NORMANDEAU ASSOCIATES
Environmental Consultants

December 14, 2016

Craig Rennie
NH Department of Environmental Services
Wetlands Bureau
29 Hazen Drive
PO Box 95
Concord, NH 03302-0095

Re: Northern Pass Wetland Application - Wetland File No. SEC -2-15-02817

Dear Mr. Rennie:

On behalf of Northern Pass Transmission LLC, Normandeau Associates Inc. is submitting this request to supplement the application for a Standard Dredge and Fill Permit for the Northern Pass Transmission Line Project from Pittsburg to Londonderry, NH. This request will address the replacement or repair of culverts which do not meet the standards in the NHDES stream rules (Env-Wt 900) on proposed off-ROW access roads. These roads are located on Wagner Forest lands in Coos County, are used primarily for forestry purposes, and were permitted under a forestry Permit by Notification. The proposed change of use to construction access triggers the stream rule requirement, as identified in data request #A-7 in the Department of Environmental Services May 16, 2016 Progress Report to the NH Site Evaluation Committee. The culvert work will improve aquatic habitat connectivity and stormwater flow in streams crossed by logging roads that Northern Pass is planning to use for construction of the Project.

Northern Pass conducted a culvert inventory along the off-ROW access roads that were proposed for use during Northern Pass construction. Based on that inventory, several access roads were eliminated from the project, as alternative routes were available. Surveys were conducted at 48 stream crossings on the remaining off-ROW access roads. Survey data and watershed analyses revealed that twenty four existing culverts require replacement, two culverts must be re-installed, and three culverts require repair to meet the stream rules. The culverts include 19 Tier 1 culverts, seven Tier 2 culverts, and three Tier 3 culverts (for a total of twenty nine). Field data was collected by VHB and Normandeau Associates, Inc. at each culvert location. The relevant data and the culvert design plans prepared by VHB, Inc. are attached.

The proposed culvert work will require impacts to 4,253 square feet of wetland and streambed resources, and 1,204 linear feet of streams/banks. The wetland permit application fee for the additional impacts is $850.60, and a check in this amount is attached. The original October 2015 wetland permit application for Northern Pass addressed 6,170,053 square feet of impact and included a check for $ 1,234,210.55. The total requested impact quantity for the Northern Pass Project as

summarized on the attached work sheet is now 6,174,306 square feet and the total fee is $1,235,061.15. The application fee worksheets for the additional impacts and for the new Project total are also attached. Because this culvert work is self-mitigating, it will not require a supplemental ARM fund payment.

In summary, we are making a request to supplement the wetland permit applications to the NHDES (SEC -2-15-02817) and the US Army Corps of Engineers (NAE 2013-02188) to increase the total amount of impact by an additional 4,253 square feet to bring the culverts on off-ROW access roads up to stream rule standards. Please feel free to call me with any additional questions. Thank you very much for your assistance with this application.

Sincerely,

Lee E. Carbonneau

Lee E. Carbonneau, CWS, PWS
Normandeau Associates, Inc.
as agent for:
Northern Pass Transmission, LLC.

Attach.

Cc: Lori Sommer, NH DES
David Keddell, US Army Corps of Engineers
Kevin McCune, Eversource Energy
Pamela G. Monroe, SEC Administrator

14. IMPACT AREA: for the additional impacts associated with ORAR culvert replacements, repairs and re-installations only.

JURISDICTIONAL AREA	PERMANENT	TEMPORARY
Forested wetland	☐	☐
Scrub-shrub wetland	☐	☐
Emergent wetland	☐	☐
Wet meadow	☐	☐
Intermittent stream	☐	☐
Perennial Stream / River	/ ☐	/ ☐
Lake / Pond	/ ☐	/ ☐
Bank - Intermittent stream	/ ☐	/ ☐
Bank - Perennial stream / River	/ ☐	/ ☐
Bank - Lake / Pond	/ ☐	/ ☐
Tidal water	/ ☐	/ ☐
Salt marsh	☐	☐
Sand dune	☐	☐
Prime wetland	☐	☐
Prime wetland buffer	☐	☐
Undeveloped Tidal Buffer Zone (TBZ)	☐	☐
Previously-developed upland in TBZ	☐	☐
Docking - Lake / Pond	☐	☐
Docking - River	☐	☐
Docking - Tidal Water	☐	☐
TOTAL	/	/

15. APPLICATION FEE: See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee: Flat fee of $ 200

☒ Minor or Major Impact Fee: Calculate using the below table below

Permanent and Temporary (non-docking)	sq. ft.	X	$
Temporary (seasonal) docking structure:	sq. ft.	X	$
Permanent docking structure:	sq. ft.	X	$
Projects proposing shoreline structures (including docks) add $200			$
		Total =	$
The Application Fee is the above calculated Total or $200, whichever is			$

14. IMPACT AREA - For the entire Northern Pass project, including the original permit application request plus the new culvert-related impacts.

JURISDICTIONAL AREA	PERMANENT	TEMPORARY
Forested wetland	☐ ATF	☐ ATF
Scrub-shrub wetland	☐ ATF	☐ ATF
Emergent wetland	☐ ATF	☐ ATF
Wet meadow	☐ ATF	☐ ATF
Intermittent stream	☐ ATF	☐ ATF
Perennial Stream / River	/ ☐ ATF	/ ☐ ATF
Lake / Pond	/ ☐ ATF	/ ☐ ATF
Bank - Intermittent stream	/ ☐ ATF	/ ☐ ATF
Bank - Perennial stream / River	/ ☐ ATF	/ ☐ ATF
Bank - Lake / Pond	/ ☐ ATF	/ ☐ ATF
Tidal water	/ ☐ ATF	/ ☐ ATF
Salt marsh	☐ ATF	☐ ATF
Sand dune	☐ ATF	☐ ATF
Prime wetland	☐ ATF	☐ ATF
Prime wetland buffer	☐ ATF	☐ ATF
Undeveloped Tidal Buffer Zone (TBZ)	☐ ATF	☐ ATF
Previously-developed upland in TBZ	☐ ATF	☐ ATF
Docking - Lake / Pond	☐ ATF	☐ ATF
Docking - River	☐ ATF	☐ ATF
Docking - Tidal Water	☐ ATF	☐ ATF
TOTAL	/	/

15. APPLICATION FEE: See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee: Flat fee of $ 200

☒ Minor or Major Impact Fee: Calculate using the below table below

Permanent and Temporary (non-docking)	sq. ft.	X	$0.20	$
Temporary (seasonal) docking structure:	sq. ft.	X	$1.00 –	$
Permanent docking structure:	sq. ft.	X	$2.00 –	$
Projects proposing shoreline structures (including docks) add $200 =				$
Total =				$
The Application Fee is the above calculated Total or $200, whichever is greater =				$

CULVERT CALCULATIONS & SIZING REPORT

NPT ORAR
Culvert Improvements

Coos County, New Hampshire

PREPARED FOR

THE NORTHERN PASS℠

Eversource Energy

PREPARED BY

vhb

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110
603.391.3900

DECEMBER 15, 2016

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Culvert Sizing Information

Project Description

It is VHB's understanding that the NHDES will require Eversource to meet Env-Wt 900 stream crossing requirements as part of their Northern Pass Transmission (NPT) project for existing off right-of-way access roads (ORAR's) in Coos County, New Hampshire. The majority of the access roads are owned and managed by Bayroot, LLC and Wagner Forest Management, LTD and are currently used for logging activities. These roads will provide access for maintenance and/or construction of the transmission lines in support of the project. As part of the evaluation process, 29 of the existing culverts were identified as stream crossings that will require repair, resetting, or replacement. These crossing include (19) Tier 1 crossings, (7) Tier 2 crossings, and (3) Tier 3 crossings. 3 are proposed to be repaired, 1 is to be reset, and 25 are to be replaced

In addition to the 29 stream crossings reviewed, there are a number of additional culverts and bridges located along the access roads. These culverts/bridges are either located at stream crossings and were determined to meet NHDES requirements for stream crossings or they carry stormwater runoff from roadside drainage ditches. As such, these additional crossings are not required to be evaluated and/or upgraded as part of the project.

The following calculations and information was prepared by VHB to evaluate each of the stream crossing sites and to document the methodology and results used in determining the proposed improvements.

Methodology & Design Criteria

VHB used two separate methodologies to evaluate the design flows and culvert hydraulics for each of the crossings. VHB analyzed the design flows using the USGS StreamStats web application and analyzed the culvert's hydraulic capacity using the methodology contained in the Federal Highway Administration's (FHA's) Hydraulic Design Series Number 5 (Hydraulic Design of Highway Culverts). The following sections summarize the design parameters/constraints that were used in the designs.

Hydrologic Model (Design Flows)

VHB estimated the design flows for each of the culvert locations using the USGS StreamStats web application (Beta version 4). StreamStats is a Web-based Geographic Information Systems (GIS) based application that is accepted by the NHDES and is referenced on the Wetland Bureau's Stream Crossing web page. It is partly based on the ArcHydro Data Model and Tools and partly on Python scripts, and is implemented using ArcGIS Server technology. It incorporates a map-based user interface for site selection; a relational database that contains information for data-collection stations; a GIS program that delineates drainage basins and measures basin characteristics; and a GIS database that contains digital representations of the land surface (digital elevation models and derivative products), historic climate data, and other data needed for locating sites of interest in the user interface, delineating drainage basins, measuring drainage-basin characteristics, and searching upstream and downstream along streams from selected sites to identify activities that may affect streamflow or water quality at the sites.

The watershed areas for each of the crossings were based on USGS topography and manually entered into StreamStats. In addition to the stream crossings, there are several culverts that carry flow from drainage ditches along the roads that may intercept some of the runoff to the stream crossings. These drainage culverts were generally ignored in the watershed delineations to provide a slightly conservative flow estimate and because their exact locations, size and conditions were not inventoried.

In addition, VHB used SCS TR-20 methodology and the hydrologic program HydroCAD as a means to compute estimated flows to compare to the flows calculated by StreamStats. The flows estimated by HydroCAD were generally slightly higher than the flows calculated by StreamStats. However, the StreamStats flows were determined to be more representative of the drainage areas and, therefore, utilized in the design of the culverts. As such, the HydroCAD flows have not been included with the Culvert Calculations.

Hydraulic Calculations (Culvert Sizing)

VHB used the methodology contained in the Federal Highway Administration's Hydraulic Design Series Number 5 (HDS-5) – Hydraulic Design of Highway Culverts to analyze the hydraulic capacity of the culverts. The computer program CulvertMaster (Bentley) was used to calculate the maximum headwater at each crossing based on the proposed culvert characteristics and the HDS-5 methodology. Culvert sizing was based on a 50-year design storm for Tier 1 crossings and a 100-year design storm for Tier 2 and Tier 3 crossings.

The existing culverts at the majority of the crossings were determined to be undersized with many of the outlets projecting from the road embankments above the stream channel. In addition, the majority of the existing culverts have minimal cover over them. In its' design, VHB has set the culvert inverts at the stream bottom where the existing conditions allow. However, several of the locations require that the inlets be lowered below the stream bed to achieve the required flow capacity and cover. In order to maintain reasonable pipe slopes, it was necessary to set several of the pipe outlets above the stream channel. In general, these conditions occurred where the stream channel dropped significantly from the upstream side of the road to the downstream side.

Culvert Information Tables

The following tables provide a summary the drainage areas, design flows, existing culvert size, and proposed culvert size for each of the stream crossings that were evaluated.

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Table 1: Northern Area Culverts

Culvert	Drainage Area (ac)	Tier	Design Storm (yr)	Flow (cfs)	Condition	Size	Shape	Material	Impact Summary				Notes
									Bank (lf)	Streambed (lf)	Streambed (sf)	Wetland (sf)	
BV-01	38	1	50	19.9	Existing	18”	Round	CMP					Undersized
					Proposed	**24”**	**Round**	**CMP**	20	7	27	9	Replace
BV-02	128	1	50	80.5	Existing	48”	Round	CMP					Damaged, hanging outlet
					Proposed	**48”**	**Round**	**CMP**	43	14	116	55	Replace
BV-03	704	3	100	396.0	Existing	84”	Round						Undersized, closed bottom
					Proposed	**21’ x 6’-4”**	**Arch, Span**	**CM**	47	15	227	87	Replace w/span, bury culvert 10” for 5’-6” Rise
HK-01	186	1	50	61.8	Existing	28”W x 40”H	Ellipse	CMP					Undersized, hanging outlet
					Proposed	**42”**	**Round**	**CMP**	42	19	138	0	Replace
HK-02	378	2	100	156.0	Existing	42”	Round	Steel					Undersized, hanging outlet
					Proposed	**49” x 33”**	**Arch**	**CMP**	61	16	209	0	Replace, set invert 4” below channel bottom
HK-03	570	2	100	257.0	Existing	60”	Round	CMP					Undersized, hanging outlet
					Proposed	**66” x 51”**	**Arch**	**CMP**	61	17	243	0	Replace, set invert 4” below channel bottom
HK-05	115	1	50	60.6	Existing	26”	Round	Steel					Undersized, hanging outlet
					Proposed	**36”**	**Round**	**CMP**	50	18	118	0	Replace
HK-07.1	45	1	50	25.7	Existing	15”	Round	CMP					Undersized, hanging outlet
					Proposed	**21”**	**Round**	**CMP**	13	6	21	0	Replace
HK-07A	32	1	50	19.0	Existing	36”	Round	CMP					Hanging outlet
					Proposed	**-**	**-**	**-**	10	4	22	0	Repair
HK-08	205	2	100	105.0	Existing	36”	Round	CMP					Undersized, hanging outlet
					Proposed	**53” x 41”**	**Arch**	**CMP**	50	22	195	0	Replace, set invert 4” below channel bottom
HK-09	1,510	3	100	646.0	Existing	120”w x 78”h	Arch	CMP					Undersized, closed bottom
					Proposed	**26’-7” x 5’-5”**	**Arch, Span**	**CM**	73	15	375	0	Replace w/span
HK-11	109	1	50	55.5	Existing	21”	Round	CMP					Undersized
					Proposed	**42”**	**Round**	**CMP**	37	18	73	106	Replace
HK-12	102	1	50	49.3	Existing	36”	Round	CMP					Hanging outlet
					Proposed	**-**	**-**	**-**	31	15	102	0	Remove & reset
HK-13	333	2	100	164.0	Existing	(2) 30” 36”W x 24”H	Round, Ellipse	CMP					Undersized, hanging outlet
					Proposed	**7’ x 4’**	**Box**	**Conc**	33	17	245	0	Replace, set invert 6” below channel bottom
									571	203	2,111	257	Total

Table 2: Southern Area Culverts

Culvert	Drainage Area (ac)	Tier	Design Storm (yr)	Flow (cfs)	Condition	Size	Shape	Material	Impact Summary				Notes
									Bank (lf)	Streambed (lf)	Streambed (sf)	Wetland (sf)	
CM-01A	122	1	50	68.9	Existing	30”	Round	CMP					Undersized, hanging outlet
					Proposed	**5’ x 2’**	**Box**	**Conc**	31	13	67	53	Replace
CM-05	627	2	100	209.0	Existing	42”W x 28”H	Arch,	CMP					Undersized
						24”	Round						24” existing to remain
					Proposed	**(2) 7’ x 3’**	**Box**	**Conc**	40	16	220	98	Replace, set invert 4” below channel bottom
						24”	Round	CMP					24” existing to remain
CT-01	83	1	50	45.7	Existing	24”	Round	CMP					Undersized
					Proposed	**36”**	**Round**	**RCP**	41	21	126	0	Replace
CT-02	154	1	50	68.5	Existing	42”W x 52”H	Ellipse	CMP					Hanging outlet
					Proposed	**-**	**-**	**-**	10	5	27	0	Repair
CT-03	128	1	50	49.9	Existing	15”	Round	HDPE					Undersized, partially buried
					Proposed	**4’ x 2’**	**Box**	**Conc**	25	10	41	3	Replace
CZ-01	147	1	50	77.4	Existing	18”	Round	CMP					Undersized
					Proposed	**(2) 30”**	**Round**	**CMP**	41	22	180	0	Replace
MP-01	147	1	50	54.5	Existing	15”	Round	CMP					Undersized, hanging outlet
					Proposed	**36”**	**Round**	**CMP**	44	17	114	33	Replace
MP-01A	390	2	100	159.0	Existing	42”	Round	CMP					Undersized, hanging outlet
					Proposed	**66” x 51”**	**Arch**	**CMP**	48	19	240	0	Replace, set invert 4” below channel bottom
MP-02	154	1	50	57.1	Existing	36”	Round	CMP					Undersized, hanging outlet
					Proposed	**(2) 30”**	**Round**	**CMP**	55	34	74	0	Replace
MP-03	979	3	100	195.0	Existing	(2) 42”	Round	CMP					Undersized, closed bottom
					Proposed	**14’ x 3’**	**Box, Span**	**Conc**	45	17	236	0	Replace w/span, buried 10 in.
MP-04	211	2	100	95.1	Existing	18”	Round	RCP					Undersized
					Proposed	**5’ x 3’**	**Box**	**Conc**	51	24	146	76	Replace, set invert 4” below channel bottom
MP-05	58	1	50	28.1	Existing	30”	Round	RCP					Hanging outlet
					Proposed	**-**	**-**	**-**	6	3	14	0	Repair
MP-06	83	1	50	41.1	Existing	18”	Round	CMP					Undersized, hanging outlet
					Proposed	**(2) 24”**	**Round**	**CMP**	9	10	4	70	Replace
MP-07	90	1	50	44.8	Existing	36”	Round	RCP					Capacity, hanging outlet
					Proposed	**-**	**-**	**-**	20	9	42	0	Remove and reset
MP-08	90	1	50	44.7	Existing	42”	Round	CMP	9	3	21	0	Hanging outlet
					Proposed	**-**	**-**	**-**					Repair
									475	223	1,552	333	Totals

Culvert Location Maps

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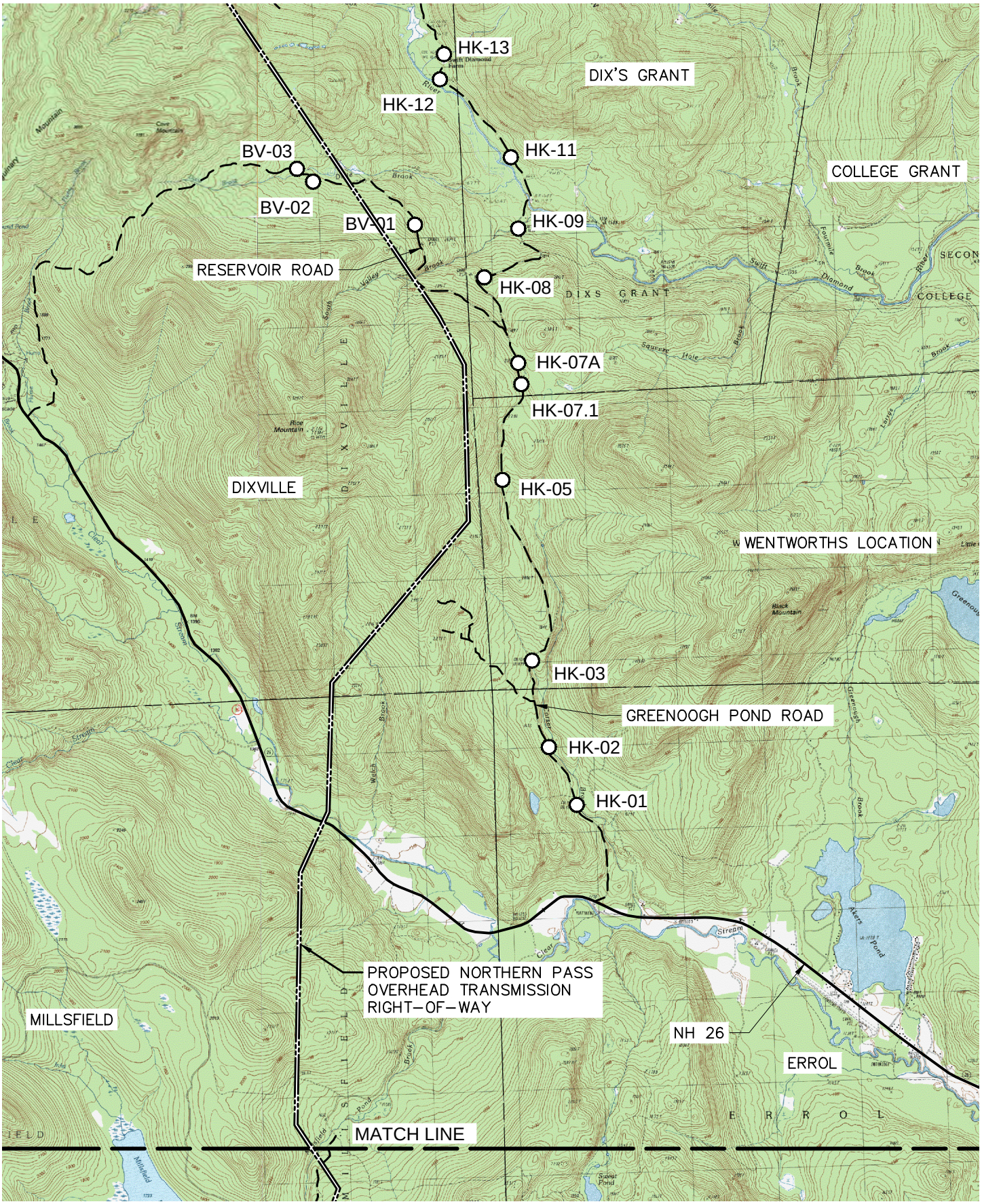
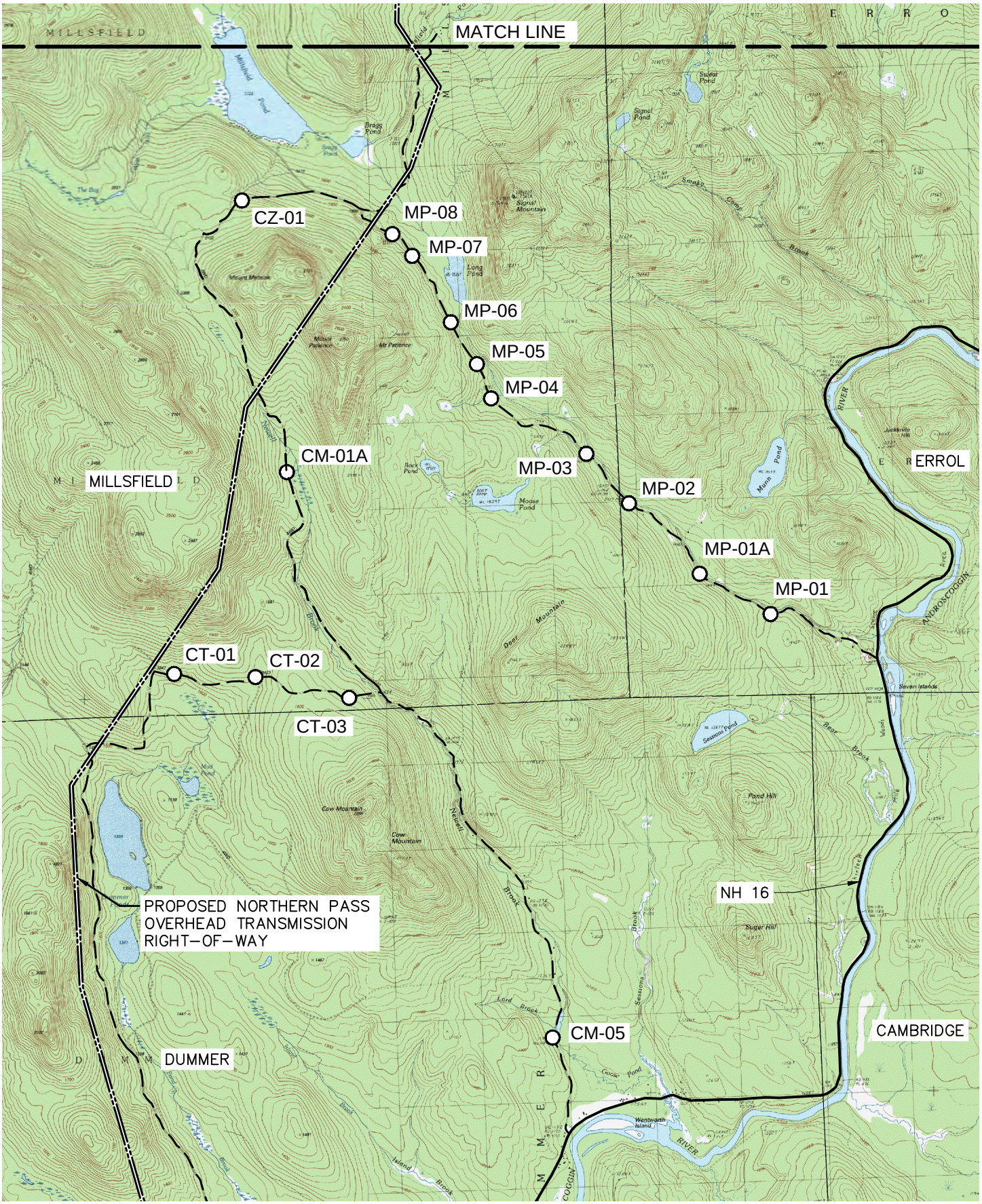


0 2500 5000 Feet

Culvert Locations
(Northern Area)
NPT ORAR Culvert Improvements
Coos County, New Hampshire



0 2500 5000 Feet

Culvert Locations
(Southern Area)
NPT ORAR Culvert Improvements
Coos County, New Hampshire

Culvert Photographs

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Culvert BV-1

Upstream

Inlet

Downstream

Outlet

Culvert BV-2

Upstream

Inlet

Inlet

Downstream

Culvert BV-3

Inlet

Upstream

Downstream

Outlet

Culvert HK-1

Upstream

Inlet

Downstream

Outlet

Culvert HK-2

Upstream

Inlet

Outlet

Downstream

Culvert HK-3

Upstream

Inlet

Outlet

Downstream

Culvert HK-5

Upstream

Inlet

Outlet

Downstream

Culvert HK-7.1

Upstream

Downstream

Culvert HK-7A

Upstream

Inlet

Downstream

Outlet

Culvert HK-8

Downstream

Inlet

Inlet

Outlet

Culvert HK-9

Downstream

Inlet

Outlet

Upstream

Culvert HK-11

Inlet

Upstream

Outlet

Outlet

Culvert HK-12

Outlet

Downstream

Inlet

Upstream

Culvert HK-13

Upstream

Outlet

Inlet

Downstream

Site Photos (November 1-3, 2016)

Culvert CM-1A

Upstream

Inlet

Downstream

Outlet

Culvert CM-5

Outlet (24")

Upstream

Outlet (30"x40")

Downstream

Culvert CT-1

Upstream

Inlet

Downstream

Outlet

Culvert CT-2

Inlet

Inlet

Downstream

Outlet

Culvert CT-3

Inlet

Inlet

Downstream

Outlet

Site Photos (November 1-3, 2016)

Culvert CZ-1

Upstream

Inlet

Outlet

Downstream

Culvert MP-1

Upstream

Inlet

Outlet

Downstream

Culvert MP-1A

Upstream

Downstream

Inlet

Outlet

Culvert MP-2

Inlet

Upstream

Outlet

Downstream

Culvert MP-3

Upstream

Inlet

Downstream

Outlet

Culvert MP-4

Upstream

Inlet

Downstream

Outlet

Culvert MP-5

Upstream

Inlet

Outlet

Downstream

Culvert MP-6

Upstream

Downstream

Inlet

Outlet

Culvert MP-7

Upstream

Inlet

Downstream

Outlet

Culvert MP-8

Upstream

Inlet

Outlet

Downstream

Design Flow/ StreamStats Information

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BV-1 StreamStats Report

Region ID:
NH
Workspace ID:
NH20161122120803597000
Clicked Point (Latitude, Longitude):
44.87374,-71.22598
Time:
2016-11-22 14:14:29 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.06	square miles
APRAVPRE	Mean April Precipitation	3.345	inches
WETLAND	Percentage of Wetlands	0	percent

Parameter Code	Parameter Description	Value	Unit
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	723	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.06	0.7	1290
Mean April Precipitation	3.345	2.79	6.23
Stream Slope 10 and 85 Method	723	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	4.142	ft^3/s	--
5 Year Peak Flood	7.666	ft^3/s	--
10 Year Peak Flood	10.9	ft^3/s	--
25 Year Peak Flood	15.718	ft^3/s	--
50 Year Peak Flood	19.906	ft^3/s	--
100 Year Peak Flood	25.013	ft^3/s	--

Statistic	Value	Unit	Prediction Error
500 Year Peak Flood	38.501	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

BV-2 StreamStats Report

Region ID: NH
Workspace ID: NH20161121144353845000
Clicked Point (Latit... 44.87908,-71.24130
Time: 2016-11-21 16:44:52 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.2	square miles
APRAVPRE	Mean April Precipitation	3.846	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	1010	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.2	0.7	1290
Mean April Precipitation	3.846	2.79	6.23
Stream Slope 10 and 85 Method	1010	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	17.328	ft^3/s	--
5 Year Peak Flood	32.051	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	45.274	ft^3/s	--
25 Year Peak Flood	64.273	ft^3/s	--
50 Year Peak Flood	80.472	ft^3/s	--
100 Year Peak Flood	100	ft^3/s	--
500 Year Peak Flood	150	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

BV-3 StreamStats Report

Region ID: NH
Workspace ID: NH20161121142744565000
Clicked Point (Latit... 44.87971,-71.24404
Time: 2016-11-21 16:28:10 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.1	square miles
APRAVPRE	Mean April Precipitation	3.839	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	611	feet per mi

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	1.1	0.7	1290
Mean April Precipitation	3.839	2.79	6.23
Stream Slope 10 and 85 Method	611	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	79.817	ft^3/s	--
5 Year Peak Flood	140	ft^3/s	--
10 Year Peak Flood	192	ft^3/s	--
25 Year Peak Flood	264	ft^3/s	--
50 Year Peak Flood	324	ft^3/s	--
100 Year Peak Flood	396	ft^3/s	--

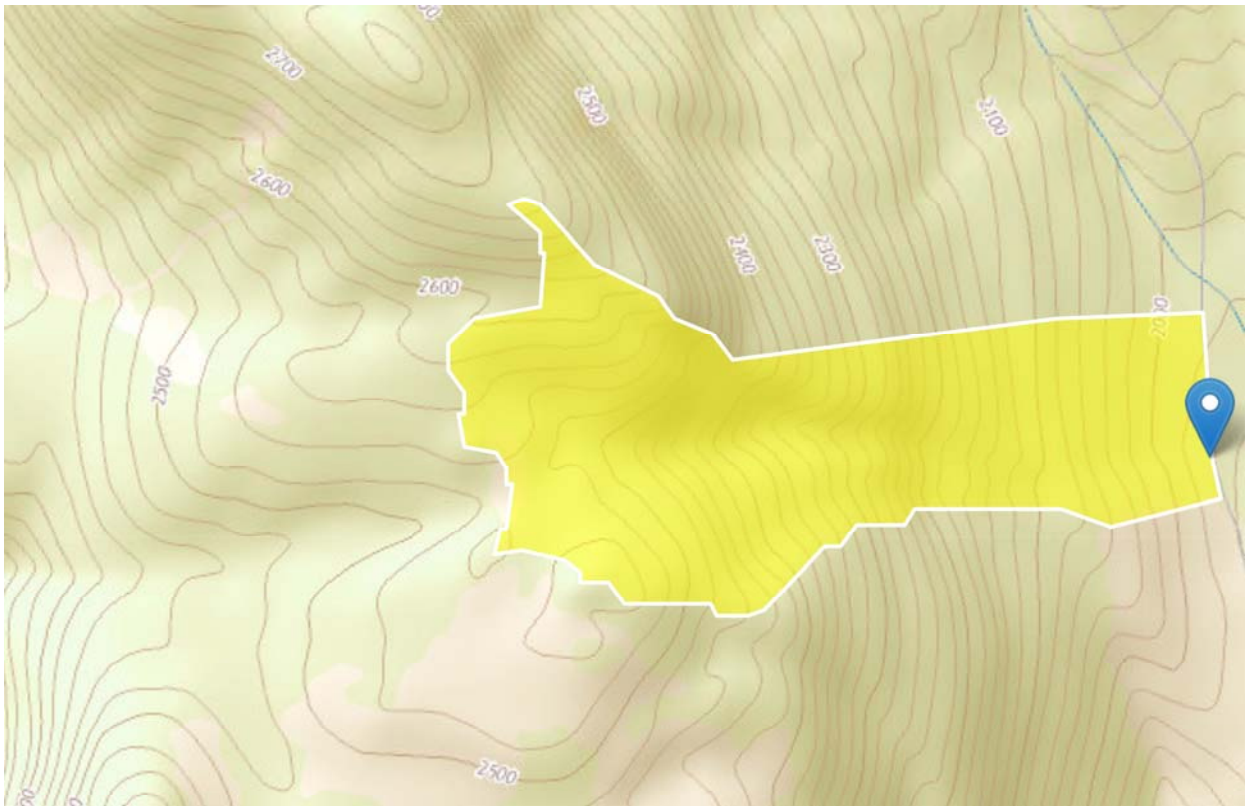
Statistic	Value	Unit	Prediction Error
500 Year Peak Flood	570	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

CM-01A StreamStats Report

Region ID:
NH
Workspace ID:
NH20161122171140866000
Clicked Point (Latitude, Longitude):
44.73232,-71.26120
Time:
2016-11-22 19:12:41 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.19	square miles
APRAVPRE	Mean April Precipitation	3.729	inches
WETLAND	Percentage of Wetlands	0	percent

Parameter Code	Parameter Description	Value	Unit
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	788	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.19	0.7	1290
Mean April Precipitation	3.729	2.79	6.23
Stream Slope 10 and 85 Method	788	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	14.969	ft^3/s	--
5 Year Peak Flood	27.491	ft^3/s	--
10 Year Peak Flood	38.747	ft^3/s	--
25 Year Peak Flood	54.999	ft^3/s	--
50 Year Peak Flood	68.89	ft^3/s	--
100 Year Peak Flood	85.71	ft^3/s	--

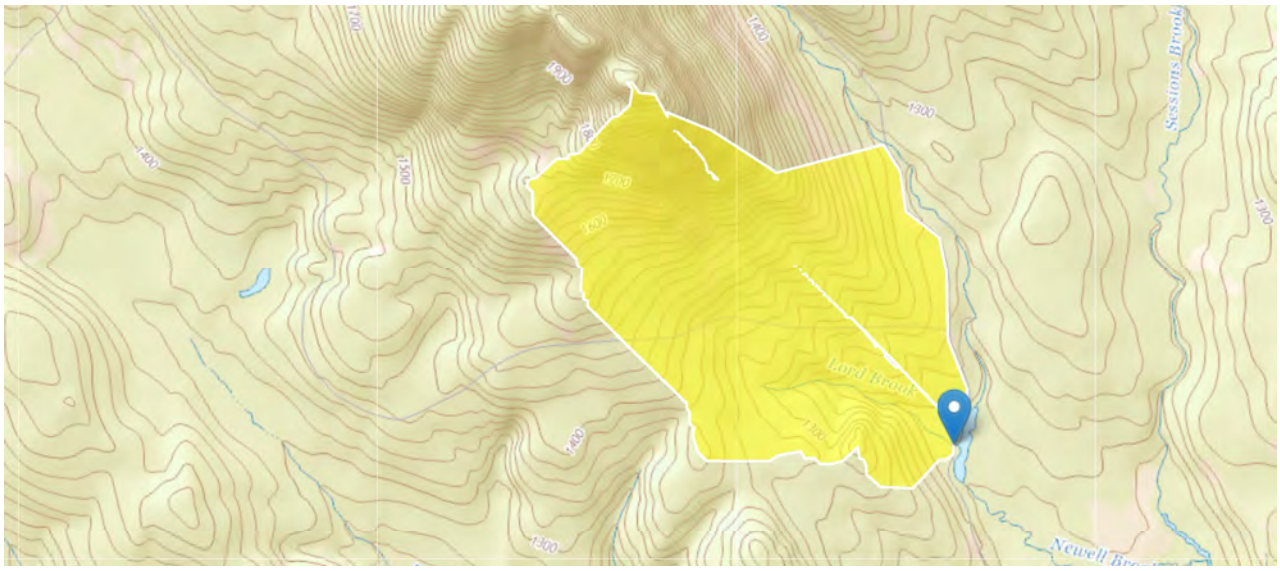
Statistic	Value	Unit	Prediction Error
500 Year Peak Flood	129	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

StreamStats Report

Region ID: NH
Workspace ID: NH20161121131019981000
Clicked Point (Latit... 44.67358,-71.22203
Time: 2016-11-21 15:11:14 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.98	square miles
APRAVPRE	Mean April Precipitation	3.144	inches
WETLAND	Percentage of Wetlands	0.55	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	353	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.98	0.7	1290
Mean April Precipitation	3.144	2.79	6.23
Stream Slope 10 and 85 Method	353	5.43	543
Percent Wetlands	0.55	0	21.8

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

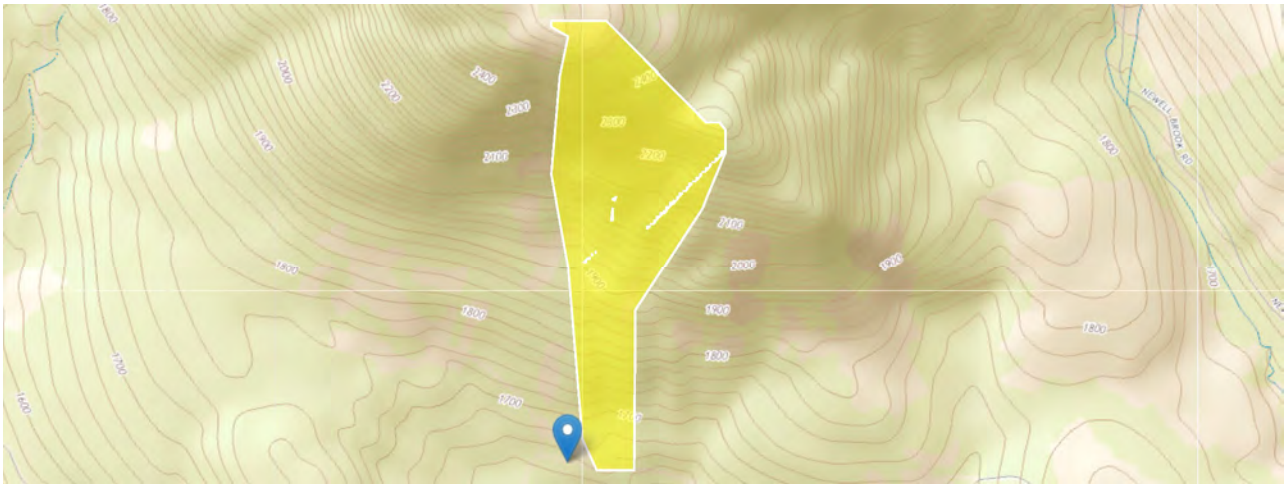
Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	45.879	ft^3/s	30.1
5 Year Peak Flood	76.878	ft^3/s	31.1
10 Year Peak Flood	104	ft^3/s	32.3
25 Year Peak Flood	141	ft^3/s	34.3
50 Year Peak Flood	172	ft^3/s	36.4
100 Year Peak Flood	209	ft^3/s	38.6
500 Year Peak Flood	302	ft^3/s	44.1

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

CT-1

Region ID: NH
Workspace ID: NH20161122095740642000
Clicked Point (Latit... 44.71116,-71.27984
Time: 2016-11-22 11:58:44 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.13	square miles
APRAVPRE	Mean April Precipitation	3.491	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	1010	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.13	0.7	1290
Mean April Precipitation	3.491	2.79	6.23
Stream Slope 10 and 85 Method	1010	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	9.918	ft^3/s	--
5 Year Peak Flood	18.166	ft^3/s	--

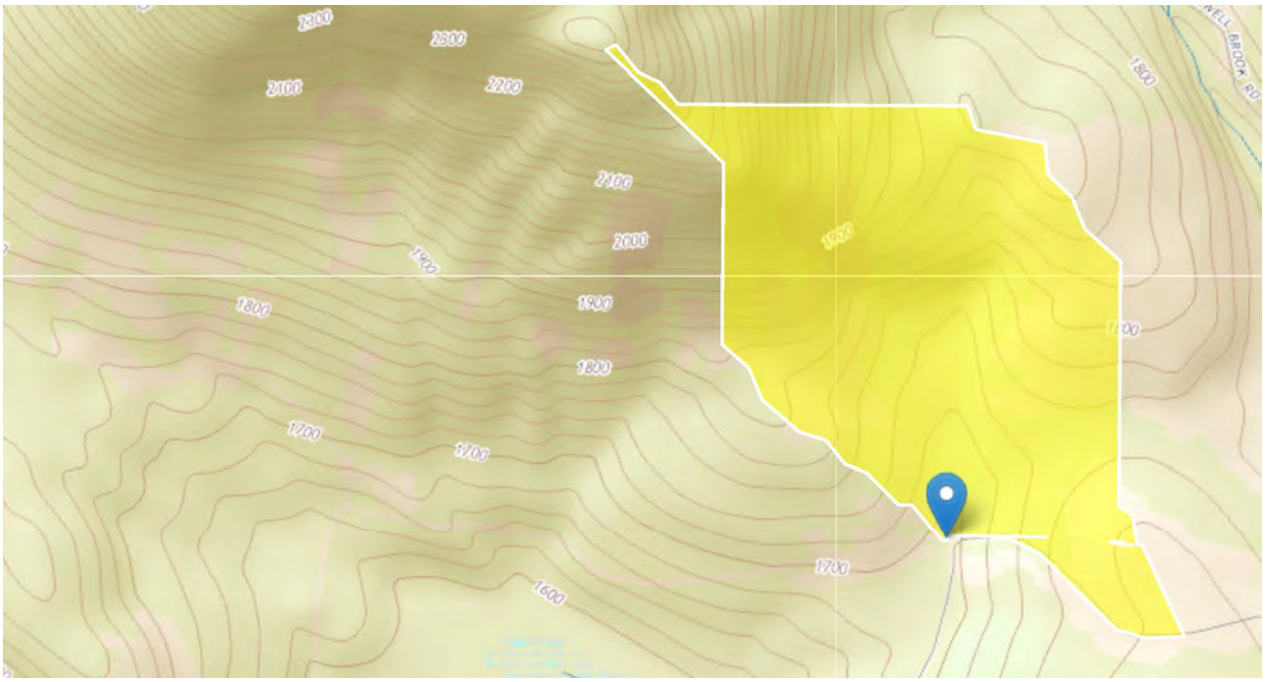
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	25.601	ft^3/s	--
25 Year Peak Flood	36.411	ft^3/s	--
50 Year Peak Flood	45.667	ft^3/s	--
100 Year Peak Flood	56.856	ft^3/s	--
500 Year Peak Flood	85.529	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

CT-2

Region ID: NH
Workspace ID: NH20161122084623352000
Clicked Point (Latit... 44.71072,-71.26552
Time: 2016-11-22 10:49:55 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.24	square miles
APRAVPRE	Mean April Precipitation	3.426	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	627	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.24	0.7	1290
Mean April Precipitation	3.426	2.79	6.23
Stream Slope 10 and 85 Method	627	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

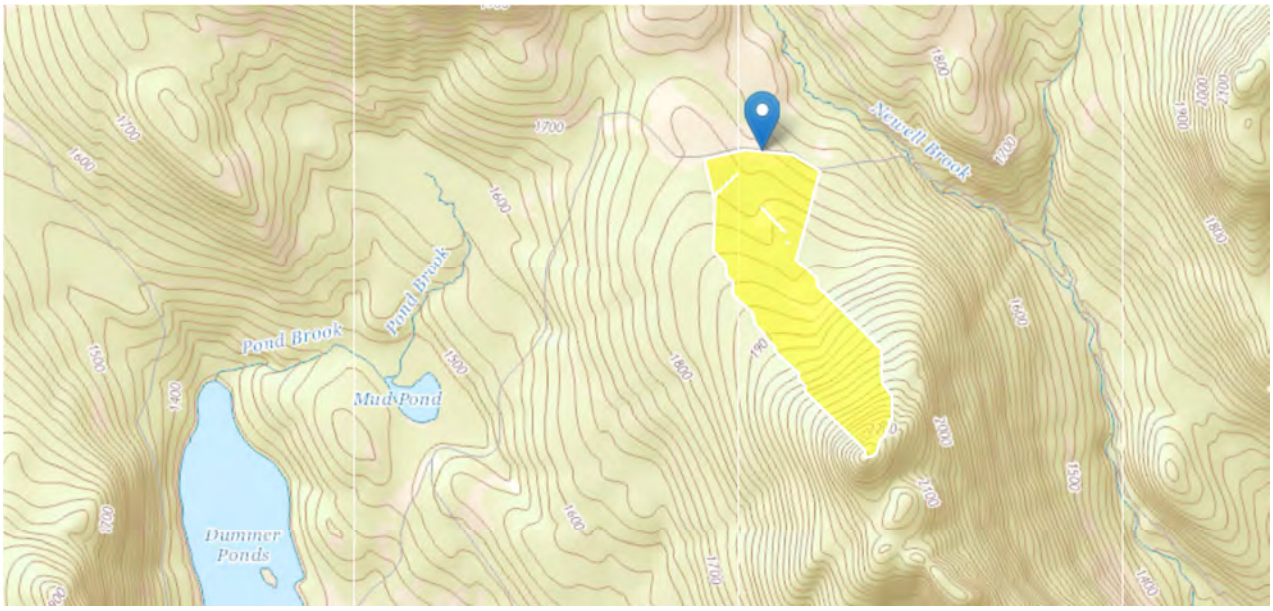
Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	15.734	ft^3/s	--
5 Year Peak Flood	28.108	ft^3/s	--
10 Year Peak Flood	39.126	ft^3/s	--
25 Year Peak Flood	55.002	ft^3/s	--
50 Year Peak Flood	68.515	ft^3/s	--
100 Year Peak Flood	84.815	ft^3/s	--
500 Year Peak Flood	126	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

CT-3

Region ID: NH
Workspace ID: NH20161121134745763000
Clicked Point (Latit... 44.70925,-71.25606
Time: 2016-11-21 15:48:42 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.2	square miles
APRAVPRE	Mean April Precipitation	3.315	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	397	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.2	0.7	1290
Mean April Precipitation	3.315	2.79	6.23

Parameter	Value	Min Limit	Max Limit
Stream Slope 10 and 85 Method	397	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	11.451	ft^3/s	--
5 Year Peak Flood	20.354	ft^3/s	--
10 Year Peak Flood	28.327	ft^3/s	--
25 Year Peak Flood	39.947	ft^3/s	--
50 Year Peak Flood	49.905	ft^3/s	--
100 Year Peak Flood	61.973	ft^3/s	--
500 Year Peak Flood	93.246	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

CZ-1 StreamStats Report

Region ID: NH
Workspace ID: NH20161121092717731000
Clicked Point (Latit... 44.76097,-71.26737
Time: 2016-11-21 11:31:50 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.23	square miles
APRAVPRE	Mean April Precipitation	3.612	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	827	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.23	0.7	1290
Mean April Precipitation	3.612	2.79	6.23
Stream Slope 10 and 85 Method	827	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	17.307	ft^3/s	--
5 Year Peak Flood	31.387	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	43.954	ft^3/s	--
25 Year Peak Flood	62.002	ft^3/s	--
50 Year Peak Flood	77.355	ft^3/s	--
100 Year Peak Flood	95.877	ft^3/s	--
500 Year Peak Flood	143	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-1 StreamStats Report

Region ID: NH
Workspace ID: NH20161121152010002000
Clicked Point (Latit... 44.81346,-71.20301
Time: 2016-11-21 17:21:07 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.29	square miles
APRAVPRE	Mean April Precipitation	3.15	inches
WETLAND	Percentage of Wetlands	2.1995	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	693	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.29	0.7	1290
Mean April Precipitation	3.15	2.79	6.23
Stream Slope 10 and 85 Method	693	5.43	543
Percent Wetlands	2.1995	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	14.993	ft^3/s	--
5 Year Peak Flood	26.143	ft^3/s	--

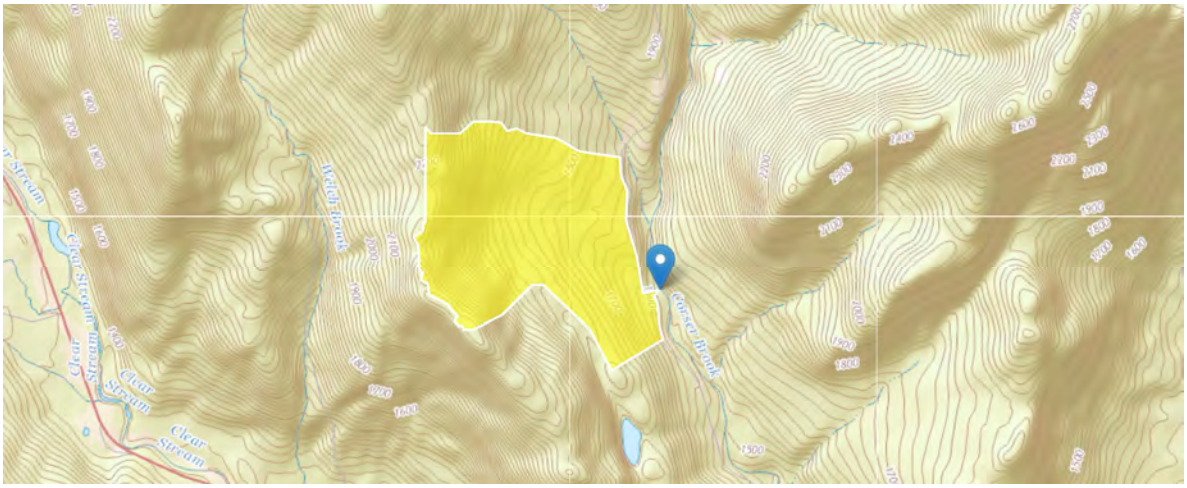
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	35.935	ft^3/s	--
25 Year Peak Flood	49.934	ft^3/s	--
50 Year Peak Flood	61.753	ft^3/s	--
100 Year Peak Flood	75.9	ft^3/s	--
500 Year Peak Flood	112	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-2 StreamStats Report

Region ID: NH
Workspace ID: NH20161129090519470000
Clicked Point (Latit... 44.82090,-71.20692
Time: 2016-11-29 11:08:28 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.48	square miles
APRAVPRE	Mean April Precipitation	3.199	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	514	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.48	0.7	1290
Mean April Precipitation	3.199	2.79	6.23
Stream Slope 10 and 85 Method	514	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	26.477	ft^3/s	--
5 Year Peak Flood	45.579	ft^3/s	--

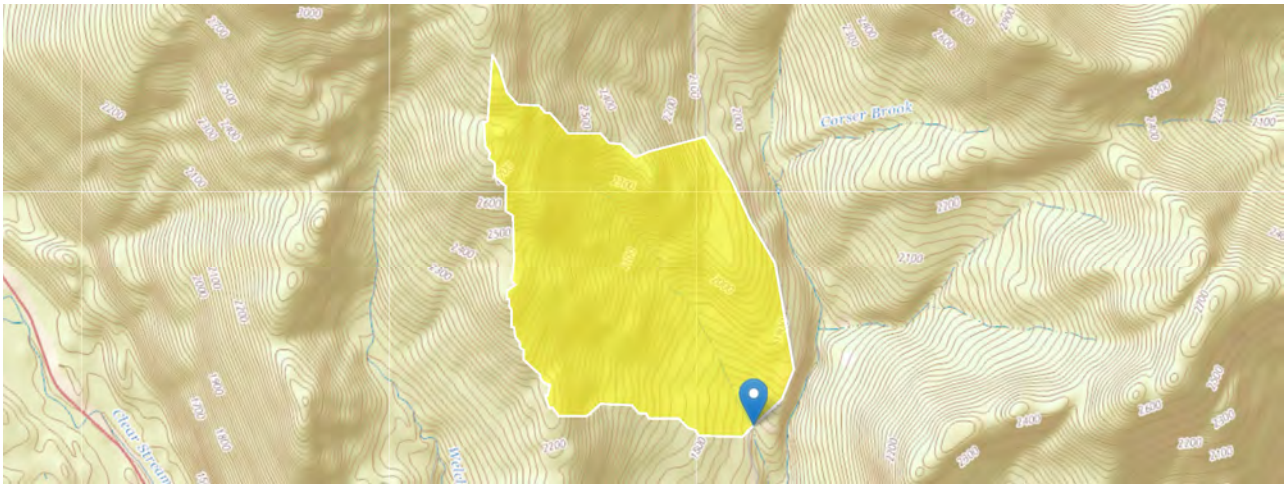
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	62.275	ft^3/s	--
25 Year Peak Flood	85.993	ft^3/s	--
50 Year Peak Flood	106	ft^3/s	--
100 Year Peak Flood	130	ft^3/s	--
500 Year Peak Flood	190	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-3 StreamStats Report

Region ID: NH
Workspace ID: NH20161121145357885000
Clicked Point (Latit... 44.82839,-71.20934
Time: 2016-11-21 16:54:57 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.89	square miles
APRAVPRE	Mean April Precipitation	3.319	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	752	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.89	0.7	1290
Mean April Precipitation	3.319	2.79	6.23
Stream Slope 10 and 85 Method	752	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	54.654	ft^3/s	--
5 Year Peak Flood	93.414	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	127	ft^3/s	--
25 Year Peak Flood	173	ft^3/s	--
50 Year Peak Flood	212	ft^3/s	--
100 Year Peak Flood	257	ft^3/s	--
500 Year Peak Flood	369	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-5 StreamStats Report

Region ID: NH
Workspace ID: NH20161121145254134000
Clicked Point (Latit... 44.84729,-71.21364
Time: 2016-11-21 16:53:53 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.18	square miles
APRAVPRE	Mean April Precipitation	3.511	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	939	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.18	0.7	1290
Mean April Precipitation	3.511	2.79	6.23
Stream Slope 10 and 85 Method	939	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	13.461	ft^3/s	--
5 Year Peak Flood	24.444	ft^3/s	--

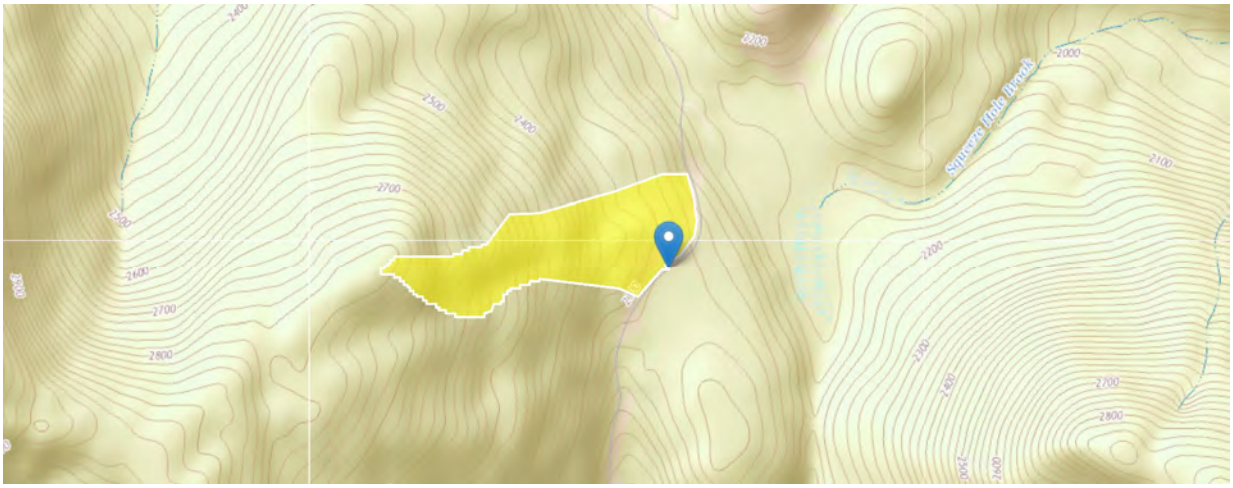
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	34.278	ft^3/s	--
25 Year Peak Flood	48.469	ft^3/s	--
50 Year Peak Flood	60.564	ft^3/s	--
100 Year Peak Flood	75.154	ft^3/s	--
500 Year Peak Flood	112	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-7.1 StreamStats Report

Region ID: NH
Workspace ID: NH20161129085220535000
Clicked Point (Latit... 44.85511,-71.21153
Time: 2016-11-29 10:54:24 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.07	square miles
APRAVPRE	Mean April Precipitation	3.445	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	987	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.07	0.7	1290
Mean April Precipitation	3.445	2.79	6.23
Stream Slope 10 and 85 Method	987	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	5.348	ft^3/s	--
5 Year Peak Flood	9.941	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	14.139	ft^3/s	--
25 Year Peak Flood	20.343	ft^3/s	--
50 Year Peak Flood	25.709	ft^3/s	--
100 Year Peak Flood	32.233	ft^3/s	--
500 Year Peak Flood	49.259	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-07A StreamStats Report

Region ID: NH
Workspace ID: NH20161129074356098000
Clicked Point (Latit... 44.85982,-71.21110
Time: 2016-11-29 09:46:34 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.05	square miles
APRAVPRE	Mean April Precipitation	3.42	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	1020	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.05	0.7	1290
Mean April Precipitation	3.42	2.79	6.23
Stream Slope 10 and 85 Method	1020	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	3.858	ft^3/s	--
5 Year Peak Flood	7.231	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	10.337	ft^3/s	--
25 Year Peak Flood	14.963	ft^3/s	--
50 Year Peak Flood	18.984	ft^3/s	--
100 Year Peak Flood	23.888	ft^3/s	--
500 Year Peak Flood	36.795	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-08 StreamStats Report

Region ID:
NH
Workspace ID:
NH20161129181224097000
Clicked Point (Latitude, Longitude):
44.86872,-71.21531
Time:
2016-11-29 20:13:26 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.32	square miles
APRAVPRE	Mean April Precipitation	3.397	inches
WETLAND	Percentage of Wetlands	0	percent

Parameter Code	Parameter Description	Value	Unit
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	563	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.32	0.7	1290
Mean April Precipitation	3.397	2.79	6.23
Stream Slope 10 and 85 Method	563	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	20.017	ft^3/s	--
5 Year Peak Flood	35.37	ft^3/s	--
10 Year Peak Flood	48.954	ft^3/s	--
25 Year Peak Flood	68.412	ft^3/s	--
50 Year Peak Flood	84.909	ft^3/s	--
100 Year Peak Flood	105	ft^3/s	--

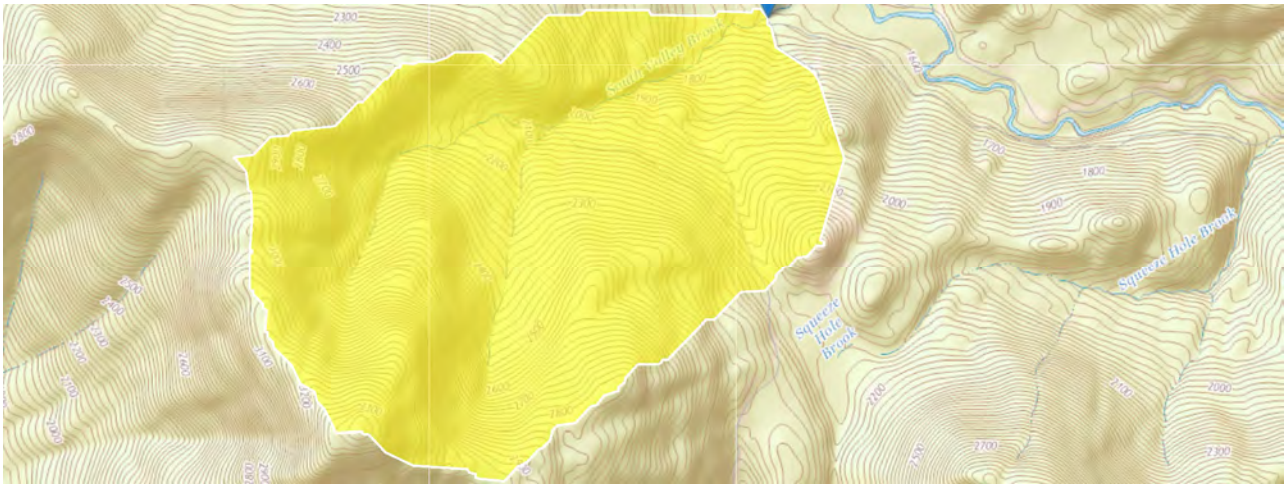
Statistic	Value	Unit	Prediction Error
500 Year Peak Flood	155	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-9 StreamStats Report

Region ID: NH
Workspace ID: NH20161121140926393000
Clicked Point (Latit... 44.87378,-71.21110
Time: 2016-11-21 16:10:24 -0500



Includes Flow from HK-8

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	2.36	square miles
APRAVPRE	Mean April Precipitation	3.539	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	577	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	2.36	0.7	1290
Mean April Precipitation	3.539	2.79	6.23
Stream Slope 10 and 85 Method	577	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error

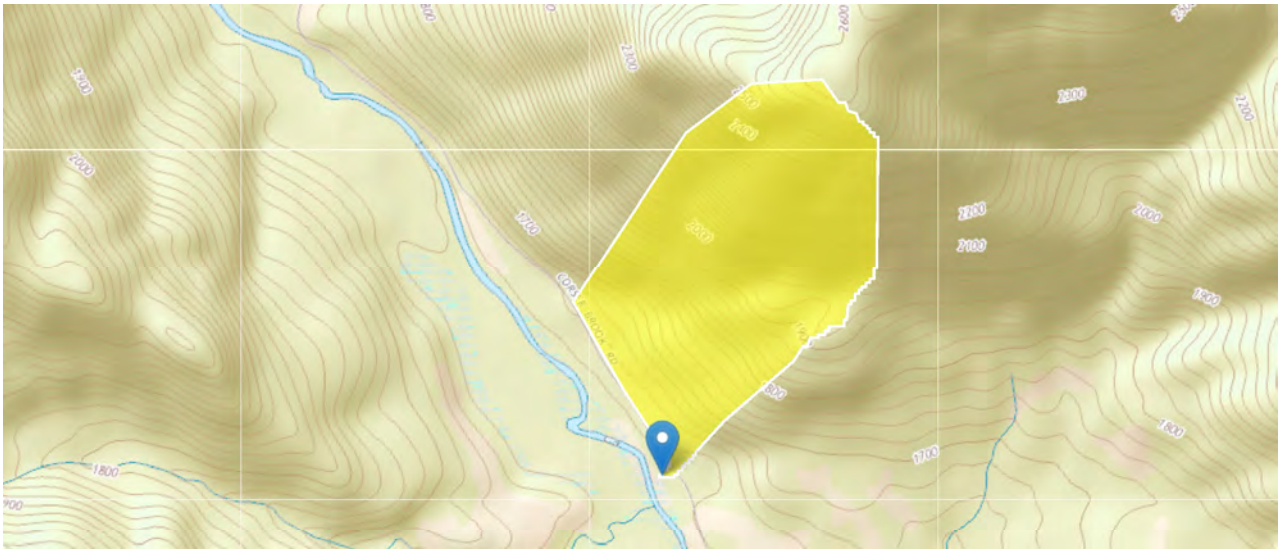
Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	145	ft^3/s	--
5 Year Peak Flood	244	ft^3/s	--
10 Year Peak Flood	328	ft^3/s	--
25 Year Peak Flood	442	ft^3/s	--
50 Year Peak Flood	535	ft^3/s	--
100 Year Peak Flood	646	ft^3/s	--
500 Year Peak Flood	909	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-11

Region ID: NH
Workspace ID: NH20161122120615540000
Clicked Point (Latit... 44.87971,-71.21106
Time: 2016-11-22 14:12:35 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.17	square miles
APRAVPRE	Mean April Precipitation	3.295	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	1440	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.17	0.7	1290
Mean April Precipitation	3.295	2.79	6.23
Stream Slope 10 and 85 Method	1440	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	12.647	ft^3/s	--
5 Year Peak Flood	22.73	ft^3/s	--
10 Year Peak Flood	31.702	ft^3/s	--
25 Year Peak Flood	44.603	ft^3/s	--
50 Year Peak Flood	55.539	ft^3/s	--
100 Year Peak Flood	68.643	ft^3/s	--
500 Year Peak Flood	102	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-12 StreamStats Report

Region ID: NH
Workspace ID: NH20161121132432853000
Clicked Point (Latit... 44.89066,-71.22207
Time: 2016-11-21 15:25:31 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.16	square miles
APRAVPRE	Mean April Precipitation	3.332	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	932	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.16	0.7	1290
Mean April Precipitation	3.332	2.79	6.23
Stream Slope 10 and 85 Method	932	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	11.1	ft^3/s	--
5 Year Peak Flood	19.983	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	27.931	ft^3/s	--
25 Year Peak Flood	39.444	ft^3/s	--
50 Year Peak Flood	49.261	ft^3/s	--
100 Year Peak Flood	61.089	ft^3/s	--
500 Year Peak Flood	91.299	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

HK-13 StreamStats Report

Region ID: NH
Workspace ID: NH20161121125944050000
Clicked Point (Latit... 44.89233,-71.22162
Time: 2016-11-21 15:00:07 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.52	square miles
APRAVPRE	Mean April Precipitation	3.366	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	701	feet per mi

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.52	0.7	1290
Mean April Precipitation	3.366	2.79	6.23
Stream Slope 10 and 85 Method	701	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	32.881	ft^3/s	--
5 Year Peak Flood	57.243	ft^3/s	--
10 Year Peak Flood	78.504	ft^3/s	--
25 Year Peak Flood	108	ft^3/s	--
50 Year Peak Flood	134	ft^3/s	--
100 Year Peak Flood	164	ft^3/s	--

Statistic	Value	Unit	Prediction Error
500 Year Peak Flood	238	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-1 StreamStats Report

Region ID: NH
Workspace ID: NH20161121125249372000
Clicked Point (Latit... 44.71728,-71.19042
Time: 2016-11-21 14:53:47 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.23	square miles
APRAVPRE	Mean April Precipitation	3.161	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	527	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.23	0.7	1290
Mean April Precipitation	3.161	2.79	6.23
Stream Slope 10 and 85 Method	527	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	12.919	ft^3/s	--
5 Year Peak Flood	22.659	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	31.312	ft^3/s	--
25 Year Peak Flood	43.837	ft^3/s	--
50 Year Peak Flood	54.499	ft^3/s	--
100 Year Peak Flood	67.341	ft^3/s	--
500 Year Peak Flood	100	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-1A StreamStats Report

Region ID: NH
Workspace ID: NH20161121113126612000
Clicked Point (Latit... 44.72140,-71.20038
Time: 2016-11-21 13:32:23 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.61	square miles
APRAVPRE	Mean April Precipitation	3.2	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	502	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.61	0.7	1290
Mean April Precipitation	3.2	2.79	6.23
Stream Slope 10 and 85 Method	502	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	33.166	ft^3/s	--
5 Year Peak Flood	56.693	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	77.148	ft^3/s	--
25 Year Peak Flood	106	ft^3/s	--
50 Year Peak Flood	130	ft^3/s	--
100 Year Peak Flood	159	ft^3/s	--
500 Year Peak Flood	231	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-2 StreamStats Report

Region ID: NH
Workspace ID: NH20161121130306928000
Clicked Point (Latit... 44.72899,-71.21091
Time: 2016-11-21 15:04:03 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.24	square miles
APRAVPRE	Mean April Precipitation	3.227	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	453	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.24	0.7	1290
Mean April Precipitation	3.227	2.79	6.23
Stream Slope 10 and 85 Method	453	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	13.456	ft^3/s	--
5 Year Peak Flood	23.663	ft^3/s	--

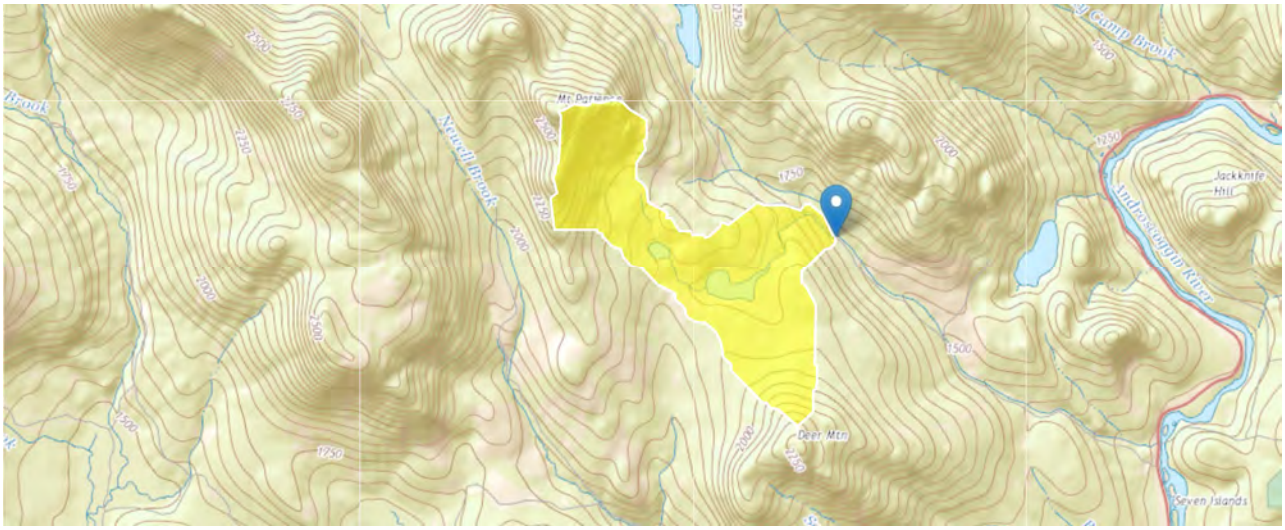
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	32.743	ft^3/s	--
25 Year Peak Flood	45.896	ft^3/s	--
50 Year Peak Flood	57.11	ft^3/s	--
100 Year Peak Flood	70.642	ft^3/s	--
500 Year Peak Flood	105	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

StreamStats Report

Region ID: NH
Workspace ID: NH20161102084940880000
Clicked Point (Latit... 44.73393,-71.21664
Time: 2016-11-02 10:52:48 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	1.53	square miles
APRAVPRE	Mean April Precipitation	3.346	inches
WETLAND	Percentage of Wetlands	7.8509	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	161	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	1.53	0.7	1290
Mean April Precipitation	3.346	2.79	6.23
Stream Slope 10 and 85 Method	161	5.43	543
Percent Wetlands	7.8509	0	21.8

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	43.526	ft^3/s	30.1

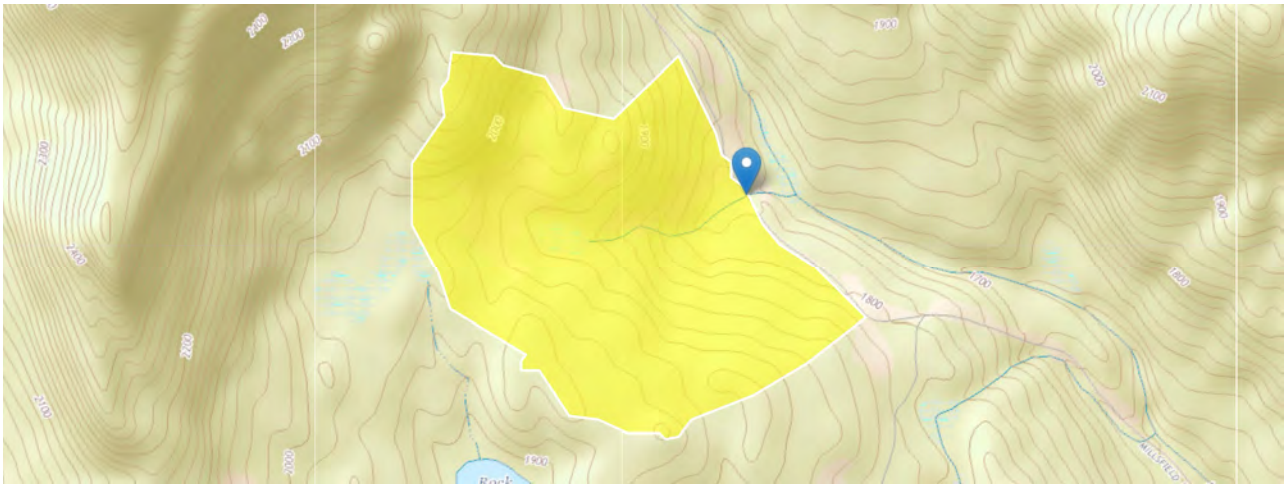
Statistic	Value	Unit	Prediction Error
5 Year Peak Flood	72.695	ft^3/s	31.1
10 Year Peak Flood	97.471	ft^3/s	32.3
25 Year Peak Flood	132	ft^3/s	34.3
50 Year Peak Flood	160	ft^3/s	36.4
100 Year Peak Flood	195	ft^3/s	38.6
500 Year Peak Flood	279	ft^3/s	44.1

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-4 StreamStats Report

Region ID: NH
Workspace ID: NH20161121131154217000
Clicked Point (Latit... 44.74021,-71.23097
Time: 2016-11-21 15:12:52 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.33	square miles
APRAVPRE	Mean April Precipitation	3.325	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	373	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.33	0.7	1290
Mean April Precipitation	3.325	2.79	6.23
Stream Slope 10 and 85 Method	373	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	18.348	ft^3/s	--
5 Year Peak Flood	32.154	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	44.384	ft^3/s	--
25 Year Peak Flood	61.996	ft^3/s	--
50 Year Peak Flood	76.976	ft^3/s	--
100 Year Peak Flood	95.058	ft^3/s	--
500 Year Peak Flood	141	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-5 StreamStats Report

Region ID: NH
Workspace ID: NH20161121134752310000
Clicked Point (Latit... 44.74405,-71.23363
Time: 2016-11-21 15:48:48 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.09	square miles
APRAVPRE	Mean April Precipitation	3.32	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	737	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.09	0.7	1290
Mean April Precipitation	3.32	2.79	6.23
Stream Slope 10 and 85 Method	737	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	6.063	ft^3/s	--
5 Year Peak Flood	11.074	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	15.625	ft^3/s	--
25 Year Peak Flood	22.336	ft^3/s	--
50 Year Peak Flood	28.127	ft^3/s	--
100 Year Peak Flood	35.158	ft^3/s	--
500 Year Peak Flood	53.516	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-6 StreamStats Report

Region ID: NH
Workspace ID: NH20161121140003931000
Clicked Point (Latit... 44.74818,-71.23703
Time: 2016-11-21 16:01:01 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.13	square miles
APRAVPRE	Mean April Precipitation	3.352	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	890	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.13	0.7	1290
Mean April Precipitation	3.352	2.79	6.23
Stream Slope 10 and 85 Method	890	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	9.093	ft^3/s	--
5 Year Peak Flood	16.487	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	23.141	ft^3/s	--
25 Year Peak Flood	32.835	ft^3/s	--
50 Year Peak Flood	41.136	ft^3/s	--
100 Year Peak Flood	51.163	ft^3/s	--
500 Year Peak Flood	76.955	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-7 StreamStats Report

Region ID: NH
Workspace ID: NH20161121143235632000
Clicked Point (Latit... 44.75516,-71.24265
Time: 2016-11-21 16:33:34 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.14	square miles
APRAVPRE	Mean April Precipitation	3.389	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	886	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.14	0.7	1290
Mean April Precipitation	3.389	2.79	6.23
Stream Slope 10 and 85 Method	886	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	9.915	ft^3/s	--
5 Year Peak Flood	17.984	ft^3/s	--

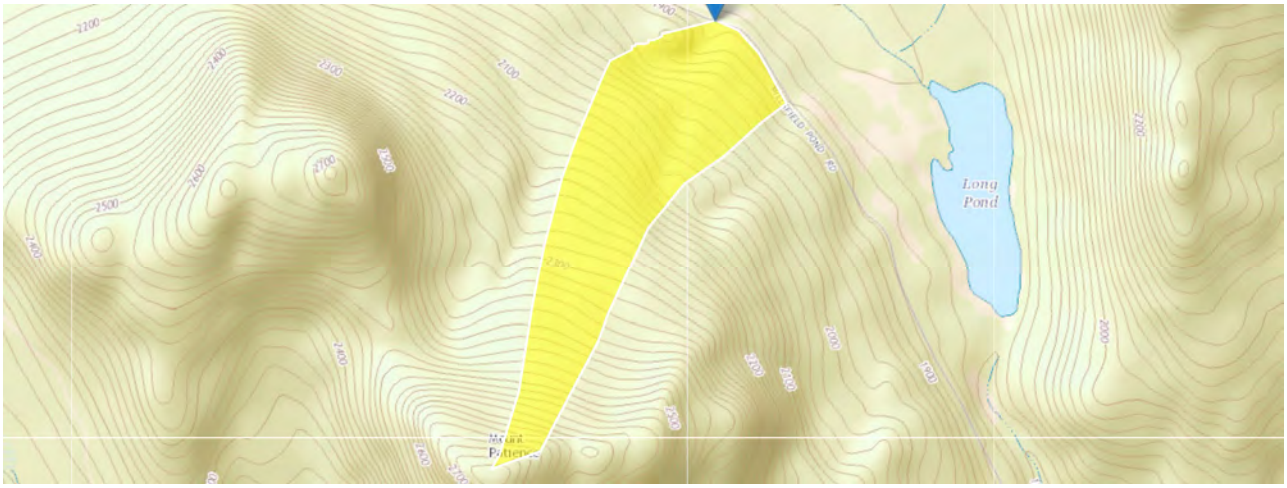
Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	25.237	ft^3/s	--
25 Year Peak Flood	35.785	ft^3/s	--
50 Year Peak Flood	44.809	ft^3/s	--
100 Year Peak Flood	55.708	ft^3/s	--
500 Year Peak Flood	83.681	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

MP-8 StreamStats Report

Region ID: NH
Workspace ID: NH20161121144154359000
Clicked Point (Latit... 44.75723,-71.24533
Time: 2016-11-21 16:42:53 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.14	square miles
APRAVPRE	Mean April Precipitation	3.41	inches
WETLAND	Percentage of Wetlands	0	percent
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	824	feet per mi

General Disclaimers

This watershed has been edited, computed flows may not apply.

Peak-Flow Statistics Parameters [100.00 Percent Peak Flow Statewide SIR2008 5206]

Parameter	Value	Min Limit	Max Limit
Drainage Area	0.14	0.7	1290
Mean April Precipitation	3.41	2.79	6.23
Stream Slope 10 and 85 Method	824	5.43	543
Percent Wetlands	0	0	21.8

Peak-Flow Statistics Disclaimers [100.00 Percent Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [100.00 Percent Peak Flow Statewide SIR2008 5206]

Statistic	Value	Unit	Prediction Error
2 Year Peak Flood	9.86	ft^3/s	--
5 Year Peak Flood	17.901	ft^3/s	--

Statistic	Value	Unit	Prediction Error
10 Year Peak Flood	25.136	ft^3/s	--
25 Year Peak Flood	35.668	ft^3/s	--
50 Year Peak Flood	44.686	ft^3/s	--
100 Year Peak Flood	55.589	ft^3/s	--
500 Year Peak Flood	83.619	ft^3/s	--

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S.Geological Survey Scientific Investigations Report 2008-5206, 57 p. (http://pubs.usgs.gov/sir/2008/5206/)

Culvert Sizing Calculations

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Culvert Calculator Report
BV-01 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,061.20	ft	Headwater Depth/Height	1.46	
Computed Headwater Elevation	2,059.72	ft	Discharge	19.90	cfs
Inlet Control HW Elev.	2,059.68	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,059.72	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	2,056.80	ft	Downstream Invert	2,056.30	ft
Length	28.00	ft	Constructed Slope	0.017857	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.60	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.60	ft
Velocity Downstream	7.37	ft/s	Critical Slope	0.027519	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,059.72	ft	Upstream Velocity Head	0.63	ft
Ke	0.50		Entrance Loss	0.31	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,059.68	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	3.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
BV-02 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,015.60	ft	Headwater Depth/Height	1.26	
Computed Headwater Elevation	2,015.33	ft	Discharge	80.50	cfs
Inlet Control HW Elev.	2,014.90	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,015.33	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	2,010.30	ft	Downstream Invert	2,008.70	ft
Length	28.00	ft	Constructed Slope	0.057143	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.99	ft
Slope Type	Steep		Normal Depth	1.84	ft
Flow Regime	Supercritical		Critical Depth	2.72	ft
Velocity Downstream	12.92	ft/s	Critical Slope	0.016527	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,015.33	ft	Upstream Velocity Head	1.22	ft
Ke	0.90		Entrance Loss	1.10	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,014.90	ft	Flow Control	N/A	
Inlet Type	Projecting		Area Full	12.6	ft^2
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

Culvert Calculator Report
BV-03 (Proposed)

Comments: Lane structural plate arch A-S-117 (21' x 6.33') buried 10 inches to provide 20' clear span and 5.47' rise to provide 3.3' cover (2.5' cover is the minimum)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,040.46	ft	Headwater Depth/Height	0.80	
Computed Headwater Elevation	2,036.37	ft	Discharge	396.00	cfs
Inlet Control HW Elev.	2,035.84	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,036.37	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	2,032.00	ft	Downstream Invert	2,031.00	ft
Length	35.00	ft	Constructed Slope	0.028571	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.96	ft
Slope Type	Steep		Normal Depth	1.94	ft
Flow Regime	Supercritical		Critical Depth	2.37	ft
Velocity Downstream	10.99	ft/s	Critical Slope	0.016579	ft/ft

Section					
Section Shape	Arch		Mannings Coefficient	0.028	
Section Material	Steel and Aluminum 5x1 and 3x1 Corrugations		Span	21.00	ft
Section Size	A-S-117 (21' x 6.33' buried 10)		Rise	5.48	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,036.37	ft	Upstream Velocity Head	1.33	ft
Ke	0.50		Entrance Loss	0.67	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,035.84	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	77.2	ft²
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-01 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,509.22	ft	Headwater Depth/Height	1.19	
Computed Headwater Elevation	1,508.86	ft	Discharge	61.80	cfs
Inlet Control HW Elev.	1,508.57	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,508.86	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,504.70	ft	Downstream Invert	1,503.70	ft
Length	33.00	ft	Constructed Slope	0.030303	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.09	ft
Slope Type	Steep		Normal Depth	2.06	ft
Flow Regime	Supercritical		Critical Depth	2.46	ft
Velocity Downstream	10.30	ft/s	Critical Slope	0.018075	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,508.86	ft	Upstream Velocity Head	1.13	ft
Ke	0.50		Entrance Loss	0.57	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,508.57	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-02 (Proposed)

Comments: Cross-Sectional Area was reduced from 8.9 SF to 8.09 SF to account for 4" burial of pipe.

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,591.98	ft	Headwater Depth/Height	4.21	
Computed Headwater Elevation	1,591.67	ft	Discharge	130.00	cfs
Inlet Control HW Elev.	1,591.67	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,590.04	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,580.10	ft	Downstream Invert	1,577.70	ft
Length	34.00	ft	Constructed Slope	0.070588	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.64	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.64	ft
Velocity Downstream	14.72	ft/s	Critical Slope	0.087772	ft/ft

Section				
Section Shape	Arch	Mannings Coefficient	0.028	
Section Material	Steel and Aluminum 5x1 and 3x1 Corrugations	Span	4.08	ft
Section Size	49 x 33 inch buried (Modified)	Rise	2.75	ft
Number Sections	1			

Outlet Control Properties					
Outlet Control HW Elev.	1,590.04	ft	Upstream Velocity Head	4.01	ft
Ke	0.50		Entrance Loss	2.00	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,591.67	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	8.1	ft²
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-03 (Proposed)

Comments: Cross-Sectional Area was reduced from 19.4 SF to 18.6 SF to account for 4" burial of pipe.

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,712.49	ft	Headwater Depth/Height	2.27	
Computed Headwater Elevation	1,710.91	ft	Discharge	257.00	cfs
Inlet Control HW Elev.	1,710.91	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,709.29	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,700.70	ft	Downstream Invert	1,698.20	ft
Length	41.00	ft	Constructed Slope	0.060976	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.34	ft
Slope Type	Steep		Normal Depth	3.20	ft
Flow Regime	Supercritical		Critical Depth	4.04	ft
Velocity Downstream	16.36	ft/s	Critical Slope	0.041463	ft/ft

Section					
Section Shape	Arch		Mannings Coefficient	0.028	
Section Material	Steel Mat Aluminum 5x1 and 3x1 Corrugations		Span	5.42	ft
Section Size	66 x 51 inch Buried (Modified)		Rise	4.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,709.29	ft	Upstream Velocity Head	3.03	ft
Ke	0.50		Entrance Loss	1.52	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,710.91	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	18.6	ft^2
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-05 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,098.06	ft	Headwater Depth/Height	1.59	
Computed Headwater Elevation	2,096.28	ft	Discharge	60.60	cfs
Inlet Control HW Elev.	2,096.28	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,096.15	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	2,091.50	ft	Downstream Invert	2,090.00	ft
Length	29.00	ft	Constructed Slope	0.051724	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.00	ft
Slope Type	Steep		Normal Depth	1.92	ft
Flow Regime	Supercritical		Critical Depth	2.51	ft
Velocity Downstream	12.13	ft/s	Critical Slope	0.027119	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,096.15	ft	Upstream Velocity Head	1.43	ft
Ke	0.50		Entrance Loss	0.71	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,096.28	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-07.1 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,206.07	ft	Headwater Depth/Height	3.11	
Computed Headwater Elevation	2,206.05	ft	Discharge	25.70	cfs
Inlet Control HW Elev.	2,206.05	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,205.01	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	2,200.60	ft	Downstream Invert	2,196.91	ft
Length	37.00	ft	Constructed Slope	0.099730	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.37	ft
Slope Type	Steep		Normal Depth	1.36	ft
Flow Regime	Supercritical		Critical Depth	1.69	ft
Velocity Downstream	12.68	ft/s	Critical Slope	0.078380	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	1.75	ft
Section Size	21 inch		Rise	1.75	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,205.01	ft	Upstream Velocity Head	1.82	ft
Ke	0.50		Entrance Loss	0.91	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,206.05	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	2.4	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-07A (Existing)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,163.39	ft	Headwater Depth/Height	0.74	
Computed Headwater Elevation	2,161.11	ft	Discharge	19.00	cfs
Inlet Control HW Elev.	2,160.77	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,161.11	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	2,158.90	ft	Downstream Invert	2,156.20	ft
Length	32.00	ft	Constructed Slope	0.084375	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.88	ft
Slope Type	Steep		Normal Depth	0.86	ft
Flow Regime	Supercritical		Critical Depth	1.40	ft
Velocity Downstream	11.07	ft/s	Critical Slope	0.014124	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	2,161.11	ft	Upstream Velocity Head	0.54	ft
Ke	0.50		Entrance Loss	0.27	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,160.77	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-08 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,922.29	ft	Headwater Depth/Height	1.78	
Computed Headwater Elevation	1,922.24	ft	Discharge	105.00	cfs
Inlet Control HW Elev.	1,922.24	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,921.52	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,916.40	ft	Downstream Invert	1,915.80	ft
Length	30.00	ft	Constructed Slope	0.020000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.62	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.62	ft
Velocity Downstream	10.25	ft/s	Critical Slope	0.031158	ft/ft

Section				
Section Shape	Arch	Mannings Coefficient	0.028	
Section Material	Steel and Aluminum 5x1 and 3x1 Corrugations	Span	4.42	ft
Section Size	53 x 41 inch buried (Modified)	Rise	3.28	ft
Number Sections	1			

Outlet Control Properties					
Outlet Control HW Elev.	1,921.52	ft	Upstream Velocity Head	1.27	ft
Ke	0.50		Entrance Loss	0.63	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,922.24	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	10.8	ft²
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-09 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,652.87	ft	Headwater Depth/Height	0.96	
Computed Headwater Elevation	1,650.58	ft	Discharge	646.00	cfs
Inlet Control HW Elev.	1,649.86	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,650.58	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,645.40	ft	Downstream Invert	1,643.20	ft
Length	32.00	ft	Constructed Slope	0.068750	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.79	ft
Slope Type	Steep		Normal Depth	1.64	ft
Flow Regime	Supercritical		Critical Depth	2.75	ft
Velocity Downstream	14.97	ft/s	Critical Slope	0.017244	ft/ft

Section				
Section Shape	Arch	Mannings Coefficient	0.028	
Section Material	Steel and Aluminum 5x1 and 3x1 Corrugations	Span	26.58	ft
Section Size	BC-A-88 (26'-7 x 5'-5)	Rise	5.42	ft
Number Sections	1			

Outlet Control Properties					
Outlet Control HW Elev.	1,650.58	ft	Upstream Velocity Head	1.63	ft
Ke	0.50		Entrance Loss	0.81	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,649.86	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	111.6	ft²
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-11 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,621.52	ft	Headwater Depth/Height	1.11	
Computed Headwater Elevation	1,620.98	ft	Discharge	55.50	cfs
Inlet Control HW Elev.	1,620.69	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,620.98	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,617.10	ft	Downstream Invert	1,616.50	ft
Length	29.00	ft	Constructed Slope	0.020690	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.17	ft
Slope Type	Steep		Normal Depth	2.17	ft
Flow Regime	Supercritical		Critical Depth	2.33	ft
Velocity Downstream	8.84	ft/s	Critical Slope	0.016896	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,620.98	ft	Upstream Velocity Head	1.03	ft
Ke	0.50		Entrance Loss	0.52	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,620.69	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-12 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,623.85	ft	Headwater Depth/Height	1.33	
Computed Headwater Elevation	1,623.78	ft	Discharge	49.30	cfs
Inlet Control HW Elev.	1,623.63	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,623.78	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,619.80	ft	Downstream Invert	1,618.00	ft
Length	32.00	ft	Constructed Slope	0.056250	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.70	ft
Slope Type	Steep		Normal Depth	1.63	ft
Flow Regime	Supercritical		Critical Depth	2.29	ft
Velocity Downstream	11.95	ft/s	Critical Slope	0.021598	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch (Modified)		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,623.78	ft	Upstream Velocity Head	1.13	ft
Ke	0.50		Entrance Loss	0.57	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,623.63	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
HK-13 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,667.33	ft	Headwater Depth/Height	1.36	
Computed Headwater Elevation	1,667.26	ft	Discharge	164.00	cfs
Inlet Control HW Elev.	1,666.97	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,667.26	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,662.50	ft	Downstream Invert	1,662.20	ft
Length	28.00	ft	Constructed Slope	0.010714	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.13	ft
Slope Type	Steep		Normal Depth	1.78	ft
Flow Regime	Supercritical		Critical Depth	2.57	ft
Velocity Downstream	11.00	ft/s	Critical Slope	0.003748	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	7.00	ft
Section Size	7 x 3.5 ft (7 x 4 - buried 6 inches)		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,667.26	ft	Upstream Velocity Head	1.29	ft
Ke	0.70		Entrance Loss	0.90	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,666.97	ft	Flow Control	N/A	
Inlet Type	0° wingwall flares		Area Full	24.5	ft^2
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Calculator Report
CM-1A (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,957.20	ft	Headwater Depth/Height	1.60	
Computed Headwater Elevation	1,957.10	ft	Discharge	68.90	cfs
Inlet Control HW Elev.	1,957.10	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,957.06	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,953.90	ft	Downstream Invert	1,953.60	ft
Length	26.00	ft	Constructed Slope	0.011538	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.46	ft
Slope Type	Steep		Normal Depth	1.26	ft
Flow Regime	Supercritical		Critical Depth	1.81	ft
Velocity Downstream	9.44	ft/s	Critical Slope	0.004176	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	5 x 2 ft		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,957.06	ft	Upstream Velocity Head	0.90	ft
Ke	0.50		Entrance Loss	0.45	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,957.10	ft	Flow Control	N/A	
Inlet Type	45° non-offset wingwall flares		Area Full	10.0	ft^2
K	0.49700		HDS 5 Chart	12	
M	0.66700		HDS 5 Scale	1	
C	0.03390		Equation Form	2	
Y	0.80300				

Culvert Analysis Report
CM-5 (Proposed)

Analysis Component			
Storm Event	Design	Discharge	209.00 cfs

Peak Discharge Method: User-Specified			
Design Discharge	209.00 cfs	Check Discharge	0.00 cfs

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	N/A ft

Name	Description	Discharge	HW Elev.	Velocity
Culvert-3	1-24 inch Circular	13.29 cfs	1,186.58 ft	6.47 ft/s
Culvert-1	2-7 x 3 ft (Modified) Box	195.66 cfs	1,186.58 ft	10.59 ft/s
Weir	Not Considered	N/A	N/A	N/A
Total	----------	208.95 cfs	1,186.58 ft	N/A

Culvert Analysis Report
CM-5 (Proposed)

Component:Culvert-3

Culvert Summary					
Computed Headwater Elevation	1,186.57	ft	Discharge	13.29	cfs
Inlet Control HW Elev.	1,186.40	ft	Tailwater Elevation	N/A	ft
Outlet Control HW Elev.	1,186.57	ft	Control Type	Entrance Control	
Headwater Depth/Height	1.09				

Grades					
Upstream Invert	1,184.40	ft	Downstream Invert	1,183.70	ft
Length	30.00	ft	Constructed Slope	0.023333	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.24	ft
Slope Type	Steep		Normal Depth	1.24	ft
Flow Regime	Supercritical		Critical Depth	1.31	ft
Velocity Downstream	6.47	ft/s	Critical Slope	0.020014	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,186.57	ft	Upstream Velocity Head	0.57	ft
Ke	0.50		Entrance Loss	0.29	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,186.40	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	3.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Analysis Report
CM-5 (Proposed)

Component:Culvert-1

Culvert Summary					
Computed Headwater Elevation	1,186.57	ft	Discharge	195.66	cfs
Inlet Control HW Elev.	1,186.30	ft	Tailwater Elevation	N/A	ft
Outlet Control HW Elev.	1,186.57	ft	Control Type	Entrance Control	
Headwater Depth/Height	1.27				

Grades					
Upstream Invert	1,183.20	ft	Downstream Invert	1,182.70	ft
Length	25.00	ft	Constructed Slope	0.020000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.32	ft
Slope Type	Steep		Normal Depth	1.01	ft
Flow Regime	Supercritical		Critical Depth	1.82	ft
Velocity Downstream	10.59	ft/s	Critical Slope	0.003526	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	7.00	ft
Section Size	7 x 3 ft (Modified)		Rise	2.67	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,186.57	ft	Upstream Velocity Head	0.91	ft
Ke	0.70		Entrance Loss	0.64	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,186.30	ft	Flow Control	N/A	
Inlet Type	0° wingwall flares		Area Full	37.3	ft^2
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Calculator Report
CT-01 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,645.40	ft	Headwater Depth/Height	1.26	
Computed Headwater Elevation	1,645.09	ft	Discharge	46.00	cfs
Inlet Control HW Elev.	1,644.98	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,645.09	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,641.30	ft	Downstream Invert	1,640.80	ft
Length	26.00	ft	Constructed Slope	0.019231	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.76	ft
Slope Type	Steep		Normal Depth	1.50	ft
Flow Regime	Supercritical		Critical Depth	2.21	ft
Velocity Downstream	10.65	ft/s	Critical Slope	0.005971	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,645.09	ft	Upstream Velocity Head	1.06	ft
Ke	0.50		Entrance Loss	0.53	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,644.98	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	7.1	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
CT-2 (Existing)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,694.40	ft	Headwater Depth/Height	1.28	
Computed Headwater Elevation	1,693.87	ft	Discharge	68.50	cfs
Inlet Control HW Elev.	1,693.68	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,693.87	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,689.40	ft	Downstream Invert	1,688.80	ft
Length	30.00	ft	Constructed Slope	0.020000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.57	ft
Slope Type	Steep		Normal Depth	2.57	ft
Flow Regime	Supercritical		Critical Depth	2.59	ft
Velocity Downstream	9.05	ft/s	Critical Slope	0.019536	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,693.87	ft	Upstream Velocity Head	1.25	ft
Ke	0.50		Entrance Loss	0.62	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,693.68	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
CT-3 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,725.80	ft	Headwater Depth/Height	1.48	
Computed Headwater Elevation	1,725.66	ft	Discharge	50.00	cfs
Inlet Control HW Elev.	1,725.54	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,725.66	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,722.70	ft	Downstream Invert	1,722.40	ft
Length	31.00	ft	Constructed Slope	0.009677	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.41	ft
Slope Type	Steep		Normal Depth	1.30	ft
Flow Regime	Supercritical		Critical Depth	1.69	ft
Velocity Downstream	8.86	ft/s	Critical Slope	0.004681	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	4 x 2 ft		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,725.66	ft	Upstream Velocity Head	0.85	ft
Ke	0.50		Entrance Loss	0.42	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,725.54	ft	Flow Control	N/A	
Inlet Type	45° wingwall flares - offset		Area Full	8.0	ft²
K	0.49700		HDS 5 Chart	13	
M	0.66700		HDS 5 Scale	1	
C	0.03020		Equation Form	2	
Y	0.83500				

Culvert Calculator Report
CZ-1 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	2,036.24	ft	Headwater Depth/Height	1.68	
Computed Headwater Elevation	2,036.21	ft	Discharge	77.40	cfs
Inlet Control HW Elev.	2,036.07	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	2,036.21	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	2,032.00	ft	Downstream Invert	2,031.70	ft
Length	25.00	ft	Constructed Slope	0.012000	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.10	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.10	ft
Velocity Downstream	8.79	ft/s	Critical Slope	0.029099	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	2,036.21	ft	Upstream Velocity Head	0.97	ft
Ke	0.50		Entrance Loss	0.48	ft

Inlet Control Properties					
Inlet Control HW Elev.	2,036.07	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.8	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
MP-01 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,388.90	ft	Headwater Depth/Height	1.43	
Computed Headwater Elevation	1,388.59	ft	Discharge	54.50	cfs
Inlet Control HW Elev.	1,388.56	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,388.59	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,384.30	ft	Downstream Invert	1,383.00	ft
Length	33.00	ft	Constructed Slope	0.039394	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.99	ft
Slope Type	Steep		Normal Depth	1.96	ft
Flow Regime	Supercritical		Critical Depth	2.40	ft
Velocity Downstream	10.92	ft/s	Critical Slope	0.023878	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,388.59	ft	Upstream Velocity Head	1.26	ft
Ke	0.50		Entrance Loss	0.63	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,388.56	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	7.1	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
MP-1A (Proposed)

Comments: Cross-sectional area was reduced from 15.6 sf to 14.9 sf for 4" burial

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,468.80	ft	Headwater Depth/Height	1.28	
Computed Headwater Elevation	1,468.67	ft	Discharge	159.00	cfs
Inlet Control HW Elev.	1,468.67	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,468.66	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,462.90	ft	Downstream Invert	1,461.50	ft
Length	30.00	ft	Constructed Slope	0.046667	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.59	ft
Slope Type	Steep		Normal Depth	2.47	ft
Flow Regime	Supercritical		Critical Depth	3.25	ft
Velocity Downstream	13.15	ft/s	Critical Slope	0.022528	ft/ft

Section					
Section Shape	Arch		Mannings Coefficient	0.028	
Section Material	Steel and Aluminum 5x1 and 3x1 Corrugations		Span	5.42	ft
Section Size	66 x 51 inch Buried (Modified)		Rise	4.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,468.66	ft	Upstream Velocity Head	1.67	ft
Ke	0.50		Entrance Loss	0.84	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,468.67	ft	Flow Control	N/A	
Inlet Type	90° headwall		Area Full	18.6	ft^2
K	0.00830		HDS 5 Chart	34	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
MP-2 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,567.30	ft	Headwater Depth/Height	1.23	
Computed Headwater Elevation	1,566.27	ft	Discharge	57.10	cfs
Inlet Control HW Elev.	1,566.16	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,566.27	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	1,563.20	ft	Downstream Invert	1,562.70	ft
Length	28.00	ft	Constructed Slope	0.017857	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.82	ft
Slope Type	Mild		Normal Depth	1.97	ft
Flow Regime	Subcritical		Critical Depth	1.82	ft
Velocity Downstream	7.45	ft/s	Critical Slope	0.021267	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,566.27	ft	Upstream Velocity Head	0.74	ft
Ke	0.50		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,566.16	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.8	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
MP-3 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,621.10	ft	Headwater Depth/Height	1.45	
Computed Headwater Elevation	1,620.19	ft	Discharge	195.00	cfs
Inlet Control HW Elev.	1,620.03	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,620.19	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,617.00	ft	Downstream Invert	1,616.50	ft
Length	30.00	ft	Constructed Slope	0.016667	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.31	ft
Slope Type	Steep		Normal Depth	1.02	ft
Flow Regime	Supercritical		Critical Depth	1.82	ft
Velocity Downstream	10.60	ft/s	Critical Slope	0.002745	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	14.00	ft
Section Size	14 x 2.2 ft (Modified)		Rise	2.20	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,620.19	ft	Upstream Velocity Head	0.91	ft
Ke	0.50		Entrance Loss	0.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,620.03	ft	Flow Control	N/A	
Inlet Type	45° wingwall flares - offset		Area Full	30.8	ft^2
K	0.49700		HDS 5 Chart	13	
M	0.66700		HDS 5 Scale	1	
C	0.03020		Equation Form	2	
Y	0.83500				

Culvert Calculator Report
MP-4 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,768.50	ft	Headwater Depth/Height	1.47	
Computed Headwater Elevation	1,767.92	ft	Discharge	95.00	cfs
Inlet Control HW Elev.	1,767.73	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,767.92	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,764.00	ft	Downstream Invert	1,763.50	ft
Length	23.00	ft	Constructed Slope	0.021739	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.67	ft
Slope Type	Steep		Normal Depth	1.27	ft
Flow Regime	Supercritical		Critical Depth	2.24	ft
Velocity Downstream	11.37	ft/s	Critical Slope	0.004416	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	5.00	ft
Section Size	5 x 3 ft Modified		Rise	2.67	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,767.92	ft	Upstream Velocity Head	1.12	ft
Ke	0.50		Entrance Loss	0.56	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,767.73	ft	Flow Control	N/A	
Inlet Type	45° wingwall flares - offset		Area Full	13.3	ft²
K	0.49700		HDS 5 Chart	13	
M	0.66700		HDS 5 Scale	1	
C	0.03020		Equation Form	2	
Y	0.83500				

Culvert Calculator Report
MP-5 (Existing)

Comments: Existing culvert is sufficient

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,823.65	ft	Headwater Depth/Height	1.23	
Computed Headwater Elevation	1,821.38	ft	Discharge	28.10	cfs
Inlet Control HW Elev.	1,821.19	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,821.38	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,818.30	ft	Downstream Invert	1,816.10	ft
Length	29.00	ft	Constructed Slope	0.075862	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.06	ft
Slope Type	Steep		Normal Depth	0.85	ft
Flow Regime	Supercritical		Critical Depth	1.81	ft
Velocity Downstream	14.27	ft/s	Critical Slope	0.006164	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,821.38	ft	Upstream Velocity Head	0.85	ft
Ke	0.50		Entrance Loss	0.42	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,821.19	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
MP-6 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,857.20	ft	Headwater Depth/Height	1.49	
Computed Headwater Elevation	1,856.88	ft	Discharge	41.10	cfs
Inlet Control HW Elev.	1,856.88	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,856.84	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,853.90	ft	Downstream Invert	1,853.30	ft
Length	28.00	ft	Constructed Slope	0.021429	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.63	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.63	ft
Velocity Downstream	7.51	ft/s	Critical Slope	0.028542	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,856.84	ft	Upstream Velocity Head	0.69	ft
Ke	0.50		Entrance Loss	0.34	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,856.88	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	6.3	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Culvert Calculator Report
MP-7 (Proposed)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,873.20	ft	Headwater Depth/Height	1.97	
Computed Headwater Elevation	1,873.12	ft	Discharge	44.80	cfs
Inlet Control HW Elev.	1,873.12	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,872.62	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	1,868.20	ft	Downstream Invert	1,866.50	ft
Length	29.00	ft	Constructed Slope	0.058621	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.50	ft
Slope Type	Steep		Normal Depth	1.18	ft
Flow Regime	Supercritical		Critical Depth	2.22	ft
Velocity Downstream	14.62	ft/s	Critical Slope	0.010622	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,872.62	ft	Upstream Velocity Head	1.47	ft
Ke	0.50		Entrance Loss	0.73	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,873.12	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
MP-8 (Existing)

Comments: Existing culvert is sufficient

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,857.00	ft	Headwater Depth/Height	0.97	
Computed Headwater Elevation	1,856.49	ft	Discharge	44.70	cfs
Inlet Control HW Elev.	1,856.15	ft	Tailwater Elevation	0.00	ft
Outlet Control HW Elev.	1,856.49	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	1,853.10	ft	Downstream Invert	1,851.80	ft
Length	30.00	ft	Constructed Slope	0.043333	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.58	ft
Slope Type	Steep		Normal Depth	1.53	ft
Flow Regime	Supercritical		Critical Depth	2.08	ft
Velocity Downstream	10.58	ft/s	Critical Slope	0.015239	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,856.49	ft	Upstream Velocity Head	0.87	ft
Ke	0.50		Entrance Loss	0.43	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,856.15	ft	Flow Control	N/A	
Inlet Type	Headwall		Area Full	9.6	ft^2
K	0.00780		HDS 5 Chart	2	
M	2.00000		HDS 5 Scale	1	
C	0.03790		Equation Form	1	
Y	0.69000				

Field Data Collection Summary (Normandeau Associates)

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NPT ORAR Culvert Improvements
Field Data Collection Summary
Coos County, New Hampshire

Submitted to
Eversource Energy
780 North Commercial Street
Manchester, NH 03105

Submitted By
Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110-5500
603.472.5191
www.normandeau.com

December 9, 2016

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1.0 Introduction

Normandeau Associates, Inc. (Normandeau) conducted field assessments at several culverts requiring upgrades along existing off right-of-way access roads (ORARs) to meet Env-Wt 900 stream crossing requirements as part of the Northern Pass Transmission (NPT) project in Coos County, New Hampshire. The field assessments were conducted as part of the evaluation of the culverts and surrounding natural resources and provided data to be used by VHB, who is preparing the design plans for the culvert replacement and/or upgrades for each of the culvert. The information collected by Normandeau included a summary of the culvert and channel in the vicinity of the culvert, a wetlands and stream evaluation, and for Tier 3 channels completion of a longitudinal profile, stream channel cross section, and pebble count to assess the channel substrate. Details on the field assessments conducted are summarized below.

2.0 Field Assessment Activities

Normandeau personnel conducted field assessments at a total of 29 stream crossings that were identified as requiring replacement or upgrades over the period November 9 to 16, 2016. Design flows and culvert hydraulics were completed for the project by VHB as described in their Culvert Calculations document. The Tier classifications were determined based on the size of the watershed for each culvert as calculated by VHB. Tier 1 crossings have watershed areas less than 200 acres, Tier 2 crossings have watershed areas greater than 200 acres but less than 640 acres, and Tier 3 crossings have watershed areas greater than 640 acres. The crossings included nineteen (19) Tier 1 crossings, seven (7) Tier 2 crossings, and three (3) Tier 3 crossings. Information on the culverts including drainage area, Tier classification, design storm and flow, and existing structures are summarized on Tables 1 and 2 below. The location of the culvert crossings are shown on Maps 1, 2, and 3 (Appendix A).

Information collected by Normandeau during the field assessment included a summary of the culvert and channel in the vicinity of the culvert, a wetlands and stream evaluation, and for the three (3) Tier 3 channels completion of a longitudinal profile, stream channel cross section, and pebble count to assess the channel substrate.

General characteristics of the culvert and surrounding channel were recorded for each stream crossing location on the "Stream Crossing Assessment Worksheet", which is included in the individual data package for each crossing (Appendix B). Information included on the Stream Crossing Assessment Worksheet included width of the crossing, location (GPS points) for the inlet and outlet, dimensions of the inlet and outlet, water depth, information on any tailwater controls or pools, channel width, photos of the inlet and outlet, a visual assessment of the bed material, and type of dominant vegetation. Site photographs were not included in the individual data packages provided by Normandeau as they were included in the design package submitted by VHB.

Table 1. Northern Area Culverts

Culvert	Drainage Area (ac)	Tier	Design Storm (yr)	Flow (cfs)	Size	Shape	Material
BV-1	38	1	50	19.9	18″	Round	CMP
BV-2	128	1	50	80.5	48″	Round	CMP
BV-3	704	3	100	396.0	84″	Round	CMP
HK-1	186	1	50	61.8	28″ W x 40″ H	Ellipse	CMP
HK-2	378	2	100	156.0	42″ (36″)	Round	Steel
HK-3	570	2	100	257.0	60″	Round	CMP
HK-5	115	1	50	60.6	26″	Round	Steel
HK-7.1	45	1	50	25.7	15″	Round	CMP
HK-7A	32	1	50	19.0	36″	Round	CMP
HK-8	205	2	100	105.0	36″	Round	CMP
HK-9	1,510	3	100	646.0	120″ W x 78″ H	Arch	CMP
HK-11	109	1	50	55.5	21″	Round	CMP
HK-12	102	1	50	49.3	36″	Round	CMP
HK-13	333	2	100	164.0	(2) 30″ and (1) 36″W x 24″ H	Round Ellipse	CMP CMP

Table 2. Southern Area Culverts

Culvert	Drainage Area (ac)	Tier	Design Storm (yr)	Flow (cfs)	Size	Shape	Material
CM-01A	122	1	50	68.9	30″	Round	CMP
CM-5	627	2	100	209.0	42″W x 28″H 24″	Arch Round	CMP CMP
CT-1	83	1	50	45.7	24″	Round	CMP
CT-2	154	1	50	68.5	42″ W x 52″ H	Ellipse	CMP
CT-3	128	1	50	49.9	15″	Round	HDPE
CZ-1	147	1	50	77.4	18″	Round	CMP
MP-1	147	1	50	54.5	15″	Round	CMP
MP-1A	390	2	100	159.0	42″	Round	CMP
MP-2	154	1	50	57.1	36″	Round	CMP
MP-3	979	3	100	195.0	(2) 42″	Round	CMP
MP-4	211	2	100	95.1	18″	Round	RCP

Culvert	Drainage Area (ac)	Tier	Design Storm (yr)	Flow (cfs)	Size	Shape	Material
MP-5	58	1	50	28.1	30″	Round	RCP
MP-6	83	1	50	41.1	18″	Round	CMP
MP-7	90	1	50	44.8	36″	Round	RCP
MP-8	90	1	50	44.7	42″	Round	CMP

Notes: Values for drainage area and design storm flows calculated by VHB.

At each location, Normandeau personnel also delineated the boundaries of any wetlands that were present and also the centerline or banks (depending upon their width) of the main stream and any smaller tributaries that drained into the channel. The assessment was performed to a distance of approximately 25 feet upstream and downstream of the culvert and approximately 25 feet above and below the crossing along the roadway. This was also the approximate extent of the survey work completed by VHB as part of their design plans.

Wetland Function and Values Data Sheets and Stream Data Sheets were completed for each location to document the delineation. The wetland boundaries were marked with flagging and GPS points were collected along the wetland and stream boundaries. Normandeau staff downloaded and post-processed the wetland and stream GPS data and forward the boundary layers to VHB for inclusion on their design plans. This information was used to calculate project related impacts to wetlands and streams. The wetland and stream data sheets are included in the individual data packages for each crossing (Appendix B).

For Tier 3 crossings, a longitudinal profile was conducted for a reference reach located upstream of the culvert. The upstream reach was initially reviewed to evaluate the extent of any impacts from the stream culvert and determine the length of the overall length of longitudinal profile and select the location of the cross section. The longitudinal profiles extended a distance of approximately 12 to 15 bankfull widths upstream from the culvert and ranged in total length from 122 for MP-3 to 300 feet for HK-9. The cross section was selected along the reference reach, typically at a transition point from a run/riffle to a pool.

The bankfull width of the cross section was surveyed and based on the maximum bankfull depth, the flood-prone area was determined (2X bankfull depth). The left and right banks (looking downstream) of the bankfull width and flood prone area were marked with the GPS The location of the longitudinal profile and cross section are shown on an aerial photograph for each of the three (3) Tier 3 crossings (Appendix B).

Pebble counts were conducted along the reference reach cross section as well as in the vicinity of the inlet and outlet of the culvert to determine the percentages of the various particle sizes present in the substrate material. Field data sheets were used to collect the data for the longitudinal profile, the cross section, and the pebble counts.

The field data for the longitudinal profile, cross section, and pebble counts were summarized on Excel spreadsheets, which are included in the individual data packages for each crossing

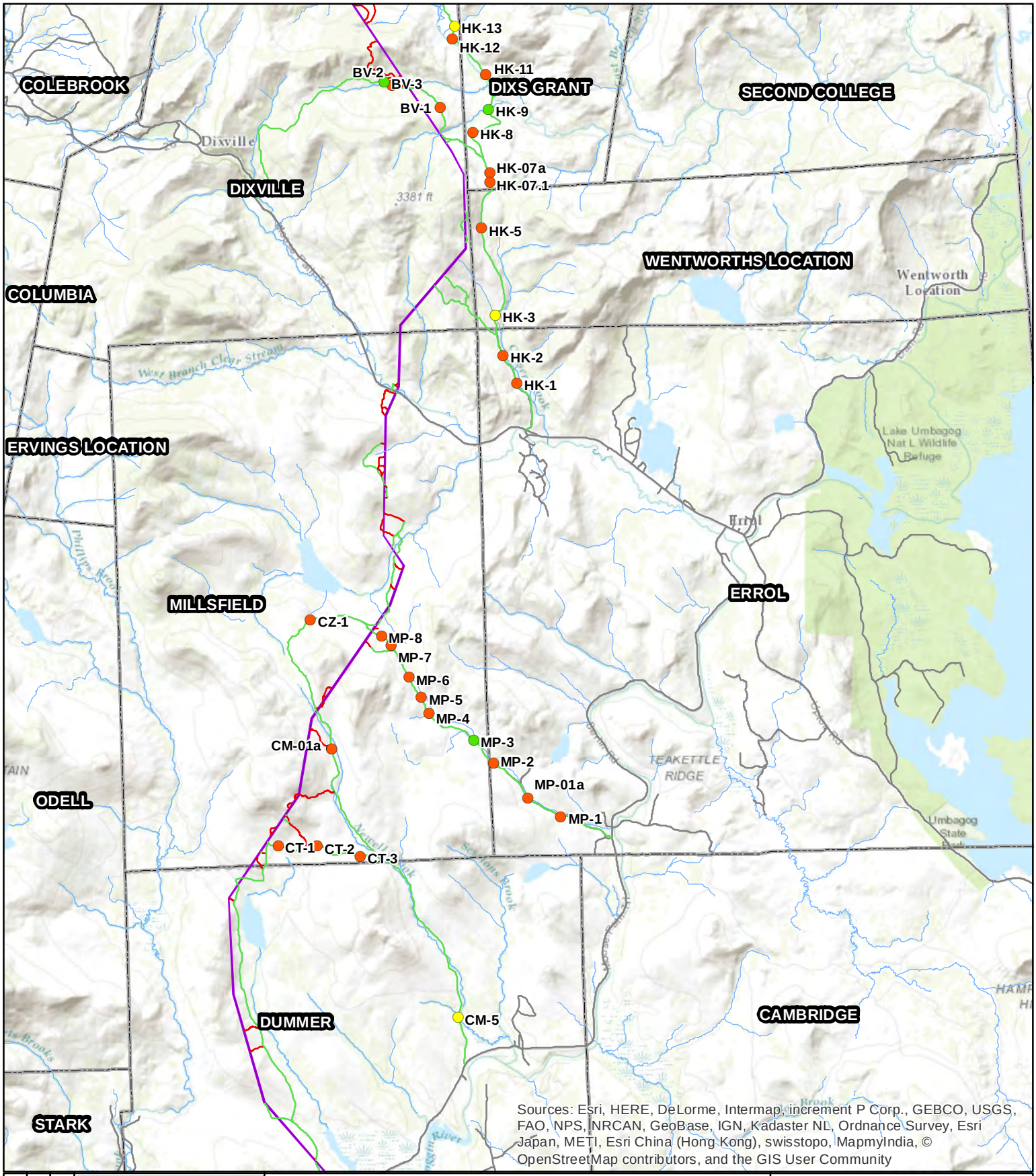
(Appendix B). The data packages include a summary table and graph for the longitudinal profile, a summary table and graph of the cross section, and summary table and graphs showing the pebble count data including the pebble counts, class %, and cumulative % finer for the three areas where pebble counts were conducted at each crossing (reference reach, upstream of culvert, and downstream of culvert).

Table 3 below summarizes several characteristics for each of the Tier 3 sites including the watershed area, bankfull width, flood prone width, maximum bankfull depth, average bankfull depth, and longitudinal profile distance. Additional values calculated based on the values above are also included on the table; entrenchment ratio (flood-prone width/bankfull width) and width depth ratio (bankfull width/average bankfull depth). Channel sinuosity and slope are also included on Table 3.

Table 3. Summary of stream channel characteristics for longitudinal profiles and cross sections.

Location	Watershed Area (acres)	Bankfull Width (ft)	Flood-prone width (ft)	Max Bankfull Depth (ft)	Avg. Bankfull Depth (ft)	Entrenchment Ratio	Width Depth Ratio	Long Profile Distance (ft)	Sinuosity	Slope	Predominant Substrate
BV-3	704	15.0	44.7	2.45	1.76	2.98	8.51	166	1.12	0.052	Cobble
HK-9	1,414.4	20	44	2.63	1.74	2.20	11.48	303	1.03	0.045	Cobble
MP-3	960	10	22.6	2.12	1.11	2.26	8.98	122	1.12	0.056	Cobble to Boulder

Appendix A
Site Figures



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Project Number: 21812

Created By: LFerrisi

Date Created: 12/1/2016

Legend

Tier

- Tier 1
- Tier 3
- Tier 2

Access Routes

- Road surveyed
- Road not surveyed; no access

- Proposed OH ROW
- Municipal Border
- Roads
- Stream/River

0 0.5 1 2 3 Miles

N

Northern Pass Map 1
ORARs Stream Crossings

Northern New Hampshire, USA

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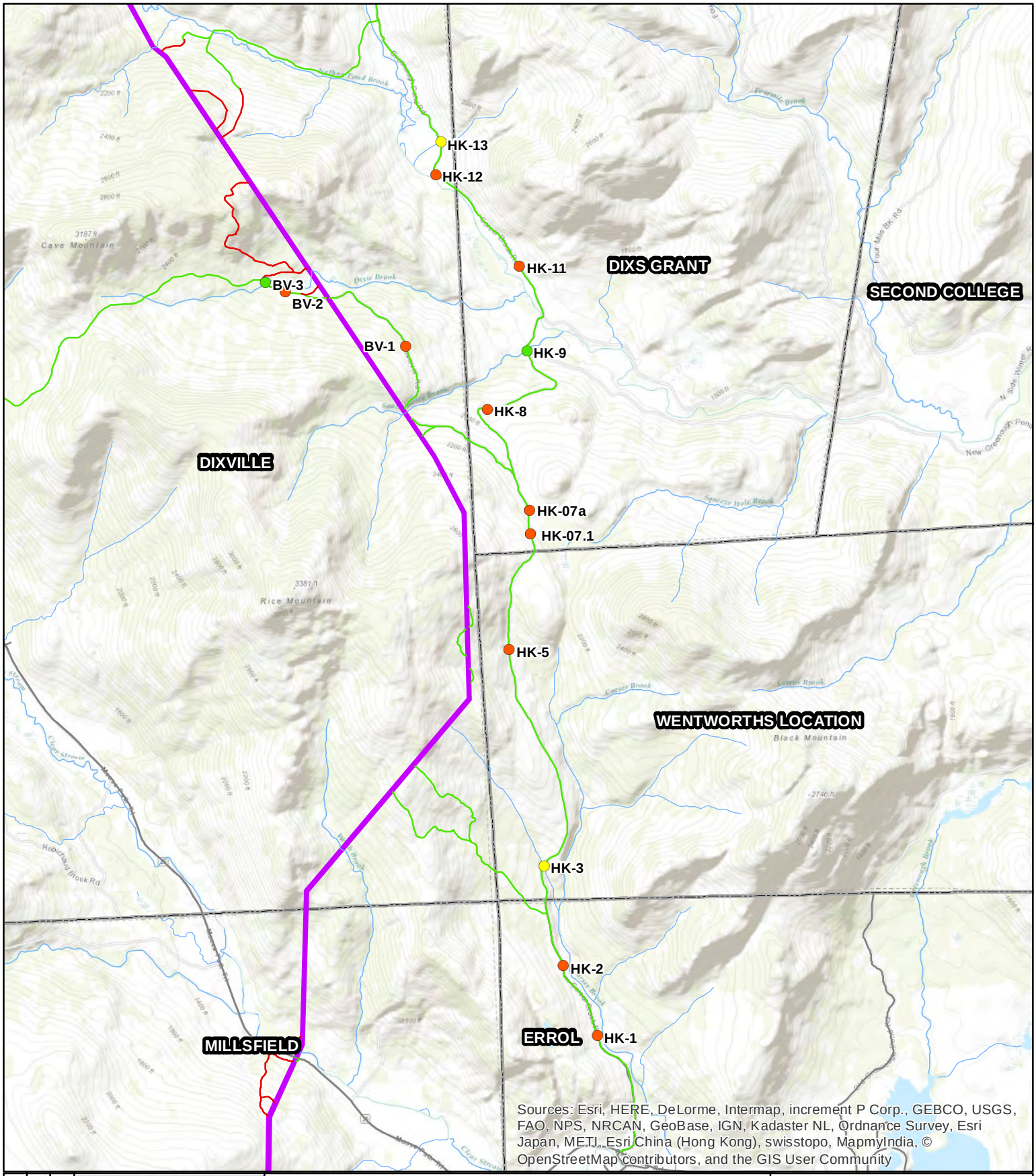

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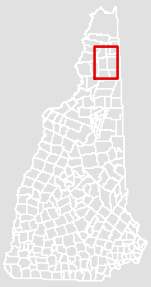
Created By: LFerrisi

Date Created: 12/1/2016



Legend

Tier

- Tier 1
- Tier 3
- Tier 2

Access Routes

- Road surveyed
- Road not surveyed; no access

- Proposed OH ROW
- Municipal Border
- Roads
- Stream/River

0 0.5 1 Miles

N

Northern Pass Map 2
ORARs Stream Crossings

Northern New Hampshire, USA

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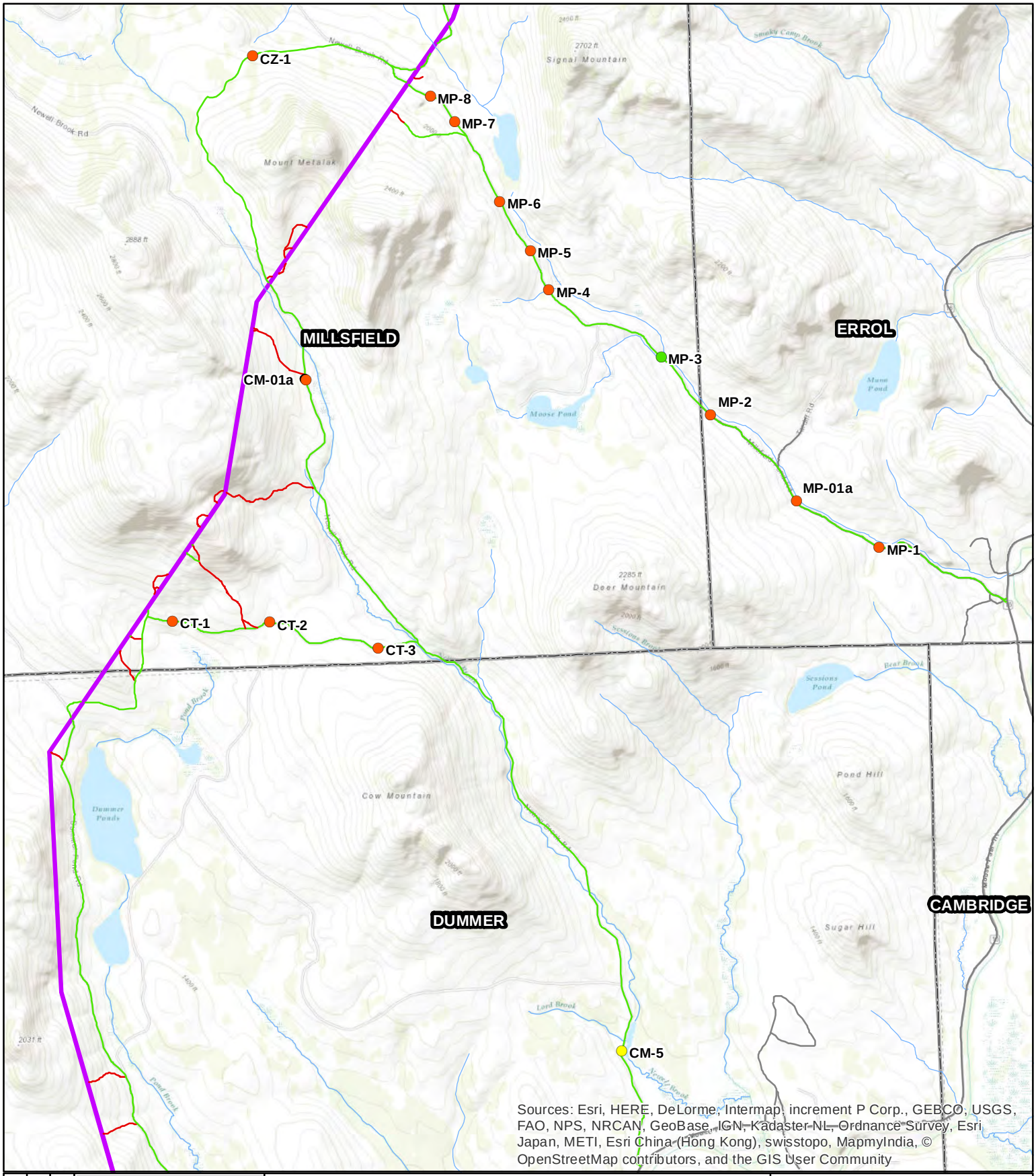
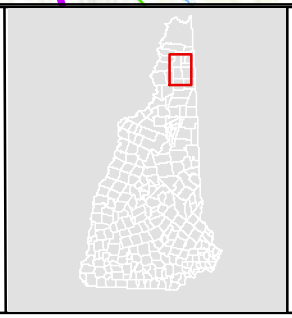


Project Number: 21812

Created By: LFerrisi

Date Created: 12/1/2016



Legend

Tier

- Tier 1
- Tier 3
- Tier 2

Access Routes

- Road surveyed
- Road not surveyed; no access

- Proposed OH ROW
- Municipal Border
- Roads
- Stream/River

0 0.5 1 Miles

N

Northern Pass Map 3
ORARs Stream Crossings

Northern New Hampshire, USA

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Appendix B
Data Submittal Packages

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

BV-1

Steam Culvert Data

Culvert Assessment Field Form – Geomorphic & Habitat Parameters

Structure ID	BV-1	Unknown ☐		Structure Number	
Observer(s)/ Organization(s)		Tidal ☐		Date & Time	7/27/16 7:40
Town		Datum		Latitude (N/S)	Cafs point altered
Location				Longitude (E/W)	" "
Crossing ID				Stream Name	unknown
Road Name	unknown BV segment map 8 of 44			Road Type	paved (gravel) trail railroad
# of shoulder lanes	0			Crossing Condition	new (old) eroding collapsing rusted
# of travel lanes	1	Structure Materials	Concrete, Plastic-Corrugated, Plastic-Smooth, Tank, Stone, (Steel-Corrugated), Steel-Smooth, Aluminum-Corrugated, Wood, Other: _____	Structure skewed to roadway	~~yes~~ (no)
# of culverts at crossing	1			Flow Conditions	unusually low (typical low) higher than average flood conditions
Overflow pipe(s)	yes (no)				
Inlet Headwall Material	Metal Concrete Masonry Gabion Dry Fit Stone Plastic (Other) None				

RX

Geomorphic and Fish Passage Data

General

Floodplain filled by roadway approaches: **entirely** (> 3/4 of floodplain) (**partially** (1/4 – 3/4 of floodplain)) **not significant**
Structure within ⅓ mile downstream of a significantly steeper segment of stream: **yes** **no** (**unsure**)
Culvert slope as compared with the channel slope is: **higher** (**lower**) **about the same**
Water depth in the crossing matches that of stream: (**yes**) **no (significantly deeper)** **no (significantly shallower)**
Water velocity in crossing matches that of stream: **yes** (**no (significantly faster)**) **no (significantly slower)**

Upstream

Structure opening partially obstructed by (circle all that apply): **wood** (**sediment**) **wood & sediment** (**deformation of culvert**) **none** **other**
Screening at inlet: **yes** (**no**)
Steep riffle present immediately upstream of structure: **yes** **no**
If channel avulses, stream will: **cross road** (**follow road**) **cross and follow road** **unsure**
Estimated distance avulsion would follow road: ≈ 100' (ft.)
Angle of stream flow approaching structure: **sharp bend (45° - 90°)** **mild bend (5° - 45°)** **naturally straight** (**channelized straight**)
Evidence of streambed erosion or aggradation immediately upstream of culvert: **erosion** **aggradation** **none**
Culvert inlet: **at grade** **cascade** **free fall**
Upstream bankfull widths: 1.) 4.2 **2.)** 4.9 **3.)**_____ **4.)**_____ **5.)**_____ **(ft.)**

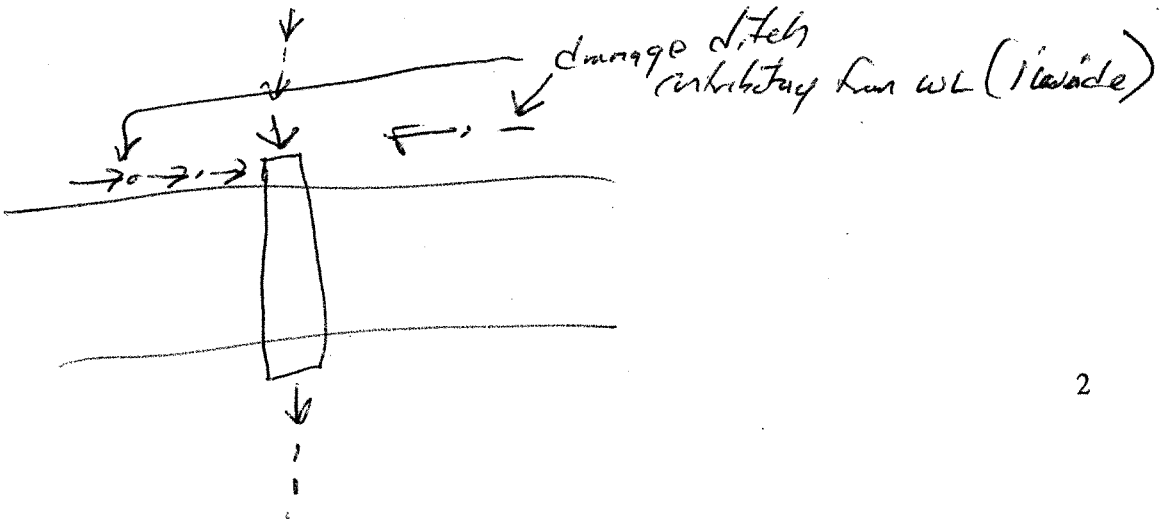
18" culvert

Reference bankfull widths: 1.)_____ 2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)

Downstream

Water depth in culvert (at outlet): 0.1 (0.0 ft.)
Culvert outlet: **at grade** **cascade** **free fall** **backwatered** _____ (ft.) Stepped footers: **yes** **no**
Outlet drop (invert to water surface): na (0.0 ft.)
Pool present immediately downstream of structure: **yes** **no**
Pool depth at point of streamflow entry: NA (ft.)
Maximum pool depth: NA (0.0 feet)
Downstream bank heights are substantially higher than upstream bank heights: **yes** **no**
Hydraulic control type: **bedrock** **boulders** **cobble** **gravel** **sand** **wood** **other:**_____
Distance from downstream end of culvert to hydraulic control: 15 (ft.)
Slope from downstream end of culvert to hydraulic control: ≈ 5% (%)
Evidence of streambed erosion or aggradation immediately downstream of culvert: **erosion** **aggradation** **none**
Downstream bankfull widths: 1.) 9.5 2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)

	Upstream	Downstream	In Structure	
Dominant bed material (substrate) at structure (use codes below)	1 2 3 4 5 6 UNK	1 2 3 4 5 6 UNK	NONE 1 2 3 4 5 6 UNK	
Bedrock present	yes no	yes no	Depth of Substrate	< 1 foot 1-2feet >2 feet UNK N/A
Sediment Deposit Type accumulation of sand	none delta side point mid-channel	none delta side point mid-channel	none delta side point mid-channel	
Elevation of sediment deposits is greater than or equal to ½ bankfull elevation	yes no	yes no	yes no	
			Substrate Throughout? yes no	
Beaver dam near structure Distance from structure to dam	yes no distance: _____ (ft.)	yes no distance: _____ (ft.)	**Bed Material Codes** 1 – bedrock 2 – boulder 3 – cobble 4 – gravel 5 – sand 6 – silt/clay UNK - unknown	
Hard bank armoring	intact failing none UNK	intact failing none UNK		
Bank erosion	high low none	high low none		
Stream bank scour causing undermining around/under structure (circle all that apply)	none culvert footers wing walls	none culvert footers wing walls		



Wildlife Data (left/right bank determined facing downstream)	**Upstream**		**Downstream**		
	LEFT	**RIGHT**	**LEFT**	**RIGHT**	
Dominant vegetation type (use codes to the right)	S	S	M	M	**Vegetation Type Codes** **C** – coniferous forest **D** – deciduous forest **M** – mixed forest **S** – shrub/sapling **H** – herbaceous/grass **B** – bare **R** – road embankment
Does a band of shrub/forest vegetation that is at least 50' wide start within 25' of structure and extend 500' or more up/downstream?	(yes) no	(yes) no	(yes) no	(yes) no	
Road-killed wildlife within ¼ mile of structure (circle none or list species)	**species:** (none)				

Wildlife sign and species observed near (up/downstream) and inside structure (circle none or list species and sign types)	**Outside Structure**		**Inside Structure**	
	species (none)	**sign**	**species (none)**	**sign**

Spatial data collected with GPS: (yes) no **Comments/Drawings:**

Photos taken: (yes) no
Please fill out photo log below

Folder Name:	**Structure Inlet**	**Structure Outlet**	**Above Structure**
Photo View - Upstream	☐	☐	☐
Photo View - Downstream	☐	☐	☐

Record the file name for each photo taken in the appropriate box

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

BV-2

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** BV-2 Tier 1

Date of field assessment: 11/10/16 Dixville, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 28 ft - 1 long - over rd. **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density* (logged over)

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:

grasses on upstream side
Balsam fir
yellow birch raspberries
red maple
spruce
dogwoods - red osier -

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Culvert side of rd. - downstream side

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Plunge pool = 1.3 ft
Water depth in culvert = 1 in

Distance between top and bottom of culvert/bed material: 4 ft / 48 in

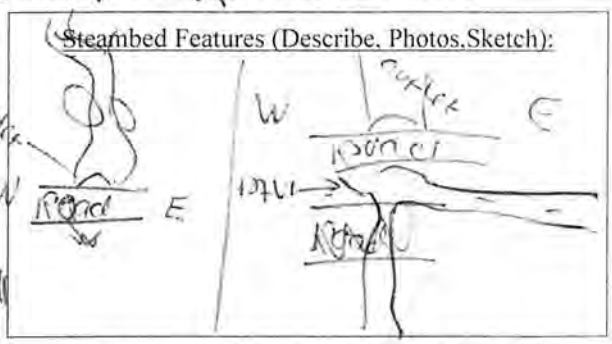
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 9 inches) (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 40 40 15 5

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 1 in (example):

next to inlet = 2 in

Distance between top and bottom of culvert/bed material: 4 ft / 48 in

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 30 30 - side 40 - side channel

Side organics ☒ (not side channel) 100%

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Side channel 5 ft

Top of bank width 5 ft Ordinary high water width _____ Distance from inlet 10

- cleared around inlet

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Northern Pass Project

Stream Data Sheet

Stream ID: BV-S100 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5-2 **Width (ft)** 2-8 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y/N

Associated with BV-2

Stream ID: BV-S101 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 2 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5-1 **Width (ft)** 1-2 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with BV-2

Stream ID: BV-S102 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BV-W101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-3 **Width (ft)** 15-20 **Ave. Depth (in):** 0-18" **Riffle/Pool Complex?** Y/N

Associated with BV-3

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

BV-3

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** BV3 - Tier 3

Date of field assessment: 11/10/16 Dixville, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 32 feet long **Watershed size** _____

☐ CMP ☒ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

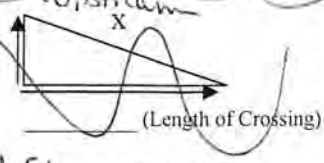
Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:

Paper birch
yellow birch
balsam fir
spruce
grasses (upstream side)
red maple
Cherry sapling near inlet

Slope at crossing: _____ (Rise in Elev.) _____ _____ (Length of Crossing)



Outlet Data: ☒ GPS Plunge pool = 1 ft

Depth of water at invert if not perched: 3" (example):

Note: could be perched if water levels get low

Distance between top and bottom of culvert/bed material: 7 ft

Perched at outlet? ☐ YES ☒ NO (If yes, Distance from invert to the waters surface: —) (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock

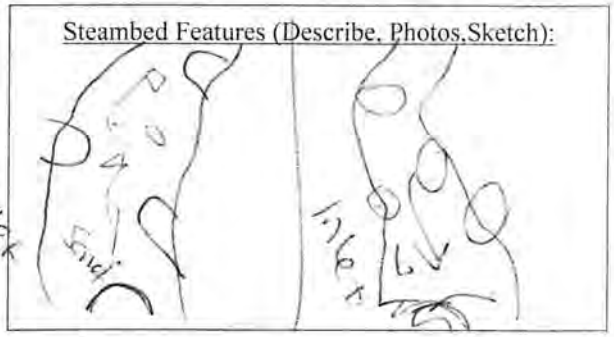
10 5 25

Pebble Count: ☐ YES ☐ NO (Tier 3 sites)

100

☐ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS water depth near inlet = 7"

Depth of water at inlet: 3" (example):

Distance between top and bottom of culvert/bed material: 7 ft

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☐ gravel ☒ cobble ☒ boulder ☐ bedrock

Pebble Count: ☒ YES ☐ NO (Tier 3 sites) → next time

10 45 45

☐ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 15 ft Ordinary high water width 15 ft, Distance from inlet 10 ft

Crossing BV-3
Tier 3 Reference Reach and Cross section Locations

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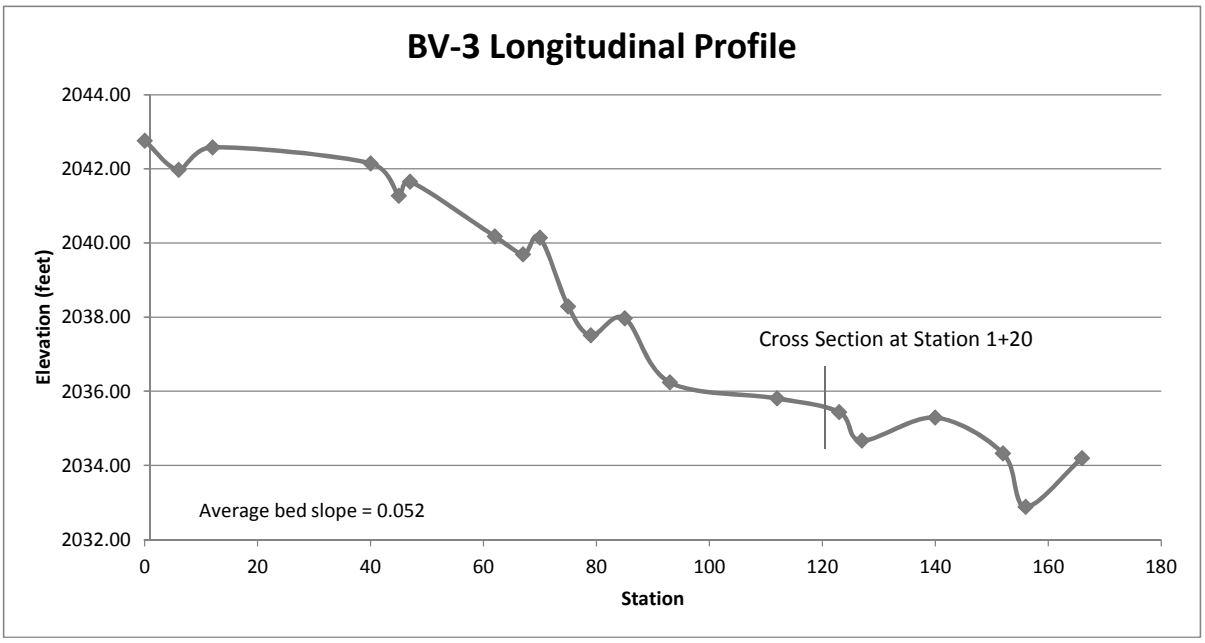
Legend

- Tier 3 Cross-section
- Tier 3 Reference Reach
- Culvert/Crossing

BV-3 Longitudinal Profile

Station	Foresight	Backsight	Elevation	Notes
STA #1		12.54	2044.34	Backsight to Culvert Inlet - Invert
0	1.58		2042.76	Briffle
6	2.36		2041.98	Pmax
12	1.76		2042.58	Bpool
40	2.19		2042.15	Briffle
45	3.06		2041.28	Pmax
47	2.68		2041.66	Bpool
62	4.16		2040.18	Briffle
67	4.64		2039.70	Pmax
70	4.19		2040.15	Bpool
75	6.05		2038.29	Bfalls
79	6.83		2037.51	Pmax
85	6.37		2037.97	Bpool
93	8.10		2036.24	Bfalls
112	8.53		2035.81	Briffle
123	8.90		2035.44	Bglide
127	9.67		2034.67	Pmax
140	9.05		2035.29	Bpool
152	10.01		2034.33	Briffle
156	11.45		2032.89	Pmax
166	10.14		2034.20	Bpool
214	12.54		2031.80	Culvert Inlet - Invert
214	5.33		2039.01	**Culvert Inlet - top (benchmark)**
246	5.70		2038.64	Culvert Outlet - top
246	12.95		2031.39	Culvert Outlet - Invert
246	13.26		2031.08	outlet substrate
	14.91		2029.43	outlet pmax



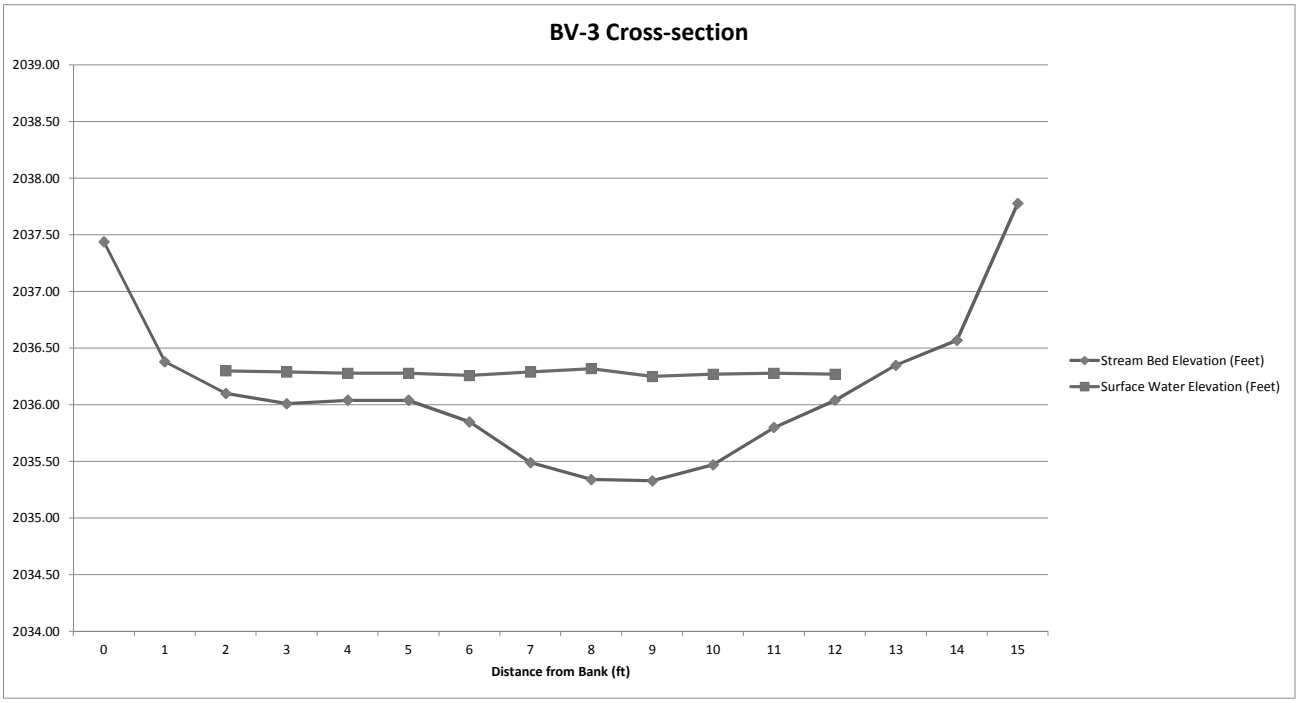
BV-3 Cross Section

Distance from Bank (rt)	Stadia Rod Reading	Water Depth (ft)	Bankfull Depth (Feet)	Water depth (Feet)	Backsight	Stream Bed Elevation (Feet)	Surface Water Elevation (Feet)	Notes
STA #1					12.54	2044.34		Backsight to invert of Culvert Inlet; Elevation = 2031.80
0	6.90		0.34			2037.44		Right Bank
1	7.96		1.40			2036.38		
2	8.24	0.20	1.68	0.20		2036.10	2036.30	
3	8.33	0.28	1.77	0.28		2036.01	2036.29	
4	8.30	0.24	1.74	0.24		2036.04	2036.28	
5	8.30	0.24	1.74	0.24		2036.04	2036.28	
6	8.49	0.41	1.93	0.41		2035.85	2036.26	
7	8.85	0.80	2.29	0.80		2035.49	2036.29	
8	9.00	0.98	2.44	0.98		2035.34	2036.32	
9	9.01	0.92	2.45	0.92		2035.33	2036.25	
10	8.87	0.80	2.31	0.80		2035.47	2036.27	
11	8.54	0.48	1.98	0.48		2035.80	2036.28	
12	8.30	0.23	1.74	0.23		2036.04	2036.27	
13	7.99		1.43			2036.35		
14	7.77		1.21			2036.57		
15	6.56		0.00			2037.78		Left Bank
Max			2.45	0.98				
Average			1.76	0.51			2036.28	

Note: Elevation is adjusted to the height of the tallest bank.

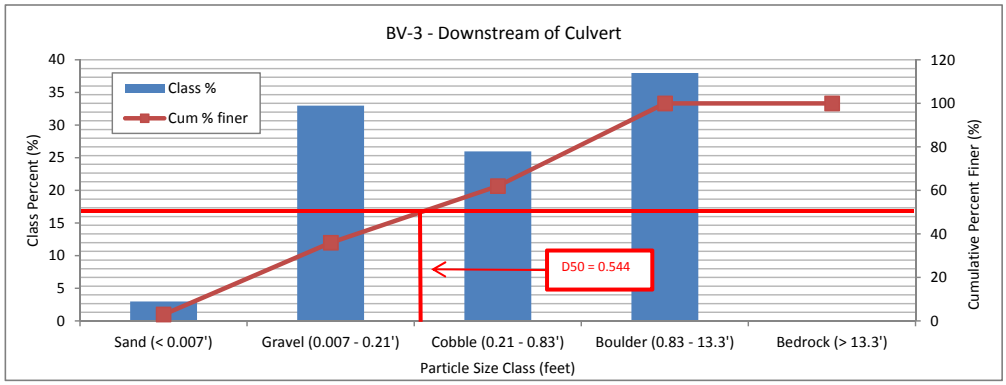
Watershed Area (acres) *	704		
Max Bankfull Depth:	2.45		
Bankfull Width:	15		
Floodprone Width:	44.7		
Entrenchment Ratio:	2.98		
Average Bankfull Depth:	1.76		
Width Depth Ratio:	8.51		
Sinuosity	1.12		
LP channel slope	0.052		
Predominant substrate:	Cobble		
50th percentile	0.407 ft	DS = 0.544 ft	US = 0.620 ft
Approximate Water Elev:	2036.28		

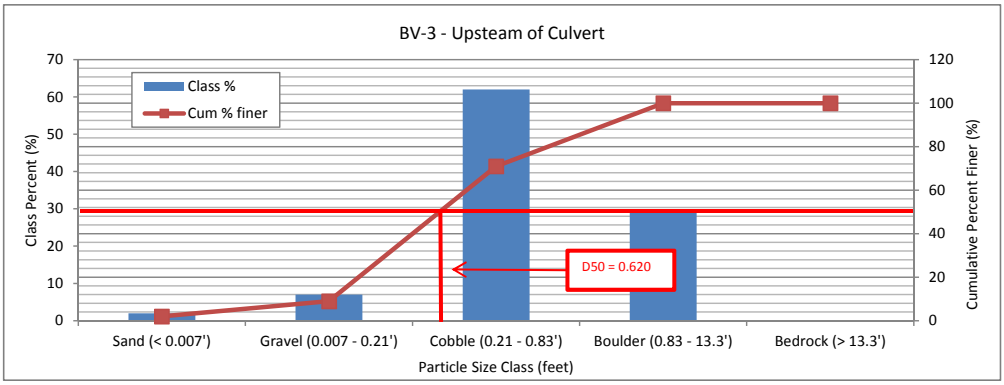
* - Watershed Area provided by VHB

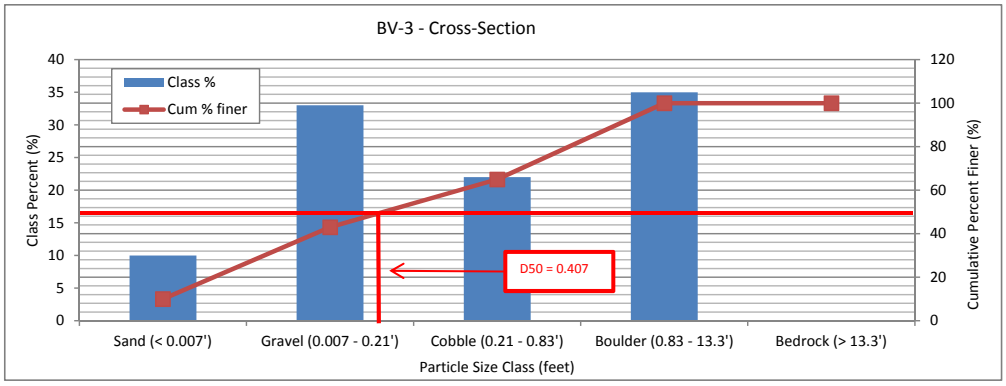


BV-3 Pebble Counts

	Downstream of Culvert			Upstream of Culvert			Cross-Section		
Particle Size (ft)	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer
Sand (< 0.007')	3	3	3	2	2	2	10	10	10
Gravel (0.007 - 0.21')	33	33	36	7	7	9	33	33	43
Cobble (0.21 - 0.83')	26	26	62	62	62	71	22	22	65
Boulder (0.83 - 13.3')	38	38	100	29	29	100	35	35	100
Bedrock (> 13.3')	0	0	100	0	0	100	0	0	100
Total	100	-	-	100	-	-	100	-	-
D50 (ft.)	0.544	-	-	0.620	-	-	0.407	-	-







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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: BV - W101 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 4 **Town:** _____ **Project:** N PASS

Wetland: Open / Closed Notes: _____ **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: BV-S102 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: _____ GPS Unit/Tech Initials: GRN / SH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PSS/PEM / E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal			
Sed/Shore Stabilization	✓		✓
Production Export			
Wildlife Habitat			
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:
Tree: R MAP
Sapling/Shrub: R.O. DOGWOOD, G BIRCH, MOOSE BUSH
Herb/Seedling:
Woody Vine:
Invasives:

Soils:
Texture: Organic Loamy Sandy Silty Clayey
If mineral - Parent Material: Till Alluvium Other _____
Restrictive Layer? Y N if Yes, Depth (inches) _____

Sketch Map:

☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Stream Data Sheet

Stream ID: BV-S100 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5-2 **Width (ft)** 2-8 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y/N

Associated with BV-2

Stream ID: BV-S101 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 2 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5-1 **Width (ft)** 1-2 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with BV-2

Stream ID: BV-S102 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: BV-W101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-3 **Width (ft)** 15-20 **Ave. Depth (in):** 0-18" **Riffle/Pool Complex?** Y/N

Associated with BV-3

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CM-01A

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** CM01a

Date of field assessment: 11-15-16

Stream Parameters at Crossing

Existing Crossing (type and size): 26' - Length over Rd. **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks): immediately near outlet - grasses + inlet

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:

alder
yellow Birch
Balsam fir
grasses

Slope at crossing: _____ (Rise in Elev.) _____ / _____ (Length of Crossing)

Outlet Data: ☒ GPS

after Log/barrier - 3"

Depth of water at invert if not perched: — (example):

8" = area immediately after outlet - backed up by log very small area

Distance between top and bottom of culvert/bed material: 24"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 7") (example):

1" = in culvert

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

Location (distance from outlet): — Materials: —

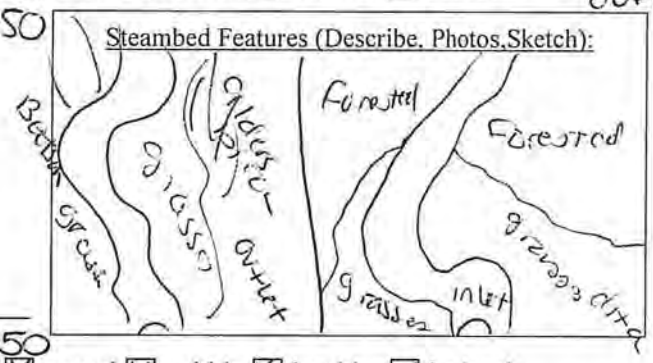
1 ft long 3 ft from ~~outlet~~ outlet

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 45 50 5

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 7" (example):

Stream Channel = 8"

Distance between top and bottom of culvert/bed material: 24"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☒ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 15 50 10 25

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 41 Ordinary high water width 41 Distance from inlet 10'

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Stream Data Sheet

Stream ID: MP-S111 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4-8 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y/N

Stream ID: MP-S112 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 2 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 5 **Width (ft)** 2-3 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Stream ID: CM-S100 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: CM-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 2-3 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert CM-01a

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: CM-W100 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 15 **Town:** MILLSFIELD **Project:** N PASS

Wetland: (Open) / Closed Notes: **2 Photos:** #'s: ✓

Open Water Component?: Y / (N)

Wetland Associated w/ Stream?: (Y) / N If Yes, ID: CM-S100 Type: P / (I) / E

Vernal Pool Identified?: Y / (N) If Yes, ID: _____ GPS Unit/Tech Initials: GW / SH Complete: (Y) / N

Cowardin Classes (Dominant(%)/others (%)): PSS/E / PFO1B

Water Regime		Special Modifiers	
A- Temp. flooded	F- Semipermanently flooded	b- Beaver	x- excavated
B- Saturated	G- Intermittently exposed	d- Partially drained/ditched	s- spoil
C- Seasonally flooded	H- Permanently flooded	f-farmed	
E- Seasonally flooded/ saturated	J- Intermittently flooded	h-diked/impounded	
	K- Artificially flooded	r- artificial	

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal	✓		
Sed/Shore Stabilization	✓		✓
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: ✓ BIRCH, A. BALSAMIA

Sapling/Shrub: ALNUS SPP.

Herb/Seedling: UNID GRASS

Woody Vine:

Invasives:

Soils:

Texture: (Organic) (Loamy) Sandy Silty Clayey

If mineral - Parent Material: (Till) Alluvium Other_____

Restrictive Layer? Y (N) if Yes, Depth (inches) _____

Sketch Map:

☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

Culvert Assessment Field Form – Geomorphic & Habitat Parameters

Structure ID	CM01a	Unknown ☐		Structure Number	—
Observer(s)/ Organization(s)	Ferrisi/Hale	Tidal ☐		Date & Time	11-15-16/2:00pm
Town	Dummer	Datum	—	Latitude (N/S)	See GPS
Location	Dummer, NH			Longitude (E/W)	See GPS
Crossing ID	CM01a			Stream Name	CMS100
Road Name	Newell Brook Rd.			Road Type	paved (gravel) trail railroad
# of shoulder lanes	0			Crossing Condition	new (old) eroding collapsing (rusted)
# of travel lanes	1	Structure Materials	Concrete Plastic-Corrugated Plastic-Smooth Tank Stone Steel-Corrugated Steel-Smooth (Aluminum-Corrugated) Wood Other: _____	Structure skewed to roadway	yes (no)
# of culverts at crossing	1			Flow Conditions	unusually low (typical low) higher than average flood conditions
Overflow pipe(s)	yes (no)				
Inlet Headwall Material	Metal Concrete Masonry Gabion Dry Fit Stone Plastic Other (None)				

Geomorphic and Fish Passage Data * Boulders placed around culvert * * Inlet is partially clogged w/ leaves *

General

Floodplain filled by roadway approaches: **entirely** (> 3/4 of floodplain) (**partially**) (1/4 – 3/4 of floodplain) **not significant**
Structure within ⅓ mile downstream of a significantly steeper segment of stream: **yes** **no** (**unsure**)
Culvert slope as compared with the channel slope is: **higher** **lower** (**about the same**)
Water depth in the crossing matches that of stream: (**yes**) **no (significantly deeper)** **no (significantly shallower)**
Water velocity in crossing matches that of stream: (**yes**) **no (significantly faster)** **no (significantly slower)** – about same

Upstream

Structure opening partially obstructed by (circle all that apply): **wood** **sediment** **wood & sediment** **deformation of culvert** **none** (**other**) – leaves and boulders
Screening at inlet: **yes** (**no**)
Steep riffle present immediately upstream of structure: **yes** (**no**)
If channel avulses, stream will: (**cross road**) **follow road** **cross and follow road** **unsure**
Estimated distance avulsion would follow road: — **(ft.)**
Angle of stream flow approaching structure: (**sharp bend (45° - 90°)**) **mild bend (5° - 45°)** **naturally straight** **channelized straight**
Evidence of streambed erosion or aggradation immediately upstream of culvert: **erosion** **aggradation** (**none**)
Culvert inlet: (**at grade**) **cascade** **free fall**
Upstream bankfull widths: 1.) 4' **2.)**____ **3.)**____ **4.)**____ **5.)**____ **(ft.)**

Wildlife Data (left/right bank determined facing downstream)	**Upstream**		**Downstream**		
	LEFT	**RIGHT**	**LEFT**	**RIGHT**	
Dominant vegetation type (use codes to the right)	M, H	M, H	M, H	M, H	**Vegetation Type Codes** **C** – coniferous forest **D** – deciduous forest **M** – mixed forest **S** – shrub/sapling **H** – herbaceous/grass **B** – bare **R** – road embankment
Does a band of shrub/forest vegetation that is at least 50' wide start within 25' of structure and extend 500' or more up/downstream?	(yes) no	(yes) no	(yes) no	(yes) no	
Road-killed wildlife within ¼ mile of structure (circle none or list species)	**species:**			(none)	

Wildlife sign and species observed near (up/downstream) and inside structure (circle none or list species and sign types)	**Outside Structure**		**Inside Structure**	
	species (none)	**sign**	**species** (none)	**sign**

Spatial data collected with GPS: (yes) **no** **Comments/Drawings:**

Photos taken: (yes) **no**
Please fill out photo log below

Folder Name:	**Structure Inlet**	**Structure Outlet**	**Above Structure**
Photo View - Upstream	☒	☒	☒
Photo View - Downstream	☒	☒	☒

Record the file name for each photo taken in the appropriate box

Reference bankfull widths: 1.)_____ 2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)

Downstream

Water depth in culvert (at outlet): 1" **(0.0 ft.)**

Culvert outlet: **at grade cascade free fall backwatered** ____ **(ft.)** Stepped footers: **yes no**

Outlet drop (invert to water surface): 7" **(0.0 ft.)**

Pool present immediately downstream of structure: **yes no**

Pool depth at point of streamflow entry: 8" **(ft.)** → area within 3ft. of outlet is impounded by log. waterdepth after barrier is 3".

Maximum pool depth: — **(0.0 feet)**

Downstream bank heights are substantially higher than upstream bank heights: **yes no**

Hydraulic control type: **bedrock boulders cobble gravel sand wood other:**_____

Distance from downstream end of culvert to hydraulic control: — **(ft.)**

Slope from downstream end of culvert to hydraulic control: — **(%)**

Evidence of streambed erosion or aggradation immediately downstream of culvert: **erosion aggradation none**

Downstream bankfull widths: 1.) 4 ft. **2.)_____ 3.)_____ 4.)_____ 5.)_____ (ft.)**

	Upstream	Downstream	In Structure	
Dominant bed material (substrate) at structure (use codes below)	1 2 3 4 5 6 UNK	1 2 3 4 5 6 UNK	NONE 1 2 3 4 5 6 UNK	
Bedrock present	yes no	yes no	Depth of Substrate	< 1 foot 1-2feet >2 feet UNK N/A
Sediment Deposit Type	none delta side point mid-channel	none delta side point mid-channel	none delta side point mid-channel	
Elevation of sediment deposits is greater than or equal to ½ bankfull elevation	yes no	yes no	yes no	
			Substrate Throughout? yes no	
Beaver dam near structure Distance from structure to dam	yes no distance: ____ (ft.)	yes no distance: ____ (ft.)	**Bed Material Codes** 1 – bedrock 2 – boulder 3 – cobble 4 – gravel 5 – sand 6 – silt/clay UNK - unknown	
Hard bank armoring	intact failing none UNK	intact failing none UNK		
Bank erosion	high low none	high low none		
Stream bank scour causing undermining around/under structure (circle all that apply)	none culvert footers wing walls	none culvert footers wing walls		

Crossing Type (from above): ☐ 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ **Ford**

	Ⓐ	Ⓑ	Ⓒ	Ⓓ
Upstream Dimensions (ft.)	24"			
Downstream Dimensions (ft.)	24"			

Length of stream through crossing (ft.): 26 feet
Crossing Slope (%): —

Note: When inventorying multiple culverts, label left culvert 1 and go in increasing order from left to right from downstream end (outlet) to looking upstream.

Culvert Cell 2 of _____

Crossing Type (from above): ☐ 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5.

	Ⓐ	Ⓑ	Ⓒ	Ⓓ
Upstream Dimensions (ft.)				
Downstream Dimensions (ft.)				

Length of stream through crossing (ft.): _____
Crossing Slope (%): _____

Culvert Cell 3 of _____

Crossing Type (from above): ☐ 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5.

	Ⓐ	Ⓑ	Ⓒ	Ⓓ
Upstream Dimensions (ft.)				
Downstream Dimensions (ft.)				

Length of stream through crossing (ft.): _____
Crossing Slope (%): _____

Culvert Cell 4 of _____

Crossing Type (from above): ☐ 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5.

	Ⓐ	Ⓑ	Ⓒ	Ⓓ
Upstream Dimensions (ft.)				
Downstream Dimensions (ft.)				

Length of stream through crossing (ft.): _____
Crossing Slope (%): _____

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CM-5

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP ORAR Culvert Assessment **Location of Crossing:** LORD BROOK CM-5

Date of field assessment: 11/14/2016

Stream Parameters at Crossing

Existing Crossing (type and size): Ovoid (29 H x 42 W), Round (24 x 24") **Watershed size** 0.69 sq. mi

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks): yes - PFO wetland above culvert

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species: Speckled alder, Cal. can., Green ash, yellow birch, Balsam fir, Sensitive fern, Ostrich fern, Northern white cedar

PFO wetland

Slope at crossing: 1.2% (Rise in Elev.) 0.43 x 27' (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: 5.0" (example):

Distance between top and bottom of culvert/bed material: ≈ 2.4"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: ≈ 6") (example):

Tailwater Controls present at crossing? ☒ YES ☐ NO

Pool Configuration: width 10' length: 10' Max pool depth at outlet: 1.6' - lateral scour pool associated with Newell Brook

Location (distance from outlet): 5' Materials: gravel/cobble/Boulder

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock

Pebble Count: ☒ YES ☐ NO (Tier 3 sites) only 50 counts below culvert

☒ Photo of Outlet Structure and Downstream Conditions * SEE BACK

Steambed Features (Describe, Photos, Sketch): Short downstream reach (2ft) flows into lateral scour pool associated w/ Newell Brook. - upstream sharp bend into culvert. smaller culvert dry at time of Assessment

Inlet Data: ☒ GPS

Depth of water at inlet: 1.5" (example):

Distance between top and bottom of culvert/bed material: ≈ 2.6"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☐ cobble ☐ boulder ☐ bedrock

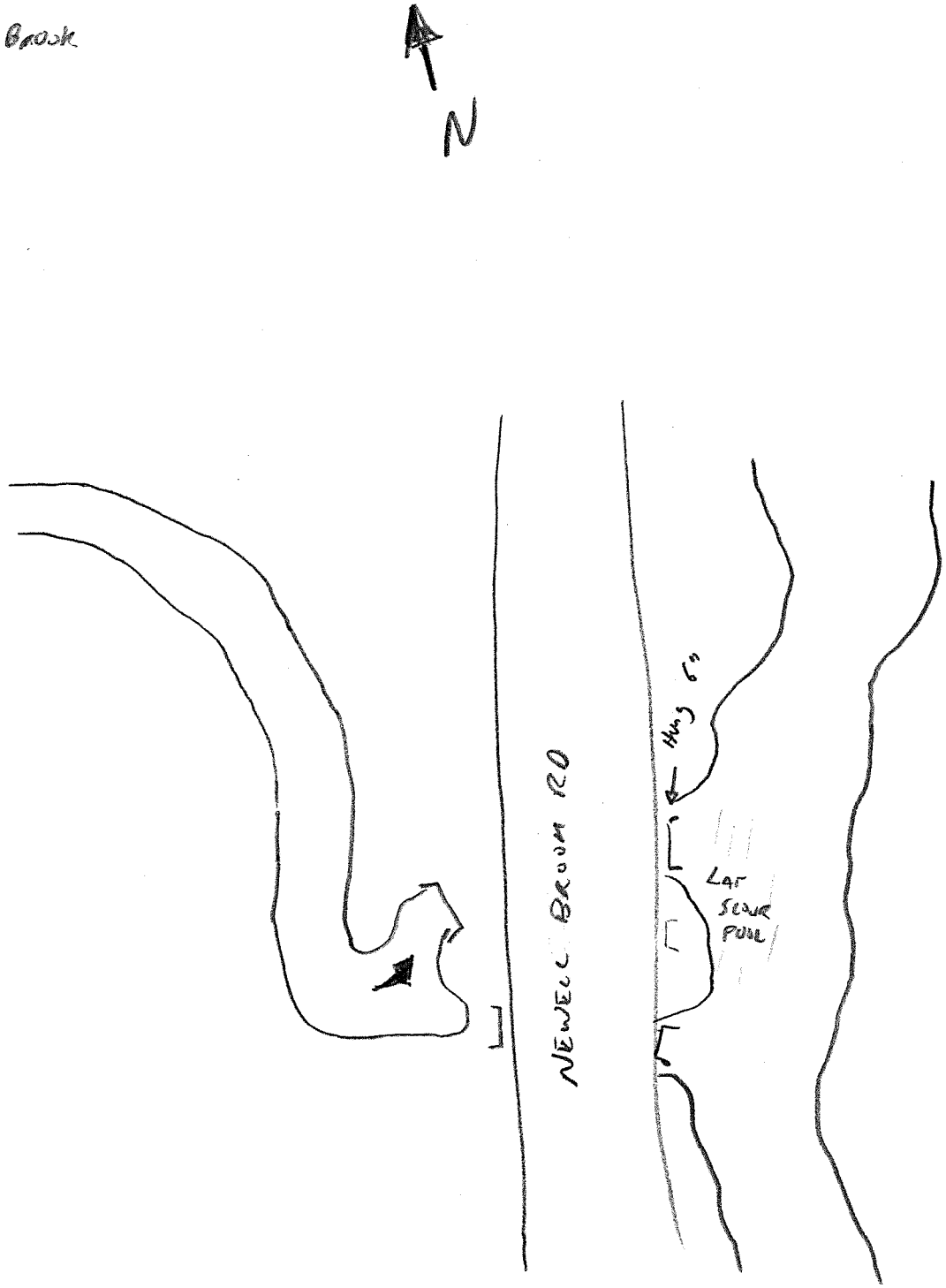
Pebble Count: ☒ YES ☐ NO (Tier 3 sites) 100 count

☒ Photo of Inlet Structure and Upstream Condition

☒ Cross Section Information ☐ GPS

Top of bank width ≈ 5 ft Ordinary high water width 5'2" Distance from inlet 128 ft

Downstream (Outlet) of culvert hung due to natural scour from Newell Brook



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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: CMW101 **Date:** 11/14/16 **Initials:** EBL

Number of Flags: 5 **Town:** Dummer **Project:** NP

Wetland: (Open) / Closed Notes: **2 Photos:** #'s: ✓

Open Water Component?: Y / (N)

Wetland Associated w/ Stream?: (Y) / N If Yes, ID: CMS100+101 Type: (P) / I / E

Vernal Pool Identified?: Y / (N) If Yes, ID: — GPS Unit/Tech Initials: White/EL Complete: (Y) / N

Cowardin Classes (Dominant(%)/others (%)): PSS / E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.		✓	
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat	✓		✓
Sed/Tox Retention	✓		
Nutrient Removal		✓	
Sed/Shore Stabilization	✓		✓
Production Export	✓		
Wildlife Habitat	✓		
Recreation		✓	
Educate/Science Value		✓	
Uniqueness/Heritage		✓	
Visual Qual/Aesthetic	✓		
End/Threatened Species		✓	
Other:			

Notes:
Wetland surrounding CMS101 and receiving flow from CMS100

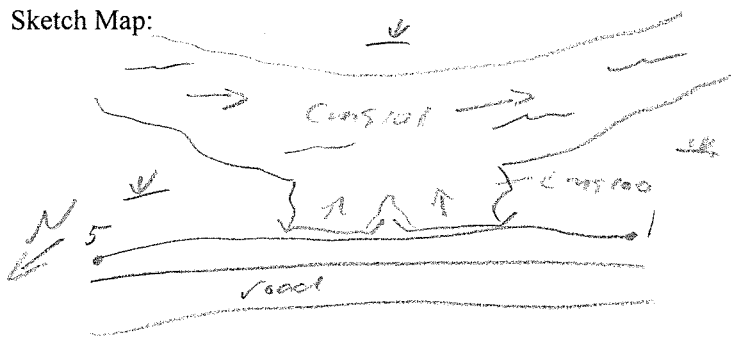
Dominant Plants:
Tree: Abies balsamea, Picea rubens, Acer rubrum
Sapling/Shrub: Alnus rugosa, Betula alleghaniensis, Spiraea alba
Herb/Seedling: Clematis virginiana, Onoclea sensibilis, Calamagrostis canadensis, Tiarella cordifolia
Woody Vine:
Invasives:

Soils:
Texture: Organic Loamy (Sandy) Silty Clayey

If mineral - Parent Material: Till (Alluvium) Other

Restrictive Layer? Y (N) if Yes, Depth (inches)

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: CMW 100 **Date:** 11/14/2016 **Initials:** JLS/EL

Number of Flags: 4 **Town:** Dummer **Project:** NP DRAR Culverts

Wetland: (Open) / Closed Notes: between 1 & 4 **2 Photos:** #'s: ✓

Open Water Component?: Y / (N)

Wetland Associated w/ Stream?: (Y) / N If Yes, ID: CM5 Type: (P) / I / E

Vernal Pool Identified?: Y / (N) If Yes, ID: NA GPS Unit/Tech Initials: White/EL Complete: (Y) / N

Cowardin Classes (Dominant(%)/others (%)): PFO1/4 B

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		
Floodflow Alteration	✓		
Fish/Shellfish Habitat	✓		
Sed/Tox Retention		✓	
Nutrient Removal		✓	
Sed/Shore Stabilization	✓		
Production Export	✓		
Wildlife Habitat	✓		
Recreation		✓	
Educate/Science Value		✓	
Uniqueness/Heritage		✓	
Visual Qual/Aesthetic		✓	
End/Threatened Species		✓	
Other:			

Notes:
Wetland with PEM fringe on edge of road but largely dominated by PFO community

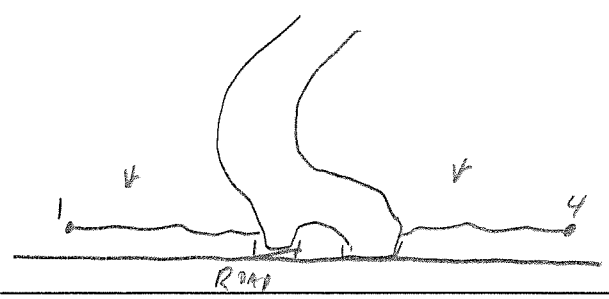
Dominant Plants:
Tree: Fraxinus pen., Abies balsamea, Betula alleghaniensis
Sapling/Shrub: Alnus incana, Salix sp, Spiraea alba,
Herb/Seedling: Cal. Can, Glyceria can, Solidago rugosa, Osmunda sensibilis, Scum Suave,
Woody Vine: Clematis virginiana
Invasives: –

Soils:
Texture: Organic Loamy (Sandy) Silty Clayey

If mineral - Parent Material: (Till) Alluvium Other

Restrictive Layer? Y (N) if Yes, Depth (inches)

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Stream Data Sheet

Stream ID: CTS 200 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 5 **Cowardin Class(es):** R4SB 2/3

Two Photos: Yes / No **GPS/Tech:** white EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CTW200

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4 **Ave. Depth (in):** 6 **Riffle/Pool Complex?** Y / N

Associated with culvert CT-2

Stream ID: CMS 100 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 6 **Cowardin Class(es):** R2UB1

Two Photos: Yes / No **GPS/Tech:** White/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CMW 100, 101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 6 **Ave. Depth (in):** 5 **Riffle/Pool Complex?** Y / N

Associated with culvert CM-5

Stream ID: CMS 101 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 4a, 4b **Cowardin Class(es):** R2UB1

Two Photos: Yes / No **GPS/Tech:** white/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CMW101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 2.5 **Width (ft)** 15 **Ave. Depth (in):** 12 **Riffle/Pool Complex?** Y / N

Associated with culvert CM-5

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CT-1

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** CT-1 Grass Rd. Millsfield, NH

Date of field assessment: 11-15-16

Stream Parameters at Crossing

Existing Crossing (type and size): 26'-Length **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Quaking aspen - US side
Red maple
Cherry
W. Ash
Yellow Birch
am. Beech
- No conifers
1 sugar - US side

Slope at crossing: _____ (Rise in Elev.) _____ _____ (Length of Crossing)

Coltsfoot along rd. - US side
Ferns - ds side
Terraced

Outlet Data: ☒ GPS

Depth of water at invert if not perched: 3" (example):
3" - channel near culvert

Distance between top and bottom of culvert/bed material: 24"

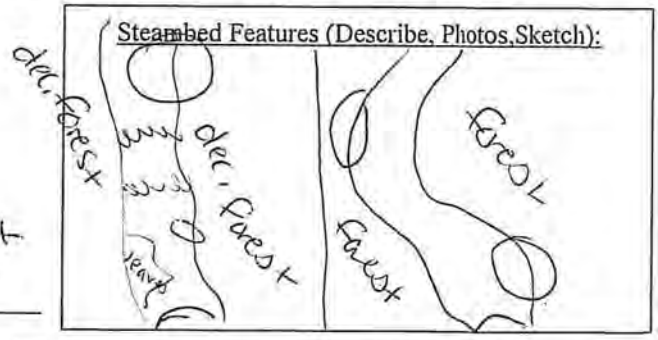
Perched at outlet? ☐ YES ☒ NO (If yes, Distance from invert to the waters surface: —) (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☐ gravel ☐ cobble ☒ boulder ☐ bedrock 5
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 95

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 1" (example):
3" - channel - see comment

Distance between top and bottom of culvert/bed material: 24"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 25 30 40 5

☒ Photo of Inlet Structure and Upstream Condition

inlet - leaves, sticks blocking

☐ Cross Section Information ☐ GPS

Top of bank width 4' Ordinary high water width 4' Distance from inlet 10'

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Northern Pass Project

Stream Data Sheet Flows Through Culvert CT-1

Stream ID: CT-S100 **Date:** 11-15-2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 2-4 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Stream ID: CT-S101 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CT-U100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 5 **Width (ft)** 4-8 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Stream ID: _____ **Date:** _____ **Initials:** _____

Number of Flags: _____ **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** _____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/ N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CT-2

Steam Culvert Data

CT-1 - Low density

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** CT-2

Date of field assessment: 11-15-16

Grass Rd.
Millsfield, NH

Stream Parameters at Crossing

Existing Crossing (type and size): _____ **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub, sapling, tree*

Dominant Species:
Balsam Fir
Red maple
Yellow Birch
White Birch
Cherry

Slope at crossing: _____ (Rise in Elev.) _____ / _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

depth Inside culvert = 1"
Plunge pool = 7"

Distance between top and bottom of culvert/bed material: 52"

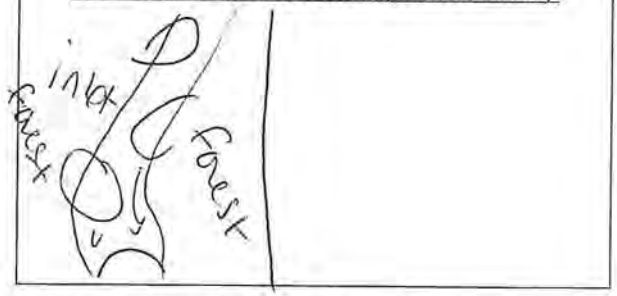
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 5") (example):
borderline

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☒ silt ☐ gravel ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 90 10

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 5" (example):
5" in channel

Distance between top and bottom of culvert/bed material: 52"

Dominant Channel Material (visual assessment): ☒ sand ☒ silt ☐ gravel ☐ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 40 20 40

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 8' Ordinary high water width 8' Distance from inlet 10'

Associated with
Culvert CT-2

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: CT-W100 **Date:** 11-15-2016 **Initials:** SH/LF

Number of Flags: 8 **Town:** MILLSFIELD **Project:** N PASS

Wetland: Open / Closed Notes: **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: CT-S101 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: _____ GPS Unit/Tech Initials: GW / SH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PFO/US

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal			
Sed/Shore Stabilization	✓		✓
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: RMAP Y BINOD A BALSAMED

Sapling/Shrub: ALNUS SPP.

Herb/Seedling: —

Woody Vine:

Invasives:

Soils:

Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other_____

Restrictive Layer? Y N if Yes, Depth (inches) _____

Sketch Map:

☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Stream Data Sheet

Stream ID: CT-S100 **Date:** 11-15-2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 2-4 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Flows through Culvert CT-2

Stream ID: CT-S101 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CT-U100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 5 **Width (ft)** 4-8 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Stream ID: _____ **Date:** _____ **Initials:** _____

Number of Flags: _____ **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** _____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/ N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CT-3

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP ORAR CULVERT ASSESSMENT **Location of Crossing:** CT-3

Date of field assessment:

Stream Parameters at Crossing

Existing Crossing (type and size): 16" Round **Watershed size** _____

☐ CMP ☐ RCP ☒ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

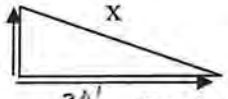
Riparian Zone (surrounding or on the banks): Hardwoods upstream Softwoods downstream

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
yellow birch, beech, paper birch
sugar maple
Balsam fir
Jumping alfalfa
Glycerin melissa

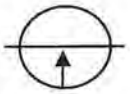
Slope at crossing: 2.1% (Rise in Elev.) .62' 30' (Length of Crossing)



INLET TOP:
OUTLET TOP:
INLET SUB: 1.50
OUTLET SUB: 5.14
Culvert length: 30

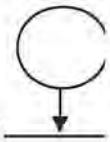
Outlet Data: ☒ GPS

Depth of water at invert if not perched: 6" (example):



Distance between top and bottom of culvert/bed material: 14"

Perched at outlet? ☐ YES ☒ NO (If yes, Distance from invert to the waters surface: _____) (example): _____



Tailwater Controls present at crossing? ☒ YES ☐ NO
Pool Configuration: width 1' length: 1' Max pool depth at outlet: 6"
Location (distance from outlet): 1' Materials: Vegetation

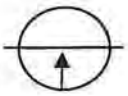
Dominant Channel Material (visual assessment): ☒ sand (50) ☐ silt ☒ gravel (50) ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):
Intermittent flow
Cobble/gravel/boulder substrate upstream of road disturbance
Sand/gravel near roadway
SEE BACK

Inlet Data: ☒ GPS

Depth of water at inlet: 5" (example):



Distance between top and bottom of culvert/bed material: 9"

Dominant Channel Material (visual assessment): ☒ sand (50) ☐ silt ☒ gravel (50) ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Inlet Structure and Upstream Condition

☒ Cross Section Information ☒ GPS

Top of bank width 24' Ordinary high water width 24' Distance from inlet 14'
12' wetted width

POOL
GLIDE
Grass Rd.
RIFFLE
CASCADE
RIPPLE

Culvert CM5

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Wetlands Functions & Values Data Sheet

Wetland ID: CTW200 **Date:** 11-16-16 **Initials:** EBL

Number of Flags: 4 **Town:** Millsfield **Project:** NPT

Wetland: (Open) / Closed Notes: open @ 1-4 **2 Photos:** #'s: ✓

Open Water Component?: Y / (N)

Wetland Associated w/ Stream?: (Y) / N If Yes, ID: CTS200 Type: P / (I) / E

Vernal Pool Identified?: Y / (N) If Yes, ID: — GPS Unit/Tech Initials: white / LF Complete: (Y) / N

Cowardin Classes (Dominant(%)/others (%)): PEM1C

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.		✓	
Floodflow Alteration	✓		
Fish/Shellfish Habitat		✓	
Sed/Tox Retention		✓	
Nutrient Removal		✓	
Sed/Shore Stabilization	✓		✓
Production Export	✓		
Wildlife Habitat	✓		
Recreation		✓	
Educate/Science Value		✓	
Uniqueness/Heritage		✓	
Visual Qual/Aesthetic		✓	
End/Threatened Species		✓	
Other:			

Notes:
Evaluated only near road, extends to a larger wetland area that is significantly higher quality
- good potential VP habitat

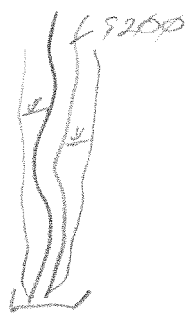
Dominant Plants:
Tree: Picea glauca (planted)
Sapling/Shrub: Betula alleghaniensis
Herb/Seedling: Glyceria melicaria, onoclea sensibilis, Symplocarpus foetidus, Caragana
Woody Vine: —
Invasives: —

Soils:
Texture: Organic Loamy (Sandy) Silty Clayey

If mineral - Parent Material: (Till) Alluvium Other

Restrictive Layer? Y (N) if Yes, Depth (inches)

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Stream Data Sheet

Stream ID: CTS 200 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 5 **Cowardin Class(es):** R4SB 2/3

Two Photos: Yes / No **GPS/Tech:** white EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CTW200

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4 **Ave. Depth (in):** 6 **Riffle/Pool Complex?** Y / N

Associated with culvert CT-3

Stream ID: CMS 100 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 6 **Cowardin Class(es):** R2UB1

Two Photos: Yes / No **GPS/Tech:** White/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CMW 100, 101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 6 **Ave. Depth (in):** 5 **Riffle/Pool Complex?** Y / N

Associated with culvert CM-5

Stream ID: CMS 101 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 4a, 4b **Cowardin Class(es):** R2UB1

Two Photos: Yes / No **GPS/Tech:** white/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: CMW101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 2.5 **Width (ft)** 15 **Ave. Depth (in):** 12 **Riffle/Pool Complex?** Y / N

Associated with culvert CM-5

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

CZ-1

Steam Culvert Data

~~12:23~~ 12:23 pm

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT culverts **Location of Crossing:** CZ-1

Date of field assessment: 11-15-16

~~[illegible]~~, off Millsfield Pond Rd, Millsfield, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 23' Length - along Rd, **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, ~~moderate density~~, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Spruce
Yellow Birch
Balsam Fir
Red maple
- Coltsfoot on roadside near inlet + outlet

Slope at crossing: _____ (Rise in Elev.) _____ / _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 18"

- water depth immediately after outlet = 3'
- Plunge pool = 10"
- inside culvert less than 1"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 3") (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

Location (distance from outlet): — Materials: —

mostly gravel + sand

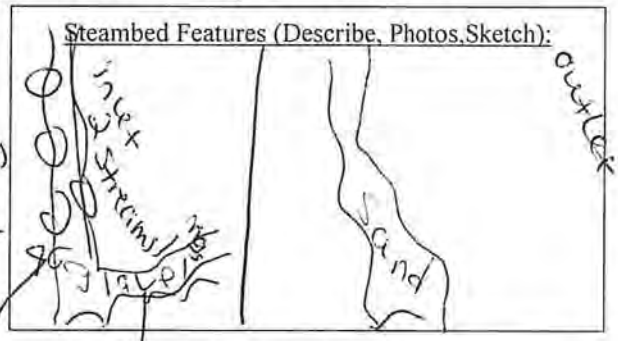
Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☐ cobble ☒ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 50

45 5

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 2" - in culvert (example): 2" - stream channel

gravel depositing at culvert mouth

Distance between top and bottom of culvert/bed material: 18"

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☐ cobble ☒ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

Channel directly across from inlet 50

50

Culvert bottom on US side is rusting out

☒ Photo of Inlet Structure and Upstream Condition

Side channel, cobble 50, gravel 50

☐ Cross Section Information ☐ GPS

Top of bank width 12' Ordinary high water width 12' Distance from inlet 10'

Exists from inlet

Side channel - 10' from channel across from inlet - 6' wide

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Stream Data Sheet

Stream ID: MP-S111 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4-8 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert CZ-1

Stream ID: MP-S112 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 2 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 5 **Width (ft)** 2-3 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert CZ-1

Stream ID: CM-S100 **Date:** 11-15-2016 **Initials:** SH/LP

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: CM-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 2-3 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert CM-01A

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-1

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** HK-1

Date of field assessment: 11/9/16

Errol, NH
Greenough Pond Rd,

Stream Parameters at Crossing

Existing Crossing (type and size): 30ft. 3" Long - over Rd, **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Spruce
yellow birch
red maple
ferns
* colts foot near inlet on left bank

~~Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)~~

Outlet Data: ☒ GPS perched

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 29 inches

Perched at outlet? ☐ YES ☐ NO (If yes, Distance from invert to the waters surface: 1' 3") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☐ boulder ☐ bedrock
(40) (40)
Pebble Count: ☐ YES ☐ NO (Tier 3 sites) (20)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):

Inlet Data: ☒ GPS

Depth of water at inlet 2" in culvert 6" stream channel (example):

Distance between top and bottom of culvert/bed material: 29 inches

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☒ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)
(50) (50)

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☒ GPS

Top of bank width 10' Ordinary high water width 10' Distance from inlet 15'

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Stream Data Sheet

Stream ID: HK-S100 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 12 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 6-10 **Ave. Depth (in):** 0-18 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-1

Stream ID: HK-S101 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 12 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-4 **Width (ft)** 3-12 **Ave. Depth (in):** 0-24 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-2

Stream ID: HK-S102 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 3 **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 1 **Ave. Depth (in):** 0-1 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-2

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-2

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** HK-2

Date of field assessment: 11/9/16

Errol, NH
Greenough Pond Rd,

Stream Parameters at Crossing

Existing Crossing (type and size): 30feet Long - over rd. **Watershed size** _____

not corrugated

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:

~~Same as HK1~~
Spruce
ferns
red maple
Balsam fir
Quaking aspen

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 3feet / 36"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 4' 5") (example):

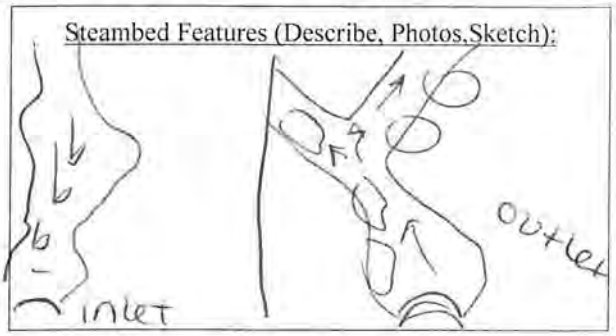
Plundge pool = 2'

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☐ gravel ☒ cobble ☒ boulder ☐ bedrock (40 40)
Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 20

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 5" in culvert / 2" stream channel (example):

Distance between top and bottom of culvert/bed material: 36"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 40 60

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

* Inlet lower than stream but not clogged.
- Top culvert to substrate above = 2.8 inches

Top of bank width 12' Ordinary high water width 12' Distance from inlet 10'

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Stream Data Sheet

Stream ID: HK-S100 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 12 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 6-10 **Ave. Depth (in):** 0-18 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-1

Stream ID: HK-S101 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 12 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-4 **Width (ft)** 3-12 **Ave. Depth (in):** 0-24 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-2

Stream ID: HK-S102 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 3 **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 5 **Width (ft)** 1 **Ave. Depth (in):** 0-1 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-2

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-3

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** HK-3 Wentworths location Greenough Pond. R

Date of field assessment: 11/9/16

Stream Parameters at Crossing

Existing Crossing (type and size): 38feet, 5inches long **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

Dominant Species:
Yellow Birch
Spruce
ferns
red maple
grasses - upstream side only

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 59" / 4Ft. 11" — depth of water at outlet = 5"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 1' 5") (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

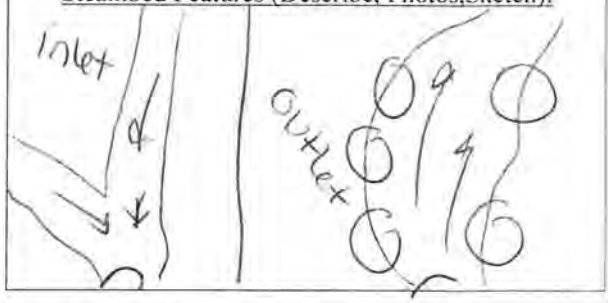
Location (distance from outlet): — Materials: _____

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock (20 20 50)

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 10

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 4" (example): water at inlet = 4"

Distance between top and bottom of culvert/bed material: 59"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 10 40 50

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 13' Ordinary high water width 13' Distance from inlet 10'

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Wetlands Functions & Values Data Sheet

Wetland ID: HK-W100 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 3 **Town:** _____ **Project:** NP

Wetland: (Open) Closed Notes: V-2 WETLAND BORDERING STREAM **2 Photos: #'s:** ✓

Open Water Component?: Y / (N)

Wetland Associated w/ Stream?: (Y) N If Yes, ID: HK-S103, HK-S104 Type: (P) (I) / E

Vernal Pool Identified?: Y / (N) If Yes, ID: _____ GPS Unit/Tech Initials: GW / SH Complete: (Y) N

Cowardin Classes (Dominant(%)/others (%)): PFO1/4 E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat		✓	
Sed/Tox Retention	✓		
Nutrient Removal		✓	
Sed/Shore Stabilization	✓		
Production Export	✓		
Wildlife Habitat		✓	
Recreation		✓	
Educate/Science Value		✓	
Uniqueness/Heritage		✓	
Visual Qual/Aesthetic		✓	
End/Threatened Species		✓	
Other:			

Notes:

Dominant Plants:

Tree: Y BIRCH, R MAPLE, A. BALSAMEA

Sapling/Shrub: W. HAZEL

Herb/Seedling:

Woody Vine:

Invasives:

Soils:

Texture: (Organic) (Loamy) Sandy Silty Clayey

If mineral - Parent Material: (Till) Alluvium Other _____

Restrictive Layer? (Y) N if Yes, Depth (inches) VARIABLE

Sketch Map:

☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Northern Pass Project

Stream Data Sheet

Stream ID: HK-S103 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 10 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-2 **Width (ft)** ≈15 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-3

Stream ID: HK-S104 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 3 (#1 GPS ONLY) **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 1-2 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-3

Stream ID: HK-S105 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-5

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-5

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** HK5

Date of field assessment: 11/9/16

Wentworths location Greenough Pond Rd.

Stream Parameters at Crossing

Existing Crossing (type and size): 28 feet long metal pipe not corrugated **Watershed size** _____

☐ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

Dominant Species:
ferns
Spruce
yellow birch

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 2ft 8 inches (32")

bottom of falls to water depth.

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: (inches) (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

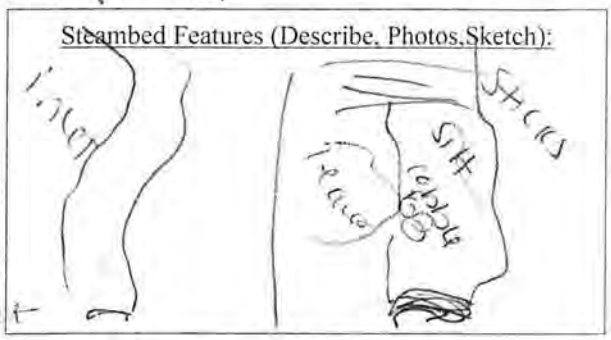
Location (distance from outlet): — Materials: —

4 feet from culvert to stream

Dominant Channel Material (visual assessment): ☐ sand ☒ silt (10) ☒ gravel (40) ☒ cobble (5) ☒ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites) (40)

Steambed Features (Describe, Photos, Sketch):



☒ Photo of Outlet Structure and Downstream Conditions

Inlet Data: ☒ GPS

Depth of water at inlet: 5 inches - channel - see comment (example):

Distance between top and bottom of culvert/bed material: 32" assuming same as outlet

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel (5) ☐ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

organic - leaves

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 4 ft Ordinary high water width 4 ft Distance from inlet 10 ft

* Inlet buried in sediment and leaves

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Northern Pass Project

Stream Data Sheet

Stream ID: HK-S103 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 10 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1-2 **Width (ft)** ≈15 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-3

Stream ID: HK-S104 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 3 (#1 GPS ONLY) **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 1-2 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-3

Stream ID: HK-S105 **Date:** 11/9/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-5

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-7.1

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP ORAR CULVERT ASSESSMENT **Location of Crossing:** HK 7.1

Date of field assessment:

Stream Parameters at Crossing

Existing Crossing (type and size): 16" Round X **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

Dominant Species:
yellow birch, American beech, Balsam fir, Sugar Maple

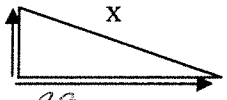
GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

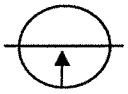
Slope at crossing: 8.7 (Rise in Elev.) 3.31



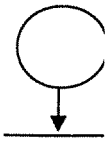
38 (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):



Distance between top and bottom of culvert/bed material: 16"



Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 5.5") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): NA Materials: NA

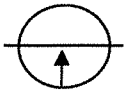
Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☒ cobble (80) ☒ boulder (20) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):
SEE BACK

Inlet Data: ☒ GPS

Depth of water at inlet: 0 (example):



Distance between top and bottom of culvert/bed material: UNK

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☐ cobble ☒ boulder (20%) ☒ Debris 80%
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Inlet Structure and Upstream Condition

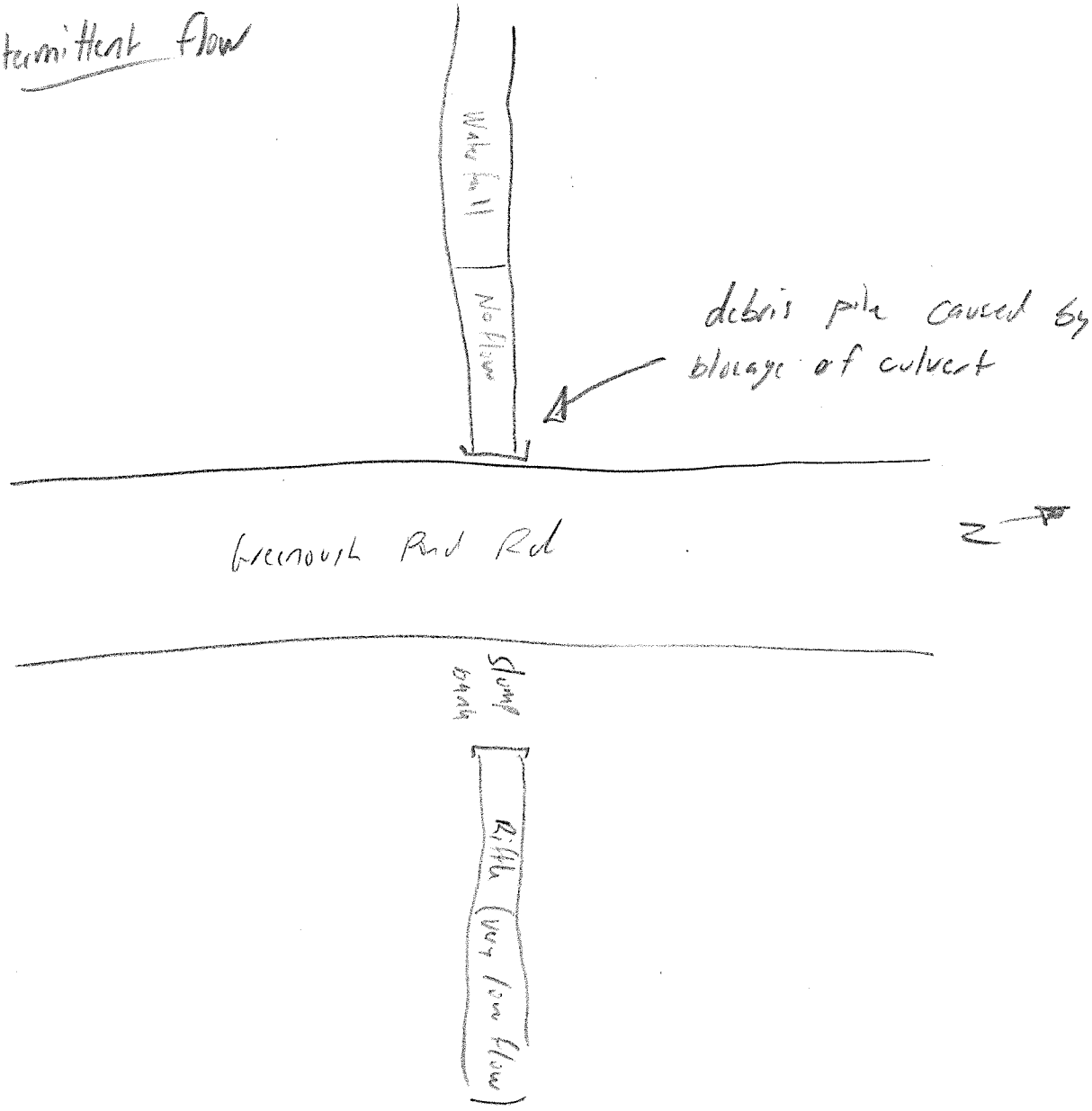
☒ Cross Section Information ☒ GPS

Top of bank width 36" Ordinary high water width 90" Distance from inlet 15'

Culvert - 38' long
Top of culvert inlet 9.11
Top of culvert outlet 12.42

HK 7.1

Intermittent flow



NORMANDEAU ASSOCIATES
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Northern Pass Project

Stream Data Sheet

Stream ID: HKS-202 **Date:** 11-15-16 **Initials:** EL

Number of Flags: 12 **Cowardin Class(es):** R3UB1

Two Photos: Yes / No **GPS/Tech:** White - EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** 10 **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

Associated with culvert HK-07A

Stream ID: HKS-203 **Date:** 11-15-16 **Initials:** EL

Number of Flags: 6 **Cowardin Class(es):** R4SB3

Two Photos: Yes / No **GPS/Tech:** White - EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 3 **Ave. Depth (in):** 6 **Riffle/Pool Complex?** Y / N

Associated with culvert HK-07.1

Stream ID: ____ **Date:** ____ **Initials:** ____

Number of Flags: ____ **Cowardin Class(es):** ____

Two Photos: Yes / No **GPS/Tech:** ____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** ____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: ____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-7a

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP DRAR CULVERT ASSESSMENT **Location of Crossing:** HK 7A

Date of field assessment:

Stream Parameters at Crossing

Existing Crossing (type and size): 36" Round x **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

Dominant Species:
Balsam fir, Red maple
yellow Birch

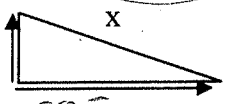
GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

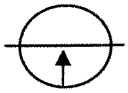
Slope at crossing: 8.3% (Rise in Elev.) 2.52



30.5 (Length of Crossing)

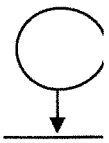
Outlet Data: ☒ GPS

Depth of water at invert if not perched: NA (example):



Distance between top and bottom of culvert/bed material: 36"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 11") (example):



Tailwater Controls present at crossing? ☒ YES ☐ NO
Pool Configuration: width 80" length: 102" Max pool depth at outlet: 21"
Location (distance from outlet): 5' Materials: COBBLE / BOULDER

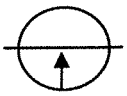
Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☒ cobble (60) ☒ boulder (40) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):
SEE BACK.

Inlet Data: ☒ GPS

Depth of water at inlet: 3.5" (example):



Distance between top and bottom of culvert/bed material: 37"

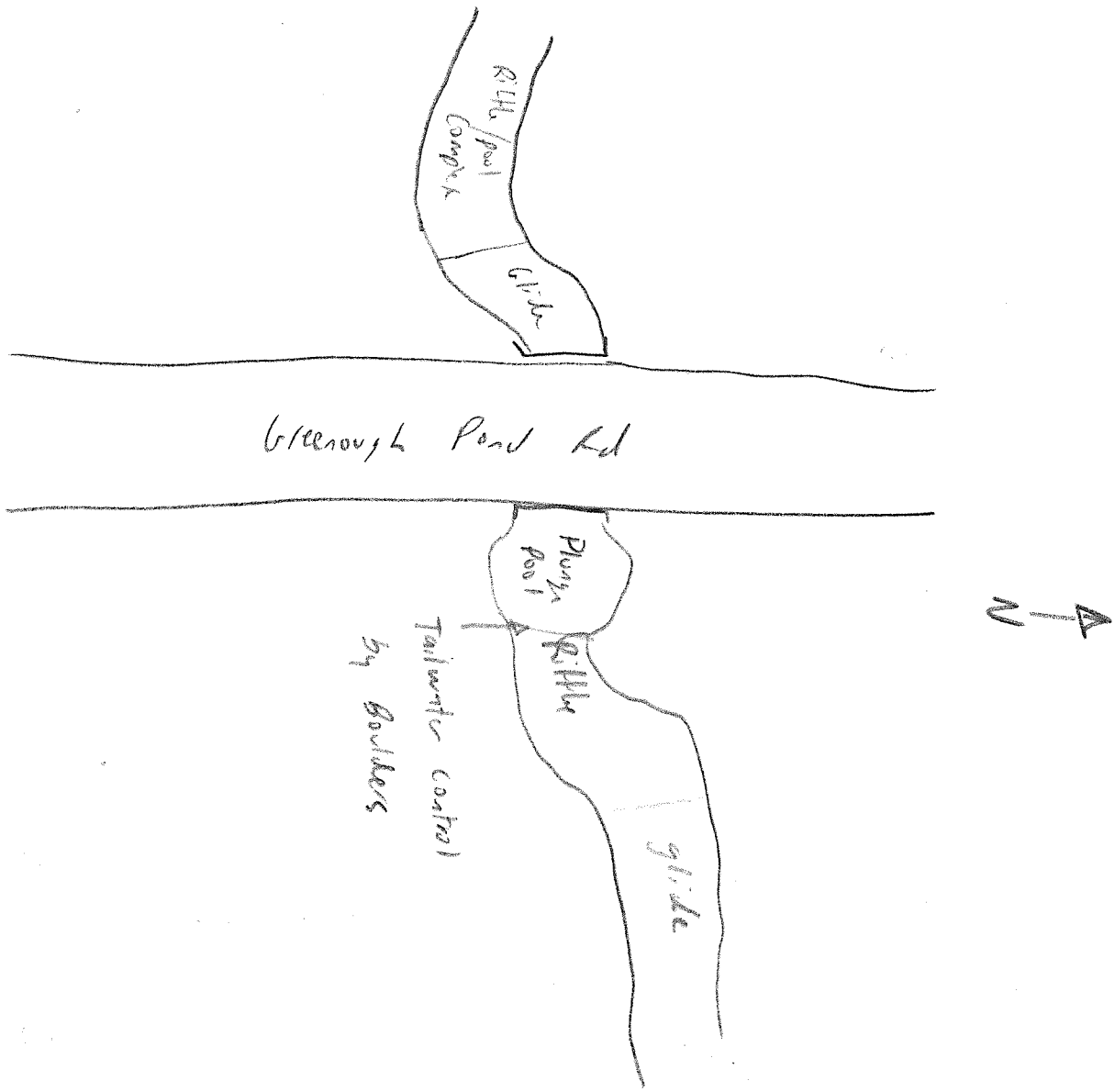
Dominant Channel Material (visual assessment): ☒ sand (30) ☒ silt (10) ☒ gravel (60) ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Inlet Structure and Upstream Condition

☒ Cross Section Information ☒ GPS

Top of bank width 9' 9" Ordinary high water width 9' 9" Distance from inlet 17'

Culvert length 30.5'
Upstream invert 10.83
Downstream invert 13.35
Downstream substrate 14.74 @ 31' from upstream culvert invert



NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Northern Pass Project

Stream Data Sheet

Stream ID: HKS-202 **Date:** 11-15-16 **Initials:** EL

Number of Flags: 12 **Cowardin Class(es):** R3UB1

Two Photos: Yes / No **GPS/Tech:** white - EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** 10 **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

Associated with culvert HK-07A

Stream ID: HKS-203 **Date:** 11-15-16 **Initials:** EL

Number of Flags: 6 **Cowardin Class(es):** R4SB3

Two Photos: Yes / No **GPS/Tech:** white - EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 3 **Ave. Depth (in):** 6 **Riffle/Pool Complex?** Y / N

Associated with culvert HK-07.1

Stream ID: ____ **Date:** ____ **Initials:** ____

Number of Flags: ____ **Cowardin Class(es):** ____

Two Photos: Yes / No **GPS/Tech:** ____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** ____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: ____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-8

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** Greenough Pond Rd, Dixs Grant

Date of field assessment: 11/10/16 HKB

Stream Parameters at Crossing

Existing Crossing (type and size): 31 feet **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks): near Hunt Rd, birch saplings

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub, sapling, tree*

Dominant Species:
Yellow Birch
White birch
Red maple
Spruce
Balsam fir
birch saplings
ferns (most upstream on the left side)
grass seed (upstream side)

Slope at crossing: _____ (Rise in Elev.) _____ X _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 3 feet

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 3 feet) (example):

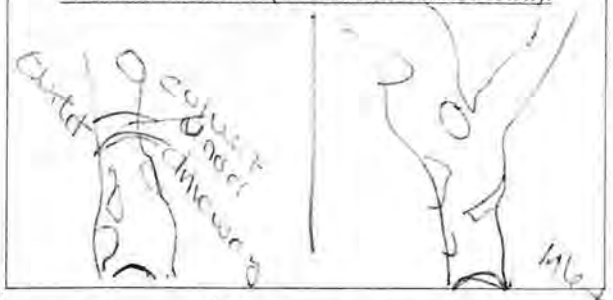
Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

depth after culvert 6", 0.5 feet

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☐ cobble ☒ boulder ☐ bedrock
60 40
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos,Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: .3 ft (example): 10ths

Distance between top and bottom of culvert/bed material: 3 feet

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☐ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☐ NO (Tier 3 sites)
80 20

☒ Photo of Inlet Structure and Upstream Condition

depth water at culvert .3 feet 10ths

☐ Cross Section Information ☐ GPS

Top of bank width 5' 5" Ordinary high water width 5' 5" Distance from inlet 10 ft

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Northern Pass Project

Stream Data Sheet

Stream ID: HK-S106 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 3 (#4 GPS ONLY) **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4-8 **Ave. Depth (in):** 0-8 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-8

Stream ID: HK-S107 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2-12 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-12

Stream ID: HK-S108 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 10 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 10-15 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-13

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-9

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP ORAR Culvert Assessment **Location of Crossing:** HM-9 / South Valley

Date of field assessment: 11/15/2016

Stream Parameters at Crossing

Existing Crossing (type and size): 10' W x 30' L **Watershed size** 2.21 sq. mi.

☐ CMP ☐ RCP ☐ HDPE ☑ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

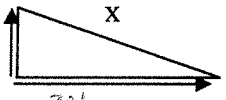
Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
yellow birch, Balsam fir, Red spruce, Speckled alder, Goum sr, hobblebush

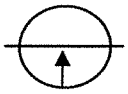
Slope at crossing: 3.4% (Rise in Elev.) 1.02'



30' (Length of Crossing)

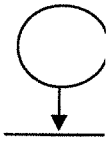
Outlet Data: ☒ GPS

Depth of water at invert if not perched: NA (example):



Distance between top and bottom of culvert/bed material: 7.05'

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 6.0") (example):



Tailwater Controls present at crossing? ☑ YES ☐ NO
Pool Configuration: width 18.5 length: 32 Max pool depth at outlet: 2.79'
Location (distance from outlet): 32 Materials: Cobble/gravel/Boulder

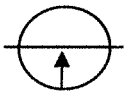
Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☑ gravel ☒ cobble ☒ boulder ☐ bedrock
Pebble Count: ☒ YES ☐ NO (Tier 3 sites) 5 15 40 40

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):
Riffle above culvert
Pool below culvert
See Tier III data

Inlet Data: ☒ GPS

Depth of water at inlet: 5" (example):



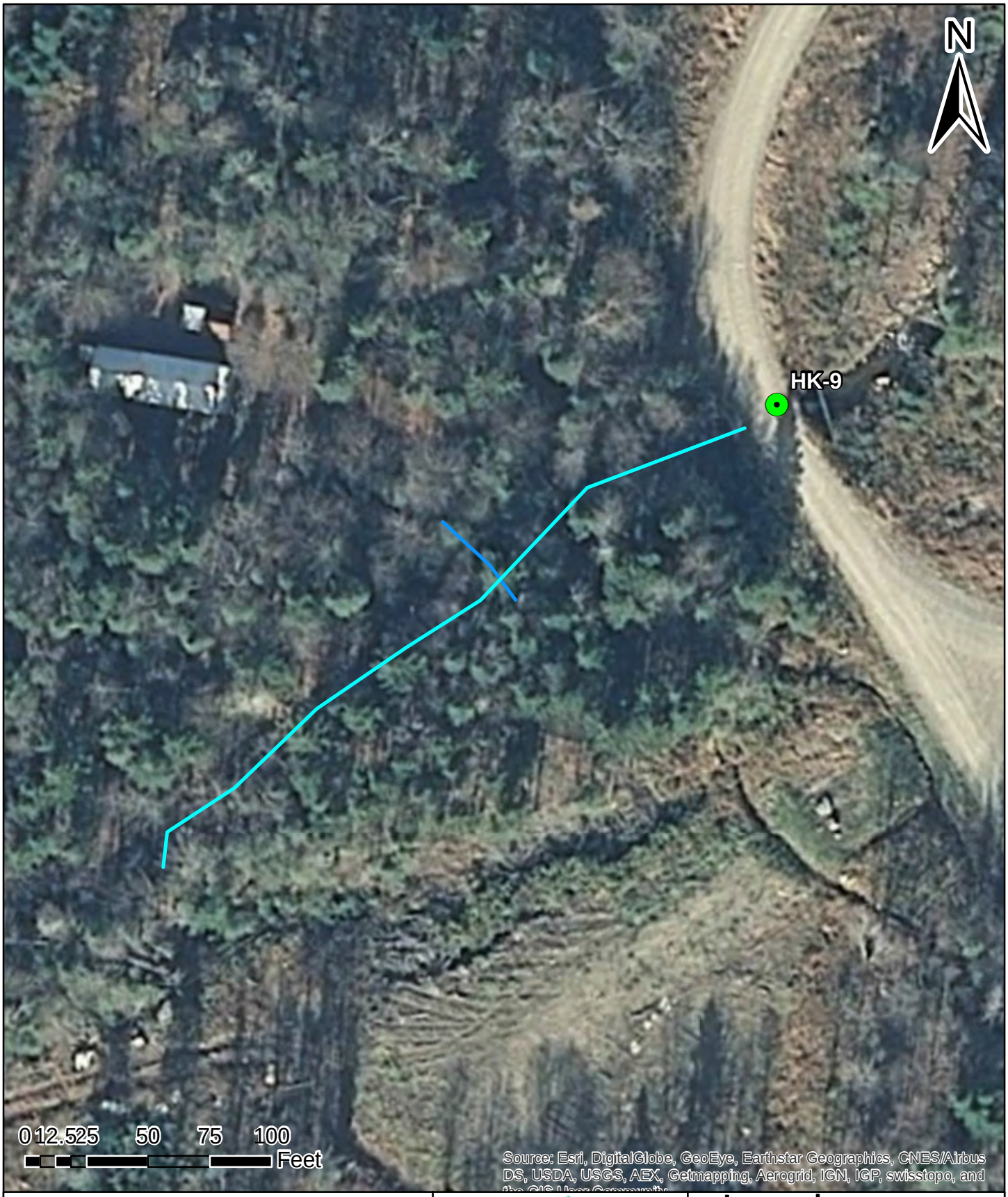
Distance between top and bottom of culvert/bed material: 6.76'

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☑ cobble ☑ boulder ☐ bedrock
Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 60 / 40

☑ Photo of Inlet Structure and Upstream Condition

☑ Cross Section Information ☒ GPS @ AK5200-2b flag

Top of bank width 20' Ordinary high water width 20' Distance from inlet 10'



Crossing HK-9
Tier 3 Reference Reach and Cross section Locations

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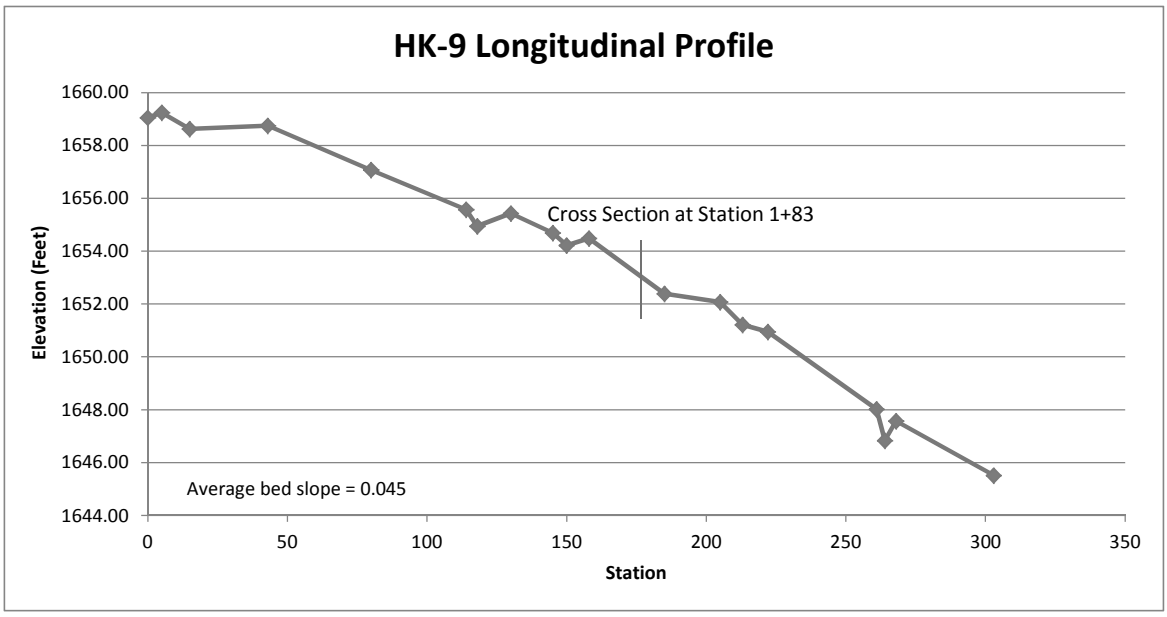
Legend

- Tier 3 Cross-section
- Tier 3 Reference Reach
- Culvert/Crossing

HK-9 Longitudinal Profile

Station	Foresight	Backsight	Elevation	Notes
STA #1		16.18	1661.68	Backsight to Culvert Inlet - Invert
0	2.63		1659.05	riffle
5	2.44		1659.24	Pmax
15	3.05		1658.63	Bpool
43	2.93		1658.75	Bglide
80	4.61		1657.07	Riffle-mid
114	6.11		1655.57	Briffle
118	6.73		1654.95	Pmax
130	6.25		1655.43	Bpool
145	6.99		1654.69	Briffle
150	7.46		1654.22	Pmax
158	7.20		1654.48	Bpool
185	9.29		1652.39	Briffle
205	9.60		1652.08	Bglide
213	10.46		1651.22	Briffle
222	10.73		1650.95	Bglide
261	13.66		1648.02	Briffle
264	14.85		1646.83	Pmax
268	14.11		1647.57	Bpool
303	16.17		1645.51	Briffle
	16.18		1645.50	Culvert Inlet - Invert
	17.20		1644.48	Culvert Outlet - Invert
	9.42		1652.26	Culvert Inlet - Top
	10.25		1651.43	Culvert Outlet - Top
	8.00		1653.68	**Bechmark, rt side, downstream (pin on road edge in ground)**
	18.33		1643.35	Outlet Invert substrate
	20.39		1641.29	Pmax at outlet



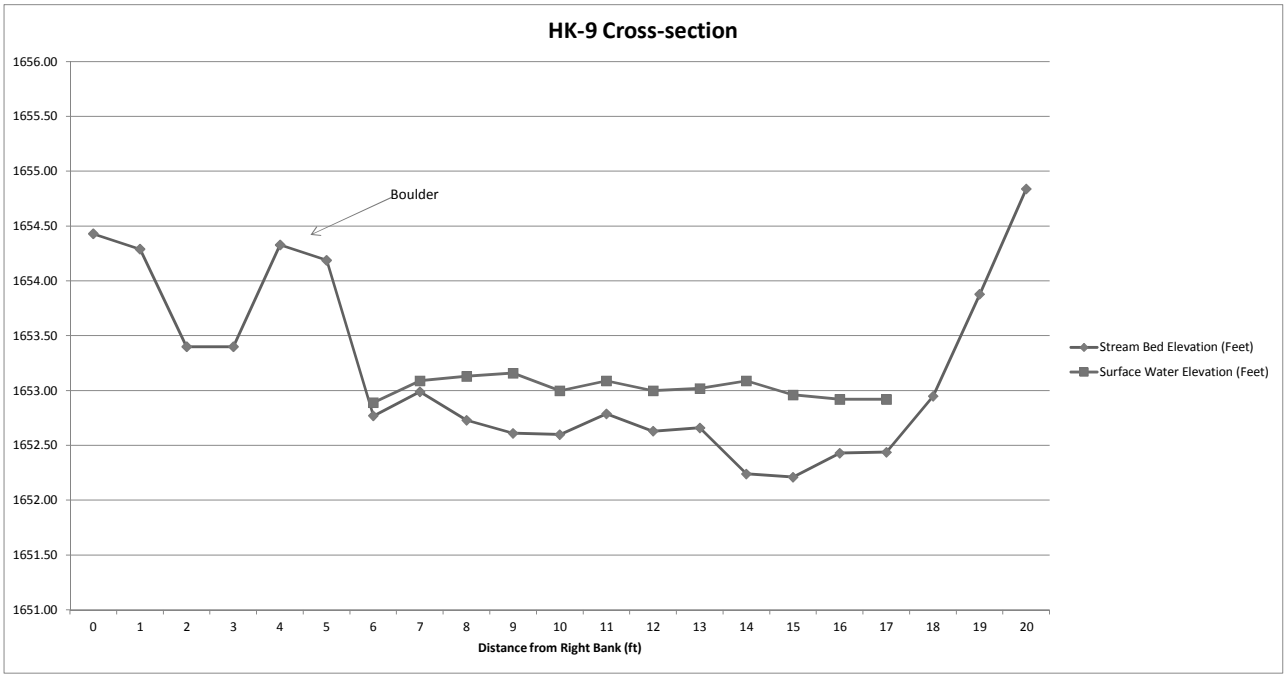
HK-9 Cross Section

Distance from Bank (rt)	Stadia Rod Reading	Water Depth (ft)	Bankfull Depth (Feet)	Water depth (Feet)	Backsight	Stream Bed Elevation (Feet)	Surface Water Elevation (Feet)	Notes:
STA #1					16.18	1661.68		Backsight to Culvert Inlet - Invert (elevation = 1645.50 feet)
0	7.25		0.41			1654.43		Right Bank
1	7.39		0.55			1654.29		
2	8.28		1.44			1653.40		
3	8.28		1.44			1653.40		
4	7.35		0.51			1654.33		
5	7.49		0.65			1654.19		
6	8.91	0.12	2.07	0.12		1652.77	1652.89	
7	8.69	0.10	1.85	0.10		1652.99	1653.09	
8	8.95	0.40	2.11	0.40		1652.73	1653.13	
9	9.07	0.55	2.23	0.55		1652.61	1653.16	
10	9.08	0.40	2.24	0.40		1652.60	1653.00	
11	8.89	0.30	2.05	0.30		1652.79	1653.09	
12	9.05	0.37	2.21	0.37		1652.63	1653.00	
13	9.02	0.36	2.18	0.36		1652.66	1653.02	
14	9.44	0.85	2.60	0.85		1652.24	1653.09	
15	9.47	0.75	2.63	0.75		1652.21	1652.96	
16	9.25	0.49	2.41	0.49		1652.43	1652.92	
17	9.24	0.48	2.40	0.48		1652.44	1652.92	
18	8.73		1.89			1652.95		
19	7.80		0.96			1653.88		
20	6.84		0.00			1654.84		Left Bank
MAX			2.63	0.85				
AVERAGE			1.74	0.43			1653.02	

Note: Elevation is adjusted to the height of the tallest bank.

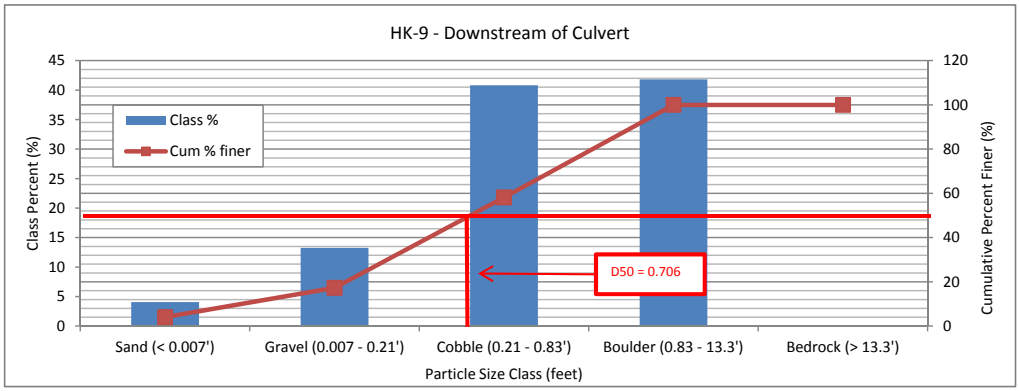
Watershed Area (acres) *	1414.4		
Max Bankfull Depth:	2.63		
Bankfull Width:	20		
Floodprone Width:	44		
Entrenchment Ratio:	2.2		
Average Bankfull Depth:	1.74		
Width Depth Ratio:	11.48		
Sinuosity	1.03		
LP channel slope	0.045		
Predominant substrate:	Cobble		
50th percentile	0.554 ft	DS = 0.706 ft	US = 0.747 feet
Approximate Water Elev:	1653.02		

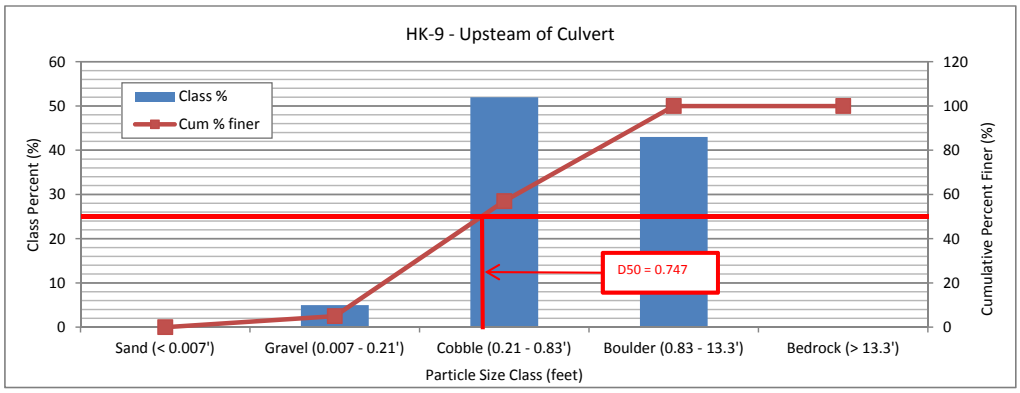
* - Watershed Area provided by VHB

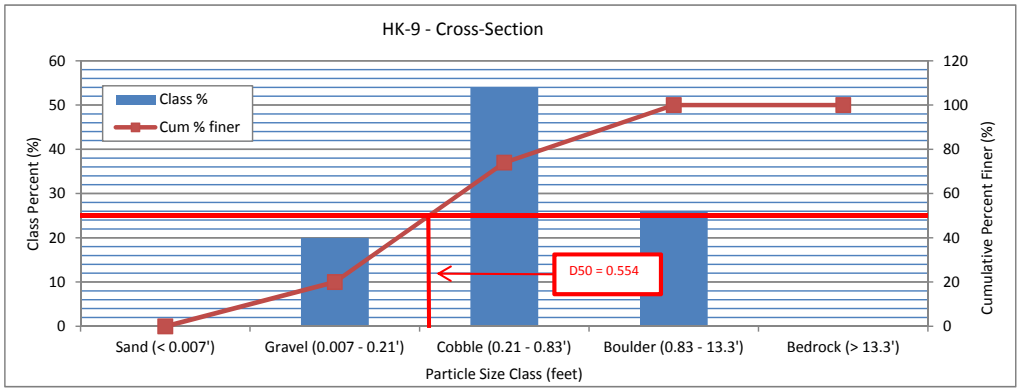


HK-9 Pebble Counts

	Downstream of Culvert			Upstream of Culvert			Cross-Section		
Particle Size (ft)	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer
Sand (< 0.007')	4	4	4	0	0	0	0	0	0
Gravel (0.007 - 0.21')	13	13	17	5	5	5	20	20	20
Cobble (0.21 - 0.83')	40	41	58	52	52	57	54	54	74
Boulder (0.83 - 13.3')	41	42	100	43	43	100	26	26	100
Bedrock (> 13.3')	0	0	100	0	0	100	0	0	100
Total	98	-	-	100	-	-	100	-	-
D50 (ft.)	0.706	-	-	0.747	-	-	0.554	-	-







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Northern Pass Project

Stream Data Sheet

Stream ID: HK-S-200 **Date:** 11-14-16 **Initials:** EC

Number of Flags: 6a, 6b **Cowardin Class(es):** R3UB1

Two Photos: (Yes) / No **GPS/Tech:** white/EC **Flagging Type:** Center / Top of Bank

Flow Regime: (Perennial) / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / (Mod) / High / Flood **Ass.Wetland:** Y/ (N) If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / (Cobl / Gravl) / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 2' **Width (ft)** 15 **Ave. Depth (in):** 8 **Riffle/Pool Complex?** (Y) / N

Associated with HK-9

Stream ID: HK-S-201 **Date:** 11-14-16 **Initials:** EC

Number of Flags: 2 **Cowardin Class(es):** R4SB3

Two Photos: (Yes) / No **GPS/Tech:** white/EC **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / (Intermittent) / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / (Low) / Mod / High / Flood **Ass.Wetland:** Y / (N) If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / (Gravl) / Sand / (Slt/Clay) / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2 **Ave. Depth (in):** 3 **Riffle/Pool Complex?** Y / (N)

Associated with HK-9

Stream ID: _____ **Date:** _____ **Initials:** _____

Number of Flags: _____ **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** _____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/ N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-11

Steam Culvert Data

Culvert Assessment Field Form – Geomorphic & Habitat Parameters

Structure ID	HK-11	Unknown ☐		Structure Number	
Observer(s)/ Organization(s)		Tidal ☐		Date & Time	7/26/16 2:00
Town		Datum		Latitude (N/S)	GPS point taken
Location	Dixville			Longitude (E/W)	" "
Crossing ID				Stream Name	Unknown
Road Name	Coarser Brook Rd mile 5.5			Road Type	paved gravel trail railroad
# of shoulder lanes				Crossing Condition	new old eroding collapsing rusted
# of travel lanes		Structure Materials	Concrete Plastic-Corrugated Plastic-Smooth Tank Stone Steel-Corrugated 21" Steel-Smooth Aluminum-Corrugated Wood Other: _____	Structure skewed to roadway	yes no
# of culverts at crossing				Flow Conditions	unusually low typical low higher than average flood conditions
Overflow pipe(s)	yes no				
Inlet Headwall Material	Metal Concrete Masonry Gabion Dry Fit Stone Plastic Other None				

Geomorphic and Fish Passage Data

General

Floodplain filled by roadway approaches: **entirely** (> 3/4 of floodplain) **partially** (1/4 – 3/4 of floodplain) **not significant**
Structure within ⅓ mile downstream of a significantly steeper segment of stream: **yes** **no** **unsure**
Culvert slope as compared with the channel slope is: **higher** **lower** **about the same**
Water depth in the crossing matches that of stream: **yes** **no (significantly deeper)** **no (significantly shallower)** no info
Water velocity in crossing matches that of stream: **yes** **no (significantly faster)** **no (significantly slower)** "

Upstream

Structure opening partially obstructed by (circle all that apply): **wood** **sediment** 1/4 of opening **wood & sediment**
Screening at inlet: **yes** **no** **deformation of culvert** **none** **other**
Steep riffle present immediately upstream of structure: **yes** **no**
If channel avulses, stream will: **cross road** **follow road** **cross and follow road** **unsure**
Estimated distance avulsion would follow road: 40 **(ft.)**
Angle of stream flow approaching structure: **sharp bend (45° - 90°)** **mild bend (5° - 45°)** **naturally straight** **channelized straight**
Evidence of streambed erosion or aggradation immediately upstream of culvert: **erosion** **aggradation** **none**
Culvert inlet: **at grade** **cascade** **free fall**
Upstream bankfull widths: 1.) 4.8 **2.)** 4.3 **3.)**_____ **4.)**_____ **5.)**_____ **(ft.)**

Reference bankfull widths: 1.)____ 2.)____ 3.)____ 4.)____ 5.)____ (ft.)

Downstream

Water depth in culvert (at outlet): 0.0 **(0.0 ft.)**
Culvert outlet: **at grade** **cascade** **free fall** **backwatered** ____ **(ft.)** Stepped footers: **yes** **no**
Outlet drop (invert to water surface): 0.0 **(0.0 ft.)**
Pool present immediately downstream of structure: **yes** **no**
Pool depth at point of streamflow entry: ____ **(ft.)**
Maximum pool depth: ____ **(0.0 feet)**
Downstream bank heights are substantially higher than upstream bank heights: **yes** **no**
Hydraulic control type: **bedrock** **boulders** **cobble** **gravel** **sand** **wood** **other:**____
Distance from downstream end of culvert to hydraulic control: 1-2 **(ft.)**
Slope from downstream end of culvert to hydraulic control: ≈10% **(%)**
Evidence of streambed erosion or aggradation immediately downstream of culvert: **erosion** **aggradation** **none**
Downstream bankfull widths: 1.) 4.5 **2.)** 5.4 **3.)** 5.9 **4.)**____ **5.)**____ **(ft.)**

	Upstream	Downstream	In Structure	
Dominant bed material (substrate) at structure (use codes below)	1 2 3 4 5 6 UNK	1 2 3 4 5 6 UNK	NONE 1 2 3 4 5 6 UNK	
Bedrock present	yes no	yes no	Depth of Substrate	< 1 foot 1-2feet >2 feet UNK N/A
Sediment Deposit Type	none delta side point mid-channel	none delta side point mid-channel	none delta side point mid-channel	
Elevation of sediment deposits is greater than or equal to ½ bankfull elevation	yes no	yes no	yes no	
			Substrate Throughout? yes no	
Beaver dam near structure Distance from structure to dam	yes no distance: ____ (ft.)	yes no distance: ____ (ft.)	**Bed Material Codes** 1 – bedrock 2 – boulder 3 – cobble 4 – gravel 5 – sand 6 – silt/clay UNK - unknown	
Hard bank armoring	intact failing none UNK	intact failing none UNK		
Bank erosion	high low none	high low none		
Stream bank scour causing undermining around/under structure (circle all that apply)	none culvert footers wing walls	none culvert footers wing walls		

- embedded w/ connectivity.
- culvert partially blocked on outlet w/ sticks/leaves

Wildlife Data (left/right bank determined facing downstream)	**Upstream**		**Downstream**		
	LEFT	**RIGHT**	**LEFT**	**RIGHT**	
Dominant vegetation type (use codes to the right)					**Vegetation Type Codes** **C** – coniferous forest **D** – deciduous forest **M** – mixed forest **S** – shrub/sapling **H** – herbaceous/grass **B** – bare **R** – road embankment
Does a band of shrub/forest vegetation that is at least 50' wide start within 25' of structure and extend 500' or more up/downstream?	**yes no**	**yes no**	**yes no**	**yes no**	
Road-killed wildlife within ¼ mile of structure (circle none or list species)	**species:**			**none**	

Wildlife sign and species observed near (up/downstream) and inside structure (circle none or list species and sign types)	**Outside Structure**		**Inside Structure**	
	species (none)	**sign**	**species (none)**	**sign**

Spatial data collected with GPS: **yes** **no** **Comments/Drawings:**

Photos taken: **yes** **no**

Please fill out photo log below

Folder Name:	**Structure Inlet**	**Structure Outlet**	**Above Structure**
Photo View - Upstream	☐	☐	☐
Photo View - Downstream	☐	☐	☐

Record the file name for each photo taken in the appropriate box

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-12

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** Greenough Pond Rd, HK12 Dixville, NH

Date of field assessment: 11/10/16

Stream Parameters at Crossing

Existing Crossing (type and size): 31 feet Long **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:

Downstream: grasses, raspberries, alder, spruce

Upstream: grasses, sapling - birch, raspberries

immediately around culvert

Slope at crossing: _____ (Rise in Elev.) _____ / _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: _____ (example):

Pondage pool - 10 inches

Distance between top and bottom of culvert/bed material: 3 feet / 36"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 10 inches) (example): _____

0.8 feet

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width _____ length: _____ Max pool depth at outlet: _____

Location (distance from outlet): _____ Materials: _____

Dominant Channel Material (visual assessment): ☐ sand ☒ silt (10) ☒ gravel (80) ☒ cobble (20) ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Inlet Data: ☒ GPS

depth of culvert since cut before

Depth of water at inlet: 1 inch (example):

34" squashed culvert

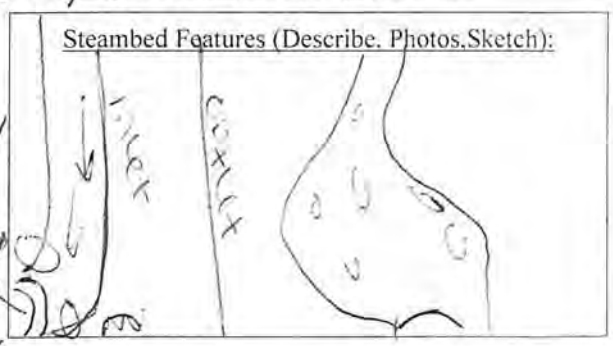
Distance between top and bottom of culvert/bed material: 2 ft 10" (squashed) supposed to be 36"

Dominant Channel Material (visual assessment): ☒ sand (50) ☐ silt ☒ gravel (50) ☐ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Inlet Structure and Upstream Condition

Steambed Features (Describe, Photos, Sketch):



Boulders near inlet mouth might have fallen or been placed there

10

☐ Cross Section Information ☐ GPS

Top of bank width _____ Ordinary high water width _____ Distance from inlet _____

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: HK - W101 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 2 **Town:** _____ **Project:** NPass

Wetland: Open / Closed Notes: BVW of INT STREAM/P RIVER **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: HK - S107 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: _____ GPS Unit/Tech Initials: GRW LSH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PSS1E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal	✓		
Sed/Shore Stabilization	✓		✓
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: ABIES BALSAMEA

Sapling/Shrub: ALNUS SPP.

Herb/Seedling: SIFON, MSWEET

Woody Vine: _____

Invasives: _____

Soils:

Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other _____

Restrictive Layer? Y N if Yes, Depth (inches) _____

Sketch Map:

☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Stream Data Sheet

Stream ID: HK-S106 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 3 (#4 GPS ONLY) **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4-8 **Ave. Depth (in):** 0-8 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-8

Stream ID: HK-S107 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2-12 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-12

Stream ID: HK-S108 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 10 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 10-15 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-13

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

HK-13

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** HK13 Dixville Greenough Pond Rd.

Date of field assessment: 11/10/16

Stream Parameters at Crossing

Existing Crossing (type and size): 3 culverts 28' Long each **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

Dominant Species:
alder
grasses
Balsam fir
ferns
yellow maple
Red maple

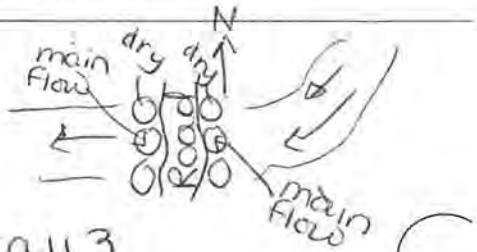
GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)



Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: See notes for all 3

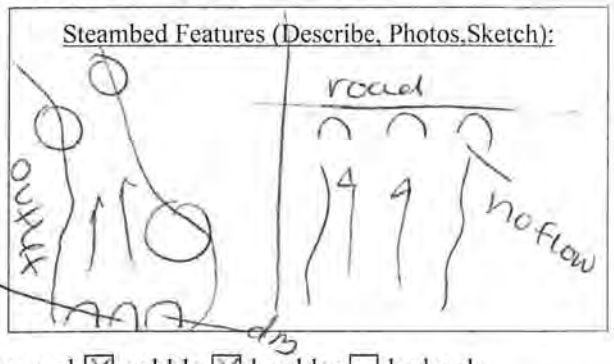
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: See notes) (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☐ sand ☒ silt ☐ gravel ☒ cobble ☒ boulder ☐ bedrock 50 25
Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 25

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: _____ (example): main flow

Distance between top and bottom of culvert/bed material: See notes

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 15 50 25

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 14' Ordinary high water width 14' Distance from inlet 10'

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Stream Data Sheet

Stream ID: HK-S106 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 3 (#4 GPS ONLY) **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4-8 **Ave. Depth (in):** 0-8 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-8

Stream ID: HK-S107 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: HK-W101

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2-12 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-12

Stream ID: HK-S108 **Date:** 11/10/2016 **Initials:** SH/LF

Number of Flags: 10 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 10-15 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert HK-13

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-1

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-1

Date of field assessment: 11-14-16

Millsfield Pond Rd, Errol, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 33 feet - length over rd. **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Yellow Birch
Red Maple
Cedar - upstream side
Sphagnum moss
Balsam Fir
Grasses - ~~[illegible]~~
ferns
w. Spruce

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 1'3"

Plunge pool = 6"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 1 ft.) (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO

.5" = water depth inside culvert

Pool Configuration: width — length: — Max pool depth at outlet: —

Location (distance from outlet): — Materials: —

downstream 100%

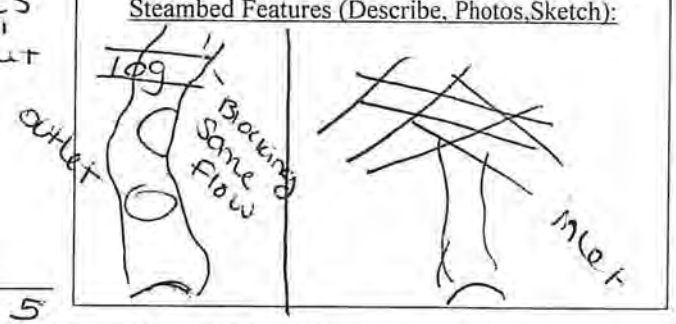
Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☒ gravel ☐ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ organics 100% 25'

☒ Photo of Outlet Structure and Downstream Conditions out

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 1" (example):

4" = in stream channel

Distance between top and bottom of culvert/bed material: 1' 3"

10 5

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☐ cobble ☐ boulder ☐ bedrock

Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

organics ☒ 75

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 1' Ordinary high water width 1' Distance from inlet 10'

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: MP-W100/101 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Town:** ERROL NH **Project:** NPASS

Wetland: Open / Closed Notes: **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: MP-S100 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: GPS Unit/Tech Initials: GRJ / SH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PFO1/4 E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal			
Sed/Shore Stabilization	✓		
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: Y BIRCH, R MAP

Sapling/Shrub: Y BIRCH, R MAP

Herb/Seedling: SPHAGNUM SPP, A. BALSAMEA

Woody Vine:

Invasives:

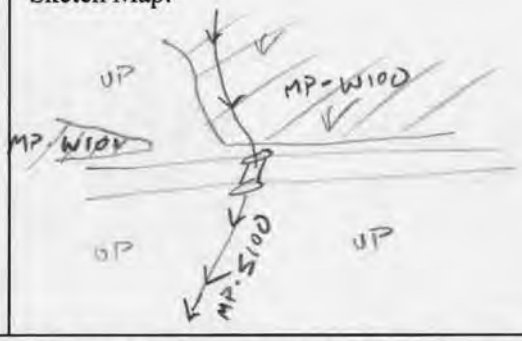
Soils:

Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other

Restrictive Layer? Y N if Yes, Depth (inches) VARIABLE

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Stream Data Sheet

Stream ID: MP-S100 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 1-4 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-1

Stream ID: MP-S101 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4 **Ave. Depth (in):** 0-2 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-2

Stream ID: MP-S102 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 3 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 1-2 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-2

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-1a

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NP ORAR CULVERT ASSESSMENT **Location of Crossing:** MP01A Mansfield Pond Rd

Date of field assessment:

Stream Parameters at Crossing

Existing Crossing (type and size): 42" wx 28' L **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

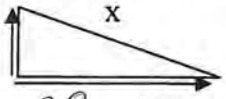
Riparian Zone (surrounding or on the banks): Downstream - 10' both banks upstream right - 7100 ft left - 50 ft

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Balsam fir, Yellow Birch, Red maple, Cal. cap.

Slope at crossing: 7.2% (Rise in Elev.) 2.02

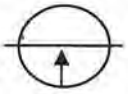


28 (Length of Crossing)

INLET INVERT: 2.93
OUTLET INVERT: 0.95
OUTLET SUBSTRATE: 10.56
Substrate [illegible] 12.69

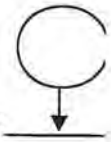
Outlet Data: ☒ GPS

Depth of water at invert if not perched: NA (example):



Distance between top and bottom of culvert/bed material: 42"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: ≈ 28") (example):



Tailwater Controls present at crossing? ☒ YES ☐ NO
Pool Configuration: width 9' length: 10' Max pool depth at outlet: 25"
Location (distance from outlet): 10' Materials: Cobble / Boulder

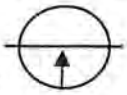
Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☒ cobble (80) ☐ boulder (20) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):
PERENNIAL
RIFFLE/POOL SEQUENCE
SEE BACK

Inlet Data: ☒ GPS @ flag MP5200-2A

Depth of water at inlet: 2" (example):



Distance between top and bottom of culvert/bed material: 42"

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☒ cobble (80) ☐ boulder (20) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Inlet Structure and Upstream Condition

☒ Cross Section Information ☒ GPS

Top of bank width 14' Ordinary high water width 14' Distance from inlet 14'
6' wetted width

Cascade
POOL
RIFFLE
MP 5.00 - 16
Millsfield Pond Rd
Parking
Riffle
Pool
Bridge
Pond Stream

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S-200 **Date:** 11-16-16 **Initials:** EL

Number of Flags: 10 **Cowardin Class(es):** R3UB1

Two Photos: Yes / No **GPS/Tech:** White/CF **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 14 **Ave. Depth (in):** 8 **Riffle/Pool Complex?** Y / N

Associated with culvert MP-1a

Stream ID: MP-S-201 **Date:** 11-16-16 **Initials:** EL

Number of Flags: 3 (right bank only) **Cowardin Class(es):** R2UB1/2

Two Photos: Yes / No **GPS/Tech:** White/CF **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: —

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 2 **Width (ft)** 20 **Ave. Depth (in):** 12 **Riffle/Pool Complex?** Y / N

Associated with culvert MP-1a

Stream ID: _____ **Date:** _____ **Initials:** _____

Number of Flags: _____ **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** _____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/ N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-2

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT culverts **Location of Crossing:** MP-2 Millsfield Pond Rd, Errol, NH

Date of field assessment: 11-14-16

Stream Parameters at Crossing

Existing Crossing (type and size): 28' Long - over rd. **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

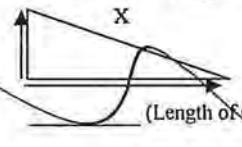
Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Balsam fir
Spruce
Yellow Birch
Sphagnum moss - upstream side
ferns
grasses
Red Maple

Slope at crossing: _____ (Rise in Elev.) _____ / _____ (Length of Crossing)



Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

water level in culvert = 0.5"
Plunge pool = 3"

Distance between top and bottom of culvert/bed material: 3' 1"

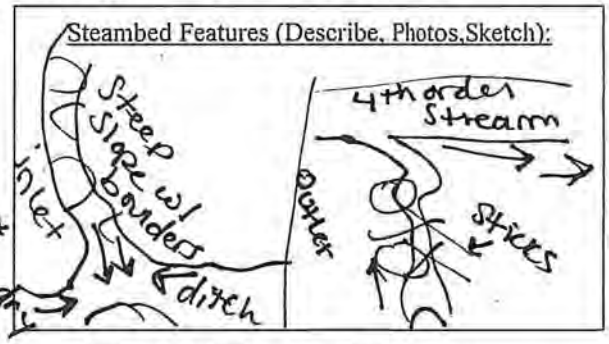
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 9") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 10 20 30 40

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS - Steep slope

Depth of water at inlet: 0.5" (example):
1" -> Stream channel near culvert

Distance between top and bottom of culvert/bed material: 3' 1"

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☐ cobble ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) organics ☒ 10% 90%

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 3' Ordinary high water width 3' Distance from inlet 10'

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S100 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W100

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 1-4 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-1

Stream ID: MP-S101 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 5 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 4 **Ave. Depth (in):** 0-2 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-2

Stream ID: MP-S102 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 3 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 1-2 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-2

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-3

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-3

Millsfield Pond Rd, Millsfield, NH Tier #3

Date of field assessment: 11/14/16

2 culverts

Stream Parameters at Crossing

Existing Crossing (type and size): 34' - Length - over Rd, - Southern 30' - Length - over Rd, - northern **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Balsam fir
ferns
Red maple
yellow birch
Sphagnum moss

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

dry culvert = 3'6"

Distance between top and bottom of culvert/bed material: 3'6"

Millsfield Pond Rd N dry 30' length main channel 34' length

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 4") (example):

3" in culvert Plunge pool = 9"

Tailwater Controls present at crossing? ☐ YES ☒ NO

Pool Configuration: width — length: — Max pool depth at outlet: —

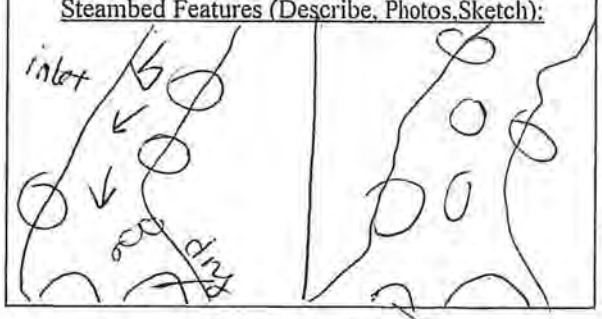
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock

Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 50 10 20 20

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

10" in channel near culvert

Depth of water at inlet: 8" (example):

Distance between top and bottom of culvert/bed material: 3'6"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock

Pebble Count: ☐ YES ☐ NO (Tier 3 sites) 10 20 30 40

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 12' Ordinary high water width 12' Distance from inlet 10'

Crossing MP-3
Tier 3 Reference Reach and Cross section Locations

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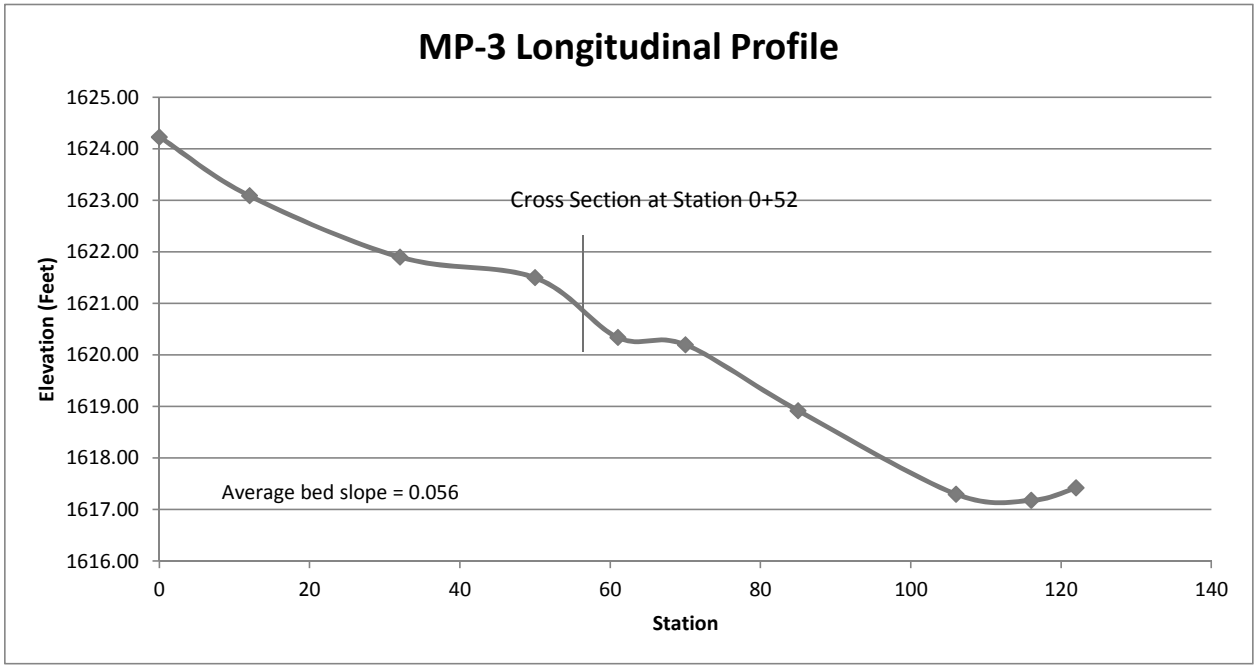
Legend

- Tier 3 Cross-section
- Tier 3 Reference Reach
- Culvert/Crossing

MP-3 Longitudinal Profile

Station	Foresight	Backsight	Elevation	Notes
STA #1		13.68	1630.68	Backsight to Culvert 1 Inlet - Invert
0	6.45		1624.23	Brun
12	7.59		1623.09	Riffle-Mid
32	8.78		1621.90	Riffle-Bottom
50	9.18		1621.50	Brun
61	10.34		1620.34	Riffle-Bottom
70	10.48		1620.20	Brun
85	11.76		1618.92	Riffle-Mid
106	13.38		1617.30	Riffle-Bottom (begin Impact Area)
116	13.50		1617.18	Pmax
122	13.26		1617.42	Bpool
122	12.47		1618.21	Top of pool obstruction
124	**13.68**		**1617.00**	**Culvert 1 Inlet - Invert**
124	10.10		1620.58	Culvert 1 Inlet - Top
124	12.98		1617.70	Culvert 2 Inlet - Invert
124	9.88		1620.80	Culvert 2 Inlet - Top
	13.75		1616.93	Culvert 1 Outlet - Invert
	10.18		1620.50	Culvert 1 Outlet - Top
	14.32		1616.36	Top of Pool at Outlet
	14.63		1616.05	Pmax at Outlet
	13.62		1617.06	Culvert 2 Outlet - Invert
	10.04		1620.64	Culvert 2 Outlet - Top
	2.10		1628.58	**Benchmark on Yellow Birch**



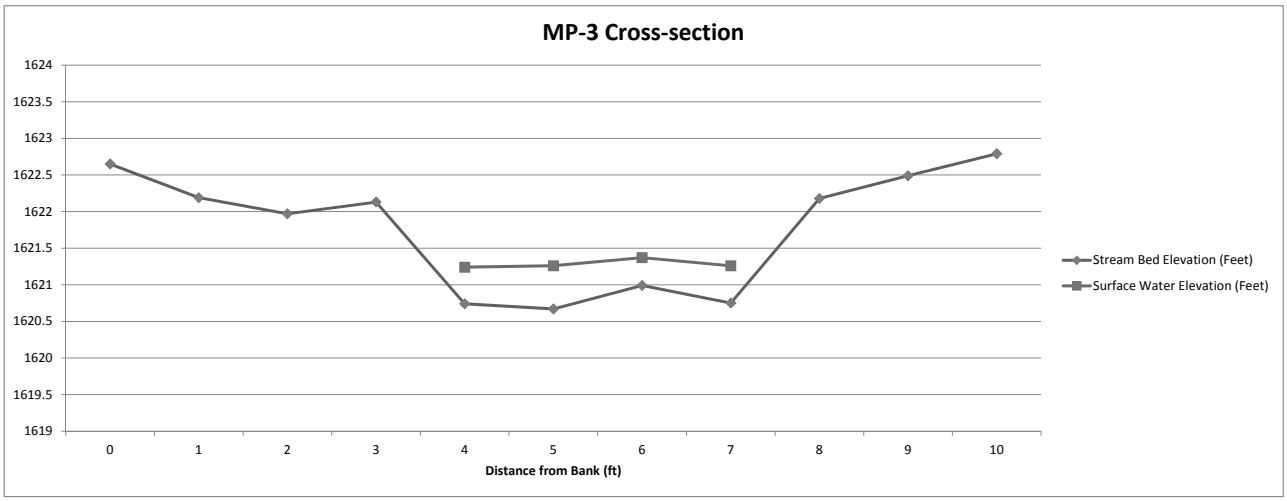
MP-3 Cross Section

Distance from Bank (rt)	Stadia Rod Reading	Water Depth (ft)	Bankfull Depth (Feet)	Water Depth (Feet)	Backsight	Stream Bed Elevation (Feet)	Surface Water Elevation (Feet)	Notes
STA #1					13.68	1630.68		Backsight to Culvert 1 Inlet - Invert (elevation = 1617.00)
0	8.03		0.14			1622.65		Right bank
1	8.49		0.6			1622.19		
2	8.71		0.82			1621.97		
3	8.55		0.66			1622.13		value on data sheet was 1.55'; believe it was an error (did not use)
4	9.94	0.5	2.05	0.5		1620.74	1621.24	
5	10.01	0.59	2.12	0.59		1620.67	1621.26	
6	9.69	0.38	1.8	0.38		1620.99	1621.37	
7	9.93	0.51	2.04	0.51		1620.75	1621.26	
8	8.50		0.61			1622.18		
9	8.19		0.3			1622.49		
10	7.89		0			1622.79		Left bank
Max			2.12	0.59				
Average			1.11	0.50			1621.28	

Note: Elevation is adjusted to the height of the tallest bank.

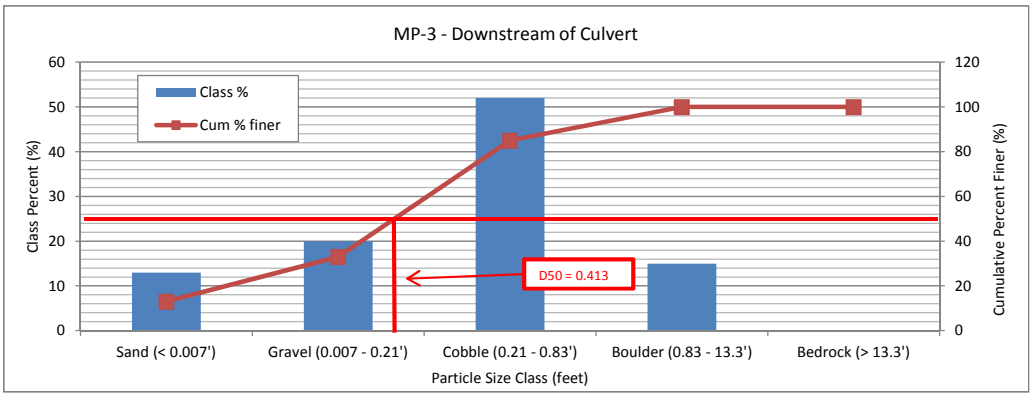
Watershed Area (acres)*	960		
Max Bankfull Depth:	2.12		
Bankfull Width:	10		
Floodprone Width:	22.6		
Entrenchment Ratio:	2.26		
Average Bankfull Depth:	1.11		
Width Depth Ratio:	8.98		
Sinuosity	1.12		
LP channel slope	0.056		
Predominant substrate:	Cobble to Boulder		
50th percentile	2.166 ft.	DS = 0.413 ft	US = 0.774 ft
Approximate Water Elev:	1621.28		

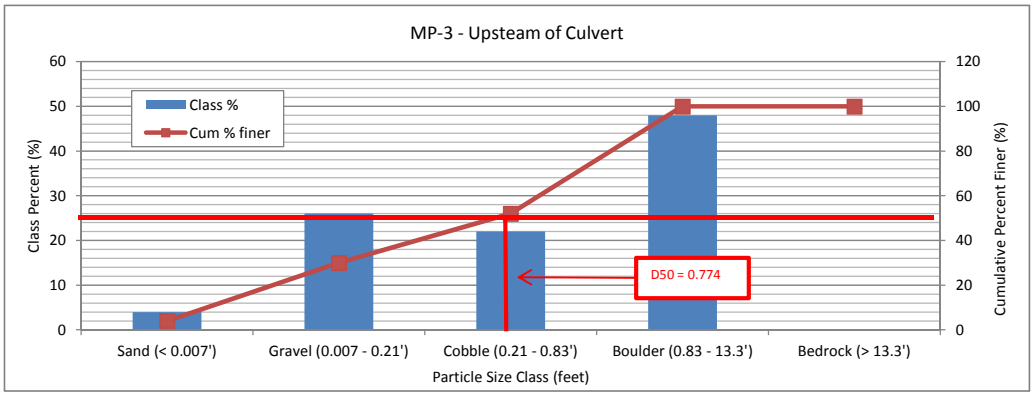
* - Watershed Area provided by VHB

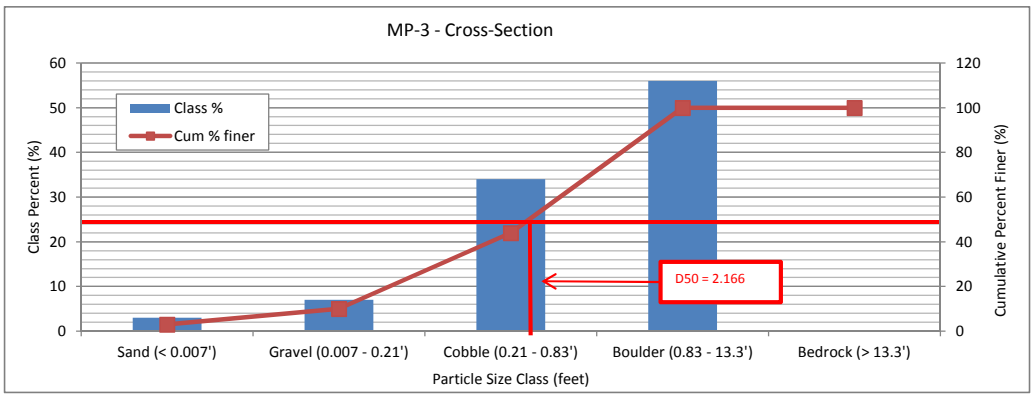


MP-3 Pebble Counts

	Downstream of Culvert			Upstream of Culvert			Cross-Section		
Particle Size (ft)	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer	Pebble Counts	Class %	Cum % finer
Sand (< 0.007')	13	13	13	4	4	4	3	3	3
Gravel (0.007 - 0.21')	20	20	33	26	26	30	7	7	10
Cobble (0.21 - 0.83')	52	52	85	22	22	52	34	34	44
Boulder (0.83 - 13.3')	15	15	100	48	48	100	56	56	100
Bedrock (> 13.3')	0	0	100	0	0	100	0	0	100
Total	100	-	-	100	-	-	100	-	-
D50 (ft.)	0.413	-	-	0.774	-	-	2.166	-	-







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Northern Pass Project

Stream Data Sheet

Stream ID: MP-5-103 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 5a, 6b **Cowardin Class(es):** R3UB1

Two Photos: Yes / No **GPS/Tech:** white/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 3 **Width (ft)** 10 **Ave. Depth (in):** 6 **Riffle/Pool Complex?** Y / N

Associated with MP-3

Stream ID: MP-5-104 **Date:** 11-14-16 **Initials:** EL

Number of Flags: 2 **Cowardin Class(es):** R4SB5

Two Photos: Yes / No **GPS/Tech:** white/EL **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** —

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 1 **Ave. Depth (in):** 1 **Riffle/Pool Complex?** Y / N

Ditch

Associated with MP-3

Stream ID: _____ **Date:** _____ **Initials:** _____

Number of Flags: _____ **Cowardin Class(es):** _____

Two Photos: Yes / No **GPS/Tech:** _____ **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/ N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): ____ **Width (ft)** ____ **Ave. Depth (in):** ____ **Riffle/Pool Complex?** Y / N

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-4

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT culverts **Location of Crossing:** MP-4 Millsfield Pond Rd, Millsfield, NH

Date of field assessment: 11-14-16

Stream Parameters at Crossing

Existing Crossing (type and size): 21' - Length - over Rd. **Watershed size** _____

☐ CMP ☒ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____
concrete culvert

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

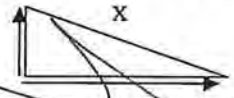
Riparian Zone (surrounding or on the banks): ds side upstream side (dense alder)

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
alder
Spruce
Balsam fir
Red Maple
Quaking aspen
white birch
grasses
moss - upstream side
ferns -

~~Slope at crossing:~~ _____ (Rise in Elev.) _____ (Length of Crossing)



Outlet Data: ☒ GPS

Depth of water at invert if not perched: 11" in culvert and stream channel (example):

Distance between top and bottom of culvert/bed material: 24" near culvert

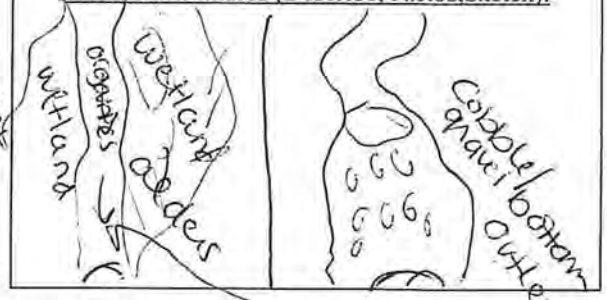
Perched at outlet? ☐ YES ☒ NO (If yes, Distance from invert to the waters surface: _____) (example): _____

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width _____ length: _____ Max pool depth at outlet: _____
Location (distance from outlet): _____ Materials: _____

Dominant Channel Material (visual assessment): ☒ sand (30) ☐ silt ☒ gravel (60) ☒ cobble (10) ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 4" (example): 3" - stream channel near culvert

Distance between top and bottom of culvert/bed material: 24"

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ - organics 100% wetland area

aquatic plants in stream channel

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 5' Ordinary high water width 5' Distance from inlet 10'

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: MP-W102 AND W103 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 9 **Town:** MILLSFIELD **Project:** NPASS

Wetland: Open / Closed Notes: ✓ **2 Photos:** #'s:

Open Water Component?: Y N

Wetland Associated w/ Stream?: Y / N If Yes, ID: MP-S10S Type: P I E

Vernal Pool Identified?: Y / N If Yes, ID: GPS Unit/Tech Initials: GM SH Complete: Y N

Cowardin Classes (Dominant(%)/others (%)): PSS1E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat	✓		✓
Sed/Tox Retention	✓		
Nutrient Removal			
Sed/Shore Stabilization	✓		✓
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: A. BALSAMEA, RMAP

Sapling/Shrub: ALNUS SPP.

Herb/Seedling: SPAGNUM SPP.

Woody Vine:

Invasives:

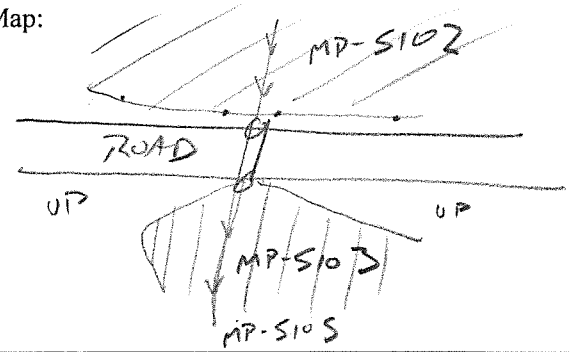
Soils:

Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other

Restrictive Layer? Y N if Yes, Depth (inches)

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

Rev 7

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S105 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W102 MP-W103

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 6 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-4

Stream ID: MP-S106 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W104

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 6-8 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-5

Stream ID: MP-S107 **Date:** 11/14/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W105

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 0-.5 **Width (ft)** 1-4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-6

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-5

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-5 Millsfield Pond Rd, Millsfield, NH

Date of field assessment: 11-14-16

Stream Parameters at Crossing

Existing Crossing (type and size): 28' - Length **Watershed size** _____

☐ CMP ☒ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

Concrete culvert

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Red maple
Balsam fir
Yellow Birch
White Birch

Slope at crossing: _____ (Rise in Elev.) _____ X _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 30"

6" - plunge pool
1" - inside culvert

Slightly perched

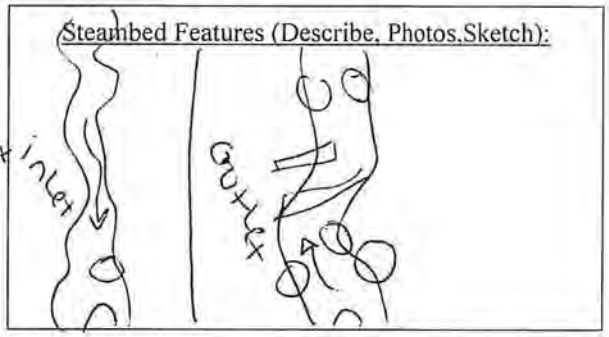
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 1") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand (40) ☐ silt ☒ gravel (40) ☒ cobble (10) ☒ boulder (10) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

rocks have been pushed near culvert

Depth of water at inlet: 1" (example):

2" - just outside culvert

4" - pool near culvert,

Distance between top and bottom of culvert/bed material: 30"

Dominant Channel Material (visual assessment): ☒ sand (50) ☐ silt ☐ gravel ☒ cobble (5) ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ organics = 45

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 8' Ordinary high water width 8' Distance from inlet 10'

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: MP-W104 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Town:** MILLSFIELD NH **Project:** NPASS

Wetland: Open / Closed Notes: **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: MP-S106 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: _____ GPS Unit/Tech Initials: GW / SH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PFO1/4 E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		✓
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		
Nutrient Removal			
Sed/Shore Stabilization	✓		
Production Export			
Wildlife Habitat	✓		
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

Dominant Plants:

Tree: A. BALSAMEA, RMAP, Y BIRCH

Sapling/Shrub: RMAP, A. BALSAMEA

Herb/Seedling: DRYOPTERIS SPINULOSA

Woody Vine:

Invasives:

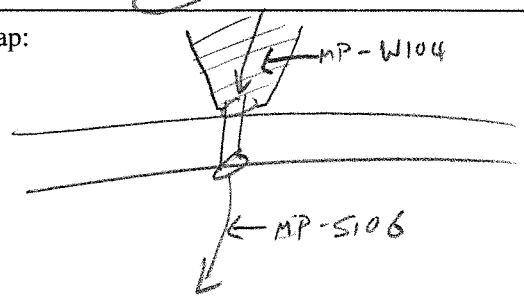
Soils:

Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other

Restrictive Layer? Y N if Yes, Depth (inches)

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S105 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W102 MP-W103

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 6 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-4

Stream ID: MP-S106 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W104

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 6-8 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-5

Stream ID: MP-S107 **Date:** 11/14/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W105

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 0-.5 **Width (ft)** 1-4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-6

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-6

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-6

Date of field assessment: 11-14-16

Millsfield Pond Rd.
Millsfield, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 28'-length **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks): Clover wheat

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Grasses - upstream - open
Balsam fir
Spruce
Yellow Birch
White Birch
Red Maple
Quaking aspen - DS
Ferns - ds mostly mostly

Slope at crossing: _____ (Rise in Elev.) _____ _____ (Length of Crossing)

Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: 1'8"

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 7") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

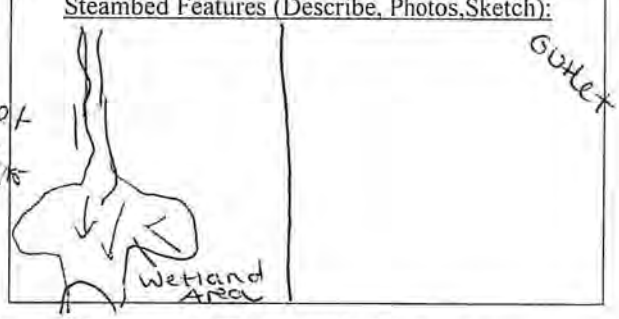
Plunge pool = 4"
water depth in culvert = 0.5"

Dominant Channel Material (visual assessment): ☒ sand (25) ☐ silt ☒ gravel (25) ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

Organics ☒ 50

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: .5" (example):
5" - stream channel

Distance between top and bottom of culvert/bed material: 1'8"

Dominant Channel Material (visual assessment): ☐ sand ☐ silt ☐ gravel ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites)

☒ - Organics - 100%
Low flow/moss

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 1' Ordinary high water width 1' Distance from inlet 10'

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Northern Pass Project

Wetlands Functions & Values Data Sheet

Wetland ID: MP-W105 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 6 **Town:** MILLSFIELD **Project:** NPAES

Wetland: Open / Closed Notes: ROADSIDE DITCH/SWALES **2 Photos:** #'s: ✓

Open Water Component?: Y / N

Wetland Associated w/ Stream?: Y / N If Yes, ID: MP-S107 Type: P / I / E

Vernal Pool Identified?: Y / N If Yes, ID: _____ GPS Unit/Tech Initials: GW / SH Complete: Y / N

Cowardin Classes (Dominant(%)/others (%)): PEM1E

Water Regime

A- Temp. flooded
B- Saturated
C- Seasonally flooded
E- Seasonally flooded/ saturated
F- Semipermanently flooded
G- Intermittently exposed
H- Permanently flooded
J- Intermittently flooded
K- Artificially flooded

Special Modifiers

b- Beaver
d- Partially drained/ditched
f-farmed
h-diked/impounded
r- artificial
x- excavated
s- spoil

Functions and Values:

F/V:	Suitable Y	Suitable N	Principal (Check)
Groundwater Rech/Disch.	✓		
Floodflow Alteration	✓		✓
Fish/Shellfish Habitat			
Sed/Tox Retention	✓		✓
Nutrient Removal			
Sed/Shore Stabilization			
Production Export			
Wildlife Habitat			
Recreation			
Educate/Science Value			
Uniqueness/Heritage			
Visual Qual/Aesthetic			
End/Threatened Species			
Other:			

Notes:

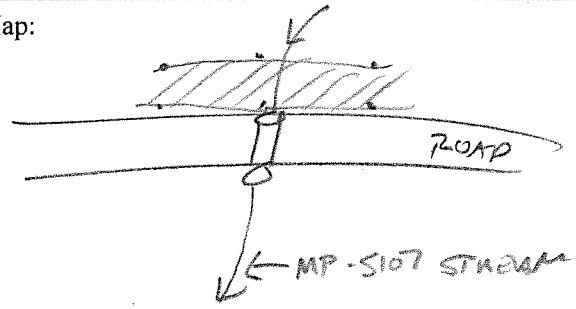
Dominant Plants:
Tree: Ø
Sapling/Shrub: Ø
Herb/Seedling: UNID GRASS, MEADOW SWEET, SPHAGNUM SPP., SOLIDAGO SPP.
Woody Vine:
Invasives:

Soils:
Texture: Organic Loamy Sandy Silty Clayey

If mineral - Parent Material: Till Alluvium Other _____

Restrictive Layer? Y N if Yes, Depth (inches) _____

Sketch Map:



☐ Enrich./Calc. Seepage Swamp ☐ Floodplains/FP Forest ☐ Peatland (bogs & fens) ☐ Freshwater Marsh ☐ Unique Basin Swamp/Marsh, which often include: ☐ Black Ash ☐ Silver Maple ☐ Vegetated Shallow

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Stream Data Sheet

Stream ID: MP-S105 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W102 MP-W103

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): .5 **Width (ft)** 6 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-4

Stream ID: MP-S106 **Date:** 11-14-2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W104

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 6-8 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-5

Stream ID: MP-S107 **Date:** 11/14/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:**

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y/N If Yes, ID: MP-W105

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 0-.5 **Width (ft)** 1-4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y/N

Associated with Culvert MP-6

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-7

Steam Culvert Data

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-7

Date of field assessment: 11-14-16

Millsfield Pond Rd.
Millsfield, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 28 feet - Length **Watershed size** _____

☐ CMP ☒ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____
Concrete

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Yellow Birch
Spruce
Balsam Fir
Ferns
Grasses - US

Slope at crossing: _____ (Rise in Elev.) _____ x _____ (Length of Crossing)

Outlet Data: ☐ GPS

Depth of water at invert if not perched: — (example):

Distance between top and bottom of culvert/bed material: ~~3' or 2'~~ 6"

Plunge pool = 8"
Water in culvert
=> water is flowing
2" under culvert

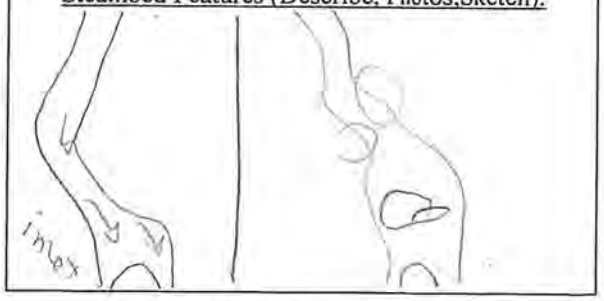
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 2") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand (30) ☐ silt (30) ☒ gravel (20) ☒ cobble (5) ☒ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) ☒ organics 15%

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☐ GPS

Depth of water at inlet: 0.5" (example): 36"
2" channel

Distance between top and bottom of culvert/bed material: ~~3' or 2'~~ 20

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☐ gravel ☒ cobble (35%) ☒ boulder (30%) ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) ☒ organics = 15%

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 5' Ordinary high water width 5' Distance from inlet 10"

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S108 **Date:** 11/14/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2-4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-7

Stream ID: MP-S109 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 8-10 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-8

Stream ID: MP-S110 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 7 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-8a

NORTHERN PASS

OFF RIGHT-OF-WAY STREAM CROSSING

MP-8

Steam Culvert Data

9:54AM

STREAM CROSSING ASSESSMENT WORKSHEET

Project: NPT Culverts **Location of Crossing:** MP-8

Date of field assessment: 11-15-16

Millsfield Pond Rd., Millsfield, NH

Stream Parameters at Crossing

Existing Crossing (type and size): 30' Length - over road **Watershed size** _____

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

GPS Wetland Delineation: ☒ GPS: Roadway ☒

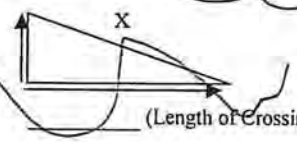
Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): *absent, low density, moderate density, high density*

Type of dominant vegetation (circle): *graminoid, herbaceous, shrub/sapling, tree*

Dominant Species:
Yellow Birch
Red Maple
Balsam Fir
ferns
grasses
goldenrod
> near rd.

Slope at crossing: _____ (Rise in Elev.) _____ (Length of Crossing)



Outlet Data: ☒ GPS

Depth of water at invert if not perched: — (example):

Plunge pool = 1'6"
water depth in culvert = 1"

Distance between top and bottom of culvert/bed material: 36" - actually 40"

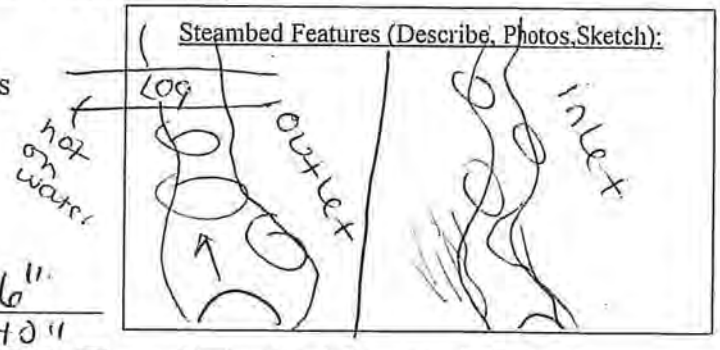
Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 4") (example):

Tailwater Controls present at crossing? ☐ YES ☒ NO
Pool Configuration: width — length: — Max pool depth at outlet: —
Location (distance from outlet): — Materials: —

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock (30 40 10)
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 30

☒ Photo of Outlet Structure and Downstream Conditions

Steambed Features (Describe, Photos, Sketch):



Inlet Data: ☒ GPS

Depth of water at inlet: 2" (example):

near culvert - Stream Channel = 8"

Distance between top and bottom of culvert/bed material: 36" actually 40"

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☐ cobble ☐ boulder ☐ bedrock
Pebble Count: ☐ YES ☒ NO (Tier 3 sites) 90 10

☒ Photo of Inlet Structure and Upstream Condition

☐ Cross Section Information ☐ GPS

Top of bank width 8' Ordinary high water width 8' Distance from inlet 10'

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Northern Pass Project

Stream Data Sheet

Stream ID: MP-S108 **Date:** 11/14/2016 **Initials:** SH/LF

Number of Flags: 4 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1.5 **Width (ft)** 2-4 **Ave. Depth (in):** 0-4 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-7

Stream ID: MP-S109 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 8 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 8-10 **Ave. Depth (in):** 0-6 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-8

Stream ID: MP-S110 **Date:** 11/15/2016 **Initials:** SH/LF

Number of Flags: 6 **Cowardin Class(es):** R

Two Photos: Yes / No **GPS/Tech:** SH **Flagging Type:** Center / Top of Bank

Flow Regime: Perennial / Intermittent / Ephemeral **Flow Change Flag #:** _____

Flow Observations: Dry / Low / Mod / High / Flood **Ass.Wetland:** Y / N If Yes, ID: _____

Predominant Bed Composition: Bedrk / Bldr / Cobl / Gravl / Sand / Slt/Clay / Organic

Ave. Bank Ht. (ft): 1 **Width (ft)** 7 **Ave. Depth (in):** 0-3 **Riffle/Pool Complex?** Y / N

Associated with Culvert MP-8a