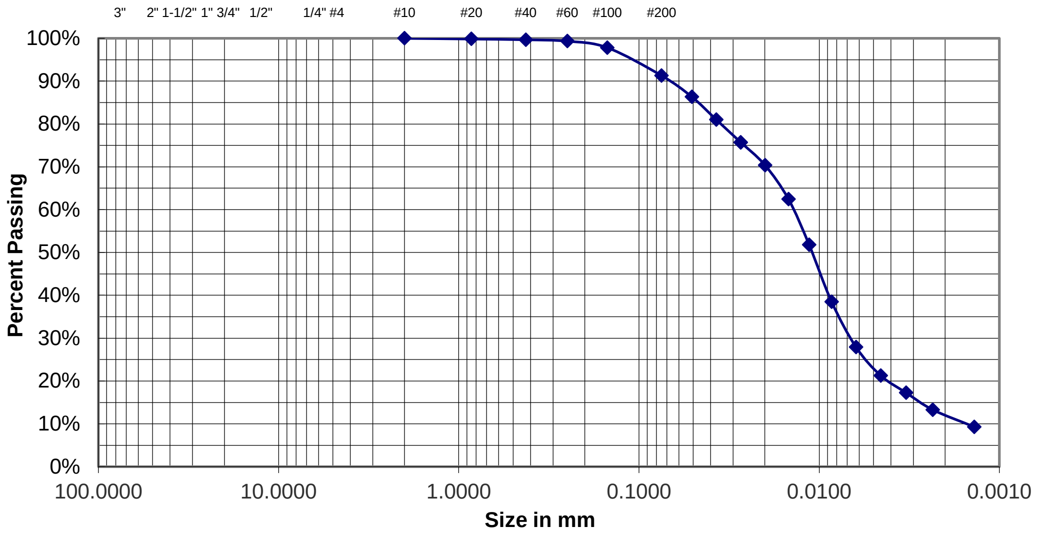
Project Number: 16-0600
Lab ID: 15370S
Date Received: 11/22/2016
Date Completed: 12/1/2016
Tested By: BLG

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	**100**	
No. 4	4.75	**100**	
No. 10	2	**100**	
No. 20	0.85	**100**	
No. 40	0.425	**100**	
No. 60	0.25	**99**	
No. 100	0.15	**98**	
No. 200	0.075	**91.3**	
	0.02		

Hydrometer Analysis

Particle Size (mm)	Amount Passing (%)
0.05082	**86.3**
0.03723	**81.0**
0.02721	**75.7**
0.02721	**75.7**
0.01997	**70.4**
0.01478	**62.4**
0.01136	**51.8**
0.00853	**38.5**
0.00624	**27.9**
0.00455	**21.2**
0.00329	**17.3**
0.00234	**13.3**
0.00138	**9.3**



Particle Distribution:

Gravel (3" - No. 4)	**0.0%**	Fines (0.074 -0.005)	**68.4%**
Sand (No. 4 - No. 200)	**8.7%**	Clay (<0.005)	**22.9%**

Comments:

CBM

Reviewed By

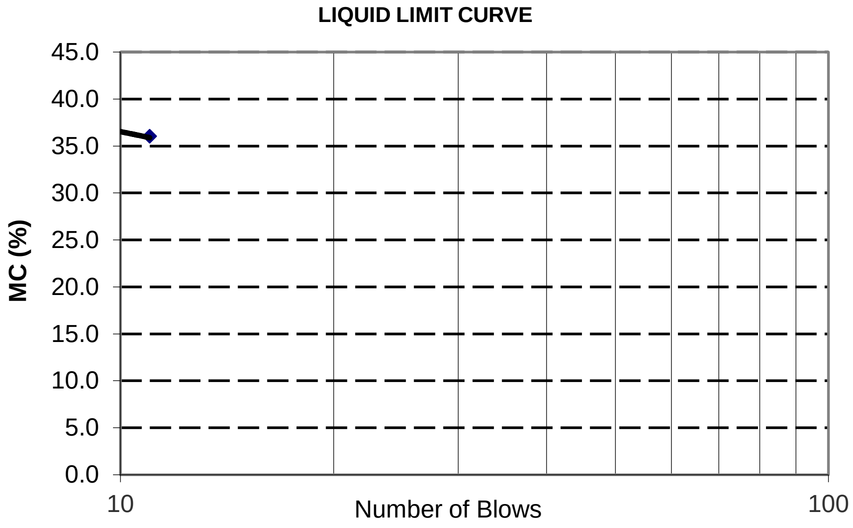
S.W.COLE ENGINEERING, INC.

Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15348S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/13/16
Material Source:	BH-105, BULK, 1-6'	**Tested By:**	SLH

Liquid Limit	**33**
Plastic Limit	**33**
Plasticity Index	



Material Retained On the No. 40 Sieve: 12%

As-received Moisture Content: 33%

Comments:

Reviewed By: CBM

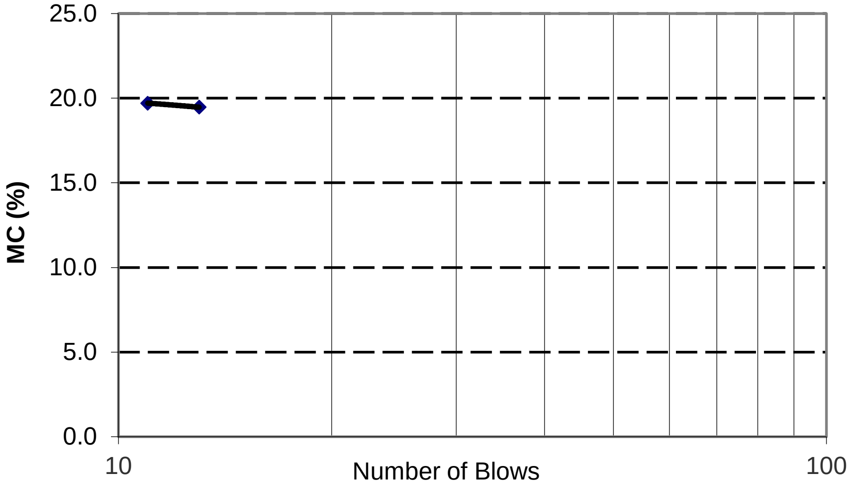
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15352S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/13/16
Material Source:	BH-106, BULK, 5-15'	**Tested By:**	SLH

Liquid Limit	**18**
Plastic Limit	
Plasticity Index	**Non-Plastic**

LIQUID LIMIT CURVE



Material Retained On the No. 40 Sieve: 14%

As-received Moisture Content: 16%

Comments:

Reviewed By: CBM

S.W.COLE
ENGINEERING, INC.

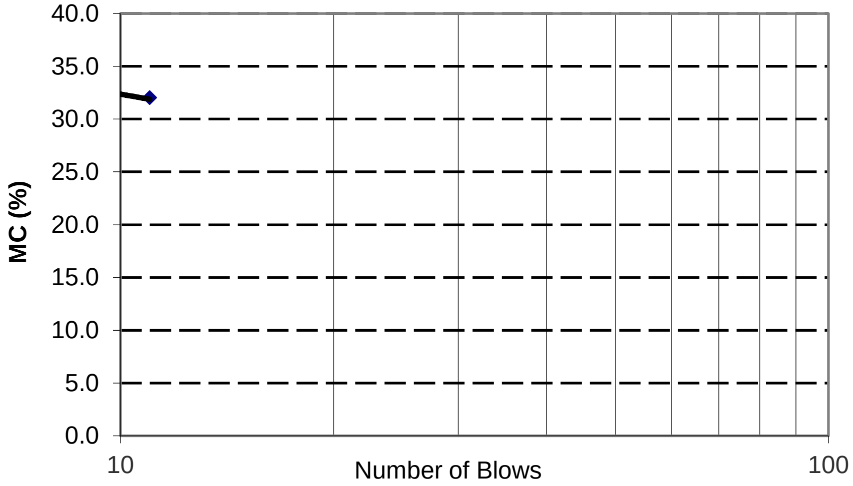
Report of Atterberg Limits

ASTM D4318-10 - Method A

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15361S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/13/16
Material Source:	BH-108, BULK, 1-10'	**Tested By:**	SLH

Liquid Limit	**28**
Plastic Limit	
Plasticity Index	**Non-Plastic**

LIQUID LIMIT CURVE



Material Retained On the No. 40 Sieve: 11%

As-received Moisture Content: 15%

Comments:

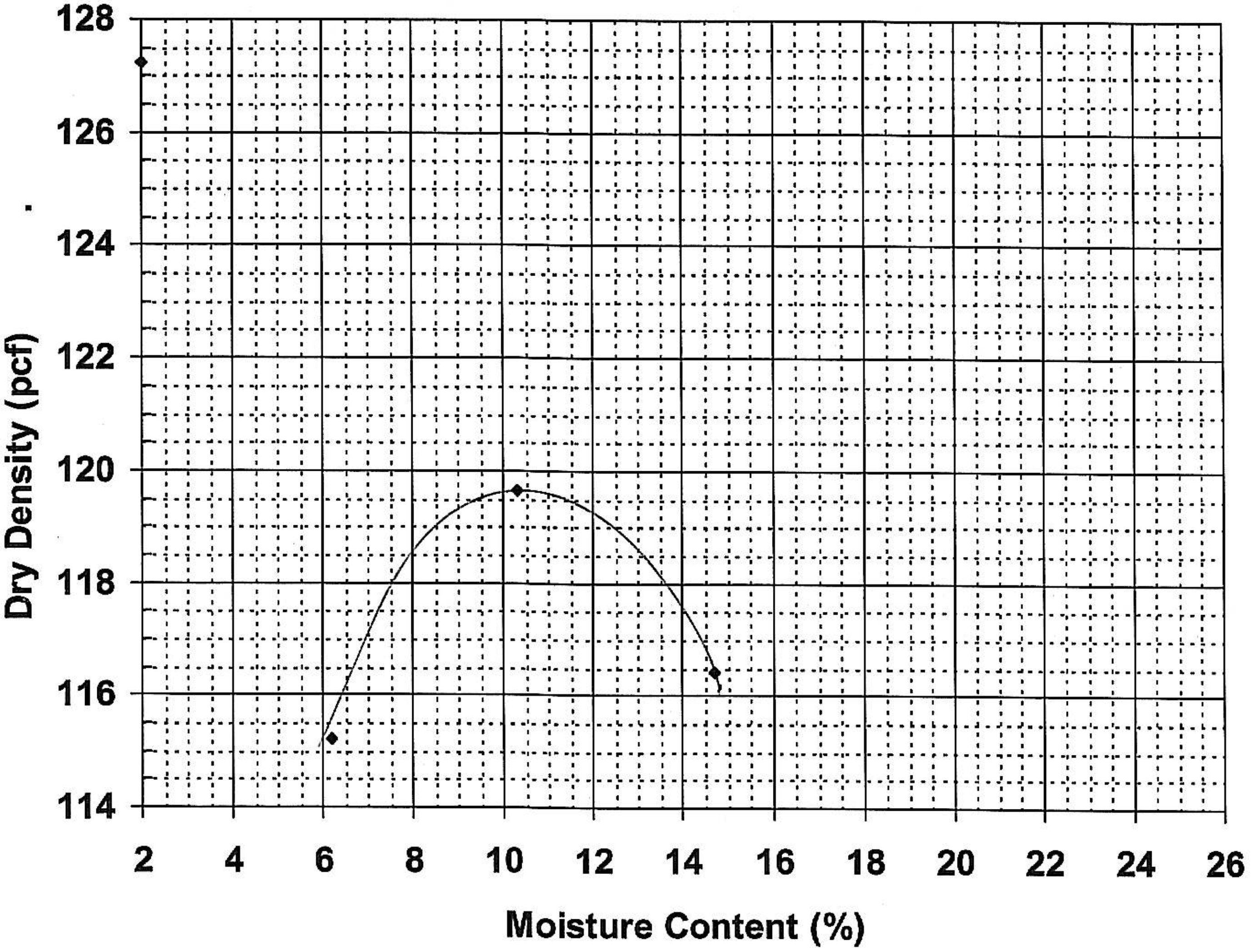
Reviewed By: CBM

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	15348S
Material Type	SM	Date Received	11/22/2016
Material Source	BH-105, BULK, 1-6'	Date Completed	12/13/2016
		Tested By	BRADLEY GERSCHWILER

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	119.7
Optimum Moisture Content (%)	10.3
Percent Oversized	7.5%

Corrected Dry Density (pcf)	**121.9**
Corrected Moisture Content (%)	**9.7**

CBM

Comments

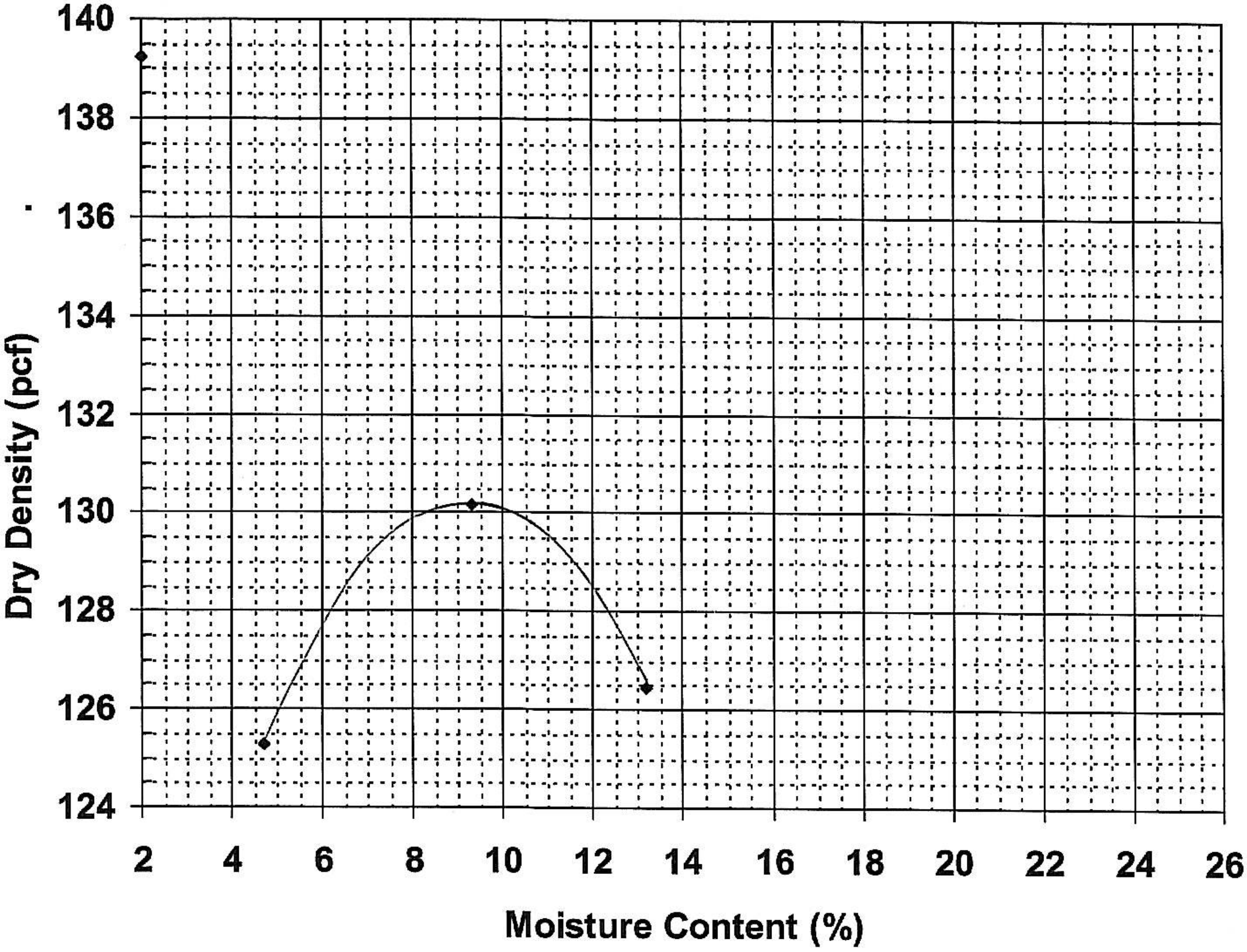
S.W.COLE
ENGINEERING, INC.

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	15352S
Material Type	SM	Date Received	11/22/2016
Material Source	BH-106, BULK, 5-15'	Date Completed	12/13/2016
		Tested By	BRADLEY GERSCHWILER

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	130.2
Optimum Moisture Content (%)	9.3
Percent Oversized	8.6%

Corrected Dry Density (pcf)	**132.2**
Corrected Moisture Content (%)	**8.7**

CBM

Comments

10 Centre Road, Somersworth, NH 03878-2926 • Tel (603) 692-0088 • Fax (603) 692-0044 • www.swcole.com

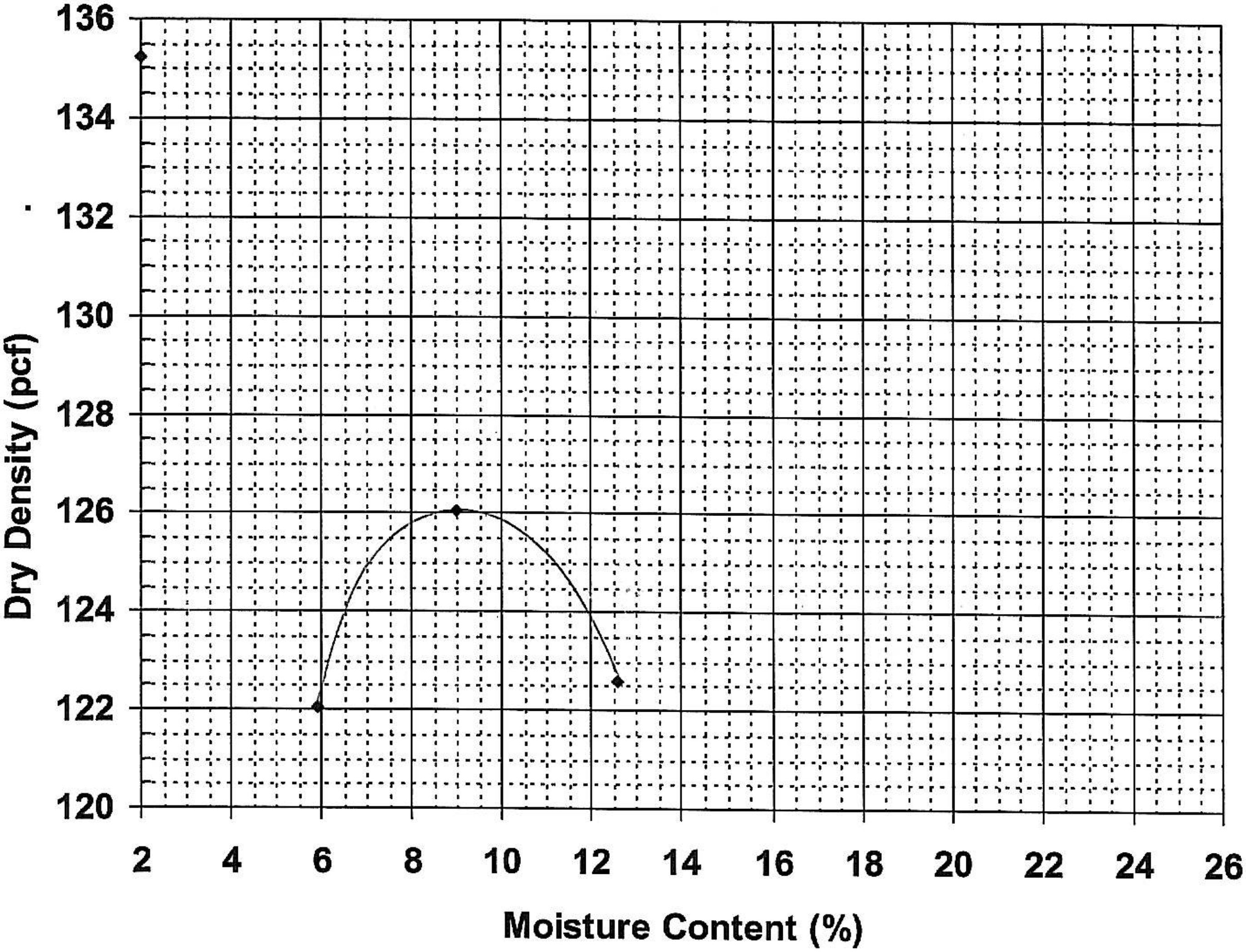
S.W.COLE
ENGINEERING, INC.

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	15361S
Material Type	SM	Date Received	11/22/2016
Material Source	BH-108, BULK, 1-10'	Date Completed	12/13/2016
		Tested By	ANTONIO SANTIAGO

Moisture-Density Relationship Curve



Maximum Dry Density (pcf)	126.1
Optimum Moisture Content (%)	9
Percent Oversized	6.9%

Corrected Dry Density (pcf)	**127.8**
Corrected Moisture Content (%)	**8.5**

CBM

Comments

S.W.COLE
ENGINEERING, INC.

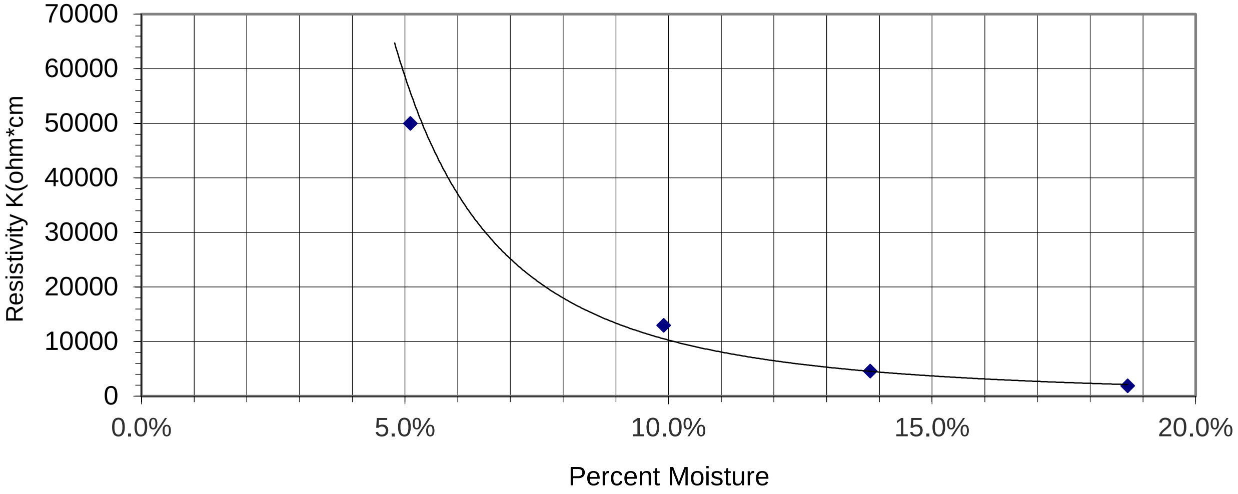
Report of Soil Resistivity

AASHTO T288

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15348S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/12/16
Material Source:	BH-105, BULK, 1-6'	**Tested By:**	BLG

Minimum Soil Resistivity 1,900 ohm-cm

Soil Temperature 20.5 °C



Comments:

Reviewed By: CBM

S.W.COLE
ENGINEERING, INC.

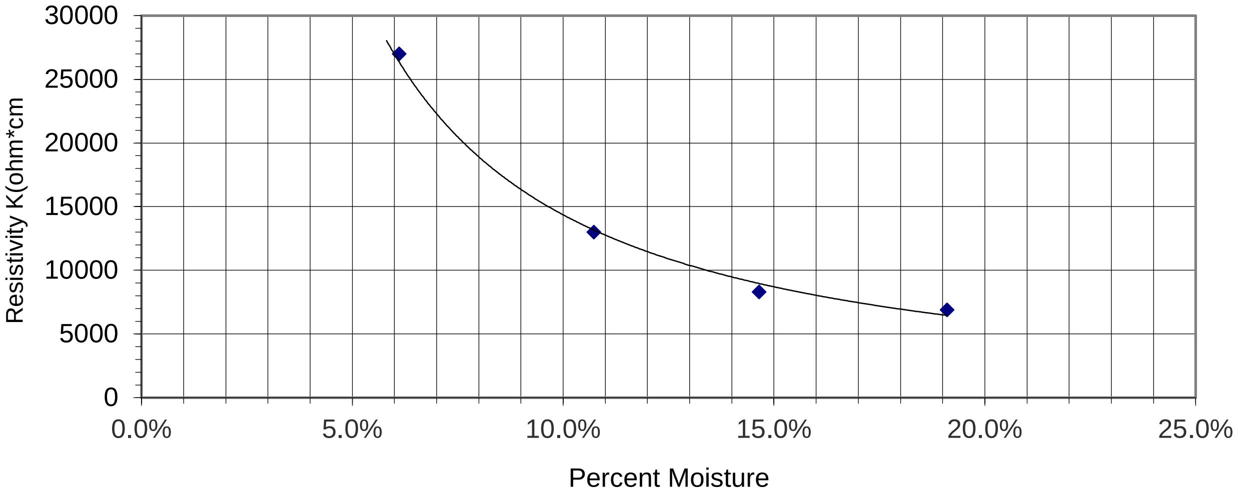
Report of Soil Resistivity

AASHTO T288

Project Name:	Northern Pass Transmission Line	**Project Number:**	16-0600
Project Location:	Various, NH	**Lab ID:**	15352S
Client:	SWCOLE Explorations, LLC	**Date Received:**	11/22/16
Material Description:	SM	**Date Completed:**	12/12/16
Material Source:	BH-106, BULK, 5-15'	**Tested By:**	BLG

Minimum Soil Resistivity 6,900 ohm-cm

Soil Temperature 20.5 °C



Comments:

Reviewed By: CBM

Laboratory Report

Absolute Resource associates
124 Heritage Avenue Portsmouth NH 03801

Chad Michaud
S.W. Cole Engineering Inc.
10 Centre Road
Somersworth, NH 03878-2926

PO Number: None
Job ID: 38616
Date Received: 11/22/16

Project: None

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

(for)

Sue Sylvester
Principal, General Manager

Date of Approval: 12/8/2016
Total number of pages: 3

Absolute Resource Associates Certifications

New Hampshire	1732	Massachusetts	M-NH902
Maine	NH903		

Project ID: None

Job ID: 38616

Sample#: 38616-001

Sample ID: BH-105, Bulk, 1-6'

Matrix: Solid Percent Dry: 73.6% Results expressed on a dry weight basis.

Sampled: 11/22/16 9:30

Parameter	Result	Reporting Limit	Units	Instr Dil'n Factor	Analyst	Prep Date	Batch	Analysis Date	Analysis Time	Reference
Chloride	< 6.8	6.8	ug/g	1	JZL		1603363	12/2/16	18:13	E300.0A
Sulfate	< 6.8	6.8	ug/g	1	JZL		1603363	12/2/16	18:13	E300.0A
pH	**5.8**		pH	1	APA		1603274	11/29/16	4:35	SW9045C

PAGE 1 OF 1

Absolute Resource
associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

38616

Company Name: SWCOLE
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:
Project #:
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 # ____

ANALYSIS REQUEST

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix: WATER	Matrix: SOLID	Matrix: OTHER	Preservation Method: HCl	HNO$_3$	H$_2$SO$_4$	NaOH	MeOH	Sampling: DATE	TIME	SAMPLER	☐ 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	☐ 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)
38616-01	BH-105, BULK, 1-6'			X							11/22	9:30										X								X							
-02	INF-802, BULK, 1-6'			X							11/22	9:30										X								X							

TAT REQUESTED
Priority (24 hr)* ☐
Expedited (48 hr)* ☐
Standard (10 Business Days) X
*Date Needed ____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS

OK per Client history.

REPORTING INSTRUCTIONS ☐ PDF (e-mail address) CMICHAUD@SWCOLE.COM
☐ HARD COPY REQUIRED ☐ FAX (FAX#)

RECEIVED ON ICE ☐ YES ☐ NO
TEMPERATURE 10 °C

CUSTODY RECORD

Relinquished by Sampler:	Date 11/22	Time 12:00	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by Laboratory:	Date 11/22/16	Time 12:00

QSD-01 Revision 10/14/15

Laboratory Report

Absolute Resource associates
124 Heritage Avenue Portsmouth NH 03801

Chad Michaud
S.W. Cole Engineering Inc.
10 Centre Road
Somersworth, NH 03878-2926

PO Number: None
Job ID: 38757
Date Received: 12/7/16

Project: NPT 16-0600

Attached please find results for the analysis of the samples received on the date referenced above.

The following report has been reissued to report sulfate, as requested by the customer.

Unless otherwise noted in the attached report, the analyses performed met the requirements of Absolute Resource Associates' Quality Assurance Plan. The Standard Operating Procedures are based upon USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Wastewater, Standard Methods for the Examination of Water and Wastewater and other recognized methodologies. The results contained in this report pertain only to the samples as indicated on the chain of custody.

Absolute Resource Associates maintains certification with the agencies listed below.

We appreciate the opportunity to provide laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be glad to assist you.

Sincerely,
Absolute Resource Associates

(for)

Sue Sylvester
Principal, General Manager

Date of Approval: 12/15/2016
Total number of pages: 3

Absolute Resource Associates Certifications

New Hampshire	1732	Massachusetts	M-NH902
Maine	NH903		

Project ID: NPT 16-0600

Job ID: 38757

Sample#: 38757-001

Sample ID: B-106 BULK 5-15'

Matrix: Solid Percent Dry: 85.2% Results expressed on a dry weight basis.

Sampled: 12/5/16 9:00

Parameter	**Result**	**Reporting Limit**	**Units**	**Instr Dil'n Factor**	**Analyst**	**Prep Date**	**Batch**	**Analysis Date**	**Analysis Time**	**Reference**
Chloride	< 5.9	5.9	ug/g	1	JZL		1603408	12/8/16	18:52	E300.0A
Sulfate	**12**	5.9	ug/g	1	JZL		1603472	12/14/16	21:30	E300.0A
pH	**5.4**		pH	1	APA		1603387	12/8/16	3:45	SW9045C

PAGE 1 OF 1

Absolute Resource associates

124 Heritage Avenue #16
Portsmouth, NH 03801
603-436-2001
absoluteresourceassociates.com

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

38757

Company Name: SWCOLE
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 #: 16-0600
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 # ____

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
- ☐ 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)

Lab Sample ID (Lab Use Only)	Field ID	# CONTAINERS	Matrix: WATER	Matrix: SOLID	Matrix: OTHER	Preservation Method: HCl	HNO₃	H₂SO₄	NaOH	MeOH	Sampling: DATE	TIME	SAMPLER
38757-01	B-106 BULK 5-15'	1		X							12/5/16	9:00	CSM

TAT REQUESTED
Priority (24 hr)* ☐
Expedited (48 hr)* ☒
Standard (10 Business Days) ☐
*Date Needed ____

See absoluteresourceassociates.com for sample acceptance policy and current accreditation lists.

SPECIAL INSTRUCTIONS
Report Sulfate, not nitrate
- per C. Michaud 12/14/16

historically not on ice - proceed per client 12/7/16

REPORTING INSTRUCTIONS ☒ PDF (e-mail address) CMICHAUD@SWCOLE.COM
☐ HARD COPY REQUIRED ☐ FAX (FAX#)

RECEIVED ON ICE ☐ YES ☒ NO
TEMPERATURE 21 °C

CUSTODY RECORD

Relinquished by Sampler:	Date 12-7	Time 2:24	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by Laboratory:	Date 12/7/16	Time 14:24

QSD-01 Revision 10/14/15

Client:	Quanta Subsurface		
Project:	Northern Pass - Transition Station #1		
Location:	Pittsburg, NH	Project No:	GTX-305684
Boring ID: ---	Sample Type: ---	Tested By:	rlc
Sample ID: ---	Test Date: 12/01/16	Checked By:	jsc
Depth : ---	Test Id: 399255		

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 106	R2	38.20-38.55	169	5062	2	Yes	---
BH 109	R1	21.75-22.10	172	3107	2	Yes	---
BH 110	R1	10.05-10.37	176	15020	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:	12/1/2016
Project Name:	Northern Pass - Transition Station #1	Tested By:	rlc
Project Location:	Pittsburg, NH	Checked By:	jsc
GTX #:	305684		
Boring ID:	BH 106		
Sample ID:	R2		
Depth:	38.20-38.55 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:	3.96	3.96	3.96		
Specimen Diameter, in:	1.99	1.99	1.99		
Specimen Mass, g:	548.39				
Bulk Density, lb/ft^3	169			**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.0			**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	-0.00060	-0.00050	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90^o)	-0.00020	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040

Difference between max and min readings, in:

0° = 0.00060 90° = 0.00040

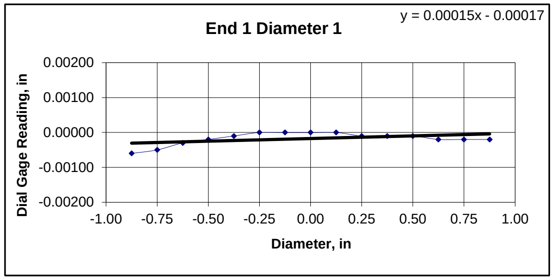
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00020	-0.00010	-0.00010	-0.00020	-0.00020	-0.00010	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	0.00000	0.00000
Diameter 2, in (rotated 90^o)	-0.00080	-0.00070	-0.00060	-0.00050	-0.00030	-0.00020	-0.00010	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00050	-0.00050	-0.00060

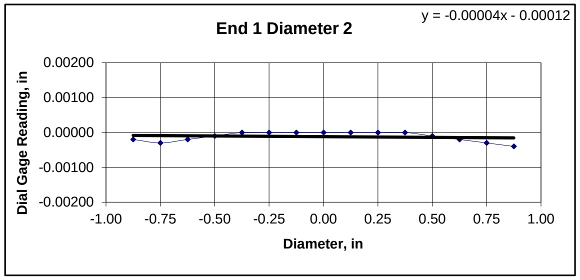
Difference between max and min readings, in:

0° = 0.0003 90° = 0.0008

Maximum difference must be < 0.0020 in. Difference = ± 0.00040

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

Slope of Best Fit Line 0.00015

Angle of Best Fit Line: 0.00859

End 2:

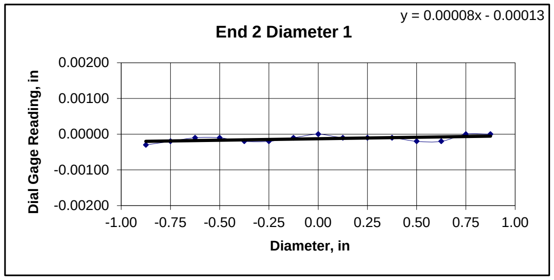
Slope of Best Fit Line 0.00008

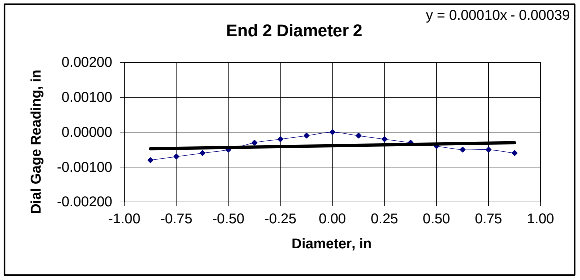
Angle of Best Fit Line: 0.00458

Maximum Angular Difference: 0.00401

Parallelism Tolerance Met? YES

Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line 0.00004

Angle of Best Fit Line: 0.00229

End 2:

Slope of Best Fit Line 0.00010

Angle of Best Fit Line: 0.00573

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	0.00060	1.990	0.00030	0.017	YES
Diameter 2, in (rotated 90^o)	0.00040	1.990	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00030	1.990	0.00015	0.009	YES
Diameter 2, in (rotated 90^o)	0.00080	1.990	0.00040	0.023	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Transition Station #1
Project Location:	Pittsburg, NH
GTX #:	305684
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 106
Sample ID:	R2
Depth, ft:	38.20-38.55

After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	11/30/2016
Project Name:	Northern Pass - Transition Station #1	Tested By:	rlc
Project Location:	Pittsburg, NH	Checked By:	jsc
GTX #:	305684		
Boring ID:	BH 109		
Sample ID:	R1		
Depth:	21.75-22.10 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:	4.12	4.12	4.12		
Specimen Diameter, in:	1.99	1.98	1.99		
Specimen Mass, g:	577.9				
Bulk Density, lb/ft^3	172			**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	-0.00030	-0.00020	-0.00010	0.00000	0.00010	0.00020	0.00010	0.00000	0.00000	0.00000	0.00010	0.00010	0.00020	0.00030	0.00040
Diameter 2, in (rotated 90^o)	0.00020	0.00010	0.00010	0.00010	0.00000	0.00000	0.00010	0.00000	0.00000	0.00010	0.00020	0.00030	0.00040	0.00040	0.00030

Difference between max and min readings, in:

0° = 0.00070 90° = 0.00040

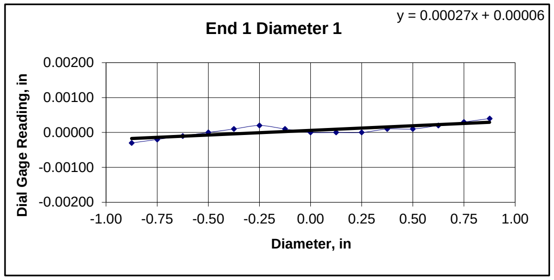
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00020	-0.00010	-0.00010	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020
Diameter 2, in (rotated 90^o)	-0.00040	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	0.00010	0.00020

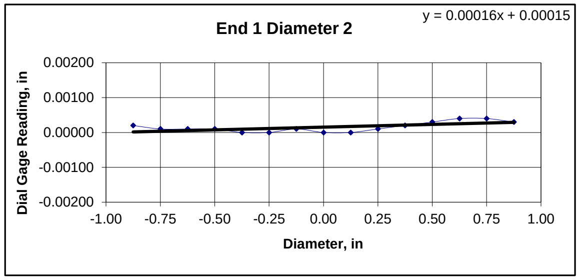
Difference between max and min readings, in:

0° = 0.0005 90° = 0.0006

Maximum difference must be < 0.0020 in. Difference = ± 0.00035

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

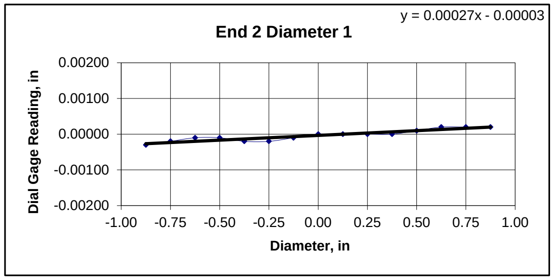
Slope of Best Fit Line 0.00027
Angle of Best Fit Line: 0.01547

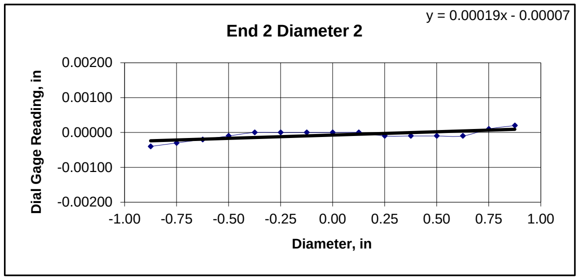
End 2:

Slope of Best Fit Line 0.00027
Angle of Best Fit Line: 0.01547

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES
Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00917

End 2:

Slope of Best Fit Line 0.00019
Angle of Best Fit Line: 0.01089

Maximum Angular Difference: 0.00172

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1)

(Calculated from End Flatness and Parallelism measurements above)

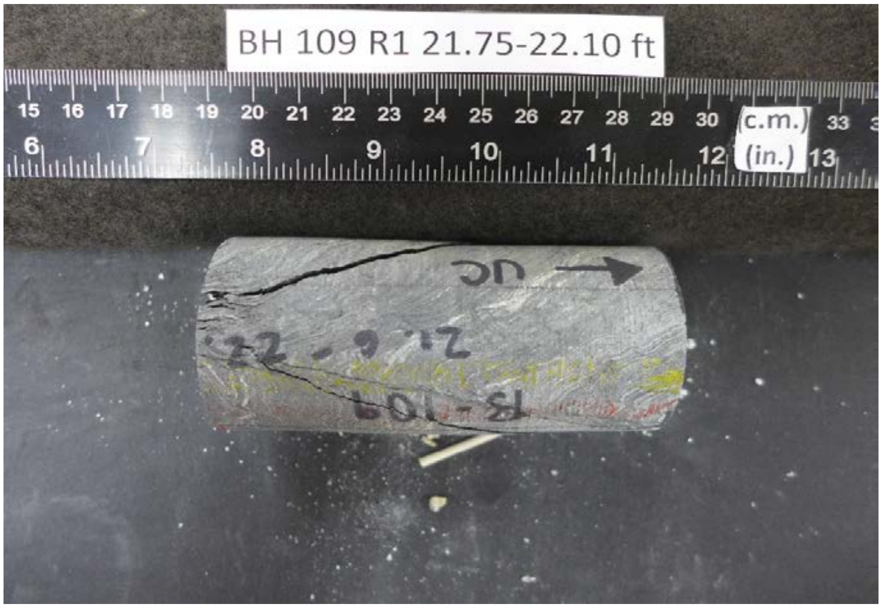
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00070	1.985	0.00035	0.020	YES
Diameter 2, in (rotated 90^o)	0.00040	1.985	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00050	1.985	0.00025	0.014	YES
Diameter 2, in (rotated 90^o)	0.00060	1.985	0.00030	0.017	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Transition Station #1
Project Location:	Pittsburg, NH
GTX #:	305684
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 109
Sample ID:	R1
Depth, ft:	21.75-22.10

After cutting and grinding



After break

GeoTesting EXPRESS

Client:	Quanta Subsurface	Test Date:	12/1/2016
Project Name:	Northern Pass - Transition Station #1	Tested By:	rlc
Project Location:	Pittsburg, NH	Checked By:	jsc
GTX #:	305684		
Boring ID:	BH 110		
Sample ID:	R1		
Depth:	10.05-10.37 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:	4.07	4.07	4.07		
Specimen Diameter, in:	1.98	1.97	1.98		
Specimen Mass, g:	576.95				
Bulk Density, lb/ft^3	176			**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	0.00040	0.00030	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00040	0.00030	0.00020	0.00010	0.00000
Diameter 2, in (rotated 90^o)	0.00010	0.00000	0.00010	0.00020	0.00020	0.00010	0.00000	0.00000	0.00000	0.00040	0.00030	0.00020	0.00010	0.00000	0.00010

Difference between max and min readings, in:

0° = 0.00040 90° = 0.00040

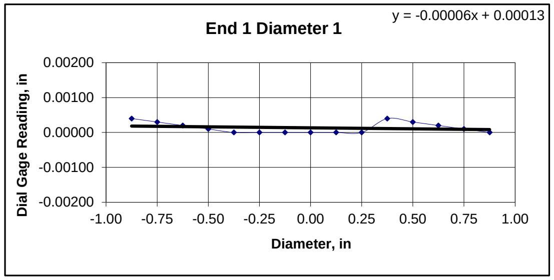
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00060	0.00040	0.00030	0.00020	0.00010	0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00030	0.00040	0.00050	0.00060
Diameter 2, in (rotated 90^o)	0.00000	0.00010	0.00020	0.00030	0.00050	0.00030	0.00010	0.00000	0.00000	0.00000	0.00010	0.00020	0.00040	0.00050	0.00030

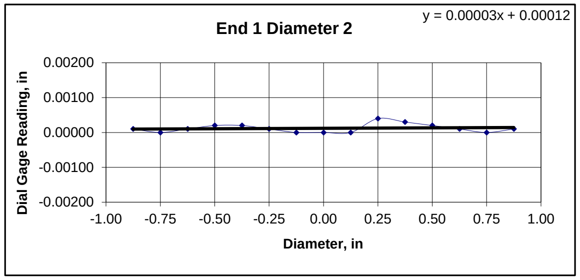
Difference between max and min readings, in:

0° = 0.0006 90° = 0.0005

Maximum difference must be < 0.0020 in. Difference = ± 0.00030

Flatness Tolerance Met? YES





DIAMETER 1

End 1:

Slope of Best Fit Line 0.00006

Angle of Best Fit Line: 0.00344

End 2:

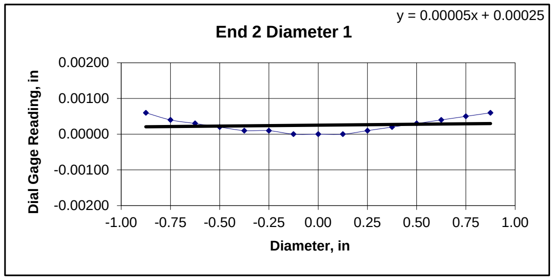
Slope of Best Fit Line 0.00005

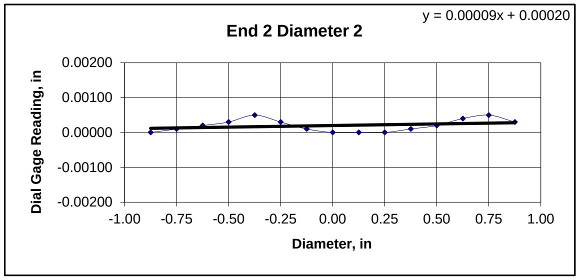
Angle of Best Fit Line: 0.00286

Maximum Angular Difference: 0.00057

Parallelism Tolerance Met? YES

Spherically Seated





DIAMETER 2

End 1:

Slope of Best Fit Line 0.00003

Angle of Best Fit Line: 0.00172

End 2:

Slope of Best Fit Line 0.00009

Angle of Best Fit Line: 0.00516

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	1.975	0.00020	0.012	YES
Diameter 2, in (rotated 90^o)	0.00040	1.975	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00060	1.975	0.00030	0.017	YES
Diameter 2, in (rotated 90^o)	0.00050	1.975	0.00025	0.015	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Quanta Subsurface
Project Name:	Northern Pass - Transition Station #1
Project Location:	Pittsburg, NH
GTX #:	305684
Test Date:	12/1/2016
Tested By:	rlc
Checked By:	jsc
Boring ID:	BH 110
Sample ID:	R1
Depth, ft:	10.05-10.37

After cutting and grinding

After break

Appendix E
Infiltration Field Test Results

QUANTA SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name: Northern Pass TL - Transition Station #1
Project Number: 16004
Client: PAR Electrical Contractors
Test Location: Infiltration Boring INF 101

Test Date: 11/19-11/20/2016
Tested By: L. Gschwind
Reviewed By: J.T. McGinnis

FIELD TEST DATA

Run #1	Date: 11/19 Time: 13:35	Run #2	Date: 11/19 Time: 14:40	Run #3	Date: 11/20 Time: 08:15	Run #4	Date: 11/20 Time: 09:20
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	0.78	0	0.78	0	0.80	0	0.80
1	0.78	1	0.78	1	0.80	1	0.80
2	0.78	2	0.78	2	0.80	2	0.80
3	0.78	3	0.78	3	0.80	3	
4	0.78	4	0.78	4		4	
5	0.78	5	0.78	5		5	
6	0.78	6		6		6	
7	0.78	7		7		7	
8	0.78	8		8		8	
9	0.78	9		9		9	
10	0.78	10	0.78	10		10	
15	0.78	15	0.78	15		15	
20	0.78	20		20		20	
25	0.78	25		25		25	
30	0.78	30	0.78	30	0.80	30	0.80
45	0.78	45	0.78	45		45	
60	0.78	60	0.78	60	0.80	60	0.80
(ft/hr)	0.00	(ft/hr)	0.00	(ft/hr)	0.00	(ft/hr)	0.00
(in/hr)	**0.00**	**(in/hr)**	**0.00**	**(in/hr)**	**0.00**	**(in/hr)**	**0.00**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**0.00**
Pre-Soak Performed on 11/18/2016 at 12:28	
Hole Depth from Top of Casing (ft)	12.6
Casing Stickup from Ground Surface (ft)	1.6
Pre-Infiltration Test Water Depth from Top of Casing (ft)	1.7

(See Note 3 below)

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.
3) The high water level measurement resulted from the drill crew flushing hole out immediately following casing installation; see the INF 101 boring log for the appropriate groundwater level.

FIELD INFILTRATION TEST RESULTS

Project Name: Northern Pass TL - Transition Station #1
Project Number: 16004
Client: PAR Electrical Contractors
Test Location: Infiltration Boring INF 102

Test Date: 11/19-11/20/2016
Tested By: L. Gschwind
Reviewed By: J.T. McGinnis

FIELD TEST DATA

Run #1	**Date: 11/19 Time: 14:10**	**Run #2**	**Date: 11/19 Time: 15:15**	**Run #3**	**Date: 11/20 Time: 08:22**	**Run #4**	**Date: 11/20 Time: 09:30**
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	5.23	0	5.23	0	5.17	0	5.15
1	5.23	1	5.24	1	5.18	1	5.15
2	5.24	2	5.24	2	5.18	2	5.15
3	5.24	3	5.25	3	5.19	3	
4	5.26	4	5.26	4		4	
5	5.27	5	5.27	5		5	
6	5.27	6		6		6	
7	5.27	7		7		7	
8	5.28	8		8		8	
9	5.29	9		9		9	
10	5.30	10	5.30	10	5.24	10	5.21
15	5.32	15	5.33	15		15	
20	5.34	20		20		20	
25	5.38	25		25		25	
30	5.41	30	5.43	30	5.39	30	5.41
45	5.50	45	5.48	45	5.51	45	5.56
60	5.58	60	5.60	60	5.64	60	5.61
(ft/hr)	0.35	(ft/hr)	0.37	(ft/hr)	0.47	(ft/hr)	0.46
(in/hr)	**4.20**	**(in/hr)**	**4.44**	**(in/hr)**	**5.64**	**(in/hr)**	**5.52**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**4.95**	
Pre-Soak Performed on 11/18/2016 at 12:42		
Hole Depth from Top of Casing (ft)	13.0	
Casing Stickup from Ground Surface (ft)	2.0	
Pre-Infiltration Test Water Depth from Top of Casing (ft)	6.9	(See Note 3 below)

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.

3) The high water level measurement resulted from the drill crew flushing hole out immediately following casing installation; see the INF 102 boring log for the appropriate groundwater level.

QUANTA
SUBSURFACE
Engineering + Construction

FIELD INFILTRATION TEST RESULTS

Project Name: Northern Pass TL - Transition Station #1
Project Number: 16004
Client: PAR Electrical Contractors
Test Location: Infiltration Boring INF 103

Test Date: 11/19-11/20/2016
Tested By: L. Gschwind
Reviewed By: J.T. McGinnis

FIELD TEST DATA

Run #1	Date: 11/19 Time: 13:05	Run #2	Date: 11/19 Time: 14:10	Run #3	Date: 11/19 Time: 15:15	Run #4	Date: 11/20 Time: 08:45
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	5.51	0	5.51	0	5.51	0	5.42
1	5.54	1	5.56	1	5.54	1	5.46
2	5.55	2	5.58	2	5.57	2	5.48
3	5.56	3	5.60	3	5.58	3	
4	5.56	4	5.60	4		4	
5	5.57	5	5.60	5		5	
6	5.59	6		6		6	
7	5.59	7		7		7	
8	5.60	8		8		8	
9	5.60	9		9		9	
10	5.61	10	5.63	10	5.63	10	
15	5.65	15	5.66	15	5.66	15	5.57
20	5.69	20		20		20	
25	5.70	25		25		25	
30	5.71	30	5.73	30	5.73	30	5.66
45	5.78	45	5.80	45	5.79	45	5.72
60	5.86	60	5.85	60	5.85	60	5.78
(ft/hr)	0.35	(ft/hr)	0.34	(ft/hr)	0.34	(ft/hr)	0.36
(in/hr)	**4.20**	**(in/hr)**	**4.08**	**(in/hr)**	**4.08**	**(in/hr)**	**4.32**

TEST SUMMARY

Average Infiltration Rate (in/hr)	**4.17**
Pre-Soak Performed on 11/18/2016 at 13:05	
Hole Depth from Top of Casing (ft)	7.9
Casing Stickup from Ground Surface (ft)	1.9
Pre-Infiltration Test Water Depth from Top of Casing (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.

Appendix F
Summary of Geotechnical Design Parameters

Summary of Geotechnical Design Parameters
Transition Station #1

Boring BH 101

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)
Glaciofluvial Deposits	0	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
	1	2	SM	9	110	29	-	-	-
	2	6	SM	100+	140	43	-	-	-
	6	10	SM	27	63	34	-	-	-

Boring BH 102

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2							
	2	4	SM	49	63	38	-	-	-
	4	6	SM/GP-GM	19	58	32	-	-	-
	6	8	GP-GM	39	68	36	-	-	-
Till	8	13	SM	55	68	39	-	-	-

Boring BH 103

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	2	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2							
	2	6	SM	15	53	31	-	-	-
Till	6	15	SM/ML	63	73	39	-	-	-

Summary of Geotechnical Design Parameters (cont)
Transition Station #1

Boring BH 104

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2	SM	9	48	29	-	-	-
	2	4	SM	29	58	34			
	4	8	GM	100+	78	43			
	8	15	SM	35	63	35	-	-	-

Boring BH 105

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	2	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	2	8	SM/ML	18	53	31	-	-	-
	8	13	ML	8	53	27	-	-	-
Till	13	22	SM	66	73	41	-	-	-

Boring BH 106

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2	SM	10	110	29	-	-	-
	2	6	SM	39	125	35			
	6	8	SM	21	58	32	-	-	-
	8	13	SM	53	68	39	-	-	-
Till	13	33	SM/ML	84	73	40	-	-	-
Bedrock	33	48	F Phyllite[1]	100+	113	-	-	52.8	5,500

[1] Assumed UCS = 4,000 psi; GSI = 50 (excellent rock)

Summary of Geotechnical Design Parameters (cont)
Transition Station #1

Boring BH 107

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2							
	2	9	SM	15	53	31	-	-	-
Till	9	11	SM	66	73	41	-	-	-
Bedrock	11	13.5	HW Phyllite	-	88	45	-	-	-

Boring BH 108

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2	SM	9	110	29	-	-	-
	2	8	SM	37	125	36	-	-	-
Bedrock	8	12	HW Phyllite	-	88	45	-	-	-
	12	27	F Phyllite[1]	-	113	-	-	52.8	5,500

[1] Assumed UCS = 4,000 psi; GSI = 50 (excellent rock)

Boring BH 109

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	8	SM	23	58	32	-	-	-
	8	20	GM/SM	39	63	35	-	-	-
Bedrock	20	21	HW Phyllite	100+	88	45	-	-	-
	33	48	F Phyllite[1]	-	113	-	-	52.8	5,500

[1] Assumed UCS = 4,000 psi; GSI = 50 (excellent rock)

Summary of Geotechnical Design Parameters (cont)
Transition Station #1

Boring BH 110

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	1	REMOVE AND REPLACE WITH CONTROLLED STRUCTURAL FILL						
Glaciofluvial Deposits	1	2	SM	8	110	29	-	-	-
	2	7.5	SM	39	125	35	-	-	-
Bedrock	7.5	10	HW Phyllite	100+	88	45	-	-	-
	10	25	F Phyllite[1]	-	113	-	-	52.8	5,500

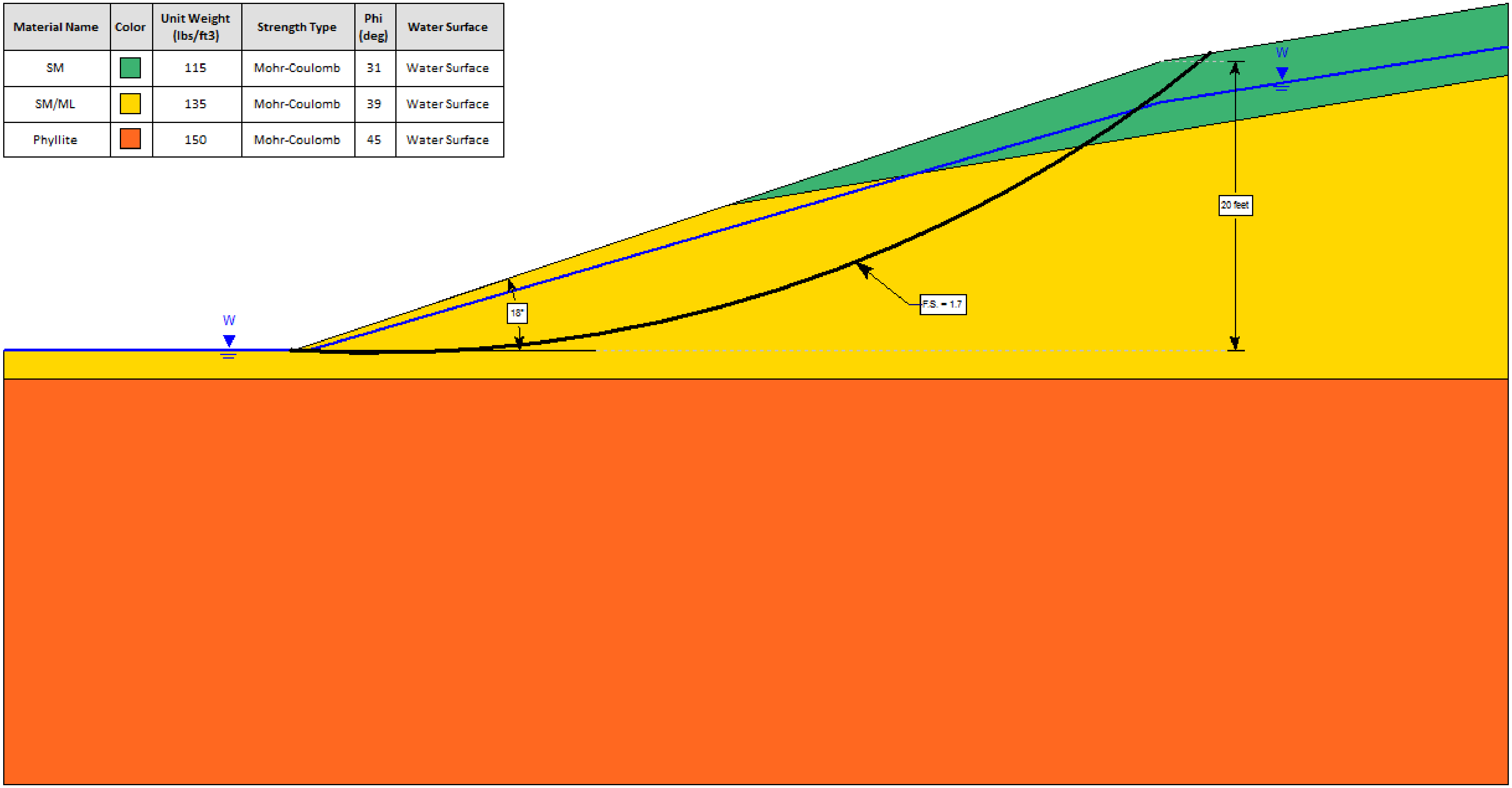
[1] Assumed UCS = 4,000 psi; GSI = 50 (excellent rock)

Controlled Structural Fill

Sublayer Description	Sublayer Depth (ft)		Material Description	Average N_{60}	Effective Unit Weight (pcf)	Friction Angle (deg)	Undrained Strength (psf)	Bedrock (Rock Mass Equivalent Mohr-Coulomb Fit)	
	Top	Bot.						Friction Angle (deg)	Cohesion (psf)
Structural Fill	-	-	SM/ML	-	125	30	-	-	-

Appendix G

SLIDE 7.0 Stability Outputs



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Phi (deg)	Water Surface
SM	🟩	115	Mohr-Coulomb	31	Water Surface
SM/ML	🟨	135	Mohr-Coulomb	39	Water Surface
Phyllite	🟧	150	Mohr-Coulomb	45	Water Surface

Base Map: Slide 7.0.

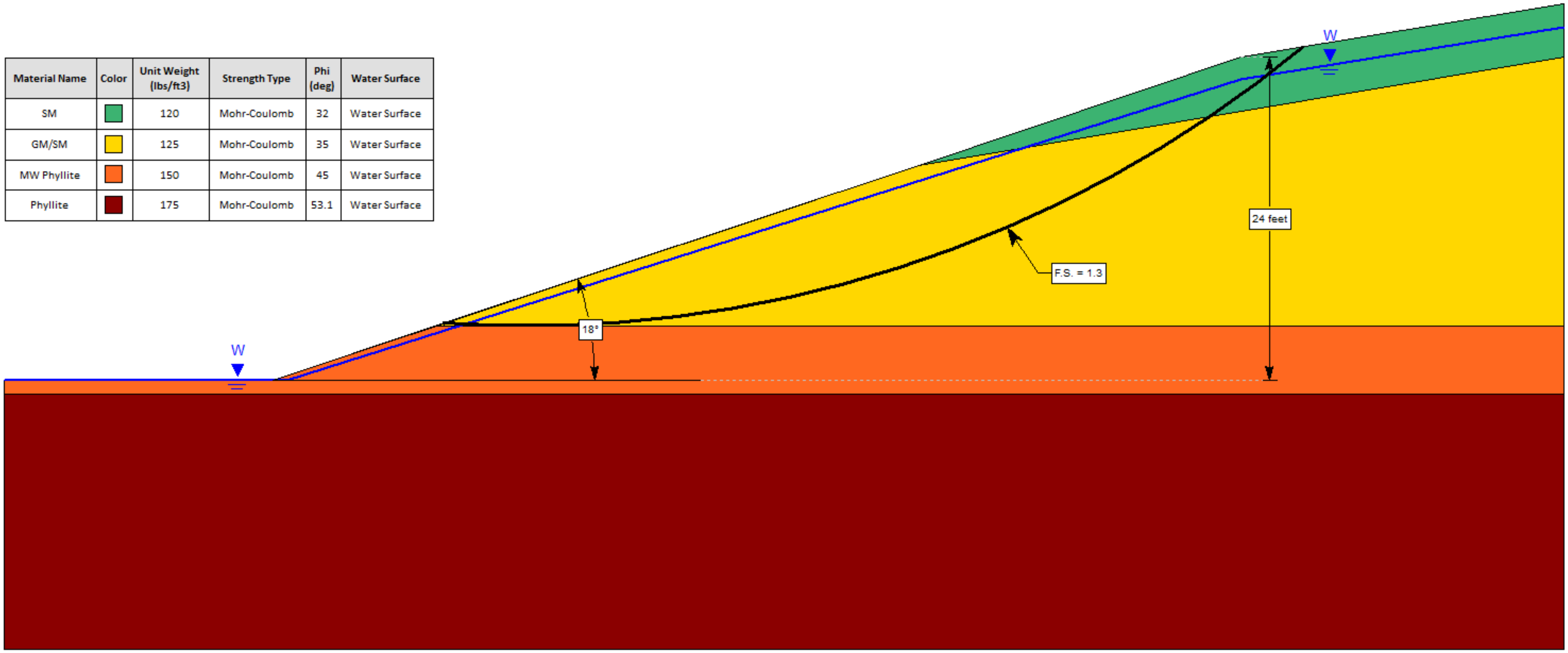
Date: December 2016

Project No.: 16004

Output 1 - BH 103 3 (H) to 1 (V)

QUANTA SUBSURFACE
Engineering – Construction

Northern Pass TL – Transition Station #1
Slope Stability Analysis



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Phi (deg)	Water Surface
SM	🟩	120	Mohr-Coulomb	32	Water Surface
GM/SM	🟨	125	Mohr-Coulomb	35	Water Surface
MW Phyllite	🟧	150	Mohr-Coulomb	45	Water Surface
Phyllite	🟥	175	Mohr-Coulomb	53.1	Water Surface

Base Map: Slide 7.0.

Date: December 2016

Project No.: 16004

Output 1 - BH 109 3 (H) to 1 (V)

Northern Pass TL – Transition Station #1
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-A	Pre-A	Pre-Dev Watershed Map Area A	Forest/Rural Open		NO	31.88	0.00	0.00	0.00		31.88	0.00	0.00	0.11	0.00	0.00	0.00	0.00		0.11	31.99	0.34%	0.34%
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		
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-A	Post-A	Post-Dev Watershed Map Area A	Forest/Rural Open	Detention Basin 1	NO	9.39	0.00	0.00	1.08	grassed open area, no fertilizer	10.47	0.00	0.00	0.24	0.00	0.00	0.00	0.00		0.24	10.71	2.24%	2.24%
Post-Development	Post-B	Post-B	Post-Dev Watershed Map Area B	Forest/Rural Open	Detention Basin 1	NO	0.00	0.00	0.27	0.11	grassed open area, no fertilizer	0.38	0.00	0.00	0.03	0.00	0.00	0.00	0.00		0.03	0.41	7.32%	7.32%
Post-Development	Post-C	Post-C	Post-Dev Watershed Map Area C	Forest/Rural Open		YES	0.00	0.00	0.00	0.21	grassed open area, no fertilizer	0.21	0.00	0.00	0.31	0.00	0.00	0.00	0.00		0.31	0.52	59.62%	0.00%
Post-Development	Post-D	Post-D	Post-Dev Watershed Map Area D	Forest/Rural Open		NO	0.00	0.00	0.00	0.07	grassed open area, no fertilizer	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.07	0.00%	0.00%
Post-Development	Post-E	Post-E	Post-Dev Watershed Map Area E	Forest/Rural Open		NO	9.12	0.00	0.00	0.34	grassed open area, no fertilizer	9.46	0.00	0.00	0.05	0.00	0.00	0.00	0.00		0.05	9.51	0.53%	0.53%
Post-Development	Post-F	Post-F	Post-Dev Watershed Map Area F	Forest/Rural Open		YES	10.33	0.00	0.00	0.11		10.44	0.00	0.00	0.06	0.00	0.00	0.00	0.00		0.06	10.50	0.57%	0.00%
Post-Development	Post-G	Post-G	Post-Dev Watershed Map Area G	Forest/Rural Open	Detention Basin 1	NO	0.00	0.00	0.00	0.11		0.11	0.00	0.00	0.00	0.00	0.00	0.17	0.00		0.17	0.28	60.71%	60.71%
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		
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):	**1/4/2017**
Project Name:	**Transition Station #1**
Town/City:	**Pittsburg, Coos County**
Impacted Surface Waters:	**Upper Connecticut River**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

Average Annual Precipitation P	**40.20**	**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 percen of area that is managed turf that is fertilized annually**

PRE-DEVELOPMENT CONDITIONS

	Area	**Impervious Area**
Total Area (All Sub-Areas) (acres)	**31.99**	**0.11**

Insert information for 1st sub-area below

Sub_Area_ID	**Pre-A**	
Point of Analysis (PoA) Number	**Pre-A**	
Total Area for Sub-Area (acres)	**31.99**	**0.11**

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	31.99	0.34%
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 CONDITIONS

	Area	**Impervious Area**	**Area Fertilized Annually**
	32.00	**0.49**	**0.00**

Sub_Area_ID	**Post-A**		
Point of Analysis (PoA) Number	**Post-A**		
Total Area in Sub-Area (acres)	**10.71**	**0.24**	**0.00**

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	10.71	2.24%	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		
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-B		
Point of Analysis (PoA) Number	Post-B		
Total Area in Sub-Area (acres)	0.41	0.03	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	0.41	7.32%	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-C		
Point of Analysis (PoA) Number	Post-C		
Total Area in Sub-Area (acres)	0.52	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	0.52	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-D**		
Point of Analysis (PoA) Number	**Post-D**		
Total Area in Sub-Area (acres)	**0.07**	**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	0.07	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-E**		
Point of Analysis (PoA) Number	**Post-E**		
Total Area in Sub-Area (acres)	**9.51**	**0.05**	**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	9.51	0.53%	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-F**		
Point of Analysis (PoA) Number	**Post-F**		
Total Area in Sub-Area (acres)	**10.50**	**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	10.50	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-G**		
Point of Analysis (PoA) Number	**Post-G**		
Total Area in Sub-Area (acres)	**0.28**	**0.17**	**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	0.28	60.71%	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

Date (MM/DD/YYYY): 1/4/2017
Project Name: Transition Station #1
Town/City: Pittsburg, Coos County
Impacted Surface Waters: Upper Connecticut River
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			TSS	TP	TN
Pre-A			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%
0.00			0%	0%	0%

POST DEVELOPMENT **INPUT BMP DESCRIPTIONS** **INPUT OVERALL REMOVAL EFFICIENCIES (%) FOR POLLUTANTS OF CONCERN**

Sub-Area			TSS	TP	TN
Post-A	Detention Basin 1 (Wet Extended Detention Pond)		80%	68%	55%
Post-B	Detention Basin 1 (Wet Extended Detention Pond)		80%	68%	55%
Post-C			0%	0%	0%
Post-D			0%	0%	0%
Post-E			0%	0%	0%
Post-F			0%	0%	0%
Post-G	Detention Basin 1 (Wet Extended Detention Pond)		80%	68%	55%
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): **1/4/2017**
Project Name: **Transition Station #1**
Town/City: **Pittsburg, Coos County**
Impacted Surface Waters: **Upper Connecticut River**
Applicant: **Northern Pass Transmission, LLC.**
DES File #:

TOTAL PRE -DEVELOPMENT (PRE-DEV) AREA (ACRES) =	31.99
TOTAL PRE-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.11
TOTAL PRE-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	0.3%
TOTAL POST DEVELOPMENT (POST-DEV) AREA (ACRES) =	32.00
TOTAL POST-DEV EFFECTIVE IMPERVIOUS AREA (ACRES) =	0.49
TOTAL POST-DEV PERCENT EFFECTIVE IMPERVIOUS (%) =	1.5%
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)	708.3	1.5	24.2
PRE DEVELOPMENT LOADS (WITH BMPS)	708.3	1.5	24.2
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)	851.1	1.8	29.0
POST DEVELOPMENT LOADS (WITH BMPS)	528.9	1.2	21.5
POST DEVELOPMENT LOAD REDUCTION DUE TO BMPS	322.3	0.6	7.6
POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE)	-179.4	-0.3	-2.7
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-25.3%	-18.5%	-11.1%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	16.8%	16.8%	16.8%

Date (MM/DD/YYYY):	**1/4/2017**
Project Name:	**Transition Station #1**
Town/City:	**Pittsburg, Coos County**
Impacted Surface Waters:	**Upper Connecticut River**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-179.4
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-25.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	16.8%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	37.9%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-21.1%

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-A	Pre-A	31.99	0.11	NA	TSS	NA		708.3	708.3	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%
PRE	0.00		0.00	0.00	NA	TSS	NA		0.0	0.0	0.0	0.0%
		TOTAL	31.99	0.11				TOTAL	708.3	708.3	0.0	0.0%

Date (MM/DD/YYYY): 1/4/2017
Project Name: Transition Station #1
Town/City: Pittsburg, Coos County
Impacted Surface Waters: Upper Connecticut River
Applicant: Northern Pass Transmission, LLC.
DES File #:

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-179.4
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-25.3%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	16.8%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	37.9%
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	-21.1%

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-A	Post-A	10.71	0.24	0.00	TSS	NA	Detention Basin 1 (Wet Extended Detention Pond)	313.4	62.7	250.7	80.0%
POST	Post-B	Post-B	0.41	0.03	0.00	TSS	NA	Detention Basin 1 (Wet Extended Detention Pond)	19.8	4.0	15.8	80.0%
POST	Post-C	Post-C	0.52	0.00	0.00	TSS	NA		10.8	10.8	0.0	0.0%
POST	Post-D	Post-D	0.07	0.00	0.00	TSS	NA		1.5	1.5	0.0	0.0%
POST	Post-E	Post-E	9.51	0.05	0.00	TSS	NA		217.1	217.1	0.0	0.0%
POST	Post-F	Post-F	10.50	0.00	0.00	TSS	NA		218.9	218.9	0.0	0.0%
POST	Post-G	Post-G	0.28	0.17	0.00	TSS	NA	Detention Basin 1 (Wet Extended Detention Pond)	69.6	13.9	55.7	80.0%
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	32.00	0.49	0.00			TOTAL	851.1	528.9	322.3	37.9%

Date (MM/DD/YYYY):	**1/4/2017**
Project Name:	**Transition Station #1**
Town/City:	**Pittsburg, Coos County**
Impacted Surface Waters:	**Upper Connecticut River**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	-0.3
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	-18.5%
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	16.8%
CURRENTLY PROPOSED REMOVAL EFFICIENCY	32.2%
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-A	Pre-A	31.99	0.11	NA	TP	NA		1.5	1.5	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%
PRE	0.00		0.00	0.00	NA	TP	NA		0.0	0.0	0.0	0.0%
		TOTAL	31.99	0.11				TOTAL	1.5	1.5	0.0	0.0%

TP SUB_AREA SUMMARY

Date (MM/DD/YYYY): 1/4/2017
Project Name: Transition Station #1
Town/City: Pittsburg, Coos County
Impacted Surface Waters: Upper Connecticut River
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-A	Post-A	10.71	0.24	0.00	TP	5.0%	Detention Basin 1 (Wet Extended Detention Pond)	0.7	0.2	0.5	68.0%
POST	Post-B	Post-B	0.41	0.03	0.00	TP	5.0%	Detention Basin 1 (Wet Extended Detention Pond)	0.0	0.0	0.0	68.0%
POST	Post-C	Post-C	0.52	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	Post-D	Post-D	0.07	0.00	0.00	TP	5.0%		0.0	0.0	0.0	0.0%
POST	Post-E	Post-E	9.51	0.05	0.00	TP	5.0%		0.5	0.5	0.0	0.0%
POST	Post-F	Post-F	10.50	0.00	0.00	TP	5.0%		0.5	0.5	0.0	0.0%
POST	Post-G	Post-G	0.28	0.17	0.00	TP	5.0%	Detention Basin 1 (Wet Extended Detention Pond)	0.2	0.0	0.1	68.0%
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	32.00	0.49	0.00			TOTAL	1.8	1.2	0.6	32.2%

Date (MM/DD/YYYY):	**1/4/2017**
Project Name:	**Transition Station #1**
Town/City:	**Pittsburg, Coos County**
Impacted Surface Waters:	**Upper Connecticut River**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

TOTAL POST DEVELOPMENT - PRE DEVELOPMENT (SHOULD BE 0 OR NEGATIVE) (lbs/yr)	**-2.7**
% DIFFERENCE FROM PRE DEVELOMENT LOADS (SHOULD BE 0 OR NEGATIVE)	**-11.1%**
TOTAL REMOVAL EFFICIENCY NEEDED TO MEET PRE-DEVELOPMENT LOAD	**16.8%**
CURRENTLY PROPOSED REMOVAL EFFICIENCY	**26.0%**
REMAINING REMOVAL EFFICIENCY NECESSARY TO MEET PRE-DEVELOPMENT LOAD	**-9.3%**

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-A	Pre-A	31.99	0.11	NA	TN	NA		24.2	24.2	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%
PRE	0.00		0.00	0.00	NA	TN	NA		0.0	0.0	0.0	0.0%
		TOTAL	31.99	0.11				TOTAL	24.2	24.2	0.0	0.0%

Date (MM/DD/YYYY):	**1/4/2017**
Project Name:	**Transition Station #1**
Town/City:	**Pittsburg, Coos County**
Impacted Surface Waters:	**Upper Connecticut River**
Applicant:	**Northern Pass Transmission, LLC.**
DES File #:	

POST-DEVELOPMENT

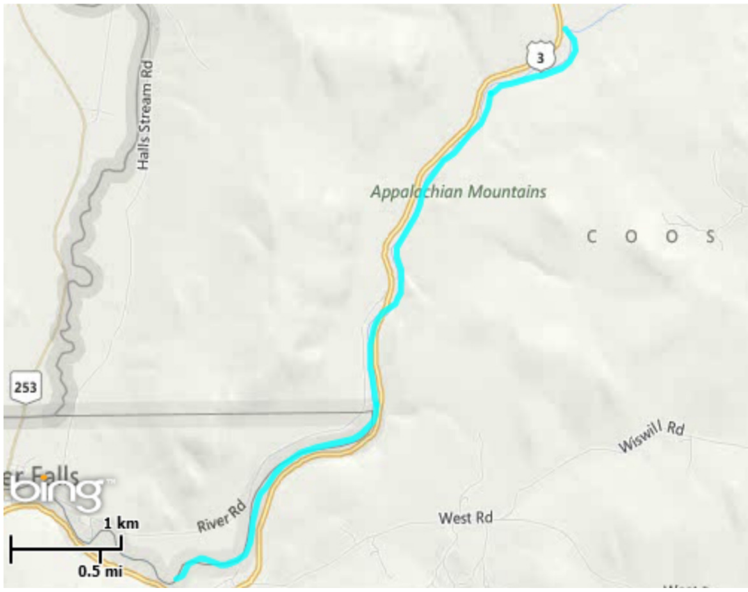
PRE OR POST - DEV	SUB-AREA	POINT OF ANALYSIS NUMBER	AREA (acres)	Effective Impervious Area (acres)	Area Fertilized Annually (acres)	POLLUTANT	PERCENT REDUCTION IN FERTILIZER APPLICATION RATE	BMPS	LOAD (NO BMPS) (lbs/yr)	LOAD (WITH BMPS) (lbs/yr)	LOAD REDUCTION DUE TO BMPS (lbs/yr)	PERCENT REMOVAL
POST	Post-A	Post-A	10.71	0.24	0.00	TN	3.5%	Detention Basin 1 (Wet Extended Detention Pond)	10.7	4.8	5.9	55.0%
POST	Post-B	Post-B	0.41	0.03	0.00	TN	3.5%	Detention Basin 1 (Wet Extended Detention Pond)	0.7	0.3	0.4	55.0%
POST	Post-C	Post-C	0.52	0.00	0.00	TN	3.5%		0.4	0.4	0.0	0.0%
POST	Post-D	Post-D	0.07	0.00	0.00	TN	3.5%		0.0	0.0	0.0	0.0%
POST	Post-E	Post-E	9.51	0.05	0.00	TN	3.5%		7.4	7.4	0.0	0.0%
POST	Post-F	Post-F	10.50	0.00	0.00	TN	3.5%		7.5	7.5	0.0	0.0%
POST	Post-G	Post-G	0.28	0.17	0.00	TN	3.5%	Detention Basin 1 (Wet Extended Detention Pond)	2.4	1.1	1.3	55.0%
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	32.00	0.49	0.00			TOTAL	29.0	21.5	7.6	26.0%

Return to home page

On This Page

- Water Quality Assessment Status
- Causes of Impairment
- Probable Sources Contributing to Impairments
- TMDLs That Apply to This Waterbody
- Previous Causes of Impairment Now Attaining All Uses

2010 Waterbody Report for Connecticut River



Click on the waterbody for an interactive map

State: New Hampshire
Waterbody ID: NHRIV801010203-07
Location: 010801010203, Connecticut River, Unknown Fishery
State Waterbody Type: River
EPA Waterbody Type: Rivers and Streams
Water Size: 4.348
Units: miles
Watershed Name: Upper Connecticut

Waterbody History Report

Data are also available for these years: 2008 2006 2004 2002

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)

Water Quality Assessment Status for Reporting Year 2010

The overall status of this waterbody is Impaired.

Description of this table

Designated Use	Designated Use Group	Status
Aquatic Life	Fish, Shellfish, And Wildlife Protection And Propagation	Impaired

Drinking Water Supply	Public Water Supply	Good
Fish Consumption	Aquatic Life Harvesting	Impaired
Primary Contact Recreation	Recreation	Good
Secondary Contact Recreation	Recreation	Good
Wildlife	Fish, Shellfish, And Wildlife Protection And Propagation	Not Assessed

---

Causes of Impairment for Reporting Year 2010

Description of this table

Cause of Impairment	Cause of Impairment Group	Designated Use (s)	State TMDL Development Status
Lead	Metals (other than Mercury)	Aquatic Life	TMDL needed
Mercury	Mercury	Fish Consumption	TMDL completed
pH	pH/Acidity/Caustic Conditions	Aquatic Life	TMDL needed

Probable Sources Contributing to Impairment for Reporting Year 2010

Description of this table

Probable Source	Probable Source Group	Cause(s) of Impairment
Atmospheric Deposition - Toxics	Atmospheric Deposition	Mercury
Source Unknown	Unknown	Lead; 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

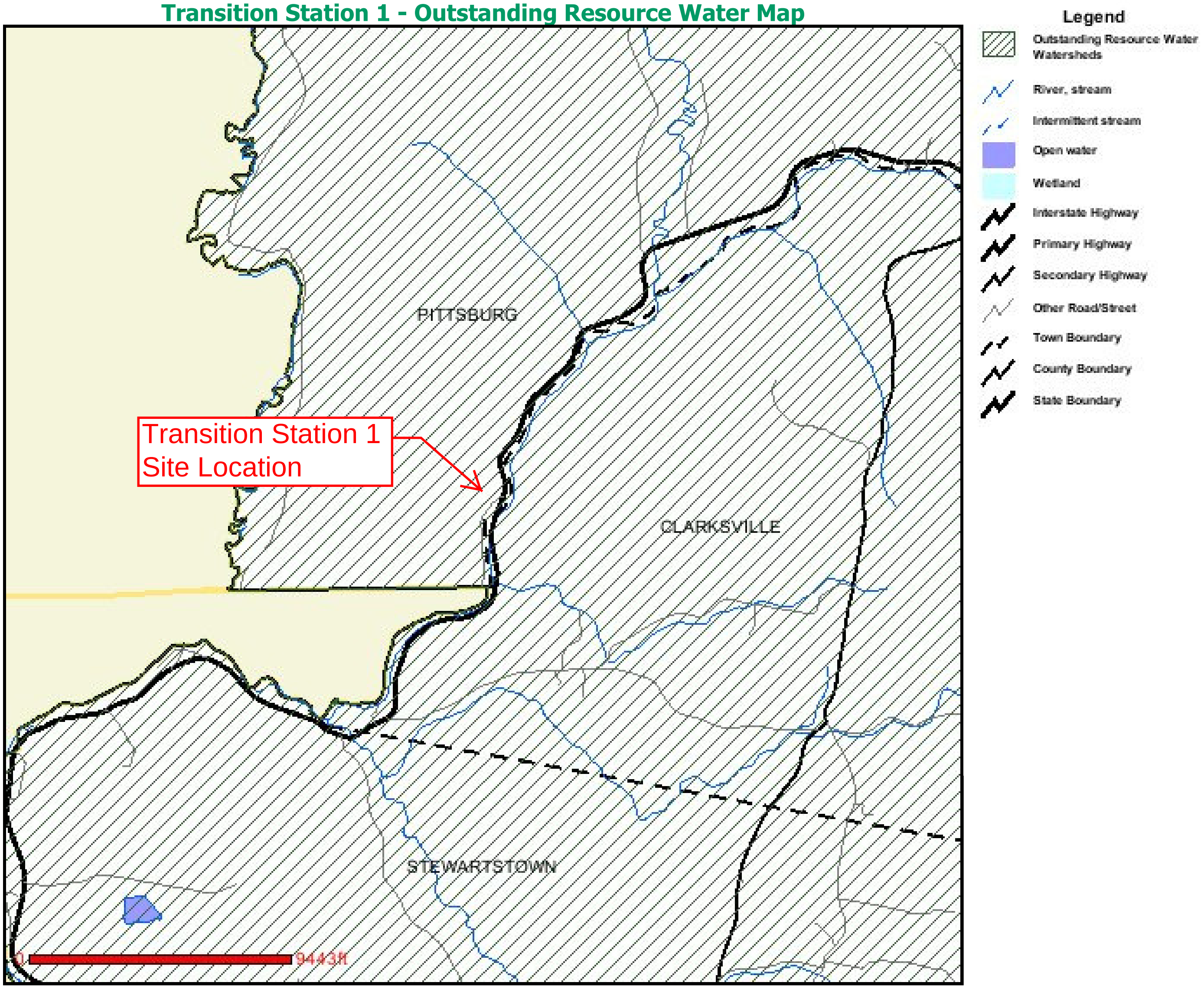
Description of this table

Cause of Impairment	Cycles Listed	WQS Attainment Date	WQS Attainment Reason	WQS Attainment Comments
Polychlorinated Biphenyls (PCBs)	2002, 2004, 2006	Sep-30-2009	Applicable WQS attained, due to change in WQS.	

New Hampshire Department of Environmental Services

OneStop Program GIS

Transition Station 1 - Outstanding Resource Water Map



Map Scale = 1 : 116047 (1" = 1.8 miles or 9671 feet)

Map prepared 7/15/2015 8:56:05 AM

GRANIT Complex Systems Research Center

Developed in
cooperation with
NH GRANIT

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