STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION

DATE: April 17, 2024

FROM: Joshua Brown
Wetlands Program Specialist

AT (OFFICE): Department of Transportation
Bureau of Environment

SUBJECT: Dredge & Fill Application
Londonderry, 41715

TO: Karl Benedict, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT Bureau of Highway Design for the subject major impact project The proposed NHDOT 41715 project involves construction of a single lane roundabout at the intersection of NH 28 and Stonehenge Road in Londonderry, NH. The project purpose is to increase traveler safety, improve traffic operations and provide intersection control. The project also consists of roadway approach work, utility relocations, drainage work and replacement of two stream crossings.

This project was reviewed at the Natural Resource Agency Coordination Meeting on December 20, 2023. A copy of the minutes has been included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link: https://www.dot.nh.gov/projects-plans-and-programs/programs/environmental-management-system/project-management-section-0.

NHDOT anticipates and request that this project be reviewed and permitted by the Army Corp of Engineers through the State Programmatic General Permit process. A copy of the application has been sent to the Army Corp of Engineers.

Mitigation was determined to be required for permanent impacts to a floodplain wetland adjacent to a Tier 3, which is a priority resource area.

The lead people to contact for this project are Jason Ayotte, Bureau of Highway Design (271- 2230or jason.m.ayotte@dot.nh.gov) or Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment (271-3226 or Andrew.O'Sullivan@dot.nh.gov).

A payment voucher has been processed for this application (Voucher #753345) in the amount of $2,120.80.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment.

JRB;
cc:
BOE Original
Town of Londonderry (4 copies via certified mail)
Marika Labash, NH Division of Historic Resources (Cultural Review Within)
Mike Dionne & Kevin Newton, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Jeanie Brochi, US Environmental Protection Agency (via electronic notification)
Michael Hicks & Rick Kristoff, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

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STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION

Water Division / Land Resources Management

Check the Status of your Application

RSA/Rule: RSA 482-A/Env-Wt 100-900

APPLICANT'S NAME: NH Dept. of Transportation **TOWN NAME:** Londonderry

Administrative Use Only	Administrative Use Only	Administrative Use Only	File No.:
			Check No.:
			Amount:
			Initials:

A person may request a waiver of the requirements in Rules Env-Wt 100-900 to accommodate situations where strict adherence to the requirements would not be in the best interest of the public or the environment but is still in compliance with RSA 482-A. A person may also request a waiver of the standards for existing dwellings over water pursuant to RSA 482-A:26, III(b). For more information, please consult the Waiver Request Form.

SECTION 1 - REQUIRED PLANNING FOR ALL PROJECTS (Env-Wt 306.05; RSA 482-A:3, I(d)(2))

Please use the Wetland Permit Planning Tool (WPPT), the Natural Heritage Bureau (NHB) DataCheck Tool, the Aquatic Restoration Mapper, or other sources to assist in identifying key features such as: Priority Resource Areas (PRAs), protected species or habitats, coastal areas, designated rivers, or designated prime wetlands.

Has the required planning been completed?	(●) Yes ( ) No
Does the property contain a PRA? If yes, provide the following information:	(●) Yes ( ) No
• Does the project qualify for an Impact Classification Adjustment (e.g. NH Fish and Game Department (NHFG) and NHB agreement for a classification downgrade) or a Project-Type Exception (e.g. Maintenance or Statutory Permit-by-Notification (SPN) project)? See Env-Wt 407.02 and Env-Wt 407.04.	( ) Yes (●) No
• Protected species or habitat? o If yes, species or habitat name(s): Northern Long-eared Bat, Monarch Butterfly, Tricolored Bat, Blandings, Eastern Box and Spotted Turtles, Northern Black Racer, Jefferson/Blue-Spotted Salamander o NHB Project ID #: NHB23-1685	(●) Yes ( ) No
• Bog?	( ) Yes (●) No
• Floodplain wetland contiguous to a tier 3 or higher watercourse?	(●) Yes ( ) No
• Designated prime wetland or duly-established 100-foot buffer?	( ) Yes (●) No
• Sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone?	( ) Yes (●) No
Is the property within a Designated River corridor? If yes, provide the following information: • Name of Local River Management Advisory Committee (LAC): • A copy of the application was sent to the LAC on Month: Day: Year:	( ) Yes (●) No

For dredging projects, is the subject property contaminated? • If yes, list contaminant:	○ Yes ● No
Is there potential to impact impaired waters, class A waters, or outstanding resource waters?	○ Yes ● No
For stream crossing projects, provide watershed size (see WPPT or Stream Stats):	Beaver Brook - 461 Acres

SECTION 2 - PROJECT DESCRIPTION (Env-Wt 311.04(i))

Provide a description of the project and the purpose of the project, the need for the proposed impacts to jurisdictional areas, an outline of the scope of work to be performed, and whether impacts are temporary or permanent.

The proposed NHDOT 41715 project involves construction of a single lane roundabout at the intersection of NH 28 and Stonehenge Road in Londonderry, NH. The project purpose is to increase traveler safety, improve traffic operations and provide intersection control. In addition to the roundabout, the project consists of 1,930 LF of full-depth roadway approach work, and utility relocations. The project includes stormwater and drainage improvements that will meet MS4 and AOT requirements to the extend practicable. The 30" culvert carrying Beaver Brook under NH 28 south of the intersection will be replaced. The 24" culvert carrying an unnamed stream north of the intersection will be replaced. The project is scheduled to advertise in November 2024. The project will require 3,616 SF of permanent impacts and 1,686 SF of temporary impacts to palustrine wetlands and stream channel associated with the roadway reconstruction and required grading.

SECTION 3 - PROJECT LOCATION

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS:	NH Route 28 Right-of-Way (ROW)
TOWN/CITY:	Londonderry
TAX MAP/BLOCK/LOT/UNIT:	ROW
US GEOLOGICAL SURVEY (USGS) TOPO MAP WATERBODY NAME: ☐ N/A	Beaver Brook
(Optional) LATITUDE/LONGITUDE in decimal degrees (to five decimal places):	42.90292, -71.36096

SECTION 4 - APPLICANT (DESIRED PERMIT HOLDER) INFORMATION (Env-Wt 311.04(a))

If the applicant is a trust or a company, then complete with the trust or company information.

NAME: New Hampshire Department of Transportation - Attn: Jason Ayotte		
MAILING ADDRESS: 7 Hazen Drive		
TOWN/CITY: Concord	STATE: NH	ZIP CODE: 03302
EMAIL ADDRESS: Jason.M.Ayotte@dot.nh.gov		
FAX: (603) 271-7025	PHONE: (603) 271-3921	

ELECTRONIC COMMUNICATION: By initialing here, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 5 - AUTHORIZED AGENT INFORMATION (Env-Wt 311.04(c))

☐ N/A

LAST NAME, FIRST NAME, M.I.: Higgins, Kyle L		
COMPANY NAME: GPI		
MAILING ADDRESS: 116 South River Rd. Suite B1		
TOWN/CITY: Bedford	STATE: NH	ZIP CODE: 03261
EMAIL ADDRESS: khiggins@gpinet.com		
FAX:	PHONE: 603-766-5230	

ELECTRONIC COMMUNICATION: By initialing here, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 6 - PROPERTY OWNER INFORMATION (IF DIFFERENT THAN APPLICANT) (Env-Wt 311.04(b))

If the owner is a trust or a company, then complete with the trust or company information.

☒ Same as applicant

NAME:		
MAILING ADDRESS:		
TOWN/CITY:	STATE:	ZIP CODE:
EMAIL ADDRESS:		
FAX:	PHONE:	

ELECTRONIC COMMUNICATION: By initialing here, I hereby authorize NHDES to communicate all matters relative to this application electronically.

SECTION 7 - RESOURCE-SPECIFIC CRITERIA ESTABLISHED IN Env-Wt 400, Env-Wt 500, Env-Wt 600, Env-Wt 700, OR Env-Wt 900 HAVE BEEN MET (Env-Wt 313.01(a)(3))

Describe how the resource-specific criteria have been met for each chapter listed above (please attach information about stream crossings, coastal resources, prime wetlands, or non-tidal wetlands and surface waters):

Env-Wt 400: Wetland boundaries and the ordinary high water and top of bank of water courses located within the
project corridor were delineated in 2022. Wetlands and surface waters have been classified using the USFWS (Cowardin et al.) Wetland Classification System. The palustrine wetland to the east of the project is located within the 100-year floodplain. Based on the proposed permanent wetland and stream impacts, the proposed project is classified as a major impact project.

Env-Wt 500: The proposed project falls under Env-Wt 527 Public Highways. The proposed project has been designed in accordance with the criteria specified in Env-Wt 527.04 and is consistent with RSA 482-A:1, 483, 483-B, 485-A, and 212-A. The purpose of the proposed project is to provide improved mobility, congestion relief, and improved safety along the project corridor. The proposed project is not anticipated to substantially impact the flood storage function of wetlands. Impacts have been minimized and avoided to the maximum extent practicable.

Env-Wt 600: N/A - No coastal or tidal wetlands present.

Env-Wt 700: N/A - No designated Prime Wetlands present.

Env-Wt 900: Env-Wt 904.10 The project includes replacement of two Tier 3 stream crossings. The culvert replacements meet the criteria of Env-Wt 904.10 and the general conditions of Env-Wt 904.01.

SECTION 8 - AVOIDANCE AND MINIMIZATION

Impacts within wetland jurisdiction must be avoided to the maximum extent practicable (Env-Wt 313.03(a)).* Any project with unavoidable jurisdictional impacts must then be minimized as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization and the Wetlands Permitting: Avoidance, Minimization and Mitigation fact sheet. For minor or major projects, a functional assessment of all wetlands on the project site is required (Env-Wt 311.03(b)(10)).*

Please refer to the application checklist to ensure you have attached all documents related to avoidance and minimization, as well as functional assessment (where applicable). Use the Avoidance and Minimization Checklist, the Avoidance and Minimization Narrative, or your own avoidance and minimization narrative.

**See Env-Wt 311.03(b)(6) and Env-Wt 311.03(b)(10) for shoreline structure exemptions.*

SECTION 9 - MITIGATION REQUIREMENT (Env-Wt 311.02)

If unavoidable jurisdictional impacts require mitigation, a mitigation pre-application meeting must occur at least 30 days but not more than 90 days prior to submitting this Standard Dredge and Fill Permit Application.

Mitigation Pre-Application Meeting Date: Month: Day: Year: DECEMBER 20, 2023

(☐ N/A - Mitigation is not required)

SECTION 10 - THE PROJECT MEETS COMPENSATORY MITIGATION REQUIREMENTS (Env-Wt 313.01(a)(1)c)

Confirm that you have submitted a compensatory mitigation proposal that meets the requirements of Env-Wt 800 for all permanent unavoidable impacts that will remain after avoidance and minimization techniques have been exercised to the maximum extent practicable: ☒ I confirm submittal.

(☐ N/A – Compensatory mitigation is not required)

SECTION 11 - IMPACT AREA (Env-Wt 311.04(g))

For each jurisdictional area that will be/has been impacted, provide square feet (SF) and, if applicable, linear feet (LF) of impact, and note whether the impact is after-the-fact (ATF; i.e., work was started or completed without a permit).

For intermittent and ephemeral streams, the linear footage of impact is measured along the thread of the channel. *Please note, installation of a stream crossing in an ephemeral stream may be undertaken without a permit per Rule Env-Wt 309.02(d), however other dredge or fill impacts should be included below.*

For perennial streams/rivers, the linear footage of impact is calculated by summing the lengths of disturbances to the channel and banks.

Permanent (PERM.) impacts are impacts that will remain after the project is complete (e.g., changes in grade or surface materials).

Temporary (TEMP.) impacts are impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

	JURISDICTIONAL AREA	PERM. SF	PERM. LF	PERM. ATF	TEMP. SF	TEMP. LF	TEMP. ATF
Wetlands	Forested Wetland	266		☐	275		☐
	Scrub-shrub Wetland	3035		☐	1015		☐
	Emergent Wetland			☐			☐
	Wet Meadow			☐			☐
	Vernal Pool			☐			☐
	Designated Prime Wetland			☐			☐
	Duly-established 100-foot Prime Wetland Buffer			☐			☐
Surface	Intermittent / Ephemeral Stream			☐			☐
	Perennial Stream or River	315	160	☐	396	47	☐
	Lake / Pond			☐			☐
	Docking - Lake / Pond			☐			☐
	Docking - River			☐			☐
Banks	Bank - Intermittent Stream			☐			☐
	Bank - Perennial Stream / River			☐			☐
	Bank / Shoreline - Lake / Pond			☐			☐
Tidal	Tidal Waters			☐			☐
	Tidal Marsh			☐			☐
	Sand Dune			☐			☐
	Undeveloped Tidal Buffer Zone (TBZ)			☐			☐
	Previously-developed TBZ			☐			☐
	Docking - Tidal Water			☐			☐
	TOTAL	3616	160		1686	47	

SECTION 12 - APPLICATION FEE (RSA 482-A:3, I)

☐ **MINIMUM IMPACT FEE**: Flat fee of $400.

☐ **NON-ENFORCEMENT RELATED, PUBLICLY-FUNDED AND SUPERVISED RESTORATION PROJECTS, REGARDLESS OF IMPACT CLASSIFICATION:** Flat fee of $400 (refer to RSA 482-A:3, 1(c) for restrictions).

☒ **MINOR OR MAJOR IMPACT FEE:** Calculate using the table below:

Permanent and temporary (non-docking): 5,302	SF	× $0.40 =	$ 2,120.80
Seasonal docking structure:	SF	× $2.00 =	$
Permanent docking structure:	SF	× $4.00 =	$
Projects proposing shoreline structures (including docks) add $400 =			$
Total =			$
The application fee for minor or major impact is the above calculated total or $400, whichever is greater =			*$* 2,120.80

SECTION 13 - PROJECT CLASSIFICATION (Env-Wt 306.05) Indicate the project classification.		
☐ Minimum Impact Project	☐ Minor Project	■ Major Project

SECTION 14 - REQUIRED CERTIFICATIONS (Env-Wt 311.11)	
Initial each box below to certify:	
Initials: KH	To the best of the signer's knowledge and belief, all required notifications have been provided.
Initials: KH	The information submitted on or with the application is true, complete, and not misleading to the best of the signer's knowledge and belief.
Initials: KH	The signer understands that: • The submission of false, incomplete, or misleading information constitutes grounds for NHDES to: 1. Deny the application. 2. Revoke any approval that is granted based on the information. 3. If the signer is a certified wetland scientist, licensed surveyor, or professional engineer licensed to practice in New Hampshire, refer the matter to the joint board of licensure and certification established by RSA 310-A:1.
Initials:	If the applicant is not the owner of the property, each property owner signature shall constitute certification by the signer that he or she is aware of the application being filed and does not object to the filing.

SECTION 15 - REQUIRED SIGNATURES (Env-Wt 311.04(d); Env-Wt 311.11)		
SIGNATURE (OWNER):	PRINT NAME LEGIBLY: Jason Ayotte	DATE: 4/12/2024
SIGNATURE (APPLICANT, IF DIFFERENT FROM OWNER):	PRINT NAME LEGIBLY:	DATE:
SIGNATURE (AGENT, IF APPLICAB	RINT NAME LEGIBLY: Kyle Higgins	DATE: 3/19/2024

SECTION 16 - TOWN / CITY CL Vt 311.04(f))	
As required by RSA 482-A:3, I(a)(1), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.	
TOWN/CITY CLERK SIGNATURE:	PRINT NAME LEGIBLY:
TOWN/CITY:	DATE:

DIRECTIONS FOR TOWN/CITY CLERK:
Per RSA 482-A:3, I(a)(1)

1. IMMEDIATELY sign the original application form and four copies in the signature space provided above.
2. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
3. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board.
4. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:
Submit the original permit application form bearing the signature of the Town/City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery at the address at the bottom of this page. Make check or money order payable to “Treasurer – State of NH”.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map OnDemand Topo

7.5-MINUTE TOPO QUADRANGLE
Custom Extent
7.5-MINUTE TOPO

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 19T

Data is provided by The National Map (TNM), is the best available at the time of map generation, and includes data content from supporting themes of Elevation, Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover, and Orthoimagery. Refer to associated Federal Geographic Data Committee (FGDC) Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands. Temporal changes may have occurred since these data were collected and some data may no longer represent actual surface conditions.

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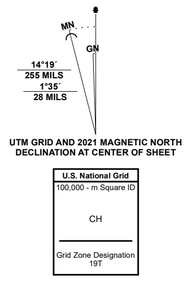

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
CONTOUR SMOOTHNESS = Medium

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

7.5-MINUTE TOPO, NH
2024

STANDARD DREDGE AND FILL WETLANDS PERMIT APPLICATION ATTACHMENT A: MINOR AND MAJOR PROJECTS

Water Division/Land Resources Management

Wetlands Bureau

Check the Status of your Application

RSA/ Rule: RSA 482-A/ Env-Wt 311.10; Env-Wt 313.01(a)(1); Env-Wt 313.03

APPLICANT'S NAME: **NH DEPARTMENT OF TRANSPORTATION** **TOWN NAME:** Londonderry

Attachment A is required for *all minor and major projects*, and must be completed *in addition* to the Avoidance and Minimization Narrative or Checklist that is required by Env-Wt 307.11.

For projects involving construction or modification of non-tidal shoreline structures over areas of surface waters having an absence of wetland vegetation, only Sections I.X through I.XV are required to be completed.

PART I: AVOIDANCE AND MINIMIZATION

In accordance with Env-Wt 313.03(a), the Department shall not approve any alteration of any jurisdictional area unless the applicant demonstrates that the potential impacts to jurisdictional areas have been avoided to the maximum extent practicable and that any unavoidable impacts have been minimized, as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization.

SECTION I.I - ALTERNATIVES (Env-Wt 313.03(b)(1))

Describe how there is no practicable alternative that would have a less adverse impact on the area and environments under the Department's jurisdiction.

THE PROJECT PURPOSE IS TO INCREASE TRAVELER SAFETY, IMPROVE TRAFFIC OPERATIONS AND PROVIDE INTERSECTION CONTROL. DUE TO THE LOCATION OF THE EXISTING ROADWAY AND ASSOCIATED INFRASTRUCTURE, THERE ARE LIMITED ALTERNATIVES FOR THE PROPOSED INTERSECTION IMPROVEMENTS. IMPACTS TO JURISDITCTIONAL RESOURCE AREAS INCLUDING WETLANDS, STREAMS AND BANKS HAVE BEEN AVOIDED AND MINIMUZED TO THE MAXIMUM EXTENT PRACTICABLE THROUGH STEEPENING ROADWAY SIDE SLOPES.

DESIGNS HAVE BEEN OPTIMIZED TO MINIMIZE IMPACTS. THE EARLY PROPOSED STORMWATER SWALE DESIGN INCLUDED APPROXIMATELY 5,500 SF OF PERMANENT WETLAND IMPACTS TO FLOODPLAIN WETLANDS. AFTER CONSIDERING ADDITIONAL ALTERNATIVES, THE ROADWAY ALIGNMENT WAS ADJUSTED AND THE STORMWATER TREATMENT SWALE WAS RECONFIGURED, AND MOVED CLOSER TO THE ROADWAY. THE PROPOSED DESIGN AVOIDS IMPACTS TO FLOODPLAIN WETLANDS TO THE GREATEST EXTENT PRACTICABLE RESULTING IN A REDUCTION OF APPROXIMATELY 4,000 SF OF IMPACTS FROM EARLIER ALTERNATIVES.

SECTION I.II - MARSHES (Env-Wt 313.03(b)(2))

Describe how the project avoids and minimizes impacts to tidal marshes and non-tidal marshes where documented to provide sources of nutrients for finfish, crustacean, shellfish, and wildlife of significant value.

There are no tidal marshes located within the project.

One non-tidal marsh will be impacted by the proposed project. NHDOT has refined the project acrea and chosen the least impactful alternative to minize impacts to this resource to the extent practicable. During construction, proper erosion control and best management practices will be emplyed to avoid and minimize impacts.

SECTION I.III - HYDROLOGIC CONNECTION (Env-Wt 313.03(b)(3))

Describe how the project maintains hydrologic connections between adjacent wetland or stream systems.

Hydrologic connections between adjacent wetland or stream systems will be maintained throughout the project duration. This project includes two stream crosign replacements.

Crossing one is south of the proposed roundabout and is currently a 30" RCP and a tier 2 by watershed size. This was upgraded to tier 3 due to the presence of the floodplain wetlands on the outlet (east) side. The proposed design is to install a 60" RCP, which will increase hydraulic capacity and improve hydrologic connection.

Crossing two is north of the proposed roundabout. It is currently a 24" RCP and is a tier 1 stream by watershed size. The crossing was also upgraded to a tier 3 due to the presence of a floodplain wetland on the outlet side. The crossing is currently perched and there is a stormwater catch basin connected to the system. The proposed crossing is a single 30" RCP that will increase the connection and correct the perched condition.

SECTION I.IV - JURISDICTIONAL IMPACTS (Env-Wt 313.03(b)(4))

Describe how the project avoids and minimizes impacts to wetlands and other areas of jurisdiction under RSA 482-A, especially those in which there are exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and habitat and reproduction areas for species of concern, or any combination thereof.

Wetland impacts have been avoided and minimized to the maximum extent practicable. The proposed project is not anticipated to impact any exemplary natural communities, vernal pools, protected species and habitat, documented fisheries, and/or habitat and reproduction areas for species of special concern. Coordination with the NH Natural Heritage Bureau, NH Fish and Game, and the US Fish and Wildlife Service has occurred. Measures will be implemented to avoid or minimize impacts to species of concern.

These measures are described in the Supplemental Narrative. A vernal pool survey was completed in the Spring of 2022 and no vernal pools were identified in the vicinity of this project segment. Appropriate sediment and erosion controls will be implemented throughout construction to avoid detrimental water quality impacts. Avoidance and minimization measures include refining and steepening roadway slopes to specifically avoid and minimize wetland and stream impacts. Stormwater treatment BMPs have also been incorporated into the design in order to treat runoff from additional pavement surfaces, thereby ensuring water quality of surface waters in the vicinity is maintained.

The project was reviewed in accordance with the FHWA, FRA, FTA Range-wide Bat Programmatic Consultation with USFWS for the Northern Long Eared Bat and the project has been included in the USFWS Incidental Take Statement https://www.fws.gov/sites/default/files/documents/Final%20Amendment%20to%202018%20FHWA%20Bat%20PBO%20March%202023.pdf

All applicable Avoidance and Minimization Measures have been incorporated into the project.

SECTION I.V - PUBLIC COMMERCE, NAVIGATION, OR RECREATION (Env-Wt 313.03(b)(5))

Describe how the project avoids and minimizes impacts that eliminate, depreciate or obstruct public commerce, navigation, or recreation.

The proposed project is not anticipated to eliminate, depreciate, or obstruct public commerce, navigation, or recreation. The proposed roundabout and roadway improvements will improve traffic flow and increase safety, improving public commerce and navigation. The road will stay open to traffic throughout construction and only minor delays are anticipated.

SECTION I.VI - FLOODPLAIN WETLANDS (Env-Wt 313.03(b)(6))

Describe how the project avoids and minimizes impacts to floodplain wetlands that provide flood storage.

The project will result in permanent and temporary impacts to the fringe of the Zone AE floodplain of Upper Beaver Brook. Impacts are minimized by steepening side slopes to the maximum extent practicable, locating water quality features in optimal locations and maintaining pipe outlet locations and elevations.

SECTION I.VII - RIVERINE FORESTED WETLAND SYSTEMS AND SCRUB-SHRUB – MARSH COMPLEXES (Env-Wt 313.03(b)(7))

Describe how the project avoids and minimizes impacts to natural riverine forested wetland systems and scrub-shrub – marsh complexes of high ecological integrity.

The project will result in impacts to forested wetlands and scrub-shrub wetlands. The project has avoided or minimized impacts to these wetland systems by steepening side slopes to the extent practicable, and limiting impacts to the roadside edge of wetland systems that extend beyond the ROW. Impacts to wetlands adjacent to streams have been avoided to the extent practicable.

SECTION I.VIII - DRINKING WATER SUPPLY AND GROUNDWATER AQUIFER LEVELS (Env-Wt 313.03(b)(8))

Describe how the project avoids and minimizes impacts to wetlands that would be detrimental to adjacent drinking water supply and groundwater aquifer levels.

Best management practices for soil erosion and sediment control will be implemented throughout construction of the project. The Contractor will prepare and implement a Stormwater Pollution Prevention Plan. The project is not anticipated to have a detrimental impact on adjacent drinking water supply and groundwater aquifer levels or the wetlands that provide these functions. There will be limited wetland impacts at the edges of existing wetlands. The project will include a treatment swale for stormwater treatment that will outlet into the large wetland to the east of NH 28. The swale will treat approximately 0.92 acres of pavement

SECTION I.IX - STREAM CHANNELS (Env-Wt 313.03(b)(9))

Describe how the project avoids and minimizes adverse impacts to stream channels and the ability of such channels to handle runoff of waters.

There are two stream crossings within the project limits. Both of the crossings are elevated to 'Tier 3' classification due to being located in the vicinity of the 100-year flood plain. A summary of geomorphic characteristics of the two stream crossings are included elsewhere in this application.

Stream 1 (Beaver Brook) crosses under NH 28 about 400' south of Stonehenge Road through a 30" RCP. This will be replaced with a 60" RCP. The proposed pipe will be approximately 150' in length. The slope of the pipe and stream channel is less than 1%. A backwater condition exists up to the outlet of the existing 30" culvert, but does not extend through the pipe.

Stream 2 crosses NH 28 through a 24" RCP just north of Stonehenge Rd and will be replaced with a 30" RCP. The exisitng pipe has a stormwater catch basin mid-way through the culvert. The existing outlet is perched. Removing these conditions and replacing with a single, upsized culvert will provide an overall benefit to the stream system and aquatic organism passage.

Both proposed culvert replacements meet the criteria of Env-Wt 904.10, Alternative Designs. A cost analysis, and hydraulic report have been appended to this application, in support of the alternative design.

SECTION I.X - SHORELINE STRUCTURES - CONSTRUCTION SURFACE AREA (Env-Wt 313.03(c)(1))

Describe how the project has been designed to use the minimum construction surface area over surface waters necessary to meet the stated purpose of the structures.

N/A - The proposed project does not involve any shoreline structures.

SECTION I.XI - SHORELINE STRUCTURES - LEAST INTRUSIVE UPON PUBLIC TRUST (Env-Wt 313.03(c)(2))

Describe how the type of construction proposed is the least intrusive upon the public trust that will ensure safe docking on the frontage.

N/A - The proposed project does not involve any shoreline structures.

SECTION I.XII - SHORELINE STRUCTURES – ABUTTING PROPERTIES (Env-Wt 313.03(c)(3))

Describe how the structures have been designed to avoid and minimize impacts on ability of abutting owners to use and enjoy their properties.

N/A - The proposed project does not involve any shoreline structures.

SECTION I.XIII - SHORELINE STRUCTURES – COMMERCE AND RECREATION (Env-Wt 313.03(c)(4))

Describe how the structures have been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.

N/A - The proposed project does not involve any shoreline structures.

SECTION I.XIV - SHORELINE STRUCTURES – WATER QUALITY, AQUATIC VEGETATION, WILDLIFE AND FINFISH HABITAT (Env-Wt 313.03(c)(5))

Describe how the structures have been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.

N/A - The proposed project does not involve any shoreline structures.

SECTION I.XV - SHORELINE STRUCTURES – VEGETATION REMOVAL, ACCESS POINTS, AND SHORELINE STABILITY (Env-Wt 313.03(c)(6))

Describe how the structures have been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.

N/A - The proposed project does not involve any shoreline structures.

PART II: FUNCTIONAL ASSESSMENT
REQUIREMENTS Ensure that project meets the requirements of Env-Wt 311.10 regarding functional assessment (Env-Wt 311.04(j); Env-Wt 311.10).
FUNCTIONAL ASSESSMENT METHOD USED: US Army Corps of Engineers New England District Highway Methodology Workbook Supplement, 1999 Edition
NAME OF CERTIFIED WETLAND SCIENTIST (FOR NON-TIDAL PROJECTS) OR QUALIFIED COASTAL PROFESSIONAL (FOR TIDAL PROJECTS) WHO COMPLETED THE ASSESSMENT: KEVIN RYAN
DATE OF ASSESSMENT: APRIL 8, 21, 22 2022
Check this box to confirm that the application includes a NARRATIVE ON FUNCTIONAL ASSESSMENT: ☒
For minor or major projects requiring a standard permit without mitigation, the applicant shall submit a wetland evaluation report that includes completed checklists and information demonstrating the RELATIVE FUNCTIONS AND VALUES OF EACH WETLAND EVALUATED. Check this box to confirm that the application includes this information, if applicable: ☒ Note: The Wetlands Functional Assessment worksheet can be used to compile the information needed to meet functional assessment requirements.

MEMORANDUM

REF: 41715 Londonderry – NH Route 28 and Stonehenge Road

DATE: September 20, 2023

TO: Jason Ayotte, P.E.
NHDOT

FROM: Kyle Higgins, P.E.
Valerie Hrabal, P.E.
GPI

RE: Hydrology & Hydraulics (H&H) Alternatives Analysis Memorandum

PROJECT DESCRIPTION

NHDOT proposes to construct a roundabout for safety and mobility improvements at the intersection of NH Route 28 and Stonehenge Road in Londonderry, NH. Two existing perennial stream crossings were identified by NHDOT within the project area. The first is a 30" RCP (Crossing #1) culvert south of the intersection conveying a tributary of Beaver Brook. The second is a system of two 24" RCPs (Crossing #2) with an interconnected structure, crossing Route 28 north of Stonehenge Road. These two stream-crossing culverts will be replaced as part of the proposed improvements in order to increase capacity, replace deficient systems, and improve aquatic organism passage.

There are two other non-stream crossings within the project area. This first is about 400' east of Crossing #1. This existing 18" RCP (Crossing #4) includes an inlet that is steeply graded from the existing edge of pavement on the southern side of NH 28, creating a roadside hazard. This crossing will be replaced as part of the proposed improvements. There is also an existing 24" RCP culvert (Crossing #3) that is proposed to be retained but will be extended at the upstream end to accommodate the proposed slope limits along the south side of NH 28.

This memo summarizes the findings of the hydrologic and hydraulic analysis conducted by our office to support the improvements described above.

EXISTING CONDITION

In existing conditions, NH 28 is uncurbed and drains to roadside swales. These swales direct the sheet flow runoff from the roadway towards the vast wetlands to the east of NH 28. There exist four crossings under NH 28 (see figure below) within the project limits – two 24" RCPs with an interconnected structure, a 30" RCP culvert, a 24" RCP culvert, and an 18" RCP connected to an upstream inlet structure, all conveying the watershed runoff to the Beaver Brook tributary and the wetlands described above. Stonehenge Road runoff eventually drains into the same wetlands via existing roadside ditches and slopes.

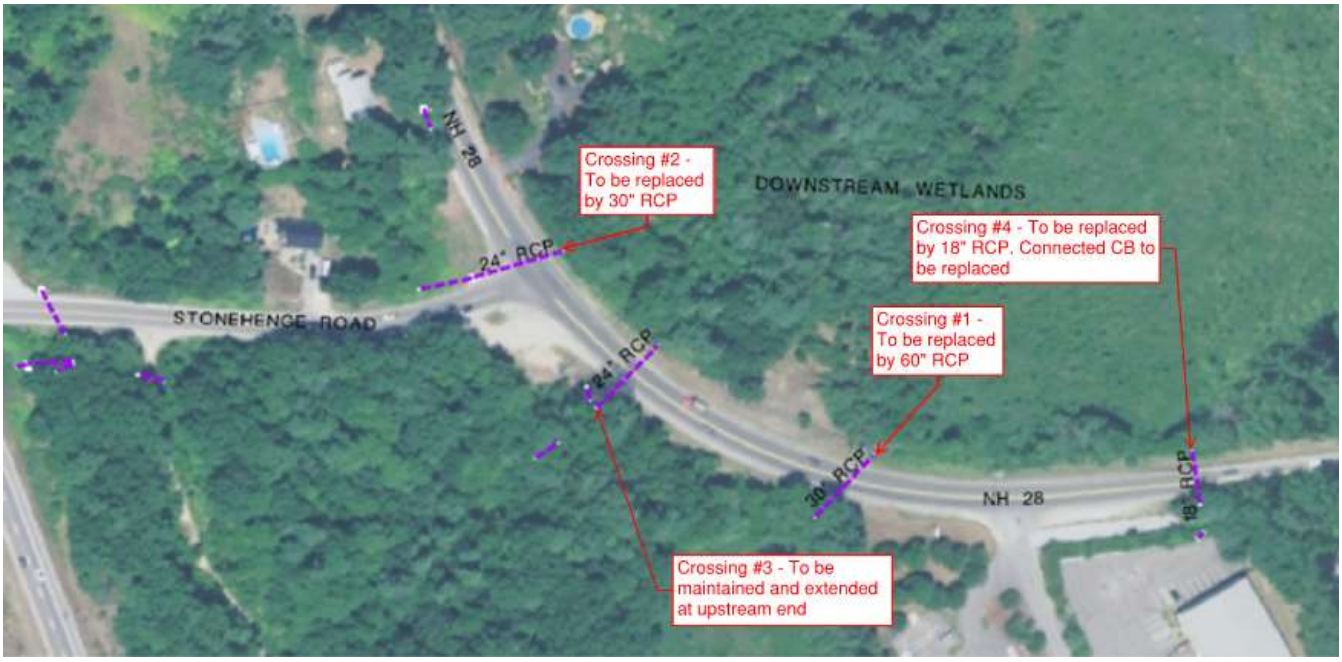

Figure 1: Pipe crossing locations

PROPOSED CONDITION

Road work on NH 28 will begin approximately 1,000 feet south of Stonehenge Road and extend north approximately 1,700 feet to the vicinity of the southern leg of Woodhenge Circle. Road work on Stonehenge Road will extend west approximately 500 feet from NH 28, ending east of the I-93 northbound overpass structure. It is anticipated that sections of the project will be curbed to capture and treat the additional impervious area to the maximum extent practicable. It is proposed to replace the northernmost 24" RCPs and interconnected structure (Crossing #2) with a single 30" RCP, while shifting it north along NH 28 and extending it to convey the stream past the proposed roundabout hence changing both upstream and downstream inverts to meet the proposed slopes. The 24" RCP (Crossing #3) immediately south of Crossing #2 will be retained but will be extended at the upstream end, while matching the existing pipe slope, to accommodate the proposed slope limits along the south side of NH 28. The 30" RCP (Crossing #1) will be replaced with a 60" RCP, while maintaining both upstream and downstream inverts, to safely convey the 100-year design storm event without overtopping NH 28. The existing 18" RCP (Crossing #4) will be replaced with a new 18" RCP to create a better outlet condition that ensures proper drainage to the easterly wetland. The existing inlet structure at this location will also be replaced with a new catch basin, to eliminate the current roadside safety hazard.

H&H ANALYSIS

Hydrology: Inflow hydrographs were generated using NRCS TR-55 methodology. NOAA PFDS were used to obtain the 24-hour rainfall depths for the design storm events. The 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storm events were analyzed.

The drainage areas at each location were broken up into different sub-watersheds using publicly available LIDAR contour data. Land use/Land Cover Curve Numbers (CN) were derived from topographic survey, high-resolution orthoimagery for the project, and USGS National Land Cover Database information. Times of concentration (Tc) for each sub-watershed were calculated using the TR-55 velocity method.

Flood Routing and Hydraulics: Flood routing for the existing conditions culvert analysis was done using HydroCAD software with the hydrologic parameters generated from above. The routing consists of a series of interconnected ponds at each of the culvert locations.

Elevation/Storage Volume relationships for the “ponds” upstream of each outlet have been estimated using Lidar mapping at 1 ft. contour intervals obtained from USGS Lidar. Contours are dated 2011, in datum State Plane NAVD88.

Existing culvert geometries and road profiles from field sketches and as-built plans were used to construct discharge rating curves for all Outlet Control Structures (OCS). Inflow hydrographs are routed through “ponds” to model storage and “reaches” representing the channels connecting each OCS where applicable.

H&H Model:
Five different Points of Analysis (POA) were utilized for comparison of the existing vs proposed conditions.

POA-1: This analysis point is where the roadside swale flows along the northern stretch of NH 28 ends and starts diverting into the wetlands.

POA-2: This is the point of comparison for the outflow from Crossing #2 (Two 24” RCPs and structure to be replaced by single 30” RCP) before it drains into the wetlands.

POA-3: This represents the discharge point for Crossing #3 (24” RCP to be maintained and extended at the upstream end.

POA-4: This is the outflow point for Crossing #1 (30” RCP to be replaced with 60” RCP).

POA-5: This analysis point compares the pre- and post-development runoff at the discharge location for Crossing #4 (18” RCP to be replaced with 18” RCP) at the southern end of the project limits.

All the above POAs eventually discharge into the wetlands east of NH 28. The wetland area was also modeled as a “pond” to compare any change in water surface elevations (WSELs) under the design storm events. The 100-year FEMA flood plain at this location is “level pool” at approximately elevation 332 feet (NGVD 1929 datum) due to the controlling culvert/bridge under the Boston & Maine Railroad embankment. According to the FEMA profile panel, the 500-year FEMA flow is conveyed without overtopping the railroad. The Tailwater (TW) elevations from FEMA Profile Panel 197P did not make any significant change in the H&H model results.

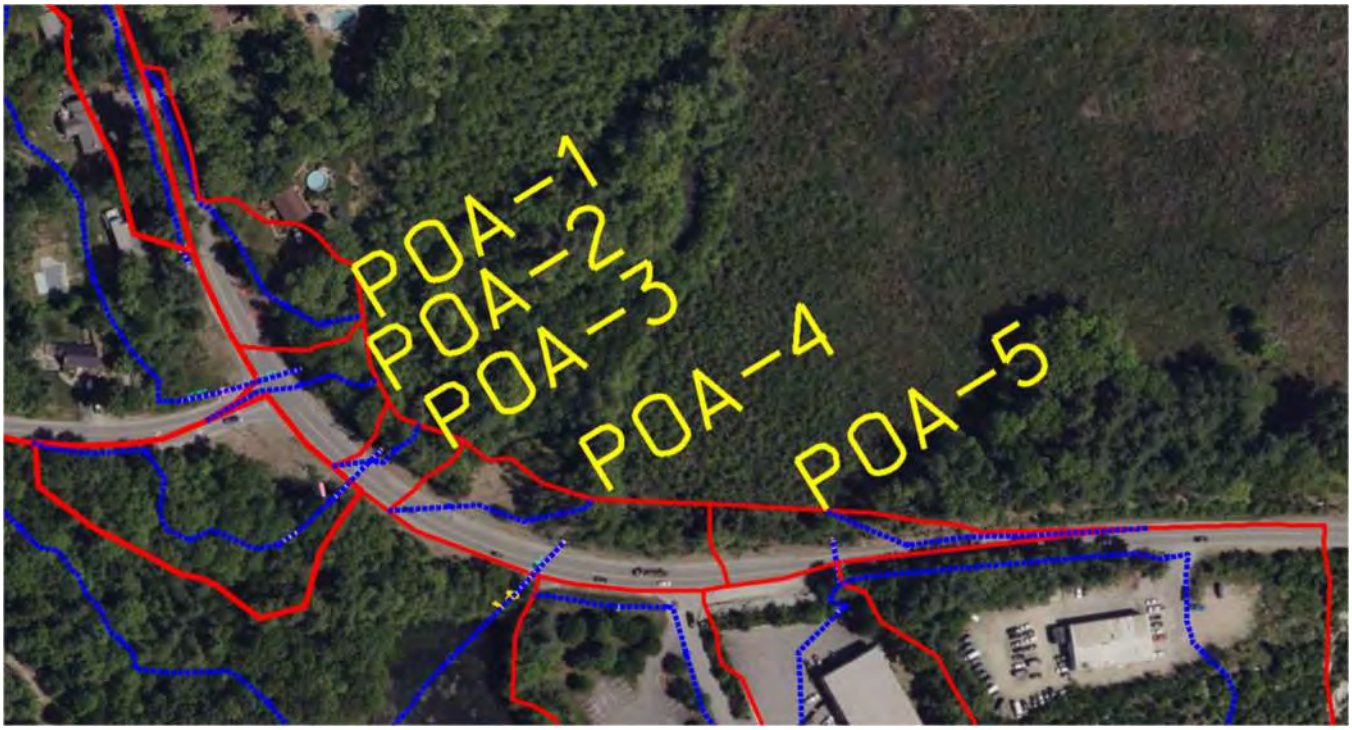

Figure 2: Points of Analysis locations

COMPLIANCE TO NHDES STREAM-CROSSING GUIDELINES

Drainage areas to Crossings 1 and 2 are less than 640 acres but both crossings may be classified as Tier 3 due to being located along the fringe of the FEMA 100-year flood plain. As outlined in NH Stream Crossing Guidelines (May 2009), the compliant replacement structures should have an openness ratio of 0.25 m or 0.8 ft. Based on these rules, Crossing #1 would require a 16.5' x 5.6' structure and Crossing #2 would require a 12.8' x 7.9' structure.

The proposed alternatives as described in the "Proposed Condition" section above meet all the general design criteria as outlined in Env-Wt 904.01 and the requirements within Env-Wt 904.07 (c) (2).

H&H DISCUSSION

Stream Crossing #1
The existing conditions model indicates that for Crossing #1, NH 28 overtopping occurs for storm events 5-years and higher. The proposed culvert size of 60" RCP safely conveys the 100-year storm without any overtopping of Rt 28. This results in a minimal increase in WSEL at the downstream wetlands (maximum increase in WSEL=0.01' for 50-year storm event). Therefore, no adverse impacts in terms of flooding downstream are anticipated due to the proposed improvements.

Other Alternatives Considered for Crossing #1: 54" RCP, 5' x 4' box culvert, elliptical pipes - 48" rise x 76" span and 43" rise x 76" span will all yield similar results as 60" RCP without adverse downstream impacts. The 54" RCP will result in reduced freeboard during 100-year design storm event, when compared to the 60" RCP option.

Stream Crossing #2
The existing conditions model indicates that for Crossing #2, NH 28 does not overtop in the 100-year storm. Replacement of the 24" RCP in kind will also convey the 100-year storm without any overtopping of Rt 28. This results in a minimal increase in WSEL at the downstream wetlands (maximum increase in WSEL=0.01'

for the 50-year storm event). Therefore, no adverse impacts in terms of flooding downstream are anticipated due to the proposed improvements.

Other Alternatives Considered for Crossing #2: 30” RCP will also yield similar results as 24” RCP, with a maximum increase in WSEL=0.01’ for the 50-year storm event and no adverse downstream impacts.

COST ANALYSIS

The following tables display the approximate costs for the stream-crossing structures explored. Costs are for the structure only and do not include associated end treatment (headwalls, riprap, streambed material), or construction staging. The options do not consider impacts to the roadway design that may result from installation.

Crossing #1 (Assumed length of 100 LF)	
Structure Type	**Approx. Cost**
60"RCP	$70,000.00
54" RCP	$55,000.00
5x4 Box	$80,000.00
43" rise, 76" span ellipse	$95,000.00
Crossing Compliant (16.5’x5.6’ Box)	$190,000.00

Crossing #2 (Assumed Length of 150 LF)	
Structure Type	**Approx. Cost**
24" RCP	$18,750
30” RCP	$24,750
Crossing Compliant (12.8'x7.9' Box)	$225,000

CONCLUSION

Due to the physical constraints of the crossing locations, the proximity to the roadway and intersection, and the cost implications to the project, GPI makes the following recommendations. Replace the 30” RCP (Crossing #1) with a 60” RCP to ensure future capacity, provide sufficient freeboard during stormwater events, and provide better reduced passage for aquatic organisms. Replace the two 24” RCPs and interconnected structure (Crossing #2) with a single 30” RCP to ensure future capacity, reduce maintenance, and eliminate the potential for future clogging. Retain and extend the 24” RCP (Crossing #3). Replace the 18” RCP and connected inlet structure (Crossing #4) with a new 18” RCP and new inlet structure to eliminate the roadside hazard and create a better outlet condition.

AVOIDANCE AND MINIMIZATION CHECKLIST

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/ Env-Wt 311.07(c)

This checklist can be used in lieu of the written narrative required by Env-Wt 311.07(a) to demonstrate compliance with requirements for Avoidance and Minimization (A/M), pursuant to RSA 482-A:1 and Env-Wt 311.07(c).

For the construction or modification of non-tidal shoreline structures over areas of surface waters without wetland vegetation, complete only Sections 1, 2, and 4 (or the applicable sections in Attachment A: Minor and Major Projects (NHDES-W-06-013).

The following definitions and abbreviations apply to this worksheet:

- "A/M BMPs" stands for Wetlands Best Management Practice Techniques for Avoidance and Minimization dated 2019, published by the New England Interstate Water Pollution Control Commission (Env-Wt 102.18).
- "Practicable" means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (Env-Wt 103.62).

SECTION 1 - CONTACT/LOCATION INFORMATION	
APPLICANT LAST NAME, FIRST NAME, M.I.: NH Department of Transportation	
PROJECT STREET ADDRESS: NH Route 28	PROJECT TOWN: Londonderry
TAX MAP/LOT NUMBER: ROW	

SECTION 2 - PRIMARY PURPOSE OF THE PROJECT		
Env-Wt 311.07(b)(1)	Indicate whether the primary purpose of the project is to construct a water-access structure or requires access through wetlands to reach a buildable lot or the buildable portion thereof.	☐ Yes ☒ No

If you answered "no" to this question, describe the purpose of the "non-access" project type you have proposed:

The purpose of the proposed intersection improvement project is to improve the NH 28 and Stonehenge Road intersection operations and safety.

SECTION 3 - A/M PROJECT DESIGN TECHNIQUES Check the appropriate boxes below in order to demonstrate that these items have been considered in the planning of the project. Use N/A (not applicable) for each technique that is not applicable to your project.		
Env-Wt 311.07(b)(2)	For any project that proposes new permanent impacts of more than one acre or that proposes new permanent impacts to a Priority Resource Area (PRA), or both, whether any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, could be used to achieve the project's purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs.	☐ Check ☒ N/A
Env-Wt 311.07(b)(3)	Whether alternative designs or techniques, such as different layouts, construction sequencing, or alternative technologies could be used to avoid impacts to jurisdictional areas or their functions and values.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1) Env-Wt 311.10(c)(2)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location and design for the proposed project that has the least impact to wetland functions.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impacts to wetland functions are unavoidable, the proposed impacts are limited to the wetlands with the least valuable functions on the site while avoiding and minimizing impacts to the wetlands with the highest and most valuable functions.	☒ Check ☐ N/A
Env-Wt 313.01(c)(1) Env-Wt 313.01(c)(2) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments under the department's jurisdiction and the project will not cause random or unnecessary destruction of wetlands.	☒ Check ☐ N/A
Env-Wt 313.01(c)(3)	The project would not cause or contribute to the significant degradation of waters of the state or the loss of any PRAs.	☒ Check ☐ N/A
Env-Wt 313.03(b)(3) Env-Wt 904.07(c)(8)	The project maintains hydrologic connectivity between adjacent wetlands or stream systems.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	Buildings and/or access are positioned away from high function wetlands or surface waters to avoid impact.	☐ Check ☒ N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	☐ Check ☒ N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	☒ Check ☐ N/A
A/M BMPs	The width of access roads or driveways is reduced to avoid and minimize impacts. Pullouts are incorporated in the design as needed.	☐ Check ☒ N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	☐ Check ☒ N/A

A/M BMPs	The project is designed to minimize the number and size of crossings, and crossings cross wetlands and/or streams at the narrowest point.	☒ Check ☐ N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism and wildlife passage.	☒ Check ☐ N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	☒ Check ☐ N/A
A/M BMPs	Disturbed areas are used for crossings wherever practicable, including existing roadways, paths, or trails upgraded with new culverts or bridges.	☐ Check ☒ N/A
SECTION 4 - NON-TIDAL SHORELINE STRUCTURES		
Env-Wt 313.03(c)(1)	The non-tidal shoreline structure has been designed to use the minimum construction surface area over surfaces waters necessary to meet the stated purpose of the structure.	☐ Check ☒ N/A
Env-Wt 313.03(c)(2)	The type of construction proposed for the non-tidal shoreline structure is the least intrusive upon the public trust that will ensure safe navigation and docking on the frontage.	☐ Check ☒ N/A
Env-Wt 313.03(c)(3)	The non-tidal shoreline structure has been designed to avoid and minimize impacts on the ability of abutting owners to use and enjoy their properties.	☐ Check ☒ N/A
Env-Wt 313.03(c)(4)	The non-tidal shoreline structure has been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.	☐ Check ☒ N/A
Env-Wt 313.03(c)(5)	The non-tidal shoreline structure has been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.	☐ Check ☒ N/A
Env-Wt 313.03(c)(6)	The non-tidal shoreline structure has been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.	☐ Check ☒ N/A

This report has been modified to only include minutes from applicable project.

BUREAU OF ENVIRONMENT
CONFERENCE REPORT

SUBJECT: NHDOT Monthly Natural Resource Agency Coordination Meeting
DATE OF CONFERENCE: December 20, 2023
LOCATION OF CONFERENCE: Virtual meeting held via Zoom

ATTENDED BY:

NHDOT
Andrew O'Sullivan
Joshua Brown
Jon Evans
Mark Hemmerlein
Rebecca Martin
Tim Mallette
Dave Smith
Dillan Schmidt
Marc Laurin
Dan Prehemo
Tony King
Jason Ayotte
Wendy Johnson
Mike Mozer
David Scott
Meli Dube
Paul Lovely
Kathleen Corliss
Curtis Morrill
Kerry Ryan
Arin Mills
Rhona Thomson

ACOE
Mike Hicks

USCG
Gary Croot

EPA
Absent

NHDES
Karl Benedict
Seta Detzel
Emily Nichols
Mary Ann Tilton

NHB
Absent

NH Fish & Game
Mike Dionne
Kevin Newton

Federal Highway
Jamie Sikora

US Fish & Wildlife
Absent

The Nature Conservancy
Absent

NH Transportation & Wildlife Workgroup
Absent

Consultants/ Public Participants
Kyle Higgins
Mike Dugas
Mark Debowski
Christine Perron
John Parelli
Steve Hoffman
Brian Colburn
Carol Foss
Peter Steckler
Jennifer Riordan
Seth Hill
Kimberly Peace
Deb Coon
Chris Fournier
Josif Bicja
Tucker Gordon
Katy Lewis
Linda Hutchins
Madelyn Glavin
Trevor Ricker

PRESENTATIONS/ PROJECTS REVIEWED THIS MONTH: *(minutes on subsequent pages)*

Table of Contents

Mike Dione (MD) (NHFG) This site has a lot of fisheries and is a highly productive wild brook trout stream. There are documented landlocked salmon spawn in Mink Brook with possible pond up into this tributary in high water. It is also possibly to have rainbow smelt spawn in this tributary. For time-of-year (TOY) restrictions would be October 15 - November 30, (Brook trout and Salmon) and march 15 - April 30 (Rainbow smelt) (no in-water work).
Kevin Newton (KN) (NHFG) No Comment.

Mike Hicks (MH) (ACOE) take a look at the SPGP on page 40, condition number 20. This addresses TOY restrictions, working in the dry, and coffer dams. An alternative window can be proposed with USFWS, NHFG. See what you can do with those conditions with the proposed TOY restrictions. There is leeway in condition number 20 with working in the dry.

AO indicated that we likely would seek an alternative TOY window from condition 20. TM clarified that there would be coffer dams, therefore the working in the dry conditions may work.

Gary Croot (GC) (USCG) No Comment. No navigable waters involved for CG bridge purposes.

Londonderry, 41715 (X-A004(724)):

Jason Ayotte started the presentation by providing an overview of the project and some historical background. The project involves the conversion of the intersection of Stonehenge Road and NH Route 28 to a single-lane roundabout, along with associated improvements to the roadway approaches. The purpose is to improve intersection operations and safety. The project includes replacement of two Tier 3 stream crossings, utility relocations, closed drainage system upgrades, and construction of a water quality treatment swale. This is the project's second Natural Resources Agency Meeting (NRAM) presentation, and the first was held on March 16, 2022 sharing the potential alternatives. The March 16, 2022 NRAM expressed concerns regarding wetland and priority resource area impacts and stream crossings, which were focal areas of the proposed design. Between the NRAM meetings, NHDOT conducted vernal pool assessments, additional wetland delineations, surveyed Nutall Reed Grass, coordinated with NHF&G regarding wildlife considerations, and refined the design alternatives and gained public support. The single-lane roundabout alternative was selected and, has fewer impacts to the project-area resources than the signalized intersection.

Josh Brown reviewed the resources on the site and displayed the mapping provided by FB Environmental. No vernal pools were located. There is a mapped FEMA floodplain east of the project. GPI determined that there would be no increase in base flood elevation from the proposed project improvements. Both crossings are upgraded to Tier Three because of the presence of the 100-year floodplain at the outlets.

Kyle Higgins reviewed the stream crossings, treatment swale, and existing telephone duct bank. The northern stream crossing is currently conveyed by a 24" reinforced concrete pipe with a catch basin in the middle of the run. It is being replaced with a single 30" reinforced concrete pipe. The southern crossing is currently a 30" reinforced concrete pipe that will be replaced with a 60" reinforced concrete pipe. Alternative designs, including costs and impacts of the structures to resources and utilities, were reviewed. Wetland impact locations and quantities were reviewed.

Josh Brown described the proposed mitigation resulting from the wetland impacts within the floodplain, which results in permanent impacts to a Priority Resource Area.

The following is a summary of key discussion points:

Karl Benedict stated that the design follows the guidance provided at the last meeting. The approach to the stream crossings, including alternatives analysis, roadway design, and impact minimization, seems appropriate. Andy O'Sullivan expounded the proposed stream crossing designs were good candidates for alternatives design meeting the intent of Env-Wt 904.09(c)(2), and NHDOT plans to submit the Standard Dredge and Fill Major Impact Project with alternative design. Karl Benedict suggested a site walk due to the number of resources.

Mary Ann Tilton reminded the group of the importance of ensuring all functional assessments and impact assessments were conducted. Josh Brown explained acknowledge and the functional assessments will be submitted with the permit.

Seta Detzel inquired about the net loss of function to critical species from project impacts. Josh stated that coordination is still ongoing with NH Fish and Game, but the coordination is not related to the culvert designs so there is likely no concern with impacts to the species as it relates to the project design. The resulting coordination will be included within the wetlands application submittal. Seta thinks that the alternative designs for the stream crossings make sense.

Emily Nichols would like to review how mitigation has been approached historically but has no specific concerns with this project. Andy O'Sullivan suggested a follow-up meeting between NHDOT and NHDES to review previous projects.

Kevin Newton acknowledged the previous wildlife coordination with NHDOT, and will meet with NHDOT independently to finalize the wildlife considerations.

There were no other concerns or comments from resource agency members present.

Nashua-Merrimack-Bedford, 13761D (Non-fed):

The purpose of the meeting was to discuss additional work to be added to the 13761D project, the northernmost segment of the FE Everett Turnpike widening project, which is currently under construction. Christine Perron provided an overview of the proposed work. The NHDOT is proposing to add to the project the construction of a berm with a privacy fence in the vicinity of Teaberry Lane. The Teaberry Lane neighborhood extends just to the south of the original project limits. Residents there requested a soundwall and it didn't meet the requirements under the NHDOT's noise policy. NHDOT agreed to instead construct a privacy fence adjacent to the Right-of-Way line. As construction progressed it was requested to move the privacy fence closer to the Turnpike and include a small berm. The berm will be approximately 1,700 feet in length and will be located entirely within existing right-of-way. A wetland delineation was completed in the area where additional impacts will occur. Delineated wetlands are all forested wetlands.

Compensatory Mitigation Report
Londonderry, 41715

Project Description:

As requested by the New Hampshire Department of Transportation (NHDOT), this report was prepared by the NHDOT Bureau of Environment for the proposed project. The project location is the intersection of NH Route 28 and Stonehendge Road in the Town of Londonderry, NH. The purpose of the project is to increase safety for the traveling public and will be accomplished through the proposed work found in this application. Work includes: areas of lane widening, better alignment for improved visibility, drainage and stream crossing pipe replacements, a stormwater treatment area, and construction of a roundabout at the intersection.

Mitigation Summary:

Wetland impacts considered for mitigation are related to work associated with: road widening, stream crossing/drainage replacements, the stormwater treatment outlet area, and construction of the roundabout.

The project is less than 5,000 ft^2 of permanent impact and includes less than 200 linear feet of permanent stream impact and thus mitigation was not triggered based on the project size. The proposed project does impact a floodplain wetland adjacent to a tier 3 stream and an area of documented protected species on the northern side of NH Route 28, which is considered a Priority Resource Area (PRA).

The two stream crossing designs meet Env-Wt 904.09 – Replacement of a Tier 3 Existing Legal Crossing. Coordination with NH Fish and Game is included within this application for the protected species and applicable recommendations will be implemented. The following table breaks down specific impacts and any proposed compensatory mitigation to meet Env-Wt 800.

Resource Type:	Permanent FT^2	Permanent Linear Feet	Proposed Mitigation:
PRA[1] Wetlands	579	-	Compensatory mitigation is proposed in the amount of $4,215.67 (See attached Mitigation Calculator).
Non-PRA Wetlands:	2,521	-	No mitigation proposed.
Stream (Bank & Channel):	516	160	No mitigation proposed.
Total:	3,616	160	

Table 1 - Mitigation Impact Summary

[1] Priority Resource Areas are defined in Env-Wt 103.66 and includes: (a) Has documented occurrences of protected species or habitat; (b) Is a bog; (c) Is a floodplain wetland contiguous to a tier 3 or higher watercourse; (d) Is a designated prime wetlands; (e) Is a duly-established 100-foot buffer of a designated prime wetlands; (f) Is a sand dune, tidal wetland, tidal water, or undeveloped tidal buffer zone; or (g) Is any combination of (a) through (f), above.

NHDES AQUATIC RESOURCE MITIGATION FUND
WETLAND PAYMENT CALCULATION
INSERT AMOUNTS IN YELLOW CELLS

1	**Convert square feet of impact to acres:**		
INSERT SQ FT OF IMPACT	Square feet of impact =	579.00	
		43560.00	
	Acres of impact =	0.0133	
	Total Wetland Credits =	0.0133	
2	**Determine acreage of wetland construction:**		
	Forested wetlands:	0.0199	
	Tidal wetlands:	0.0399	
	All other areas:	0.0199	
3	**Wetland construction cost:**		
	Forested wetlands:	$2,161.22	
	Tidal Wetlands:	$4,322.43	
	All other areas:	$2,161.22	
4	**Land acquisition cost (See land value table):**		
INSERT LAND VALUE FROM TABLE WHICH APPEARS TO THE LEFT. (Insert the amount do not copy and paste.)	Town land value:	67802	
	Forested wetlands:	$1,351.84	
	Tidal wetlands:	$2,703.67	
	All other areas:	$1,351.84	
5	**Construction + land costs:**		
	Forested wetland:	$3,513.05	
	Tidal wetlands:	$7,026.11	
	All other areas:	$3,513.05	
6	**NHDES Administrative cost:**		
	Forested wetlands:	$702.61	
	Tidal wetlands:	$1,405.22	
	All other areas:	$702.61	
**********	**TOTAL ARM PAYMENT**********		
	Forested wetlands:	$4,215.67	
	Tidal wetlands:	$8,431.33	
	All other areas:	$4,215.67	

Wetland and Watercourse Delineation, Functional Assessment, and Vernal Pool Survey
NHDOT Intersection and Drainage Improvement Project

Londonderry, New Hampshire

NHDOT# 41715

Prepared for:

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July 2022

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Beaver activity was evident throughout the Survey Area. The chewed log in the above photo was located adjacent to the confluence of Wetland B and Beaver Brook.

Summary

At the request of the New Hampshire Department of Transportation (NHDOT), FB Environmental (FBE) delineated wetlands and watercourses and conducted wetland functional assessments and a vernal pool survey within an approximately 8.6-acre Survey Area situated at the intersection of NH Route 28 (Rockingham Road) and Stonehenge Road in Londonderry, New Hampshire. FBE delineated four separate wetland areas, two watercourses, and three non-jurisdictional drainages within the Survey Area. FBE also documented the presence of six species of non-native, invasive plants. FBE recommends further coordination and confirmation with the NH Department of Environmental Services (NHDES) regarding the presence of Priority Resource Areas within the Survey Area.

1. Introduction

At the request of NHDOT, FB Environmental Associates (FBE) delineated wetlands and watercourses and conducted wetland functional assessments and a vernal pool survey within a project area in Londonderry, New Hampshire. The Survey Area encompasses approximately 8.6 acres situated at the intersection of NH Route 28 (Rockingham Road) and Stonehenge Road (see attached map). A vernal pool assessment was conducted and non-native, invasive plant species were inventoried and mapped within the Survey Area.

2. Methods

2.1 Soils

Soil information for the Survey Area was obtained from the USDA-Natural Resources Conservation Service's Web Soil Survey and the Soil Survey of Rockingham County, New Hampshire (USDA Soil Conservation Service, 1994). Wetland scientists used the soil survey as a general guide but relied on field-based hydric/non-hydric soil evaluations for the wetland delineation.

2.2 Wetlands

Based on current State and U.S. Army Corps of Engineers (USACE) policy for identifying jurisdictional wetlands, wetland delineations were performed following the protocols described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0, January 2012* (USACE, 2012). Hydric soils were identified by applying criteria described in the USDA *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 8.2, 2018.*

The Routine Onsite Determination Method (Routine Method) was used for this project. The Routine Method involves identifying wetlands based on three criteria: the predominance of hydrophytic vegetation, hydric soils, and hydrology. For a given area to be considered a wetland, all three of these parameters must be met, with some exceptions for disturbed areas.

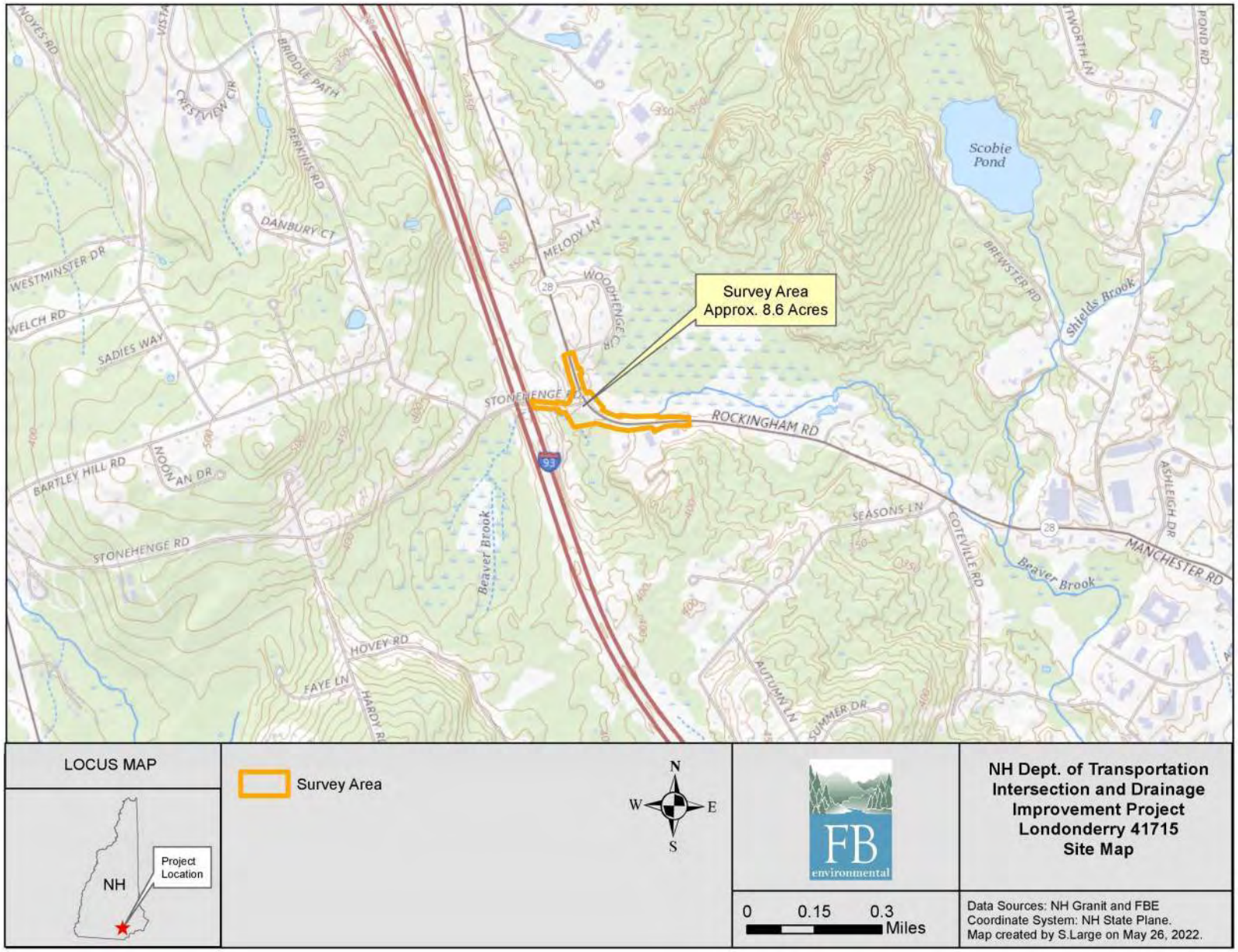

Figure 1. Project Survey Area at the intersection of NH Route 28 (Rockingham Road) and Stonehenge Road in Londonderry, New Hampshire.

Hydrophytic vegetation is defined as the community of macrophytes that occur in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant occurrence (USACE, 2012). An indicator status is assigned to each plant species; this indicator status is then used to calculate the overall dominance of wetland plants in each stratum at each sample point. Following the 2020 National Wetland Plant List (USACE, 2020), the frequency of a plant species' occurrence in a wetland community determines the five categories of indicator status (Table 1).

Table 1. Qualitative description of the five wetland indicator status ratings used during wetland delineations, based on the National Wetland Plant List (2020).

Indicator Status Rating	Designation	Qualitative Description	Example Species
Obligate (OBL)	Hydrophyte	Almost always occurs in wetlands.	Broad-leaved cattail (*Typha latifolia*)
Facultative Wetland (FACW)	Hydrophyte	Usually occurs in wetlands but may occur in non-wetlands.	Cinnamon fern (*Osmundastrum cinnamomeum*)
Facultative (FAC)	Hydrophyte	Occurs in wetlands and non-wetlands.	Red maple (*Acer rubrum*)
Facultative Upland (FACU)	Non-hydrophyte	Usually occurs in non-wetlands but may occur in wetlands.	Paper birch (*Betula papyrifera*)
Upland (UPL)	Non-hydrophyte	Almost never occurs in wetlands.	Norway maple (*Acer platanoides*)

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service, 1994). Examples of hydric soil indicators include a histic epipedon or the presence of a dark A or Ap soil horizon underlain by a high value, low chroma (light-gray) colored soil horizon with redoximorphic features (e.g., iron and manganese concentrations or depletions).

The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Typical indicators of wetland hydrology include inundated soils, soils saturated to the surface, drainage patterns, water marks, and morphological adaptations such as buttressed trunks, shallow root systems, or multiple stemmed trees.

All wetlands and watercourses were classified using the US Fish and Wildlife Service (USFWS) *Classification of Wetlands and Deepwater Habitats of the United States* (USFWS, 1979). This water resource classification system was developed by the USFWS and is commonly referred to as "Cowardin Classification" (Appendix B). The Cowardin Classification is used to define wetlands and other aquatic resources by their landscape position, cover type, and hydrologic regime. Special modifiers can be added that describe water regime/chemistry, soil types, or disturbances.

Where wetlands are present, FBE flagged wetland boundaries using glo-pink survey flagging emblazoned with the words "WETLAND DELINEATION" and labeled with an alphanumeric code denoting the resource name and flag number. Wetland delineation data plots (a.k.a. "Corps plots") are marked with red survey flagging.

2.2 Priority Resource Areas

In New Hampshire, Priority Resource Areas (PRAs) are wetlands regulated by the New Hampshire Department of Environmental Services (NH DES) under the *New Hampshire Code of Administrative Rules Env-Wt 100 – 900*. PRA criteria were developed to further define highly important functions and values that wetlands throughout the state provide as well as indicate the importance of rarer wetland types such as sand dunes, tidal wetlands, and bogs. Per Env-Wt 103.66, the following define the criteria for a wetland to be considered a PRA:

a) Has documented occurrences of protected species or habitat (using the NHB DataCheck tool);
b) Is a bog;
c) Is a floodplain wetland contiguous to a tier 3 or higher watercourse;
d) Is a designated prime wetland;
e) Is a duly-established 100-foot buffer of a designated prime wetland;
f) Is a sand dune, tidal wetland, or undeveloped tidal buffer zone, or;
g) Is any combination of (a) through (f), above.

The Survey Area was assessed for the presence of Priority Resource Areas.

2.3 Streams

The following definitions were used for delineating streams:

- *Top-of-Bank (TOB)* - "Bank" means the transitional slope immediately adjacent to the edge of a surface water body, the upper limit of which is usually defined by a break in slope. (*Source: New Hampshire Code of Administrative Rules Env-Wt 101.07*).
- *Ordinary High Water (OHW)* - the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (*Source: https://www.law.cornell.edu/cfr/text/33/329.11*).

FBE flags OHW and TOB with blue and blue/white striped survey flagging, respectively. When TOB and OHW do not diverge, only blue flagging is used and therefore represents both. For narrow streams, centerline is marked using blue flagging.

2.4 Non-Jurisdictional Drainages

Non-jurisdictional drainages are ephemeral drainages that are typically not jurisdictional under state and federal environmental regulations. These features do not meet the definition of a watercourse or fail to display the three criteria required to meet the definition of a wetland. Examples of non-jurisdictional drainages may include but are not limited to rock-filled channels, ephemeral drainage swales, ditch turnouts, swales with water-pushed leaf litter, or other similar features. FBE flagged non-jurisdictional drainages with orange/black striped flagging.

2.5 Invasive Plants

FBE documented the type, approximate extent, and location of invasive plant species within the Survey Area, and GPS data were collected for each invasive plant community. Plant locations were not marked with flagging. Table 2 (below) lists the codes used to identify invasive plant species on delineation plans.

Table 2. Scientific name, common name, and species code of invasive plants noted on delineation plans.

Scientific Name	Common Name	Species Code
Berberis thunbergii	Japanese barberry	BETH
Celastrus orbiculatus	Asiatic bittersweet	CEOR
Euonymus alatus	Burning bush	EUAL
Frangula alnus	Glossy false buckthorn	FRAL
Lonicera morrowii	Morrow's honeysuckle	LOMO
Rosa multiflora	Multiflora rose	ROMU

2.6 Global Positioning System (GPS) Data Collection

FBE geo-located natural resource feature flags (e.g., wetlands, streams, and non-jurisdictional drainages) using a mapping-grade GPS unit (Eos Arrow 100), in accordance with the manufacturer's data collection standards designed to achieve sub-meter accuracy. (Note that sub-meter accuracy is attained only in ideal conditions, which are seldom present in the field.) All data are exported as an ESRI shapefile in the coordinate system New Hampshire State Plane, Zone 4676 (FIPS 2800), NAD83, Survey Feet. In addition, FBE collected GPS points representing each invasive plant community (a community represents an isolated grouping of an individual species). GPS data points were also collected at infrastructure features observed near mapped resources, such as culverts and catch basins.

2.7 Wetland Functional Assessment

Wetland functional assessments were performed pursuant to the approach described by the Army Corps Highway Methodology Workbook Supplement: Wetland Functions and Values (USACE, 1995). In this "Descriptive Approach" to functional assessment, evaluators first determine if specific functions and values are present and why, followed by a determination of what functions and values are principal and why. Functions and values can be considered "principal" if they are an important physical component of a wetland ecosystem (function only), and/or are considered of special value to society, from a local, regional, and/or national perspective. When making determinations on the wetland, evaluators are encouraged to determine whether the wetland has the potential to serve the functions and values as well.

Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and that result from both living and non-living components of a specific wetland resource. These include all processes necessary for the self-maintenance of the wetland ecosystem such as primary productivity and nutrient cycling, among others. Therefore, functions relate to the ecological significance of wetland properties without regard to subjective human values.

Values are benefits that derive from one or more functions and the physical characteristics associated with a wetland. Most wetlands have corresponding societal value. The value of a particular wetland function, or combination of functions, is based on human judgment of the worth, merit, quality, or importance attributed to those functions. The 13 functions and values associated with a wetland functional assessment are described below:

Groundwater Recharge/Discharge: This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

Floodflow Alteration (Storage & Desynchronization): This function considers the effectiveness of a wetland in reducing flood damage by attenuation of floodwaters for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecosystem or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

Fish and Shellfish Habitat: This function considers the effectiveness of seasonal or permanent watercourses associated with a wetland in providing fish and shellfish habitat.

Sediment/Toxicant/Pathogen Retention: This function reduces or prevents degradation of water quality. It relates to the effectiveness of a wetland in trapping sediments, toxicants or pathogens in runoff water from surrounding uplands, or upstream erosive wetland areas.

Nutrient Removal/Retention/Transformation: This function considers the effectiveness of a wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

Production Export: This function evaluates the effectiveness of a wetland to produce food or usable products for man or other living organisms.

Sediment/Shoreline Stabilization: This function considers the effectiveness of a wetland in stabilizing stream banks and shorelines against erosion.

Wildlife Habitat: This function considers the effectiveness of a wetland to provide habitat for various types and populations of animals typically associated with wetlands and wetland edges. Both resident and migrating species are considered.

Recreation: This value considers the suitability of a wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting and other active or passive recreational activities.

Educational/Scientific Value: This value considers the suitability of a wetland as a site for an “outdoor classroom” or as a location for scientific study or research.

Uniqueness/Heritage: This value considers the effectiveness of a wetland or its associated waterbodies to provide certain special values, including archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, or its relative importance as a typical wetland class for the geographic location.

Visual Quality/Aesthetics: This value considers the visual and aesthetic quality or usefulness of a wetland.

Endangered Species Habitat: This value considers suitability of a wetland to support threatened or endangered species.

2.8 Stream Crossing Assessment

FBE conducts stream crossing assessments in accordance with the New Hampshire Department of Environmental Services (NHDES) wetland rules effective December 2019 (Env-Wt 100-900, specifically Env-Wt 903.04(j) and 903.05(a)). Physical data collection includes bankfull width, bankfull depth, and flood-prone width measurements at three cross sectional areas within a reference reach segment of a stream. FBE also records substrate particle size and distribution throughout the examined reach.

2.9 Vernal Pool Survey and Documentation

NH DES provides the following definition of vernal pool in Env-Wt 104.44:

> "a surface water or wetland, including an area intentionally created for purposes of compensatory mitigation, that provides breeding habitat for amphibians and invertebrates that have adapted to the unique environments provided by such pools and that:
>
> (a) Is not the result of on-going anthropogenic activities that are not intended to provide compensatory mitigation, including but not limited to:
> 1) Gravel pit operations in a pit that has been mined at least every other year; and
> 2) Logging and agricultural operations conducted in accordance with all applicable New Hampshire statutes and rules; and
>
> (b) Typically has the following characteristics:
> 1) Cycles annually from flooded to dry conditions, although the hydroperiod, size, and shape of the pool might vary from year to year;
> 2) Forms in a shallow depression or basin;
> 3) Has no permanently flowing outlet;
> 4) Holds water for at least 2 continuous months following spring ice-out;
> 5) Lacks a viable fish population; and
> 6) Supports one or more primary vernal pool indicators, or 3 or more secondary vernal pool indicators."

FBE utilizes the NH Fish and Game Department's NH Vernal Pool Documentation Form to characterize potential vernal pools according to physical and biological characteristics including, pool origin, hydroperiod, water depth, vegetation, substrate, and presence of pool-breeding amphibian egg masses. Conditions of the terrestrial (non-wetland) area surrounding the pool is also documented.

3. Results

3.1 Fieldwork

Wetland delineation fieldwork and the vernal pool surveys were conducted by NH-Certified Wetland Scientist Kevin Ryan and Wetland Scientist Sarah Large on 8 April and 12 May; fieldwork was conducted by Sarah Large

and Project Scientist Jordan Foulds on 21-22 April. Stream crossing assessment fieldwork was conducted by Sarah Large, Jordan Foulds, and Water Resources Engineer Cameron Twombly on 17 May 2022.

Land use within and surrounding the Survey Area is predominately associated with transportation, commercial, and residential uses. Forested upland (i.e., non-wetland) areas consist predominately of red oak *(Quercus rubra),* red maple *(Acer rubrum),* paper birch *(Betula papyrifera),* and white pine *(Pinus strobus)* in the tree canopy with saplings of red oak and red maple in the understory.

Four separate wetland areas, two watercourses (including Beaver Brook), and three non-jurisdictional drainage ditches were identified and delineated within the Survey Area. Delineated features are described below. FBE recommends further coordination and confirmation with the NH Department of Environmental Services (NHDES) regarding Priority Resource Areas (PRAs) within the Survey Area. Further documentation regarding PRAs is summarized with each resource description below.

3.2 Wetlands and Watercourses

Wetland A

Wetland A is a depressional wetland meeting the classification of a seasonally flooded/saturated palustrine forested wetland with broad-leaved deciduous canopy species (PFO1E). The wetland is situated on the west side of Rockingham Road (Route 28) just south of the intersection with Stonehenge Road. Hydrologic inputs to Wetland A consist of a connection to the groundwater table in addition to surface water runoff. Water is transported from the wetland through a culvert under an old woods road to the northeast to a non-jurisdictional drainage area (NJDA-1), and then under Rockingham Road through another culvert, eventually converging with Wetland D. NJDA-1 is an excavated ditch that appears to be unmaintained. The ditch has a wetted width of approximately 2-feet and a muck substrate. Only a few inches of water were observed slowly flowing through the ditch during the field investigation.

Canopy species within or overhanging Wetland A consist of red maple, green ash *(Fraxinus pennsylvanica)*, and white pine with common winterberry (*Ilex verticillata*) and highbush blueberry (*Vaccinium corymbosum*) in the understory. During the field investigation Cinnamon fern *(Osmundastrum cinnamomeum)* was observed in the herb layer.

Soil within the wetland consists of a layer of dark muck underlain by a layer of dark silt loam with redoximorphic concentrations in the matrix. Soil was saturated during the field investigation and standing water, 6 to 12 inches in depth on average, was present throughout the wetland.

The principal function of Wetland A is Wildlife Habitat. Other functions provided by Wetland A are Floodflow Alteration, Sediment/Toxicant Retention, Nutrient Removal, and Production Export.

A New Hampshire Vernal Pool Documentation Form was completed for Wetland A (Appendix G). Although the wetland exhibits some of the physical characteristics of a vernal pool, no pool-breeding amphibian egg masses were detected in the pool at any time during the field investigation. Therefore, the pool does not meet NH DES definition of a vernal pool.

Based on field evaluation, Wetland A does not meet the criteria to be a Priority Resource Area, as it does not meet any of the criteria listed in section 2.2.

Wetland B

Wetland B is a complex consisting of several wetland cover types situated along the south side of Rockingham Road, about 174 feet east of Wetland A. The system is a permanently flooded palustrine unconsolidated bottom/scrub-shrub/emergent wetland with broad-leaved deciduous shrub species and persistent marsh vegetation (PUB3/4/PSS1/PEM1H). The wetland continues beyond the Survey Area boundary to the south and is connected to Stream 1 (Beaver Brook) and Wetland C via a culvert under Rockingham Road (Route 28). Beaver activity was observed throughout the wetland.

The wetland complex transitions from an area of open water to a scrub-shrub system and then to a densely vegetated emergent marsh towards the southern boundary of the wetland. Dominant shrubs and herbaceous species within Wetland B consist of common buttonbush *(Cephalanthus occidentalis)* and broad-leaved cattail (*Typha latifolia*). Other herbaceous plants observed include cinnamon fern, sensitive fern *(Onoclea sensibilis)* and reed canary grass *(Phalaris arundinacea).* The wetland contains standing water greater than 4 feet in depth and its soil is permanently saturated.

Principal functions of Wetland B consist of Sediment/Toxicant Retention and Wildlife Habitat. Other functions provided by the wetland are Floodflow Alteration, Fish and Shellfish Habitat, Nutrient Removal, and Sediment/Shoreline Stabilization.

Wetland B does not meet the criteria to be a Priority Resource Area.

Wetland C

Wetland C is situated at the eastern end of the Survey Area along the north side of Rockingham Road. The system is a seasonally flooded/saturated palustrine emergent/scrub-shrub wetland with persistent marsh vegetation and broad-leaved deciduous shrub species (PEM1/PSS1E). The wetland continues beyond the Survey Area boundary to the north and is connected to Wetland B via a culvert under Rockingham Road (Route 28).

At the USACE plot location red maple and paper birch are dominant in the canopy. Highbush blueberry and red maple saplings are the dominant shrub layer. Tussock sedge *(Carex stricta)* and sensitive fern are dominant in the herb layer.

Soils within the wetland meet the criteria for A2 – *Histic Epipedon* and A4 – *Hydrogen Sulfide* as the soil profile contains a 20+ inch layer of dark sandy loam underneath an 8-inch dark organic muck surface layer and had the smell of rotten eggs (i.e., hydrogen sulfide odor). Observed primary indicators of hydrology consisted of *Surface Water* (A1), *High Water Table* (A2), *Saturation* (A3), *Water Marks* (B1), *Water-Stained Leaves* (B9), and *Hydrogen Sulfide Odor* (C1).

Principal functions of Wetland C consist of Floodflow Alteration, Sediment/Toxicant Retention, Nutrient Removal, and Sediment/Shoreline Stabilization. Other functions provided by the wetland are Fish and Shellfish Habitat, Production Export, and Wildlife Habitat.

Wetland C meets the criteria to be a Priority Resource Area per Env-Wt 103.66(c). Based solely on Stream 1's drainage area (approximately 461 square miles) the stream meets the criteria for a tier 2 stream crossing. However, the stream flows through a FEMA designed 100-year floodplain, located to the north of NH Route 106, and therefore the tier classification for the portion of Stream 1 flowing through Wetland C would increase to Tier 3.

Stream 1 (Beaver Brook)

Stream 1 is a watercourse meeting the classification of a riverine upper perennial system with a predominantly cobble-gravel and sand substrate (R3UB1/2). The brook briefly crosses into the Survey Area at its western-most limit to the south of Stonehenge Road, flowing from a culvert under Interstate 93. A stone swale (NJDA-2) that captures and directs stormwater towards Beaver Brook is also present in this area. The stream then meanders through the forest between the interstate highway and Rockingham Road prior to entering Wetland B.

The stream channel becomes diffuse at the confluence with Wetland B and only transitions back to a channelized form for approximately 28 feet prior to flowing through a 30-inch reinforced concrete pipe (RCP) under Rockingham Road where it then flows into Wetland C, again becoming diffuse. A partially dismantled beaver dam is located at the confluence of Wetland B and the channelized portion of Beaver Brook. Additional stormwater runoff enters the stream through a grassed swale (NJDA-3) east of Wetland B. An 8-foot wide by 5.5-foot-long scour pool is present at the outlet of the crossing. The outlet of the RCP was submerged underwater due to backwatering conditions created by another beaver dam at the outlet of the crossing,

The Survey Area is within the headwaters of Beaver Brook's watershed. Beaver Brook originates approximately 0.8 miles upstream from the crossing. Based on review of aerial imagery, Beaver Brook's geomorphology transitions back and forth between diffuse flow through large emergent/scrub-shrub wetland complexes to channelized in forested areas.

Appendix F contains a completed New Hampshire Department of Environmental Services Stream Crossing Assessment Worksheet for Beaver Brook (Stream 1). The stream crossing assessment was conducted approximately 670 feet upstream of the crossing within forested, natural reach of the stream between Interstate 93 and Rockingham Road. Based on the assessment, the reference reach of Beaver Brook meets the Type C Rosgen stream classification. The average bankfull width within the reference reach is 7.5 feet. The entrenchment ratio for a type C stream is 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Stream 1 is 16.5 feet.

Based on USGS StreamStats, Beaver Brook's drainage area at the Rockingham Road crossing is approximately 461 acres, making it a Tier 2 stream. The survey area to the north of Rockingham Road (encompassing Wetland C and D) is within a designated FEMA 100-year flood zone. (However, Wetland B nor Beaver Brook's upstream reach south of Rockingham Road are within the flood zone.) Based on the limits of the FEMA 100-year floodplain, FB Environmental anticipates Beaver Brook's Tier classification changing from Tier 2 to Tier 3 at the outlet of the crossing. Further coordination with NHDES is recommended to confirm the stream tier classification of Beaver Brook.

Wetland D

Wetland D is a seasonally flooded/saturated palustrine forested/scrub-shrub wetland with broad-leaved deciduous vegetation (PFO1/PSS1E). The wetland is situated on the east side of Rockingham Road (Route 28) at the intersection with Stonehenge Road and is approximately 200 feet west of Wetland C. Wetland D and Wetland C are part of the same larger wetland complex that extends beyond the Survey Area. Stream 2 flows through a culvert under the intersection of Stonehenge and Rockingham Road and discharges water to Wetland D.

At the USACE plot location red maple is dominant in the canopy with highbush blueberry and red maple saplings dominant in the shrub layer. Tussock sedge and reed canary grass are dominant in the herb layer.

Soils within Wetland D consist of a thick (18+ inches) dark organic muck. Soil within the wetland also has the smell of rotten eggs (i.e., hydrogen sulfide odor). Soil within the wetland therefore meet the criteria for hydric soil indicators A4 – *Hydrogen Sulfide* and A1 – *Histosol*. Observed primary indicators of hydrology consisted of *Surface Water* (A1), *High Water Table* (A2), *Saturation* (A3), *Water-Stained Leaves* (B9), and *Hydrogen Sulfide Odor* (C1).

Principal functions of Wetland D consist of Floodflow Alteration, Sediment/Toxicant Retention, Nutrient Removal, and Sediment/Shoreline Stabilization. Other functions provided by the wetland are Fish and Shellfish Habitat, Production Export, and Wildlife Habitat.

Wetland D meets the criteria to be a Priority Resource Area per Env-Wt 103.66(c). This is because Stream 2 flows through a FEMA designed 100-year floodplain located to the north of NH Route 106 and the tier classification for the portion of stream flowing through Wetland D would increase to Tier 3.

Stream 2 (Unnamed stream)

Stream 2 is an unnamed perennial stream with a bankfull width of 5.5 feet at the inlet and 6.5 feet at the outlet that carries flow to Wetland D through a 24-inch reinforced concrete pipe (RCP) under the intersection of Rockingham Road and Stonehenge Road. The stream meets the classification of a riverine upper perennial system with a predominantly cobble-gravel and sand substrate (R3UB1/2). The culvert is perched, and a deep scour pool is present at the outlet. The pool is 6.5-feet wide by 8-feet long and during high flows in April had a maximum water depth of 3 feet.

The Survey Area is within the headwaters of Stream 2's watershed. The stream originates approximately 0.6 miles upstream from where it crosses under the road intersection. Based on review of aerial imagery and the field investigation, the stream's geomorphology is predominately diffuse and sprawling throughout several forested wetland complexes. The stream is channelized for approximately 625 feet, flowing through several private properties, before crossing the road.

Appendix F contains a completed New Hampshire Department of Environmental Services Stream Crossing Assessment Worksheet for Stream 2. The stream crossing assessment was conducted approximately 0.3 miles upstream of the crossing within a natural and forested reach of the stream to the west of Interstate 93. Based on the assessment, the reference reach of Stream 2 meets the Type C Rosgen stream classification. The average bankfull width within the reference reach is approximately 5.8 feet. The entrenchment ratio for a type C stream is 2.2. Per the stream crossing guidelines and NHDES stream crossing rules, the recommended span for a compliant replacement structure at Stream 2 is 12.76 feet.

Stream 2 is not shown on USGS maps, nor is the stream's drainage area available on USGS' StreamStats watershed tool. Based on aerial imagery and field investigation, Stream 2's drainage area is anticipated to be under 200 acres, likely qualifying, solely based on drainage area, as a Tier 1 stream. The survey area to the north of Rockingham Road is within a designated FEMA 100-year floodplain zone, which is a criteria for Tier 3 designation Further coordination with NHDES is recommended to confirm the stream tier classification of Stream 2.

3.3 Non-Native, Invasive Plants

FBE identified six species of non-native, invasive plant species within the Survey Area. Overall, infestation is not very high. However, the highest density of invasive plant species was encountered at the inlet and outlet of Stream 2. Asiatic bittersweet (*Celastrus orbiculatus*), Japanese barberry *(Berberis vulgaris),* and multiflora rose *(Multiflora rosa)* were encountered the most throughout the Survey Area. Other observed species consist of burning bush (*Euonymus alatus*), glossy false buckthorn *(Frangula alnus),* and Morrow's honeysuckle *(Lonicera morrowii).* Poison-ivy *(Toxicodendron radicans),* a native but noxious plant species was also encountered throughout the entirety of the Survey Area.

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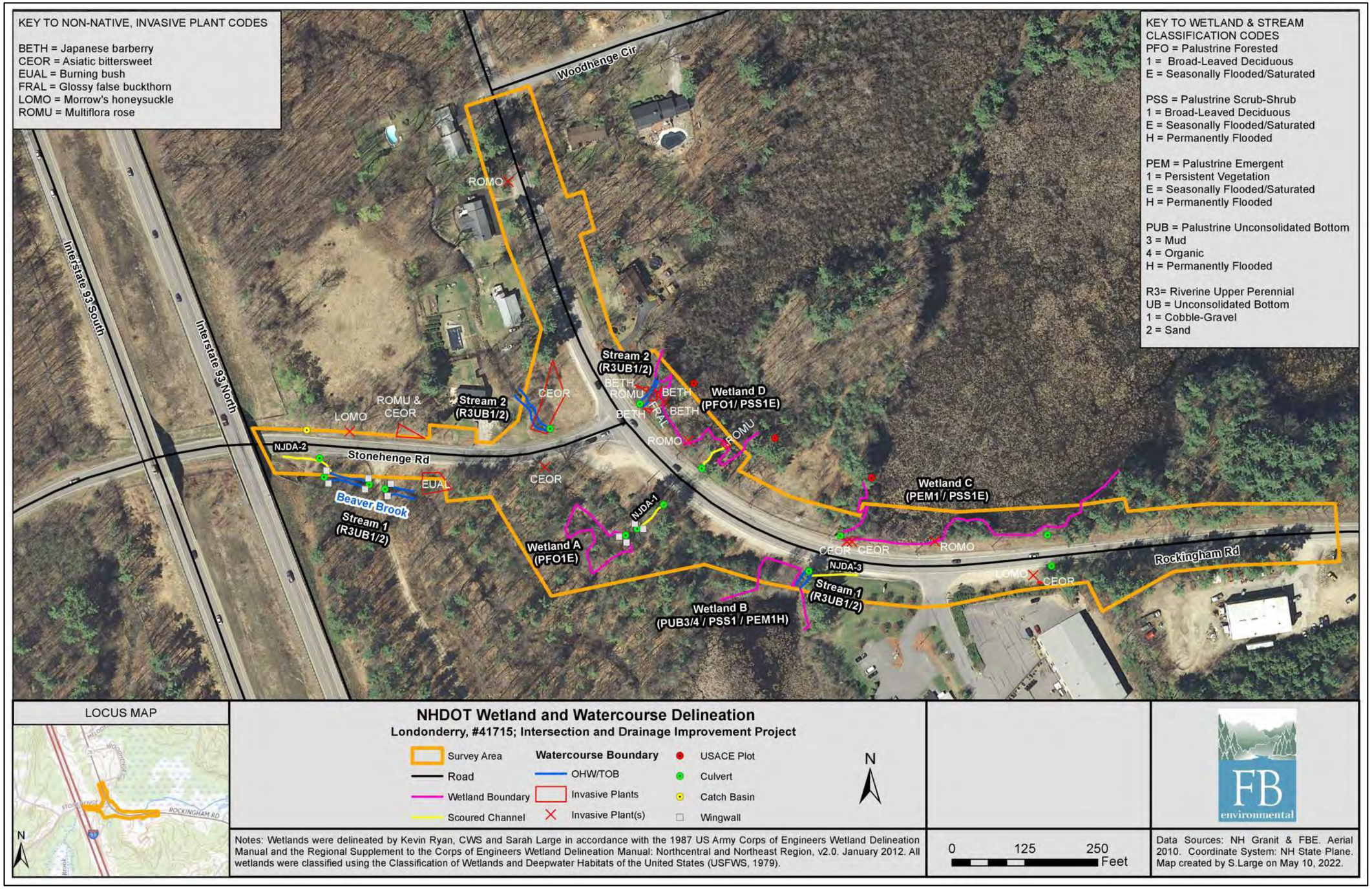
U.S. Department of Agriculture Soil Conservation Service. (1994). Changes in hydric soils of the United States. Federal Register 59(133):35680-35681, July 13, 1994.

WETLAND DELINEATION MAP


KEY TO NON-NATIVE, INVASIVE PLANT CODES
BETH = Japanese barberry
CEOR = Asiatic bittersweet
EUAL = Burning bush
FRAL = Glossy false buckthorn
LOMO = Morrow's honeysuckle
ROMU = Multiflora rose
KEY TO WETLAND & STREAM CLASSIFICATION CODES
PFO = Palustrine Forested
1 = Broad-Leaved Deciduous
E = Seasonally Flooded/Saturated
PSS = Palustrine Scrub-Shrub
1 = Broad-Leaved Deciduous
E = Seasonally Flooded/Saturated
H = Permanently Flooded
PEM = Palustrine Emergent
1 = Persistent Vegetation
E = Seasonally Flooded/Saturated
H = Permanently Flooded
PUB = Palustrine Unconsolidated Bottom
3 = Mud
4 = Organic
H = Permanently Flooded
R3= Riverine Upper Perennial
UB = Unconsolidated Bottom
1 = Cobble-Gravel
2 = Sand
Woodhenge Cir
Interstate 93 South
Interstate 93 North
Stonehenge Rd
Rockingham Rd
Beaver Brook
Stream 1 (R3UB1/2)
Stream 2 (R3UB1/2)
Wetland A (PFO1E)
Wetland B (PUB3/4 / PSS1 / PEM1H)
Wetland C (PEM1 / PSS1E)
Wetland D (PFO1/ PSS1E)
NJDA-1
NJDA-2
NJDA-3
ROMO
ROMU & CEOR
LOMO
CEOR
EUAL
BETH
ROMU
FRAL
LOCUS MAP
NHDOT Wetland and Watercourse Delineation
Londonderry, #41715; Intersection and Drainage Improvement Project
Survey Area
Road
Wetland Boundary
Scoured Channel
Watercourse Boundary
OHW/TOB
Invasive Plants
Invasive Plant(s)
USACE Plot
Culvert
Catch Basin
Wingwall
N
Notes: Wetlands were delineated by Kevin Ryan, CWS and Sarah Large in accordance with the 1987 US Army Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, v2.0. January 2012. All wetlands were classified using the Classification of Wetlands and Deepwater Habitats of the United States (USFWS, 1979).
0 125 250 Feet
Data Sources: NH Granit & FBE. Aerial 2010. Coordinate System: NH State Plane. Map created by S.Large on May 10, 2022.
FB environmental

APPENDIX A. Photographs

**Photos taken 21-22 April 2022 unless otherwise noted.*

Photo 1. Wetland A is a forested wetland with an ephemeral hydroperiod.

Photo 2. Wetland A is modified by an old woods road culvert that carries flow from the wetland through NJDA-1 to Wetland D.

Photo 3. NJDA-1 connects Wetland A to Wetland D through a series of culverts. (*Photo taken 9 April 2022).

Photo 4. Wetland B is a permanently flooded palustrine unconsolidated bottom/scrub-shrub/ emergent (PUB3/4/PSS1/PEM1H) wetland.

Photo 5. A channelized section of Stream 1 (Beaver Brook) carrying flow from Wetland B under Rockingham Road to Wetland C. (*photo taken 17 May 2022).

Photo 6. NJDA-3 is a grass swale that conveys stormwater to Stream 1 and Wetland B (* Photo taken 17 May 2022).

Photo 7. Photo taken at the outlet of the 30" RCP carrying water to Wetland C from Wetland B.

Photo 8. Photo taken at the USACE data plot for Wetland C, a palustrine emergent/scrub-shrub wetland complex (PEM1/PSS1E).

Photo 9. NJDA-1 carries flow from Wetland A under Rockingham Road and terminates at Wetland D.

Photo 10. Wetland D is a seasonally flooded/saturated forested and scrub-shrub (PFO1/PSS1E) wetland with broad-leaved deciduous vegetation.

Photo 11. Facing downstream above the 24" RCP carrying Stream 2 under the intersection of Stonehenge and Rockingham Road.

Photo 12. The outlet of the culvert carrying Stream 2 is perched by approximately 1.5 feet.

Photo 13. Facing upstream above the 24" culvert carrying Stream 2 under the intersection of Stonehenge and Rockingham Road.

Photo 14. Stream 2 flowing into the inlet of the crossing. The headwall and culvert are deteriorating.

Photo 15. Stream 1 (Beaver Brook) meets the classification of an upper perennial system with predominately cobble-gravel sand substrate (R3UB1/2).

Photo 16. NJDA-2 is a stone swale carrying stormwater runoff from Stonehenge Road to Stream 1.

Photo 17. The outlet to Stream 1 is submerged. (*photo taken 17 May 2022).

Photo 18. The headwall of the inlet of Stream 1 is deteriorated. (*photo taken 17 May 2022).

Photo 19. Reference reach cross section location #1 for Stream 1 (Beaver Brook). (*photo taken 17 May 2022).

Photo 20. Reference reach cross section location #2 for Stream 1 (Beaver Brook). (*photo taken 17 May 2022).

Photo 21. Reference reach cross section location #3 for Stream 1 (Beaver Brook). (*photo taken 17 May 2022).

Photo 22. Reference reach cross section location #1 for Stream 2. (*photo taken 17 May 2022).

Photo 23. Reference reach cross section location #2 for Stream 2. (*photo taken 17 May 2022).

Photo 24. Reference reach cross section location #3 for Stream 2. (*photo taken 17 May 2022).

APPENDIX B. Cowardin Wetland Classification System

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION

System: L - Lacustrine

Subsystem: 1 - Limnetic

Class	Subclass
RB – Rock Bottom	1 Bedrock 2 Rubble
UB – Unconsolidated Bottom	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – Aquatic Bed	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular

Subsystem: 2 - Littoral

Class	Subclass
RB – Rock Bottom	1 Bedrock 2 Rubble
UB – Unconsolidated Bottom	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – Aquatic Bed	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular
RS – Rocky Shore	1 Bedrock 2 Rubble
US – Unconsolidated Shore	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
EM – Emergent	2 Nonpersistent

System: P - Palustrine

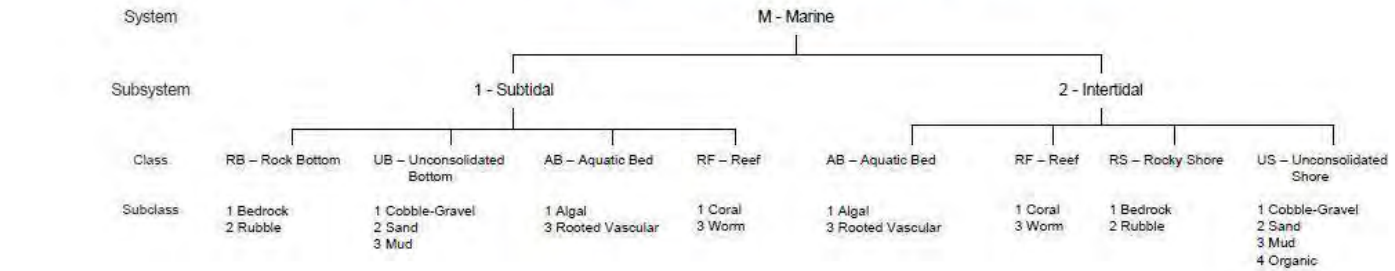
Class	Subclass
RB – Rock Bottom	1 Bedrock 2 Rubble
UB – Unconsolidated Bottom	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB – Aquatic Bed	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular
US – Unconsolidated Shore	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
ML – Moss-Lichen	1 Moss 2 Lichen
EM – Emergent	1 Persistent 2 Nonpersistent 5 *Phragmites australis*
SS – Scrub-Shrub	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen
FO – Forested	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen

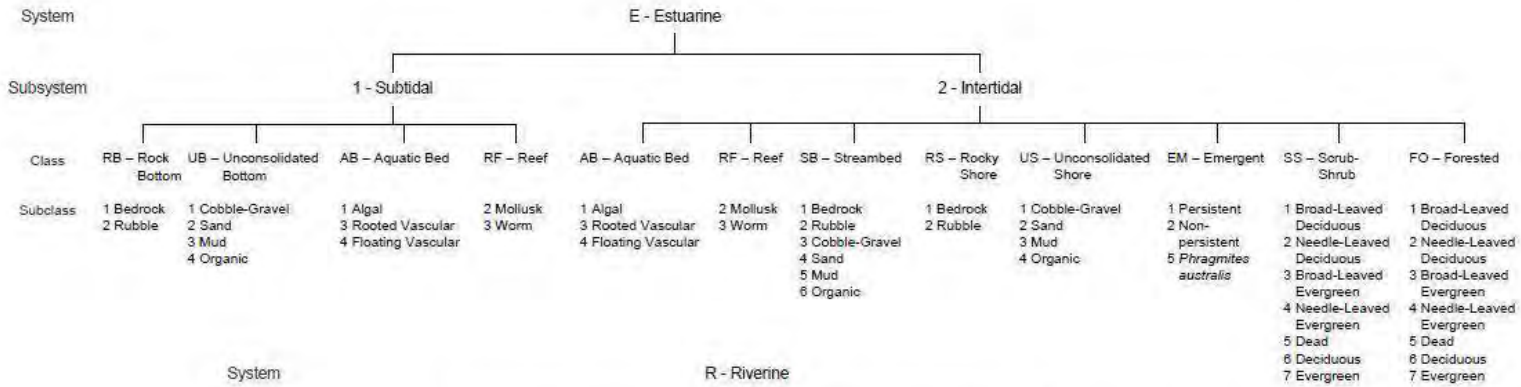
MODIFIERS

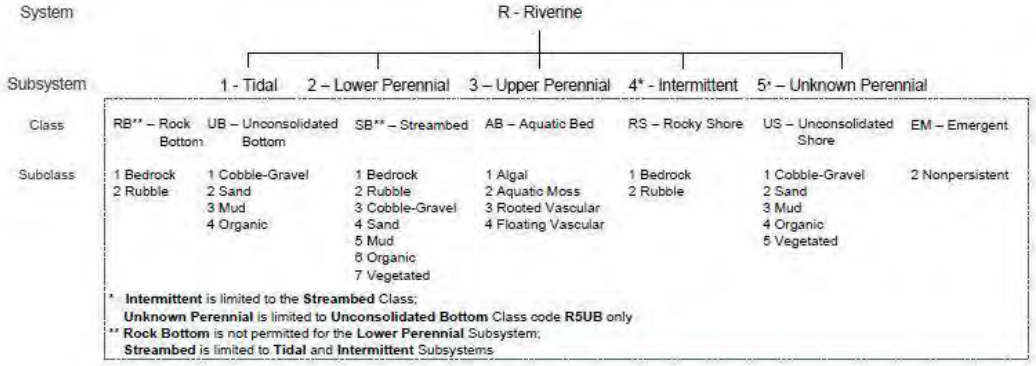
In order to more adequately describe the wetland and deepwater habitats, one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

Water Regime			Special Modifiers	Water Chemistry			Soil
Nontidal	**Saltwater Tidal**	**Freshwater Tidal**		**Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**	
A Temporarily Flooded	L Subtidal	S Temporarily Flooded-Tidal	b Beaver	1 Hyperhaline	7 Hypersaline	a Acid	g Organic
B Saturated	M Irregularly Exposed	R Seasonally Flooded-Tidal	d Partly Drained/Ditched	2 Euhaline	8 Eusaline	t Circumneutral	n Mineral
C Seasonally Flooded	N Regularly Flooded	T Semipermanently Flooded-Tidal	f Farmed	3 Mixohaline (Brackish)	9 Mixosaline	i Alkaline	
E Seasonally Flooded/ Saturated	P Irregularly Flooded	V Permanently Flooded-Tidal	h Diked/Impounded	4 Polyhaline	0 Fresh		
F Semipermanently Flooded			r Artificial	5 Mesohaline			
G Intermittently Exposed			s Spoil	6 Oligohaline			
H Permanently Flooded			x Excavated	0 Fresh			
J Intermittently Flooded							
K Artificially Flooded							

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION







APPENDIX C. Wetland Functional Assessment Criteria

Appendix A

Wetland evaluation supporting documentation; Reproducible forms.

Below is an example list of considerations that was used for a New Hampshire highway project. Considerations are flexible, based on best professional judgment and interdisciplinary team consensus. This example provides a comprehensive base, however, and may only need slight modifications for use in other projects.

GROUNDWATER RECHARGE/DISCHARGE— This function considers the potential for a wetland to serve as a groundwater recharge and/or discharge area. It refers to the fundamental interaction between wetlands and aquifers, regardless of the size or importance of either.

CONSIDERATIONS/QUALIFIERS

1. Public or private wells occur downstream of the wetland.
2. Potential exists for public or private wells downstream of the wetland.
3. Wetland is underlain by stratified drift.
4. Gravel or sandy soils present in or adjacent to the wetland.
5. Fragipan does not occur in the wetland.
6. Fragipan, impervious soils, or bedrock does occur in the wetland.
7. Wetland is associated with a perennial or intermittent watercourse.
8. Signs of groundwater recharge are present or piezometer data demonstrates recharge.
9. Wetland is associated with a watercourse but lacks a defined outlet or contains a constricted outlet.
10. Wetland contains only an outlet, no inlet.
11. Groundwater quality of stratified drift aquifer within or downstream of wetland meets drinking water standards.
12. Quality of water associated with the wetland is high.
13. Signs of groundwater discharge are present (e.g., springs).
14. Water temperature suggests it is a discharge site.
15. Wetland shows signs of variable water levels.
16. Piezometer data demonstrates discharge.
17. Other

FLOODFLOW ALTERATION (Storage & Desynchronization) — This function considers the effectiveness of the wetland in reducing flood damage by water retention for prolonged periods following precipitation events and the gradual release of floodwaters. It adds to the stability of the wetland ecological system or its buffering characteristics and provides social or economic value relative to erosion and/or flood prone areas.

CONSIDERATIONS/QUALIFIERS

1. Area of this wetland is large relative to its watershed.
2. Wetland occurs in the upper portions of its watershed.
3. Effective flood storage is small or non-existent upslope of or above the wetland.
4. Wetland watershed contains a high percent of impervious surfaces.
5. Wetland contains hydric soils which are able to absorb and detain water.
6. Wetland exists in a relatively flat area that has flood storage potential.
7. Wetland has an intermittent outlet, ponded water, or signs are present of variable water level.
8. During flood events, this wetland can retain higher volumes of water than under normal or average rainfall conditions.
9. Wetland receives and retains overland or sheet flow runoff from surrounding uplands.
10. In the event of a large storm, this wetland may receive and detain excessive flood water from a nearby watercourse.
11. Valuable properties, structures, or resources are located in or near the floodplain downstream from the wetland.
12. The watershed has a history of economic loss due to flooding.
13. This wetland is associated with one or more watercourses.
14. This wetland watercourse is sinuous or diffuse.
15. This wetland outlet is constricted.
16. Channel flow velocity is affected by this wetland.
17. Land uses downstream are protected by this wetland.
18. This wetland contains a high density of vegetation.
19. Other

FISH AND SHELLFISH HABITAT (FRESHWATER) — This function considers the effectiveness of seasonal or permanent watercourses associated with the wetland in question for fish and shellfish habitat.

CONSIDERATIONS/QUALIFIERS

1. Forest land dominant in the watershed above this wetland.
2. Abundance of cover objects present.

STOP HERE IF THIS WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE

3. Size of this wetland is able to support large fish/shellfish populations.
4. Wetland is part of a larger, contiguous watercourse.
5. Wetland has sufficient size and depth in open water areas so as not to freeze solid and retain some open water during winter.
6. Stream width (bank to bank) is more than 50 feet.
7. Quality of the watercourse associated with this wetland is able to support healthy fish/shellfish populations.
8. Streamside vegetation provides shade for the watercourse.
9. Spawning areas are present (submerged vegetation or gravel beds).
10. Food is available to fish/shellfish populations within this wetland.
11. Barrier(s) to anadromous fish (such as dams, including beaver dams, waterfalls, road crossing) are absent from the stream reach associated with this wetland.
12. Evidence of fish is present.
13. Wetland is stocked with fish.
14. The watercourse is persistent.
15. Man-made streams are absent.
16. Water velocities are not too excessive for fish usage.
17. Defined stream channel is present.
18. Other

Although the above example refers to freshwater wetlands, it can also be adapted for marine ecosystems. The following is an example provided by the National Marine Fisheries Service (NMFS) of an adaptation for the fish and shellfish function.

FISH AND SHELLFISH HABITAT (MARINE) — This function considers the effectiveness of wetlands, embayments, tidal flats, vegetated shallows, and other environments in supporting marine resources such as fish, shellfish, marine mammals, and sea turtles.

CONSIDERATIONS/QUALIFIERS

1. Special aquatic sites (tidal marsh, mud flats, eelgrass beds) are present.
2. Suitable spawning habitat is present at the site or in the area.
3. Commercially or recreationally important species are present or suitable habitat exists.
4. The wetland/waterway supports prey for higher trophic level marine organisms.
5. The waterway provides migratory habitat for anadromous fish.
6. Essential fish habitat, as defined by the 1996 amendments to the Magnuson-Stevens Fishery & Conservation Act, is present (consultation with NMFS may be necessary).
7. Other

SEDIMENT/TOXICANT/PATHOGEN RETENTION — This function reduces or prevents degradation of water quality. It relates to the effectiveness of the wetland as a trap for sediments, toxicants, or pathogens in runoff water from surrounding uplands or upstream eroding wetland areas.

CONSIDERATIONS/QUALIFIERS

1. Potential sources of excess sediment are in the watershed above the wetland.
2. Potential or known sources of toxicants are in the watershed above the wetland.
3. Opportunity for sediment trapping by slow moving water or deepwater habitat are present in this wetland.
4. Fine grained mineral or organic soils are present.
5. Long duration water retention time is present in this wetland.
6. Public or private water sources occur downstream.
7. The wetland edge is broad and intermittently aerobic.
8. The wetland is known to have existed for more than 50 years.
9. Drainage ditches have not been constructed in the wetland.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

10. Wetland is associated with an intermittent or perennial stream or a lake.
11. Channelized flows have visible velocity decreases in the wetland.
12. Effective floodwater storage in wetland is occurring. Areas of impounded open water are present.
13. No indicators of erosive forces are present. No high water velocities are present.
14. Diffuse water flows are present in the wetland.
15. Wetland has a high degree of water and vegetation interspersion.
16. Dense vegetation provides opportunity for sediment trapping and/or signs of sediment accumulation by dense vegetation is present.
17. Other

NUTRIENT REMOVAL/RETENTION/TRANSFORMATION — This function considers the effectiveness of the wetland as a trap for nutrients in runoff water from surrounding uplands or contiguous wetlands and the ability of the wetland to process these nutrients into other forms or trophic levels. One aspect of this function is to prevent ill effects of nutrients entering aquifers or surface waters such as ponds, lakes, streams, rivers, or estuaries.

CONSIDERATIONS/QUALIFIERS

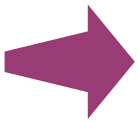
1. Wetland is large relative to the size of its watershed.
2. Deep water or open water habitat exists.
3. Overall potential for sediment trapping exists in the wetland.

4. Potential sources of excess nutrients are present in the watershed above the wetland.
5. Wetland saturated for most of the season. Ponded water is present in the wetland.
6. Deep organic/sediment deposits are present.
7. Slowly drained fine grained mineral or organic soils are present.
8. Dense vegetation is present.
9. Emergent vegetation and/or dense woody stems are dominant.
10. Opportunity for nutrient attenuation exists.
11. Vegetation diversity/abundance sufficient to utilize nutrients.

STOP HERE IF WETLAND IS NOT ASSOCIATED WITH A WATERCOURSE.

12. Waterflow through this wetland is diffuse.
13. Water retention/detention time in this wetland is increased by constricted outlet or thick vegetation.
14. Water moves slowly through this wetland.
15. Other

PRODUCTION EXPORT (Nutrient) — This function evaluates the effectiveness of the wetland to produce food or usable products for humans or other living organisms.



CONSIDERATIONS/QUALIFIERS

1. Wildlife food sources grow within this wetland.
2. Detritus development is present within this wetland
3. Economically or commercially used products found in this wetland.
4. Evidence of wildlife use found within this wetland.
5. Higher trophic level consumers are utilizing this wetland.
6. Fish or shellfish develop or occur in this wetland.
7. High vegetation density is present.
8. Wetland exhibits high degree of plant community structure/species diversity.
9. High aquatic vegetative diversity/abundance is present.
10. Nutrients exported in wetland watercourses (permanent outlet present).
11. "Flushing" of relatively large amounts of organic plant material occurs from this wetland.
12. Wetland contains flowering plants that are used by nectar-gathering insects.
13. Indications of export are present.
14. High production levels occurring, however, no visible signs of export (assumes export is attenuated).
15. Other

SEDIMENT/SHORELINE STABILIZATION — This function considers the effectiveness of a wetland to stabilize streambanks and shorelines against erosion.

CONSIDERATIONS/QUALIFIERS

1. Indications of erosion or siltation are present.
2. Topographical gradient is present in wetland.
3. Potential sediment sources are present up-slope.
4. Potential sediment sources are present upstream.
5. No distinct shoreline or bank is evident between the waterbody and the wetland or upland.
6. A distinct step between the open waterbody or stream and the adjacent land exists (i.e., sharp bank) with dense roots throughout.
7. Wide wetland (>10') borders watercourse, lake, or pond.
8. High flow velocities in the wetland.
9. The watershed is of sufficient size to produce channelized flow.
10. Open water fetch is present.
11. Boating activity is present.
12. Dense vegetation is bordering watercourse, lake, or pond.
13. High percentage of energy-absorbing emergents and/or shrubs border a watercourse, lake, or pond.
14. Vegetation is comprised of large trees and shrubs that withstand major flood events or erosive incidents and stabilize the shoreline on a large scale (feet).
15. Vegetation is comprised of a dense resilient herbaceous layer that stabilizes sediments and the shoreline on a small scale (inches) during minor flood events or potentially erosive events.
16. Other

WILDLIFE HABITAT — This function considers the effectiveness of the wetland to provide habitat for various types and populations of animals typically associated with wetlands and the wetland edge. Both resident and/or migrating species must be considered. Species lists of observed and potential animals should be included in the wetland assessment report.[1]

CONSIDERATIONS/QUALIFIERS

1. Wetland is not degraded by human activity.
2. Water quality of the watercourse, pond, or lake associated with this wetland meets or exceeds Class A or B standards.
3. Wetland is not fragmented by development.
4. Upland surrounding this wetland is undeveloped.
5. More than 40% of this wetland edge is bordered by upland wildlife habitat (e.g., brushland, woodland, active farmland, or idle land) at least 500 feet in width.
6. Wetland is contiguous with other wetland systems connected by a watercourse or lake.
7. Wildlife overland access to other wetlands is present.
8. Wildlife food sources are within this wetland or are nearby.
9. Wetland exhibits a high degree of interspersion of vegetation classes and/or open water.
10. Two or more islands or inclusions of upland within the wetland are present.
11. Dominant wetland class includes deep or shallow marsh or wooded swamp.
12. More than three acres of shallow permanent open water (less than 6.6 feet deep), including streams in or adjacent to wetland, are present.
13. Density of the wetland vegetation is high.
14. Wetland exhibits a high degree of plant species diversity.
15. Wetland exhibits a high degree of diversity in plant community structure (e.g., tree/shrub/vine/grasses/mosses)
16. Plant/animal indicator species are present. (List species for project)
17. Animal signs observed (tracks, scats, nesting areas, etc.)
18. Seasonal uses vary for wildlife and wetland appears to support varied population diversity/abundance during different seasons.
19. Wetland contains or has potential to contain a high population of insects.
20. Wetland contains or has potential to contain large amphibian populations.
21. Wetland has a high avian utilization or its potential.
22. Indications of less disturbance-tolerant species are present.
23. Signs of wildlife habitat enhancement are present (birdhouses, nesting boxes, food sources, etc.).
24. Other

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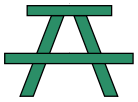
[1]In March 1995, a rapid wildlife habitat assessment method was completed by a University of Massachusetts research team with funding and oversight provided by the New England Transportation Consortium. The method is called WEThings (wetland habitat indicators for non-game species). It produces a list of potential wetland-dependent mammal, reptile, and amphibian species that may be present in the wetland. The output is based on observable habitat characteristics documented on the field data form. This method may be used to generate the wildlife species list recommended as backup information to the wetland evaluation form and to augment the considerations. Use of this method should first be coordinated with the Corps project manager. A computer program is also available to expedite this process.

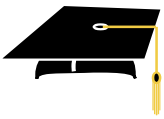
RECREATION (Consumptive and Non-Consumptive) — This value considers the suitability of the wetland and associated watercourses to provide recreational opportunities such as hiking, canoeing, boating, fishing, hunting, and other active or passive recreational activities. Consumptive opportunities consume or diminish the plants, animals, or other resources that are intrinsic to the wetland. Non-consumptive opportunities do not consume or diminish these resources of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Wetland is part of a recreation area, park, forest, or refuge.
2. Fishing is available within or from the wetland.
3. Hunting is permitted in the wetland.
4. Hiking occurs or has potential to occur within the wetland.
5. Wetland is a valuable wildlife habitat.
6. The watercourse, pond, or lake associated with the wetland is unpolluted.
7. High visual/aesthetic quality of this potential recreation site.
8. Access to water is available at this potential recreation site for boating, canoeing, or fishing.
9. The watercourse associated with this wetland is wide and deep enough to accommodate canoeing and/or non-powered boating.
10. Off-road public parking available at the potential recreation site.
11. Accessibility and travel ease is present at this site.
12. The wetland is within a short drive or safe walk from highly populated public and private areas.
13. Other

EDUCATIONAL/SCIENTIFIC VALUE — This value considers the suitability of the wetland as a site for an "outdoor classroom" or as a location for scientific study or research.



CONSIDERATIONS/QUALIFIERS

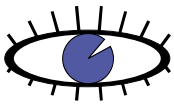
1. Wetland contains or is known to contain threatened, rare, or endangered species.
2. Little or no disturbance is occurring in this wetland.
3. Potential educational site contains a diversity of wetland classes which are accessible or potentially accessible.
4. Potential educational site is undisturbed and natural.
5. Wetland is considered to be a valuable wildlife habitat.
6. Wetland is located within a nature preserve or wildlife management area.
7. Signs of wildlife habitat enhancement present (bird houses, nesting boxes, food sources, etc.).
8. Off-road parking at potential educational site suitable for school bus access in or near wetland.
9. Potential educational site is within safe walking distance or a short drive to schools.
10. Potential educational site is within safe walking distance to other plant communities.
11. Direct access to perennial stream at potential educational site is available.
12. Direct access to pond or lake at potential educational site is available.
13. No known safety hazards exist within the potential educational site.
14. Public access to the potential educational site is controlled.
15. Handicap accessibility is available.
16. Site is currently used for educational or scientific purposes.
17. Other

UNIQUENESS/HERITAGE — This value considers the effectiveness of the wetland or its associated waterbodies to provide certain special values. These may include archaeological sites, critical habitat for endangered species, its overall health and appearance, its role in the ecological system of the area, its relative importance as a typical wetland class for this geographic location. These functions are clearly valuable wetland attributes relative to aspects of public health, recreation, and habitat diversity.

CONSIDERATIONS/QUALIFIERS

1. Upland surrounding wetland is primarily urban.
2. Upland surrounding wetland is developing rapidly.
3. More than 3 acres of shallow permanent open water (less than 6.6 feet deep), including streams, occur in wetlands.
4. Three or more wetland classes are present.
5. Deep and/or shallow marsh or wooded swamp dominate.
6. High degree of interspersion of vegetation and/or open water occur in this wetland.
7. Well-vegetated stream corridor (15 feet on each side of the stream) occurs in this wetland.
8. Potential educational site is within a short drive or a safe walk from schools.
9. Off-road parking at potential educational site is suitable for school buses.
10. No known safety hazards exist within this potential educational site.
11. Direct access to perennial stream or lake exists at potential educational site.
12. Two or more wetland classes are visible from primary viewing locations.
13. Low-growing wetlands (marshes, scrub-shrub, bogs, open water) are visible from primary viewing locations.
14. Half an acre of open water or 200 feet of stream is visible from the primary viewing locations.
15. Large area of wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
16. General appearance of the wetland visible from primary viewing locations is unpolluted and/or undisturbed.
17. Overall view of the wetland is available from the surrounding upland.
18. Quality of the water associated with the wetland is high.
19. Opportunities for wildlife observations are available.
20. Historical buildings are found within the wetland.
21. Presence of pond or pond site and remains of a dam occur within the wetland.
22. Wetland is within 50 yards of the nearest perennial watercourse.
23. Visible stone or earthen foundations, berms, dams, standing structures, or associated features occur within the wetland.
24. Wetland contains critical habitat for a state- or federally-listed threatened or endangered species.
25. Wetland is known to be a study site for scientific research.
26. Wetland is a natural landmark or recognized by the state natural heritage inventory authority as an exemplary natural community.
27. Wetland has local significance because it serves several functional values.
28. Wetland has local significance because it has biological, geological, or other features that are locally rare or unique.
29. Wetland is known to contain an important archaeological site.
30. Wetland is hydrologically connected to a state or federally designated scenic river.
31. Wetland is located in an area experiencing a high wetland loss rate.
32. Other

VISUAL QUALITY/AESTHETICS — This value considers the visual and aesthetic quality or usefulness of the wetland.



CONSIDERATIONS/QUALIFIERS

1. Multiple wetland classes are visible from primary viewing locations.
2. Emergent marsh and/or open water are visible from primary viewing locations.
3. A diversity of vegetative species is visible from primary viewing locations.
4. Wetland is dominated by flowering plants or plants that turn vibrant colors in different seasons.
5. Land use surrounding the wetland is undeveloped as seen from primary viewing locations.
6. Visible surrounding land use form contrasts with wetland.
7. Wetland views absent of trash, debris, and signs of disturbance.
8. Wetland is considered to be a valuable wildlife habitat.
9. Wetland is easily accessed.
10. Low noise level at primary viewing locations.
11. Unpleasant odors absent at primary viewing locations.
12. Relatively unobstructed sight line exists through wetland.
13. Other

ENDANGERED SPECIES HABITAT — This value considers the suitability of the wetland to support threatened or endangered species.

ES

CONSIDERATIONS/QUALIFIERS

1. Wetland contains or is known to contain threatened or endangered species.
2. Wetland contains critical habitat for a state or federally listed threatened or endangered species.

APPENDIX D. Completed Wetland Functional Assessment Forms

Wetland Function-Value Evaluation Form

Total area of wetland 0-11 acres Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Transportation corridor Distance to nearest roadway or other development 150 ft.

Dominant wetland systems present PFO1E Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin? N/A

How many tributaries contribute to the wetland? None Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland A

Latitude 42.902342 Longitude 71.361072

Prepared by: S, Large K, Ryan Date April 8, 2022

Wetland Impact:

Type _____ Area _____

Evaluation based on:

Office ✓ Field ✓

Corps manual wetland delineation completed? Y ✓ N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	N	2		
Floodflow Alteration	Y	4,5,6,9		6- not primary
Fish and Shellfish Habitat	N			
Sediment/Toxicant Retention	Y	1,2,6		
Nutrient Removal	Y	4,5		
Production Export	Y	1,2,4		
Sediment/Shoreline Stabilization	N	3		
Wildlife Habitat	Y	7,8,11,18	P	
Recreation	N			
Educational/Scientific Value	N			
Uniqueness/Heritage	N	2		
Visual Quality/Aesthetics	N			
ES Endangered Species Habitat	N			
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland ~2 acres Human made? No Is wetland part of a wildlife corridor? No or a "habitat island"? No

Adjacent land use Road Corridor, Commercial & Residential Development Distance to nearest roadway or other development 87 ft.

Dominant wetland systems present PUB3/4, PSS1, PEM1H Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? upper portion of the watershed

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland B

Latitude 42.902144 Longitude 71.359961

Prepared by: S, Large J, Foulds Date April 21, 2022

Wetland Impact:

Type _____ Area _____

Evaluation based on:

Office ✓ Field ✓

Corps manual wetland delineation completed? Y ✓ N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	N	4,7		
Floodflow Alteration	Y	4,5,6,7,8,9,10,13		7-ponded water
Fish and Shellfish Habitat	Y	1,3,4,7,10,11,16		11-culvert is barrier, ponded water is persistent, no defined channel through wetland
Sediment/Toxicant Retention	Y	1,3,4,5,9,10,12,14,15	P	3-deepwater
Nutrient Removal	Y	2,4,5,6,7		
Production Export	N	1,2,4,10,12		10-permanent outlet, 12-buttonbush
Sediment/Shoreline Stabilization	Y	1,3,4,7		
Wildlife Habitat	Y	5,6,8,9,11,16,18,21	P	Beaver hut. Connects to wetland C. 11-marsh
Recreation	N	5		
Educational/Scientific Value	N	5		RTE species unknown at time of F&V assessment
Uniqueness/Heritage	N	1,4,5,6		3 wetland classifications
Visual Quality/Aesthetics	N	8		wildlife habitat
ES Endangered Species Habitat	N			unknown
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland ~95 acres Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Road Corridor & Commercial Development Distance to nearest roadway or other development 10 ft.

Dominant wetland systems present PEM1/ PSS1 /PFO1E Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? upper portion of the watershed

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland C & D

Latitude 42.902483 Longitude 71.359083

Prepared by: S, Large J, Foulds Date April 22, 2022

Wetland Impact:

Type _____ Area _____

Evaluation based on:

Office ✓ Field ✓

Corps manual wetland delineation completed? Y ✓ N _____

Function/Value	Suitability Y / N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	N	2,4,7,15		
Floodflow Alteration	Y	1,2,4,5,6,7,8,9,13,14,16,17,18	P	
Fish and Shellfish Habitat	Y	1,4,7,10,14,15		
Sediment/Toxicant Retention	Y	1,3,4,6,8,9,10,16	P	
Nutrient Removal	Y	1,3,4,5,6,7,8,9	P	
Production Export	Y	1,2,4,7,11,12		
Sediment/Shoreline Stabilization	Y	1,3,4,7,9,12,13,15	P	
Wildlife Habitat	Y	5,7,8,11,13,18,21		
Recreation	N	5		
Educational/Scientific Value	N	5		
Uniqueness/Heritage	N	5,7,19,22		
Visual Quality/Aesthetics	N	6,8		
ES Endangered Species Habitat				unknown
Other				

Notes:

* Refer to backup list of numbered considerations.

APPENDIX E. Completed USACE Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: NHDOT Londonderry 41715 City/County: Londonderry/ Rockingham Sampling Date: 22 April 22

Applicant/Owner: NHDOT State: NH Sampling Point: C (Wet)

Investigator(s): S, Large and J, Foulds Section, Township, Range:

Landform (hillside, terrace, etc.): wetland complex/ toe slope Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Chatfield- Hollis-Canton Complex NWI classification: PEM1/SS1Eb

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No	**within a Wetland?** **Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 2.5
Water Table Present?	Yes X	No	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches):

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Large wetland complex, shallow standing water. Channelize flow through complex. Beaver activity was detected.

VEGETATION – Use scientific names of plants. Sampling Point: C (Wet)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	10	Yes	FAC
2. *Betucla papyfria*	3	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	13	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Vaccinium corymbosum*	25	Yes	FACW
2. *Acer rubrum*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	35	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex stricta*	45	Yes	OBL
2. *Onoclea sensibilis*	15	Yes	FACW
3. *Osmundastrum cinnamomeum*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	65	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Tussok sedge and cinnamon fern create mounds of vegetation where red maple and paper birch are growing from. Sensitive fern growing in areas of standing water.

SOIL

Sampling Point: C (Wet)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	7.5YR 2.5/2	100					Muck	partially decomposed organic matter; hemic
8-34	10YR 2/1	100					Loamy/Clayey	very fine sandy loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- X Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Shallow water saturated soils.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: NHDOT Londonderry 41715 City/County: Londonderry / Rockingham Sampling Date: 22 April 2022

Applicant/Owner: NHDOT State: NH Sampling Point: D (Wet)

Investigator(s): S. Large and J. Foulds Section, Township, Range:

Landform (hillside, terrace, etc.): Flat / Toe of slope Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Hinckley Loamy Sand NWI classification: PSS1/PFO1E

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No	**within a Wetland?** **Yes** X **No**
Wetland Hydrology Present?	Yes X	No	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- Saturation (A3)
- X Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- X Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- X Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No	Depth (inches): 2
Water Table Present?	Yes X	No	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: D (Wet)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	35	Yes	FAC
2. *Pinus strobus*	2	No	FACU
3.			
4.			
5.			
6.			
7.			
	37	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer rubrum*	35	Yes	FAC
2. *Spiraea alba*	1	No	FACW
3. *Vaccinium corymbosum*	30	Yes	FACW
4.			
5.			
6.			
7.			
	66	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Carex stricta*	30	Yes	OBL
2. *Onoclea sensibilis*	5	No	FACW
3. *Typha latifolia*	1	No	OBL
4. *Phalaris arundinacea*	30	Yes	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	66	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Trees and shrubs are growing on top of the tussock mounds. Mostly herbaceous vegetation such as the sensitive fern and cattail growing in the pits/ depressions around the tussocks.

SOIL

Sampling Point: D (Wet)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Muck	
4-18	10YR 2/1	100					Muck	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- X Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

Smelled hydrogen sulfide within the wetland

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: NHDOT Londonderry 41715 City/County: Londonderry/Rockingham Sampling Date: 22April 22

Applicant/Owner: NHDOT State: NH Sampling Point: C&D (UP)

Investigator(s): S, Large and J, Foulds Section, Township, Range:

Landform (hillside, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: Long: Datum:

Soil Map Unit Name: Udorthents NWI classification: not applicable

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes	No X	**within a Wetland?** **Yes** **No** X
Wetland Hydrology Present?	Yes	No X	If yes, optional Wetland Site ID:

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Inundation Visible on Aerial Imagery (B7)
- ? Sparsely Vegetated Concave Surface (B8)
- Water-Stained Leaves (B9)
- Aquatic Fauna (B13)
- Marl Deposits (B15)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres on Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- Surface Soil Cracks (B6)
- Drainage Patterns (B10)
- Moss Trim Lines (B16)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Stunted or Stressed Plants (D1)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Microtopographic Relief (D4)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes	No X	Depth (inches):
Water Table Present?	Yes	No X	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes	No X	Depth (inches):

Wetland Hydrology Present? **Yes** **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: C&D (UP)

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus strobus*	40	Yes	FACU
2. *Betchula papyrifera*	15	No	
3. *Quercus rubra*	25	Yes	FACU
4.			
5.			
6.			
7.			
	80	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Vaccinium corymbosum*	5	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
		=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	0	x 3 =	0
FACU species	65	x 4 =	260
UPL species	0	x 5 =	0
Column Totals:	70 (A)		270 (B)

Prevalence Index = B/A = 3.86

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: C&D (UP)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/2	100						organic
2 -7	10YR 3/4	100					Sandy	loamy sand
7 - 18	10YR 3/2	100					Sandy	loamy sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 7.0, 2015 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

APPENDIX F. Completed Stream Crossing Assessment Worksheets

Stream 1- Beaver Brook

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET

Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: ~461 acres

☐ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☒ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  a. The crossing would be a tier 1 stream based on contributing watershed size, or
  b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☒ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☐ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☒ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone = AE

Elevation of the 100-year floodplain at the inlet: 332 feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): CFS	Calculation method:
Estimated bankfull discharge at the crossing location: CFS	Calculation method:

Note: If tier 1, then skip to Section 10

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Bankfull Width: 10.62 feet	Mean Bankfull Depth: 1.19 feet
Bankfull Cross Sectional Area: 12.5 square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Describe the reference reach location: ~0.1mi upstream of the inlet w/in forested area

Reference reach watershed size: ~397 acres

Parameter	Cross Section 1	Cross Section 2	Cross Section 3	Range

	Describe bed form glide/ riffle (*e.g. pool, riffle, glide*)	Describe bed form riffle (*e.g. pool, riffle, glide*)	Describe bed form pool (*e.g. pool, riffle, glide*)	
Bankfull Width	7.5 feet	8.2 feet	6.8 feet	1.4 feet
Bankfull Cross Sectional Area	6.7 SF	5.7 SF	6.7 SF	1 SF
Mean Bankfull Depth	0.96 feet	0.71 feet	1.1 feet	0.39 feet
Width to Depth Ratio	7.8	11.5	5.9	5.6
Max Bankfull Depth	1.2 feet	1.0 feet	1.9 feet	0.9 feet
Flood Prone Width	41 feet	12.1 feet	40.5 feet	28.9 feet
Entrenchment Ratio	5.47	1.48	6.1	4.62

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

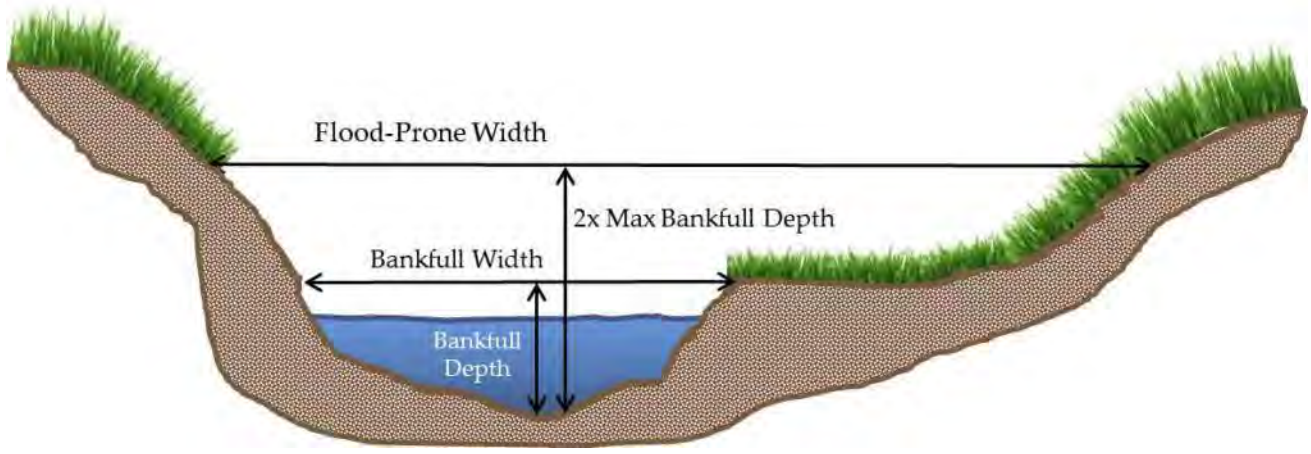


Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Average Channel Slope of the Reference Reach: ~2%	
Average Channel Slope at the Crossing Location: ~2%	
SECTION 7 - PLAN VIEW GEOMETRY Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.11	
Sinuosity of the Crossing Location: 1.58	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**1** %
% of reach that is cobble:	**26** %
% of reach that is gravel:	**45** %
% of reach that is sand:	**28** %

% of reach that is silt:	**0** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	C

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

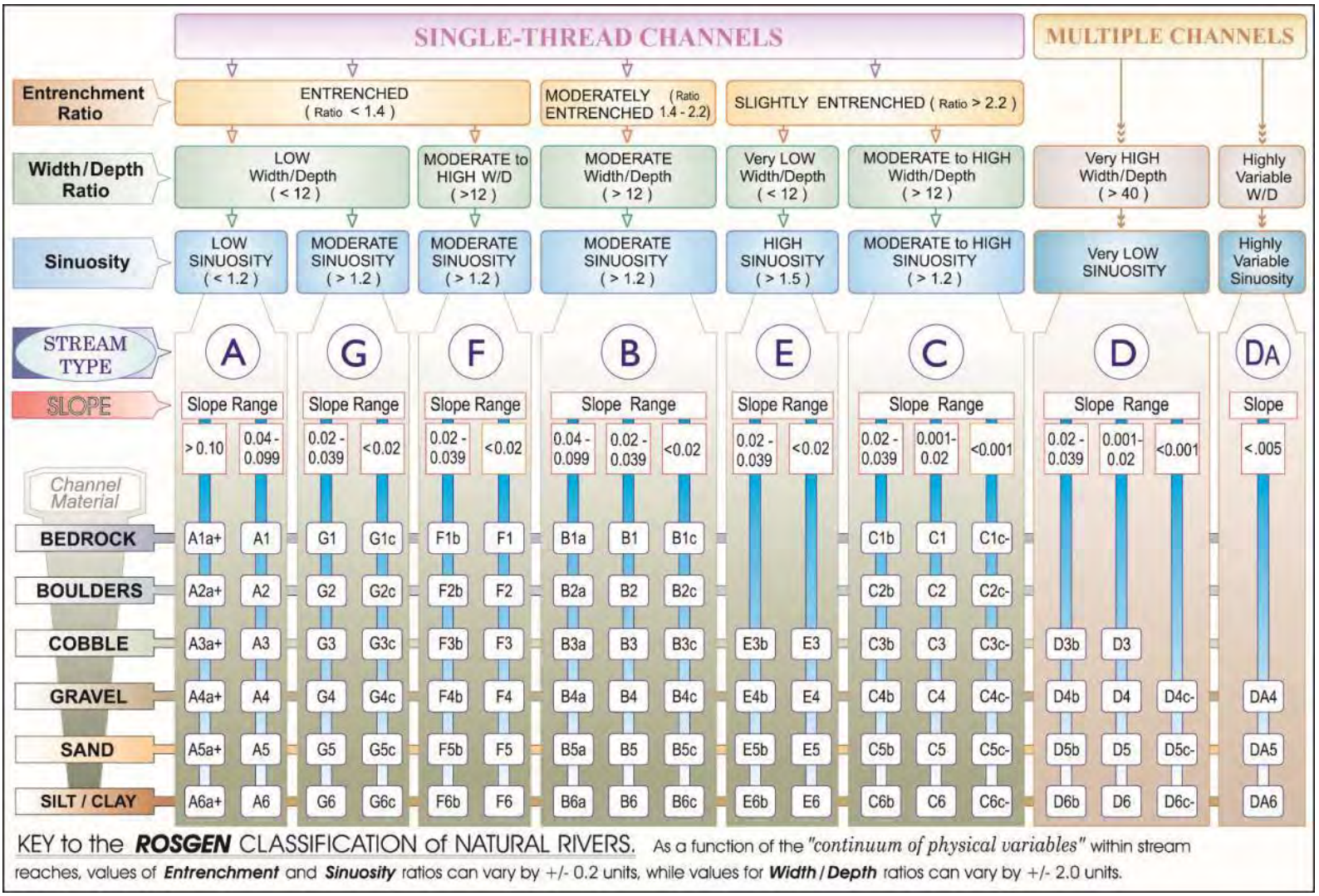


Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS			
Existing Conditions	**Existing Structure Type:**	☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:	
	Existing Crossing Span: *(perpendicular to flow)*	feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet
	Existing Crossing Length: *(parallel to flow)*	feet	**Outlet Elevation:** El. feet **Culvert Slope:**

Proposed Conditions	Proposed Structure Type:	Tier 1	Tier 2	Tier 3	Alternative Design
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet *(perpendicular to flow)*	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**			
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*				

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

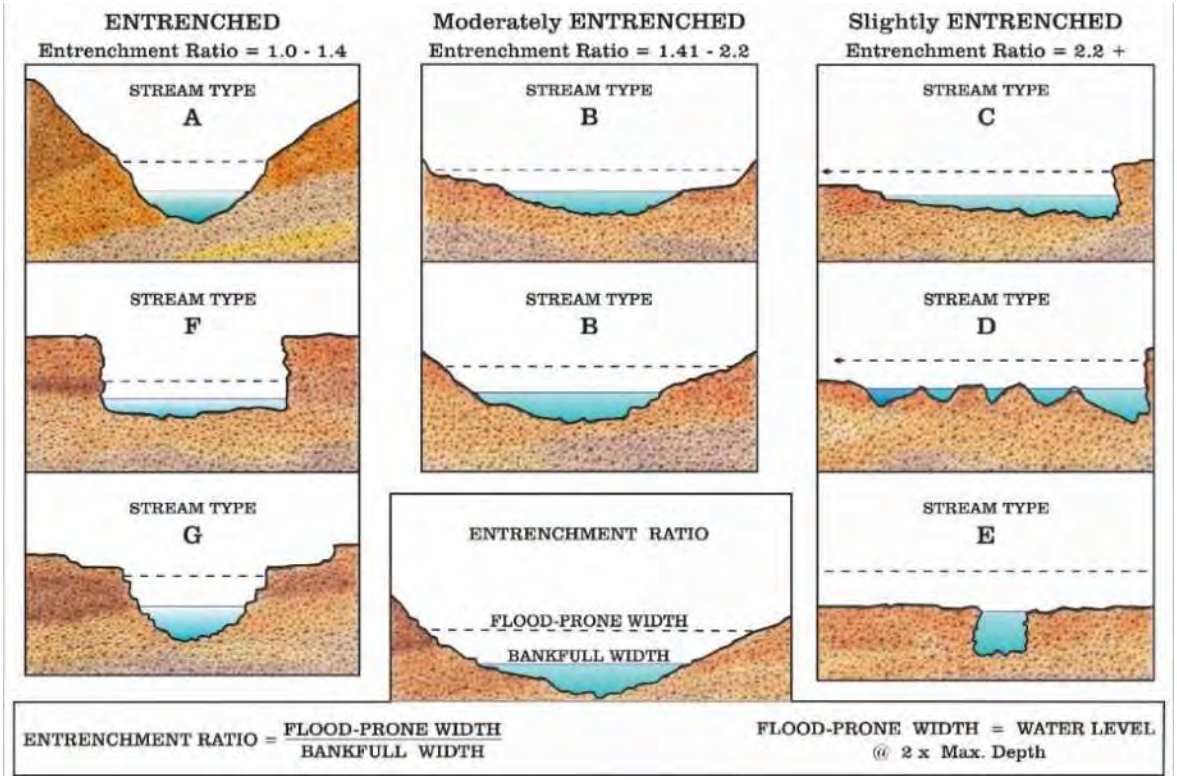


Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Crossing Structure Openness Ratio* = 0.669

* Openness box culvert = (height x width)/length
  Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

Stream 2- Unnamed Stream

WETLANDS PERMIT APPLICATION
STREAM CROSSING WORKSHEET

Water Division/Land Resources Management
Wetlands Bureau

RSA/Rule RSA 482-A/ Env-Wt-900

This worksheet can be used to accompany Wetlands Permit Applications when proposing stream crossings.

lrm@des.nh.gov or (603) 271-2147
NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
www.des.nh.gov

SECTION 1 - TIER CLASSIFICATIONS

Determine the contributing watershed size at USGS StreamStats.

Note: Plans for tier 2 and 3 crossings shall be designed and stamped by a professional engineer who is licensed under RSA 310-A to practice in New Hampshire.

Size of contributing watershed at the crossing location: *Unknown not on USGS acres

☐ **Tier 1**: A tier 1 stream crossing is a crossing located on a watercourse where the contributing watershed size is less than or equal to 200 acres.

☐ **Tier 2**: A tier 2 stream crossing is a crossing located on a watercourse where the contributing watershed size is greater than 200 acres and less than 640 acres.

☒ **Tier 3**: A tier 3 stream crossing is a crossing that meets **any** of the following criteria:

- ☐ On a watercourse where the contributing watershed is more than 640 acres.
- ☐ Within a designated river corridor unless:
  a. The crossing would be a tier 1 stream based on contributing watershed size, or
  b. The structure does not create a direct surface water connection to the designated river as depicted on the national hydrography dataset as found on GRANIT.
- ☒ Within a 100-year floodplain (see Section 2 below).
- ☐ In a jurisdictional area having any protected species or habitat (NHB DataCheck).
- ☐ In a prime wetland or within a duly-established 100-foot buffer, unless a waiver has been granted pursuant to RSA 482-A:11, IV(b) and Env-Wt 706. Review the Wetlands Permit Planning Tool (WPPT) for town prime wetland and prime wetland buffer maps to determine if your project is within these areas.

☐ **Tier 4**: A tier 4 stream crossing is a crossing located on a tidal watercourse.

SECTION 2 - 100-YEAR FLOODPLAIN

Use the FEMA Map Service Center to determine if the crossing is located within a 100-year floodplain. Please answer the questions below:

☐ **No**: The proposed stream crossing *is not* within the FEMA 100-year floodplain.

☒ **Yes**: The proposed project *is* within the FEMA 100-year floodplain. Zone = AE

Elevation of the 100-year floodplain at the inlet: 332 feet (FEMA El. or Modeled El.)

SECTION 3 - CALCULATING PEAK DISCHARGE

Existing 100-year peak discharge (Q) calculated in cubic feet per second (CFS): CFS	Calculation method:
Estimated bankfull discharge at the crossing location: CFS	Calculation method:

Note: If tier 1, then skip to Section 10

SECTION 4 - PREDICTED CHANNEL GEOMETRY BASED ON REGIONAL HYDRAULIC CURVES

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Bankfull Width: DA unknown feet	Mean Bankfull Depth: Not on USGS maps feet
Bankfull Cross Sectional Area: Not on StreamStats square feet (SF)	

SECTION 5 - CROSS SECTIONAL CHANNEL GEOMETRY: MEASUREMENTS OF THE EXISTING STREAM WITHIN A REFERENCE REACH

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Describe the reference reach location: ~0.3mi upstream of inlet west of I-93

Reference reach watershed size: Unknown; headwaters acres

Parameter	Cross Section 1	Cross Section 2	Cross Section 3	Range

	Describe bed form glide (*e.g. pool, riffle, glide*)	Describe bed form glide (*e.g. pool, riffle, glide*)	Describe bed form glide (*e.g. pool, riffle, glide*)	
Bankfull Width	6.2 feet	5.8 feet	5.4 feet	0.8 feet
Bankfull Cross Sectional Area	2 SF	1.5 SF	2.7 SF	1.2 SF
Mean Bankfull Depth	0.3 feet	0.3 feet	0.54 feet	0.24 feet
Width to Depth Ratio	18.6	19.3	10.0	8.6
Max Bankfull Depth	0.5 feet	0.4 feet	0.7 feet	0.3 feet
Flood Prone Width	45 feet	20.5 feet	42.5 feet	24.5 feet
Entrenchment Ratio	7.3	3.5	7.9	4.4

*Use **Figure 1** below to determine the measurements of the Reference Reach Attributes*

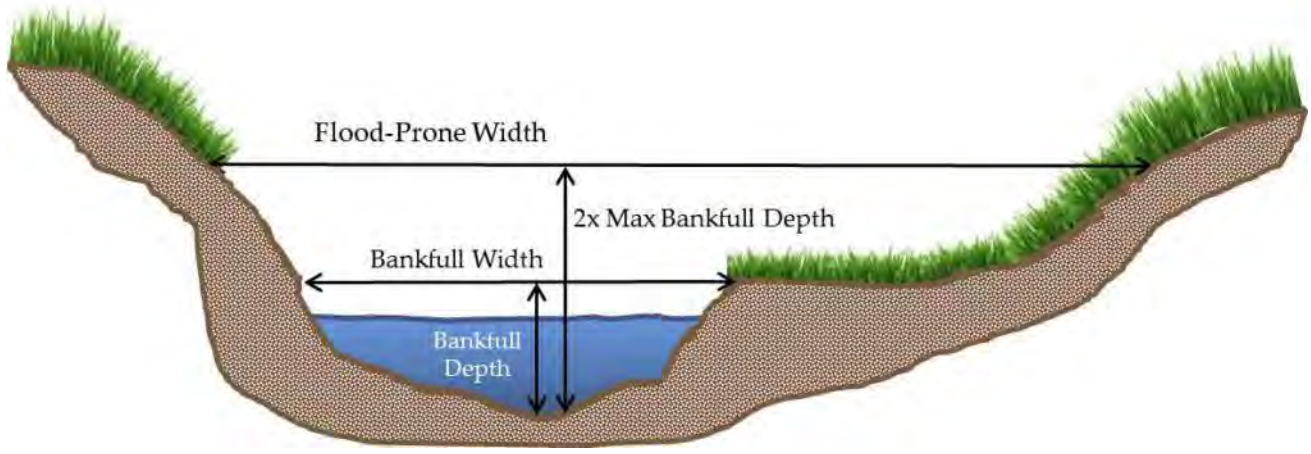


Figure 1: Determining the Reference Reach Attributes.

SECTION 6 - LONGITUDINAL PARAMETERS OF THE REFERENCE REACH AND CROSSING LOCATION *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Average Channel Slope of the Reference Reach: 1%	
Average Channel Slope at the Crossing Location: ~8%	
SECTION 7 - PLAN VIEW GEOMETRY Note: Sinuosity is measured a distance of at least 20 times bankfull width, or 2 meander belt widths. *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Sinuosity of the Reference Reach: 1.16	
Sinuosity of the Crossing Location: 3.03	
SECTION 8 - SUBSTRATE CLASSIFICATION BASED ON FIELD OBSERVATIONS *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
% of reach that is bedrock:	**0** %
% of reach that is boulder:	**0** %
% of reach that is cobble:	**3** %
% of reach that is gravel:	**32** %
% of reach that is sand:	**13** %

% of reach that is silt:	**52** %
SECTION 9 - STREAM TYPE OF REFERENCE REACH *For **tier 2**, **tier 3** and **tier 4** crossings only.*	
Stream Type of Reference Reach:	C

*Refer to Rosgen Classification Chart (**Figure 2**) below:*

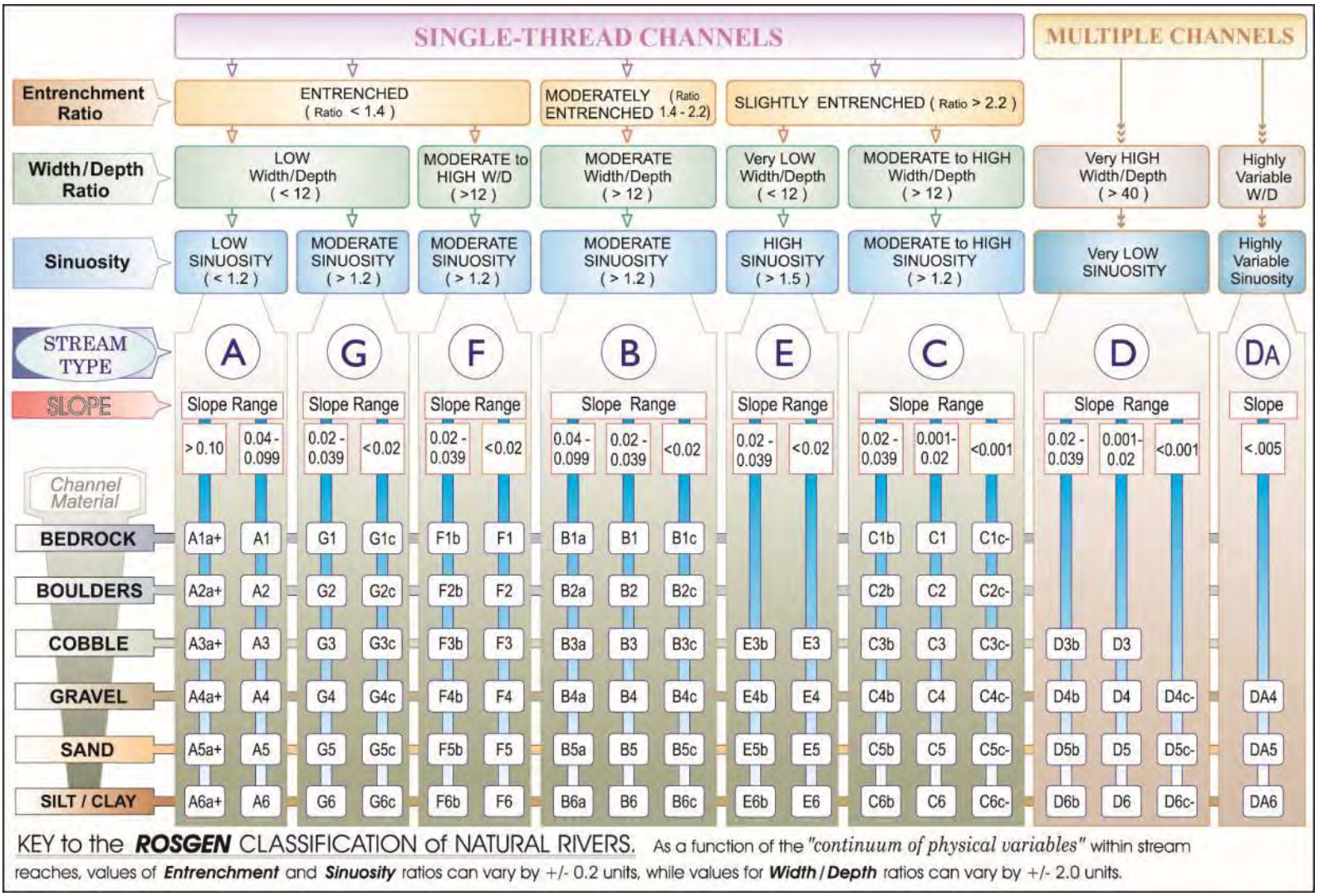


Figure 2: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 10 - CROSSING STRUCTURE METRICS			
Existing Conditions	**Existing Structure Type:**	☐ Bridge span ☐ Pipe arch ☐ Open-bottom culvert ☐ Closed-bottom culvert ☐ Closed-bottom culvert with stream simulation ☐ Other:	
	Existing Crossing Span: *(perpendicular to flow)*	feet	**Culvert Diameter:** feet **Inlet Elevation:** El. feet
	Existing Crossing Length: *(parallel to flow)*	feet	**Outlet Elevation:** El. feet **Culvert Slope:**

Proposed Conditions	Proposed Structure Type:	Tier 1	Tier 2	Tier 3	Alternative Design
	Bridge Span	☐	☐	☐	☐
	Pipe Arch	☐	☐		☐
	Closed-bottom Culvert	☐	☐		☐
	Open-bottom Culvert	☐	☐	☐	☐
	Closed-bottom Culvert with stream simulation	☐	☐	☐	☐
	Proposed Structure Span: feet *(perpendicular to flow)*	**Culvert Diameter:** feet **Inlet Elevation:** El. feet			
	Proposed Structure Length: feet *(parallel to flow)*	**Outlet Elevation:** El. feet **Culvert Slope:**			
	Proposed Entrenchment Ratio:* *For **Tier 2**, **Tier 3** and **Tier 4** Crossings Only. To accommodate the entrenchment ratio, floodplain drainage structures may be utilized.*				

** Note: Proposed Entrenchment Ratio must meet the minimum ratio for each stream type listed in **Figure 3**, otherwise the applicant must address the Alternative Design criteria listed in Env-Wt 904.10.*

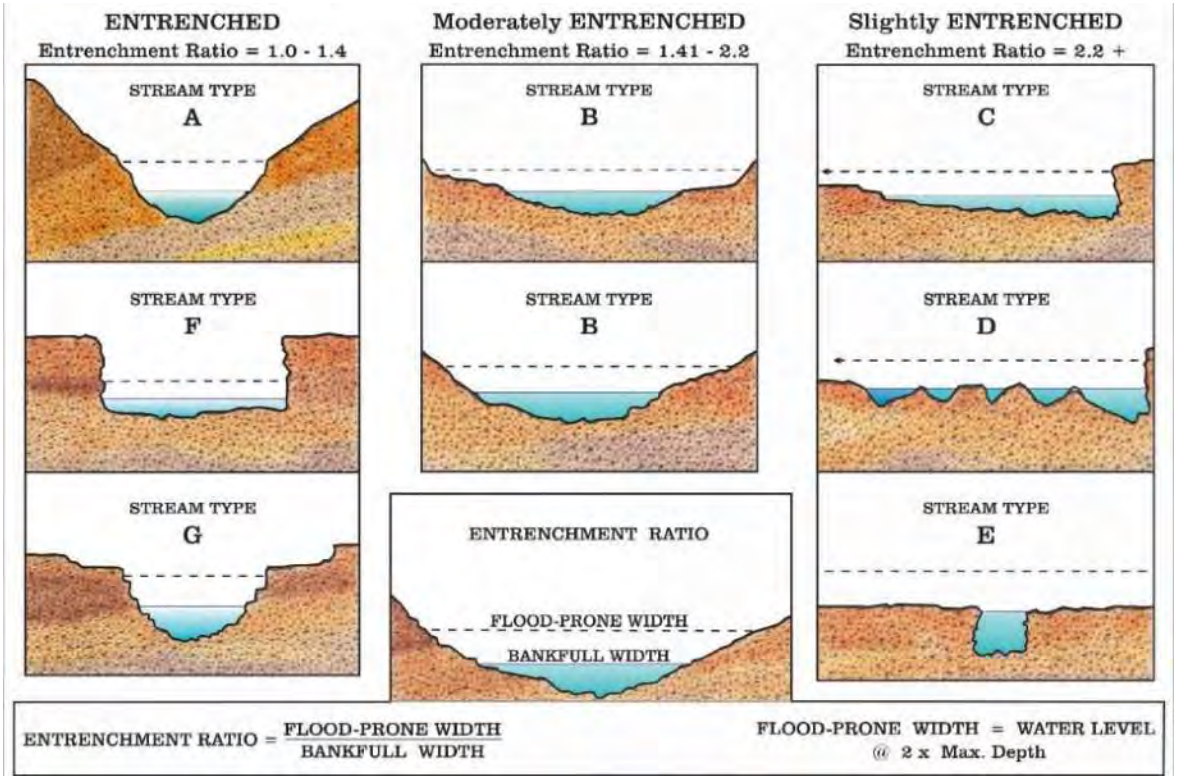


Figure 3: Reference from Applied River Morphology, Rosgen, 1996.

SECTION 11 - CROSSING STRUCTURE HYDRAULICS		
	Existing	**Proposed**
100 year flood stage elevation at inlet:		
Flow velocity at outlet in feet per second (FPS):		
Calculated 100 year peak discharge (Q) for the *proposed* structure in CFS:		
Calculated 50 year peak discharge (Q) for the *proposed* structure in CFS:		

SECTION 12 - CROSSING STRUCTURE OPENNESS RATIO

*For **tier 2**, **tier 3** and **tier 4** crossings only.*

Crossing Structure Openness Ratio* = 0.23

* Openness box culvert = (height x width)/length
  Openness round culvert = (3.14 x radius^2)/length

SECTION 13 - GENERAL DESIGN CONSIDERATIONS

Env-Wt 904.01 requires all stream crossings to be designed and constructed according to the following requirements. Check each box if the project meets these general design considerations.

All stream crossings shall be designed and constructed so as to:

- ☐ Not be a barrier to sediment transport.
- ☐ Prevent the restriction of high flows and maintain existing low flows.
- ☐ Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.
- ☐ Not cause an increase in the frequency of flooding or overtopping of banks.
- ☐ Maintain or enhance geomorphic compatibility by:
  a. Minimizing the potential for inlet obstruction by sediment, wood, or debris, and
  b. Preserving the natural alignment of the stream channel.
- ☐ Preserve watercourse connectivity where it currently exists.
- ☐ Restore watercourse connectivity where:
  a. Connectivity previously was disrupted as a result of human activity(ies), and
  b. Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both.
- ☐ Not cause erosion, aggradation, or scouring upstream or downstream of the crossing.
- ☐ Not cause water quality degradation.

SECTION 14 - TIER-SPECIFIC DESIGN CRITERIA

Stream crossings must be designed in accordance with the tier specific design criteria listed in Part Env-Wt 904.

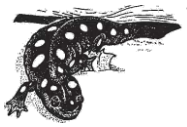
- ☐ The proposed project meets the tier specific design criteria listed in Part Env-Wt 904 and each requirement has been addressed in the plans and as part of the wetland application.

SECTION 15 - ALTERNATIVE DESIGN

NOTE: If the proposed crossing does not meet all of the general design considerations, the tier specific design criteria, or the minimum entrenchment ratio for each given stream type listed in **Figure 3**, then an alternative design plan and associated requirements must be addressed pursuant to Env-Wt 904.10.

- ☐ I have submitted an alternative design and addressed each requirement listed in Env-Wt 904.10.

APPENDIX G. Completed NH Fish and Game Department NH Vernal Pool Documentation Form



New Hampshire Vernal Pool Documentation Form

Purpose: This form is to provide a way to collect appropriate information necessary to document the presence of a vernal pool or potential vernal pool in New Hampshire. It is also appropriate to use this form to document the *absence* of certain physical and, especially, biological characteristics to describe a pool or depression within a wetland that may not meet the definition of a vernal pool.

I. Observer Contact information

Observer name	Kevin Ryan & Sarah Large
Observer phone #:	(207) 221-6699
Observer email	sarahl@fbenvironmental.com
Observer Mailing address:	383, Central Avenue, Suite 267, Dover, NH 03820

II. Location and Owner Identification

Town: Londonderry	
Property name (if applicable):	
Location Description/ Property street address: Forest along Rockingham Road (NH Rt 28) just south of the intersection with Stonehendge Road.	
Vernal Pool Coordinates *Coordinates obtained by GPS or other means. Report in degrees minutes seconds or decimal degrees: Latitude 43.2164 Longitude -71.5192. Datum: Use NAD83 or WGS84 for all coordinates*	Latitude: 42.902 Longitude: -71.361
Source of coordinates: (circle one): GPS unit, Google Maps/Google Earth, Topo map, other	Tax map and lot # (if known):
Is observation on public land? Yes / No	Landowner permission obtained? Yes / No
Landowner name (if known)	
Landowner address (if different than property address)	
Landowner phone or email	

Note: Provide a map that shows property and location of vernal pool (tax map/ USGS)

Vernal Pool Site Name: Wetland A - Pool 1

Project affiliation
- ☐ None
- ☐ Harris Center/AVEO
- ☐ Town _____
- ☐ Consultant
- ☐ Other _____

III. Survey Information

Date of survey:	8 April, 12 May 2022	**Visit # (for season):**2 Visits	**1** **2** 3 4 ___
Survey start time:	11 : 30 **am** /pm	**Survey end time:**	2 : 00 **am /pm**
Air temperature (F):	First Visit: 52 degrees F; Second Visit: 61 degrees F		

Weather/Other Comments: provide any information about precipitation, cloud cover, wind, humidity, ice cover, etc here: Visit 1: Heavy rain previous night. Light rain ended prior to surey. No ice present.
Visit 2: Warm spring day. No recent precipitation.

IV. Vernal Pool Description

Photos: 1-3 photographs of vernal pool taken and provided with datasheet Yes / No

Pool characteristics

Vernal pool type (choose most appropriate description)

- ☐ Upland-isolated pool (not associated with a larger wetland)
- ☐ Wetland complex (pool within or associated with a larger wetland habitat, such as red maple swamp, marsh pond edge.
- ☐ Floodplain pool

Origin of pool (select one)

- ☐ Unknown
- ☐ Natural depression
- ☐ Natural, but altered
- ☐ Small pond / constructed pond
- ☐ Quarry/sand pit excavation
- ☐ Ditch along road or rut from vehicle
- ☐ Created wetland/ pool (such as for wetland mitigation purposes)
- ☐ Other: _____

Pool size (dimensions): 111 feet X 78 feet (Area of open water in the pool depression)

If round, measure diameter; if long and narrow, provide length and width dimensions.

(check one): ☐Measured ☐Paced ☐Estimated ☐Other: GIS

How long does the vernal pool hold water? (Hydroperiod)

- ☐ Seasonal (drying out entirely in most years)
- ☐ Semi-permanent (drying partially in most years)
- ☐ Permanent (Typically maintains water)
- ☐ Unknown

Maximum water depth on survey date

- ☐ < 6 inches (ankle deep)
- ☐ 6 inches – 1 foot (shin deep)
- ☐ 1 - 2 feet (knee deep)
- ☐ 2 - 3 feet (hip deep)
- ☐ 3 - 4 feet (chest deep)
- ☐ > 4 feet

Pool Outlet: Did you observe water flowing out of the pool on this date? **Y / N**

Overstory/Shading of vernal pool depression

(Overstory is trees, shrubs, and associated limbs and leaves that block sunlight from penetrating the pool surface)

- ☐ Mostly shaded by trees (> 50%)
- ☐ Less shaded by trees (< 50%)
- ☐ Shaded only by vegetation **in** the pool (such as shrubs)

Vegetation in Pool (vernal pool depression)
Check (X) ***Vegetation type and proportion of vegetation <u>in the pool</u>*** *(percent coverage) that can provide egg attachment or offer concealment to aquatic or developing larvae.*

Vegetation type	**Percent coverage of pool by vegetation *in the pool***		
	<10%	**10-50%**	**>50%**
Shrubs	**X**		
Emergent vegetation (Grasses, sedges, rushes, cattails)			
Submergent vegetation			

Are **dead branches and downed woody material** (branches/twigs) available in pool for egg attachment?
(Select one category) ☐**None** ☐**1 - 10** ☐**greater than 10**

Pool substrate (select all that apply)
☐ Leaf litter
☐ Sand/gravel
☐ Muck
☐ Bedrock
☐ Other: _____

Disturbance to vernal pool observed (select all that apply)
Observe any disturbance to the pool (direct or indirect by siltation, for example)
☐ Dumping
☐ Ditching/draining
☐ Ruts from wheeled vehicles
☐ Runoff /siltation from human sources
☐ Other: stone berm failing and stones falling into wetland
☐ None

Surrounding habitat (within 100 feet of the pool)

Check habitat type and select/circle appropriate percentage

☐ Forest (< 10%, 10-50%, > 50%)
☐ Open (shrublands, agriculture, grassland, etc.) (< 10%, 10-50%, > 50%)
☐ Wetlands (< 10%, 10-50%, > 50%)
☐ Open water (lakes/ponds, rivers/streams) (< 10%, 10-50%, > 50%)
☐ Residential (lawn, little amount of pavement/structures) (< 10%, 10-50%, > 50%)
☐ Industrial/Urban (mostly pavement and structures)(< 10%, 10-50%, > 50%)
☐ Paved Roads/driveways (< 10%, 10-50%, > 50%)
☐ Unpaved roads/driveways (< 10%, 10-50%, > 50%)

Describe any disturbance observed in the 100 foot area around the pool: Road is within 100' of wetland A

V. Survey for vernal pool fauna (amphibians and macroinvertebrates)

NOTE: Provide photographs when possible.

Species information - Primary Vernal Pool Indicators

Species observed	Adults			Egg masses (#)		Tadpoles, Salamander Larvae and Transforming Juveniles	
	Seen #	Courtship/ amplexus (Y/N)	Heard Y/N	Counted	Estimated	Tadpole/ Larvae estimated	#Transforming juveniles (#)
Wood frog	None		N	None	None	None	None
Spotted salamander	↓		NA	↓	↓	↓	↓
Marbled salamander	↓		NA	↓	↓	↓	↓
Blue spotted/ Jefferson salamander	↓		NA	↓	↓	↓	↓
Mole salamander (unknown species)	↓		NA	↓	↓	↓	↓
Fairy shrimp	↓	NA	NA	NA	NA	NA	NA

Record **other amphibian and reptile species** observed (such as spring peepers, etc.):

Species observed	Adults			Egg masses (#)		Tadpoles, Salamander Larvae and Transforming Juveniles	
	Seen #	Courtship/ amplexus (Y/N)	Heard Y/N	Counted)	Estimated	Tadpole/ Larvae estimated	#Transforming juveniles (#)

Was entire pool surveyed for egg masses? Yes/ No If Yes, what percent of the pool? 100%

(If the entire pool was not surveyed, is any part of the pool on an adjacent property? (Y/N)

Sampling methods used during your survey (check all that apply):

- ☐ Visual search
- ☐ Audible detection (Recorded: : Yes / No)
- ☐ Dip net
- ☐ Trapping
- ☐ None (incidental observation)

Were **spermatophores** observed (see photo right) ? Yes / No

Were **fish** observed in the pool? Yes / No

No secondary indicator species were detected during field visits

Secondary vernal pool indicators - Invertebrates

During or after amphibian breeding season, there are other organisms whose presence or remains (larval cases, exuviae, or shells) indicate the presence of a vernal pool. These organisms are considered secondary vernal pool indicators.

The families or groups listed in the following table are among those **secondary vernal pool indicators** under the New Hampshire wetlands rules (Env-Wt 100). Additional species (family or groups) may qualify as secondary vernal pool indicators, hence blank spaces are provided to enter other species you observe.

Macroinvertebrate Common name of group	Common name of family members	Macroinvertebrate family	Observed? (X)	Photo?
Caddisfly larvae or cases	Unknown type	Unknown type		
	Northern caddisflies	Limnephilidae		
	Giant case makers	Phryganeidae		
	Tube or trumpet caddisflies	Polycentropodidae		
Clam shrimp or shells	Unknown type	Unknown type		
	Clam shrimp	Laevicaudata		
	Clam shrimp	Spinicaudata		
Fingernail clams or shells	Fingernail clams	Sphaeriidae		
Aquatic beetle larvae	Unknown type	Unknown type		
	Diving beetle	Dytiscidae		
	Whirligig beetle	Gyrinidae		
	Crawling water beetle	Haliplidae		
	Water scavenger beetle	Hydrophilidae		
Dragonfly larvae or exuviae	Unknown type	Unknown type		
	Darners	Aeshnidae		
	Skimmers	Libellulidae		
Damselfly larvae or exuviae	Unknown type	Unknown type		
	Narrow-winged damselflies	Coenagrionidae		
	Spread-winged dragonflies	Lestidae		
True fly larvae or pupae	Unknown type	Unknown type		
	Mosquitoes	Culicidae		
	Phantom midges	Chaoboridae		
	Non-biting midges	Chironomidae		
Spire-shaped snails or shells	Unknown type	Unknown type		
	Tadpole snails or pouch snails	Physidae		
	Pond snails or limpets	Lymnaeidae		
Flat-spire snails or shells	Wheel snails, orb snail, or ram's horn snails	Planorbidae		
Other*:				
Other*:				

Completed datasheets can be submitted to NH Wildlife Sightings at: http://nhwildlifesightings.unh.edu/ or mailed to NH Fish & Game Department, Nongame & Endangered Wildlife Program, 11 Hazen Drive, Concord NH 03301.

NH Vernal Pool Documentation Instructions

Sections:

I. Observer Contact Information
II. Location and Owner Identification
III. Survey Information
IV. Vernal Pool Description
V. Survey for Vernal Pool Fauna (amphibians and macroinvertebrates)

The **Vernal Pool Documentation Form** is used to record observations made during visits to a vernal pool or potential vernal pool. Your data can be submitted to NH Fish and Game, entered in the Wildlife Sightings online system, as well as used locally to inform your town's conservation efforts.

A minimum of two visits to a site are recommended -- one in the spring during breeding periods of amphibian indicator species (late March – early May) and a second visit a month or more later as the pool is drying. If you find a pool late in the season or are unable to make more than one visit, document the results of your survey at that time. Larval cases, exuviae, or shells of some secondary vernal pool indicators can be found when the pool is dry and used to document the presence of the indicator species and the vernal pool.

We encourage observers to fill in as many fields as they have information for. However, data may still be valuable if datasheets are only partially filled out. For example, if you didn't measure water depth or pool size but recorded the presence of fairy shrimp, this is valuable information.

I. Observer Contact Information

- Provide your **name** (as the observer) and contact information, including email address, in the appropriate spaces.

II. Location and Owner Identification

- In the **Location** section, provide basic information about the **location** of the vernal pool – town, street address (if possible), tax map and lot number of the property. If you are not the landowner, indicate if the landowner is known and whether permission was obtained.
- In addition to location descriptions and maps, location-specific data (such as a point location) is valuable. If a GPS unit is available, your location can be recorded as latitude and longitude in various formats (degrees, minutes, seconds, decimal degrees). The **datum of the GPS unit** should be set to NAD83, or record the datum (such as WGS 84). If a GPS unit is not available, latitude/longitude coordinates can be obtained from some online map services, such as Google Maps or Google Earth. If you have a smart phone with location capabilities enabled, record your location and indicate what phone and software was used to obtain the location. If you are taking photos with your smart phone (or some digital cameras), the location information may be captured with each photo you take. Indicate if that is the source of the location information.
- Vernal Pool Site Name – This is used for reference; use unique name for every pool identified. Exact pools previously identified on a different date should use same Site Name.
- If you are conducting the survey as part of a project sponsored by the town or another organization, provide that information. If the vernal pool has been assigned an ID number or name by another organization, enter that information as the site name.
- Provide a sketch/field map of the pool in addition to other maps to illustrate the pool location.
- Photos of the pool, surrounding habitat and animals found are encouraged. Indicate if photos are being provided or available.

III. Survey Information

- Provide the **date** of your visit and the **Survey Start Time** and **Survey End Time** of your search at the pool.
- Note whether this is your **first or a subsequent visit (Visit #)** documenting the resources of the pool this season. More than one visit to a pool is recommended to observe the pool from its high water to its drying stage.
- Record **weather** information such as **air temperature**, precipitation, humidity, cloud cover, wind, ice cover.

IV. Vernal Pool Description

Pool characteristics

- Identify the **vernal pool type.** Is the pool isolated and in an upland, part of a wetland complex or within a floodplain? Choose the best option.
- Identify the **origin of the pool**, if it is known. Options include “unknown” and “other” (with explanation).
- Determine **pool size** (area of open water) by measuring the pool, pacing the perimeter or estimating the size (at each visit). Indicate if size is estimated or measured. If you are using a GPS unit, you may be able to record your tracks around the pool (if that is possible), or you could take point measurements and connect them to determine size. The accuracy of your GPS may not be appropriate to measure smaller pools, so estimating the size would be good backup information for any GPS-based distance measurements you collect.
- Provide information about the **hydroperiod of the vernal pool**. If this is the first time you are visiting the pool, can select ‘unknown’ and report on the hydroperiod after your next visit to the pool.
- Measure and record the **maximum water depth** during each visit, according to the increments and descriptions provided.
- Identify whether or not there is an **outlet** to the pool, and if present, did you observe water flowing out of it during today’s visit?
- Identify to what extent the pool is *shaded* by **overstory** vegetation (more than 50% or less than 50%).
- Observe and estimate the type of **vegetation** (shrub, emergent, etc.) and proportion of the pool covered by vegetation. This is limited to the vegetation in the pool that can provide surfaces for egg attachment or conceal developing aquatic larvae.
- Observe and estimate the amount of **dead and downed woody material** (branches/twigs) available in pool for egg attachment? Select one category, none, 1-10, or greater than 10.
- Identify the **pool substrate** (choose more than one, as necessary).
- As you approach the pool, observe and record the type(s) of **surrounding habitat** and land use that surround the pool -- within 100 feet of the pool. Select more than one type as appropriate. For example, if half of the pool is within a forested area and the other half is within 100 feet of a residential lot with managed lawn select the 10-50% category for both of those habitat/land use types.
- Note if you observe any **disturbance to the pool**, or if no disturbance was observed.

V. Survey for Vernal Pool Fauna (amphibians and macroinvertebrates)

In addition to breeding amphibians that use vernal pools, you will be looking for aquatic macroinvertebrates.

Primary Vernal Pool Indicators – Amphibians and Fairy Shrimp

- During the breeding season you will be looking for and recording information about species that require the habitat of vernal pools as part of their life cycle. These species are referred to as **primary vernal pool indicators.** Record your observations about the type and number of these animals that you hear or see – whether in egg, larval or adult form – in the table.
- If you observe other amphibian and reptiles, record them in the table that follows the primary vernal pool indicators.
- If you hear chorusing wood frogs, you may obtain an audio recording and submit a digital audio file of the full chorus -- where calls are constant, continuous and overlapping -- as evidence of breeding.
- Indicate how much of the vernal pool was surveyed for egg masses. If you were not able to survey the entire pool, indicate if it is the result of the pool occupying an adjacent property when no landowner permission was obtained.
- Identify the sampling methods that you used during your survey.
- Indicate if you observed spermatophores (sperm packets deposited by male mole salamanders)
- Indicate if you observed any fish.

Secondary Vernal Pool Indicators – Invertebrates Only
There are additional macroinvertebrates, other than **fairy shrimp**, that use vernal pools. By definition in the NH Department of Environmental Services wetland rules, without the presence of a primary vernal pool indicator, at least **three** of these secondary vernal pool indicators need to be identified to consider a pool a "vernal pool." Note that some of these may also be identified outside of the amphibian breeding season, and even after a pool has dried. Document whatever you observe. You may find that additional resources may be needed to identify the macroinvertebrates you find. Collect a macroinvertebrate specimen in vernal pool water. Long term preservation may be done in 70% rubbing alcohol.

You may observe other species that are not listed in the table on the form but are in the vernal pools, and record them on the form.

- Record species observed, both primary and secondary vernal pool indicator species.
- Record the species and indicate whether what was observed was living larvae or "remnants" were present (shells or exuviae).

VI. Documentation - Photographic and Otherwise

As you observe the habitat pool characteristics and animal species, take photos to document your observations. Depending on when your survey(s) occur(s), you may observe empty shells (of fingernail clams and clam shrimp), exuviae (of damsel and dragonfly larvae), or larval cases (caddisfly) -- all of them document the vernal pool's wetter stage. Photographing these secondary invertebrate indicators is important and collecting them for further identification may be considered. As many amphibians and reptiles, and their egg and larval stages can be easily misidentified, it is important to provide photographs whenever possible.

Reporting Your Observations

You have collected valuable information. The data on this form may be entered directly into Wildlife Sightings, an online tool for capturing observations at vernal pool and of other wildlife (http://nhwildlifesightings.unh.edu). If you are not using **NH Wildlife Sightings**, submit data forms, maps, photos and associated information to the Nongame and Endangered Wildlife Program at the **N.H. Fish and Game Department** and your **town Conservation Commission**, if appropriate.

Thank you for taking the time identify these valuable natural resources of New Hampshire!

NH Fish and Game Department
11 Hazen Drive, Concord, NH
http://www.wildlife.state.nh.us

NH Department of Environmental Services - Wetlands Bureau
PO Box 95, 29 Hazen Drive, Concord, NH
http://des.nh.gov

Photo 1. View north from the southern boundary of the pool 1. Photo taken 8 April 2022).

Photo 2. View east towards Pool 1. Photo taken 8 April 2022.

Photo 3. View south from the northern boundary of the pool. Photo taken 8 April 2022).

Photo 4. View west toward the pool. Photo taken 8 April 2022.

Photo 5. The outlet of Pool 1 Photo taken 8 April 2022.

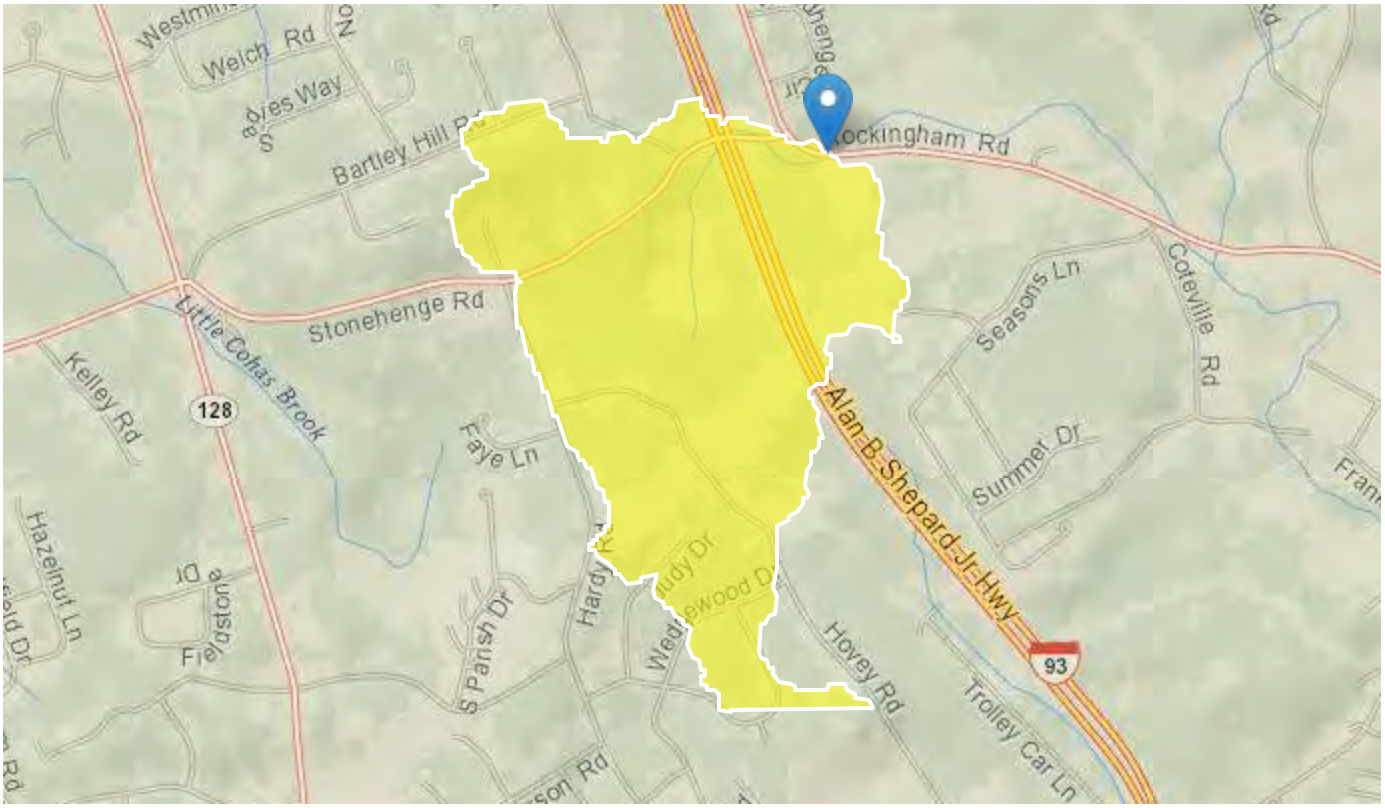
Photo 2. A scoured channel directs flow from Pool 1 towards and under Rockingham Road. Photo taken 8 April 2022.

Photo 3. View northwest toward Pool 1. Photo taken 12 May 2022.

Photo 4. View west toward Pool 1. Photo taken 12 May 2022.

StreamStats Report

Region ID: NH
Workspace ID: NH20240212195732461000
Clicked Point (Latitude, Longitude): 42.90223, -71.35921
Time: 2024-02-12 14:57:55 -0500



Beaver Brook

Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
APRAVPRE	Mean April Precipitation	3.838	inches
BSLDEM30M	Mean basin slope computed from 30 m DEM	5.588	percent
CONIF	Percentaqe of land surface covered by coniferous forest	12.4766	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	78.1	feet per mi
DRNAREA	Area that drains to a point on a stream	0.72	square miles
ELEVMAX	Maximum basin elevation	533.383	feet
MINTEMP_W	Mean winter minimum air temperature over basin surface area	15.621	degrees F
MIXFOR	Percentage of land area covered by mixed deciduous and coniferous forest	7.3271	percent
PREBC0103	Mean annual precipitation of basin centroid for January 1 to March 15 winter period	7.36	inches
PREBC_1112	Mean annual precipitation of basin centroid for November 1 to December 31 period	7.87	inches
PRECIPCENT	Mean Annual Precip at Basin Centroid	41.4	inches
PRECIPOUT	Mean annual precip at the stream outlet (based on annual PRISM precip data in inches from 1971-2000)	41.5	inches
PREG_03_05	Mean precipitation at gaging station location for March 16 to May 31 spring period	8.5	inches
PREG_06_10	Mean precipitation at gaging station location for June to October summer period	17.7	inches
SNOFALL	Mean Annual Snowfall	61.012	inches
TEMP	Mean Annual Temperature	46.58	degrees F
TEMP_06_10	Basinwide average temperature for June to October summer period	62.708	degrees F
WETLAND	Percentage of Wetlands	7.751	percent

Peak-Flow Statistics

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

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	0.7	1290
APRAVPRE	Mean April Precipitation	3.838	inches	2.79	6.23
WETLAND	Percent Wetlands	7.751	percent	0	21.8
CSL10_85	Stream Slope 10 and 85 Method	78.1	feet per mi	5.43	543

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

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PIL	PIU	ASEp	Equiv. Yrs.
50-percent AEP flood	22.5	ft^3/s	13.7	36.9	30.1	3.2
20-percent AEP flood	39.5	ft^3/s	23.7	65.8	31.1	4.7
10-percent AEP flood	54.4	ft^3/s	32	92.5	32.3	6.2
4-percent AEP flood	75.6	ft^3/s	42.9	133	34.3	8
2-percent AEP flood	93.7	ft^3/s	51.5	170	36.4	9
1-percent AEP flood	116	ft^3/s	61.6	218	38.6	9.8
0.2-percent AEP flood	172	ft^3/s	84	352	44.1	11

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/)

Low-Flow Statistics

Low-Flow Statistics Parameters [Low Flow Statewide]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	3.26	689
TEMP	Mean Annual Temperature	46.58	degrees F	36	48.7
PREG_06_10	Jun to Oct Gage Precipitation	17.7	inches	16.5	23.1

Low-Flow Statistics Disclaimers [Low Flow Statewide]

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

Low-Flow Statistics Flow Report [Low Flow Statewide]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.0183	ft^3/s
7 Day 10 Year Low Flow	0.00438	ft^3/s

Low-Flow Statistics Citations

Flynn, R.H. and Tasker, G.D.,2002, Development of Regression Equations to Estimate Flow Durations and Low-Flow-Frequency Statistics in New Hampshire Streams: U.S.Geological Survey Scientific Investigations Report 02-4298, 66 p. (http://pubs.water.usgs.gov/wrir02-4298)

Flow-Duration Statistics

Flow-Duration Statistics Parameters [Low Flow Statewide]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	3.26	689

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PREG_06_10	Jun to Oct Gage Precipitation	17.7	inches	16.5	23.1
TEMP	Mean Annual Temperature	46.58	degrees F	36	48.7

Flow-Duration Statistics Disclaimers [Low Flow Statewide]

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

Flow-Duration Statistics Flow Report [Low Flow Statewide]

Statistic	Value	Unit
60 Percent Duration	0.312	ft^3/s
70 Percent Duration	0.188	ft^3/s
80 Percent Duration	0.0916	ft^3/s
90 Percent Duration	0.0373	ft^3/s
95 Percent Duration	0.0196	ft^3/s
98 Percent Duration	0.0104	ft^3/s

Flow-Duration Statistics Citations

Flynn, R.H. and Tasker, G.D.,2002, Development of Regression Equations to Estimate Flow Durations and Low-Flow-Frequency Statistics in New Hampshire Streams: U.S.Geological Survey Scientific Investigations Report 02-4298, 66 p. (http://pubs.water.usgs.gov/wrir02-4298)

Seasonal Flow Statistics

Seasonal Flow Statistics Parameters [Low Flow Statewide]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	3.26	689
CONIF	Percent Coniferous Forest	12.4766	percent	3.07	56.2

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PREBC0103	Jan to Mar Basin Centroid Precip	7.36	inches	5.79	15.1
BSLDEM30M	Mean Basin Slope from 30m DEM	5.588	percent	3.19	38.1
MIXFOR	Percent Mixed Forest	7.3271	percent	6.21	46.1
PREG_03_05	Mar to May Gage Precipitation	8.5	inches	6.83	11.5
TEMP	Mean Annual Temperature	46.58	degrees F	36	48.7
TEMP_06_10	Jun to Oct Mean Basinwide Temp	62.708	degrees F	52.9	64.4
PREG_06_10	Jun to Oct Gage Precipitation	17.7	inches	16.5	23.1
ELEVMAX	Maximum Basin Elevation	533.383	feet	260	6290

Seasonal Flow Statistics Disclaimers [Low Flow Statewide]

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

Seasonal Flow Statistics Flow Report [Low Flow Statewide]

Statistic	Value	Unit
Jan to Mar15 60 Percent Flow	0.468	ft^3/s
Jan to Mar15 70 Percent Flow	0.39	ft^3/s
Jan to Mar15 80 Percent Flow	0.336	ft^3/s
Jan to Mar15 90 Percent Flow	0.242	ft^3/s
Jan to Mar15 95 Percent Flow	0.189	ft^3/s
Jan to Mar15 98 Percent Flow	0.154	ft^3/s
Jan to Mar15 7 Day 2 Year Low Flow	0.326	ft^3/s
Jan to Mar15 7 Day 10 Year Low Flow	0.169	ft^3/s
Mar16 to May 60 Percent Flow	1.23	ft^3/s
Mar16 to May 70 Percent Flow	0.985	ft^3/s
Mar16 to May 80 Percent Flow	0.866	ft^3/s
Mar16 to May 90 Percent Flow	0.676	ft^3/s

Statistic	Value	Unit
Mar16 to May 95 Percent Flow	0.545	ft^3/s
Mar16 to May 98 Percent Flow	0.428	ft^3/s
Mar16 to May 7 Day 2 Year Low Flow	0.447	ft^3/s
Mar16 to May 7 Day 10 Year Low Flow	0.235	ft^3/s
Jun to Oct 60 Percent Flow	0.0582	ft^3/s
Jun to Oct 70 Percent Flow	0.0393	ft^3/s
Jun to Oct 80 Percent Flow	0.026	ft^3/s
Jun to Oct 90 Percent Flow	0.0142	ft^3/s
Jun to Oct 95 Percent Flow	0.0086	ft^3/s
Jun to Oct 98 Percent Flow	0.00688	ft^3/s
Jun to Oct 7 Day 2 Year Low Flow	0.0177	ft^3/s
Jun to Oct 7 Day 10 Year Low Flow	0.00425	ft^3/s
Nov to Dec 60 Percent Flow	0.582	ft^3/s
Nov to Dec 70 Percent Flow	0.414	ft^3/s
Nov to Dec 80 Percent Flow	0.288	ft^3/s
Nov to Dec 90 Percent Flow	0.168	ft^3/s
Nov to Dec 95 Percent Flow	0.0976	ft^3/s
Nov to Dec 98 Percent Flow	0.0517	ft^3/s
Oct to Nov 7 Day 2 Year Low Flow	0.281	ft^3/s
Oct to Nov 7 Day 10 Year Low Flow	0.0882	ft^3/s

Seasonal Flow Statistics Citations

Flynn, R.H. and Tasker, G.D.,2002, Development of Regression Equations to Estimate Flow Durations and Low-Flow-Frequency Statistics in New Hampshire Streams: U.S.Geological Survey Scientific Investigations Report 02-4298, 66 p. (http://pubs.water.usgs.gov/wrir02-4298)

Bankfull Statistics

Bankfull Statistics Parameters [Appalachian Highlands D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	0.07722	940.1535

Bankfull Statistics Parameters [New England P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	3.799224	138.999861

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Appalachian Highlands D Bieger 2015]

Statistic	Value	Unit
Bieger_D_channel_width	13.3	ft
Bieger_D_channel_depth	1.02	ft
Bieger_D_channel_cross_sectional_area	13.7	ft^2

Bankfull Statistics Disclaimers [New England P Bieger 2015]

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

Bankfull Statistics Flow Report [New England P Bieger 2015]

Statistic	Value	Unit
Bieger_P_channel_width	23	ft
Bieger_P_channel_depth	1.28	ft
Bieger_P_channel_cross_sectional_area	29.3	ft^2

Bankfull Statistics Flow Report [USA Bieger 2015]

Statistic	Value	Unit
Bieger_USA_channel_width	11	ft
Bieger_USA_channel_depth	1.12	ft
Bieger_USA_channel_cross_sectional_area	14.3	ft^2

Bankfull Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Bieger_D_channel_width	13.3	ft
Bieger_D_channel_depth	1.02	ft
Bieger_D_channel_cross_sectional_area	13.7	ft^2
Bieger_P_channel_width	23	ft
Bieger_P_channel_depth	1.28	ft
Bieger_P_channel_cross_sectional_area	29.3	ft^2
Bieger_USA_channel_width	11	ft
Bieger_USA_channel_depth	1.12	ft
Bieger_USA_channel_cross_sectional_area	14.3	ft^2

Bankfull Statistics Citations

Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G.,2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p. (https://digitalcommons.unl.edu/usdaarsfacpub/1515?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1515&utm_medium=PDF&utm_

Recharge Statistics

Recharge Statistics Parameters [Groundwater Recharge Statewide 2004 5019]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIPOUT	Mean Annual Precip at Gage	41.5	inches	35.83	53.11
TEMP	Mean Annual Temperature	46.58	degrees F	36.05	48.69

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
MINTEMP_W	Mean Winter Min Temperature	15.621	degrees F	0.8	19.88
CONIF	Percent Coniferous Forest	12.4766	percent	3.07	56.18
PREG_03_05	Mar to May Gage Precipitation	8.5	inches	6.83	11.54
SNOFALL	Mean Annual Snowfall	61.012	inches	54.46	219.07
PREG_06_10	Jun to Oct Gage Precipitation	17.7	inches	16.46	23.11
MIXFOR	Percent Mixed Forest	7.3271	percent	6.21	46.13
PREBC_1112	Nov to Dec Basin Centroid Precip	7.87	inches	6.57	15.2
PRECIPCENT	Mean Annual Precip at Basin Centroid	41.4	inches	37.44	75.91

Recharge Statistics Flow Report [Groundwater Recharge Statewide 2004 5019]

PIL: Lower 90% Prediction Interval, PIU: Upper 90% Prediction Interval, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
GW_Recharge_Jan_to_Mar15	5.27	in	15.5
GW_Recharge_Mar16_to_May	6.93	in	12.4
GW_Recharge_Jun_to_Oct	3.19	in	26.5
GW_Recharge_Nov_to_Dec	3.7	in	15.8
GW_Recharge_Ann	20.3	in	12.4

Recharge Statistics Citations

Flynn, R.H. and Tasker, G.D.,2004, Generalized Estimates from Streamflow Data of Annual and Seasonal Ground-Water-Recharge Rates for Drainage Basins in New Hampshire, U.S. Geological Survey Scientific Investigations Report 2004-5019, 67 p. (http://pubs.usgs.gov/sir/2004/5019/)

Maximum Probable Flood Statistics

Maximum Probable Flood Statistics Parameters [22.0 Percent (0.156 square

miles) Crippen Bue Region 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	0.1	10000

Maximum Probable Flood Statistics Parameters [78.0 Percent (0.568 square miles) Crippen Bue Region 2]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.72	square miles	0.1	3000

Maximum Probable Flood Statistics Flow Report [22.0 Percent (0.156 square miles) Crippen Bue Region 1]

Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	2560	ft^3/s

Maximum Probable Flood Statistics Flow Report [78.0 Percent (0.568 square miles) Crippen Bue Region 2]

Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	4460	ft^3/s

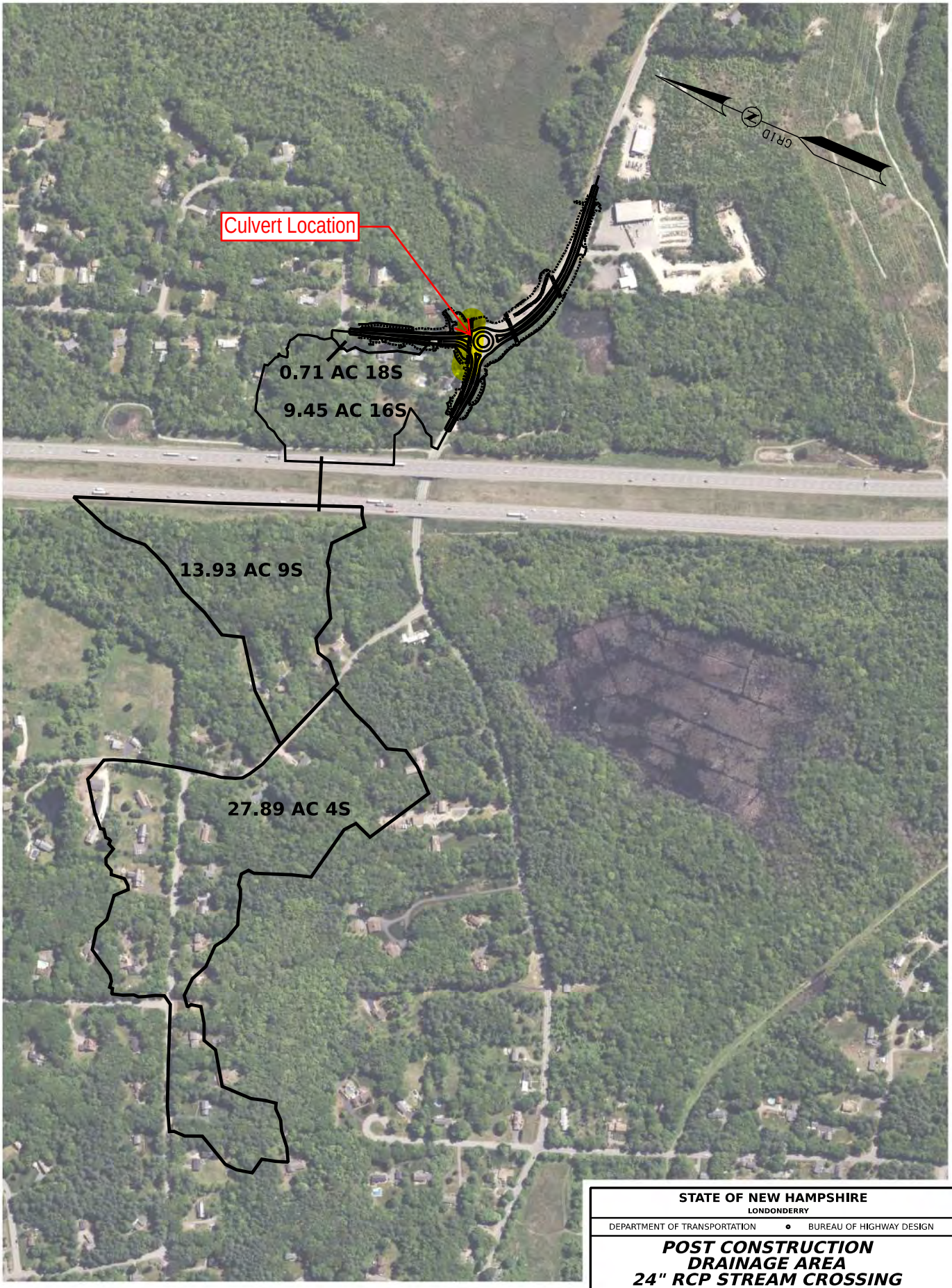
Maximum Probable Flood Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	4040	ft^3/s

Maximum Probable Flood Statistics Citations

Crippen, J.R. and Bue, Conrad D.1977, Maximum Floodflows in the Conterminous United States, Geological Survey Water-Supply Paper 1887, 52p. (https://pubs.usgs.gov/wsp/1887/report.pdf)

Application Version: 4.19.4
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1



STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN

POST CONSTRUCTION DRAINAGE AREA 24" RCP STREAM CROSSING

MODEL	DGN	STATE PROJECT NO.	SHEET NO.	SHEET TOTAL
Default	41715_POST_Watershed	41715	1	1

NHB DataCheck Results Letter
NH Natural Heritage Bureau
Please note: maps and NHB record pages are **confidential** and shall be redacted from public documents.

To: Rebecca Martin, NH DOT
7 Hazen Drive PO Box 483
Concord, NH 03302
rebecca.a.martin@dot.nh.gov

From: NHB Review
NH Natural Heritage Bureau
Main Contact: Ashley Litwinenko - nhbreview@dncr.nh.gov

cc: NHFG Review

Date: 06/06/2023 (valid until 06/06/2024)
Re: DataCheck Review by NH Natural Heritage Bureau and NH Fish & Game
Permits: NHDES - Wetland Standard Dredge & Fill - Major, USACE - General Permit, USCEQ - Federal: NEPA Review

NHB ID: NHB23-1685

Town: Londonderry
Location: Route 28 and Stonehenge

Project Description: Londonderry 41715, NHB21-3738 Intersection improvement project- the roundabout option has been selected. A stormwater swale is also proposed, as well as drainage improvements and culvert replacements.

Next Steps for Applicant:

NHB's database has been searched for records of rare species and exemplary natural communities. Please carefully read the comments and consultation requirements below.

NHB Comments: Based on a survey performed by Benjamin Griffith in 2022, the proposed project area was searched for Nuttall's reed grass and none was found. As long as the survey encompassed all proposed impact areas of suitable habitat, NHB has no further concerns regarding this proposed project.

NHFG Comments: Please refer to NHFG consultation requirements below.

NHB Consultation

If this NHB DataCheck letter includes records of rare plants and/or natural communities/systems, please contact NHB and provide any requested supplementary materials by emailing nhbreview@dncr.nh.gov.

If this NHB DataCheck letter DOES NOT include any records of rare plants and/or natural communities/systems, no further consultation with NHB is required.

NH Fish and Game Department Consultation

If this NHB DataCheck letter DOES NOT include ANY wildlife species records, then, based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

If this NHB DataCheck letter includes a record for a threatened (T) or endangered (E) wildlife species, consultation with the New Hampshire Fish and Game Department under Fis 1004 may be required. To review the Fis 1000 rules (effective February 3, 2022), please go to https://wildlife.state.nh.us/wildlife/environmental-review.html. All requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent by mail, and **must include the NHB DataCheck results letter number and "Fis 1004 consultation request" in the subject line**.

If the NHB DataCheck response letter does not include a threatened or endangered wildlife species but includes other wildlife species (e.g., Species of Special Concern), consultation under Fis 1004 is not required; however, some species are protected under other state laws or rules, so coordination with NH Fish & Game is highly recommended or may be required for certain permits. While some permitting processes are exempt from required consultation under Fis 1004 (e.g., *statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule*), coordination with NH Fish & Game may still be required under the rules governing those specific permitting processes, and it is recommended you contact the applicable permitting agency. For projects not requiring consultation under Fis 1004, but where additional coordination with NH Fish and Game is requested, please email NHFGreview@wildlife.nh.gov, and include the NHB DataCheck results letter number and "review request" in the email subject line. **Contact NH Fish & Game at (603) 271-0467 with questions.**

NHB DataCheck Results Letter
NH Natural Heritage Bureau
Please note: maps and NHB record pages are **confidential** and shall be redacted from public documents.

NHB Database Records:
The following record(s) have been documented in the vicinity of the proposed project.
Please see the map and detailed information about the record(s) on the following pages.

Plant species	**State[1]**	**Federal**	**Notes**
Nuttall's reed grass (*Calamagrostis coarctata*)	E	--	

Vertebrate species	**State[1]**	**Federal**	**Notes**
Banded Sunfish (*Enneacanthus obesus*)	SC	--	Contact the NH Fish & Game Dept (see above).
Blanding's Turtle (*Emydoidea blandingii*)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Box Turtle (*Terrapene carolina carolina*)	E	--	Contact the NH Fish & Game Dept (see below).
Jefferson/Blue-spotted Salamander Complex (*Ambystoma pop. 3*)	--	--	Contact the NH Fish & Game Dept (see above).
Northern Black Racer (*Coluber constrictor constrictor*)	T	--	Contact the NH Fish & Game Dept (see above).
Redfin Pickerel (*Esox americanus americanus*)	SC	--	Contact the NH Fish & Game Dept (see above).
Spotted Turtle (*Clemmys guttata*)	T	--	Contact the NH Fish & Game Dept (see below).

[1]Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list.
An asterisk (*) indicates that the most recent report for that occurrence was 20 or more years ago.

For all animal reviews, refer to 'IMPORTANT: NHFG Consultation' section above.

Disclaimer: NHB's database can only tell you of known occurrences that have been reported to NHFG/NHB. Known occurrences are based on information gathered by qualified biologists or members of the public, reported to our offices, and verified by NHB/NHFG.
However, many areas have never been surveyed, or have only been surveyed for certain species.
NHB recommends surveys to determine what species/natural communities are present onsite.

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

November 2, 2022

Andrew O'Sullivan, Wetlands Program Manager
New Hampshire Department of Transportation
PO Box 483 | 7 Hazen Drive
Concord, NH 03302-0483

Re: Nuttall's reedgrass survey, NHDOT Project 41715 Londonderry
NHDOT Task Order #NAI2203
Statewide Wetlands Services 43757

Dear Mr. O'Sullivan:

As requested by the New Hampshire Natural Heritage Bureau, Normandeau reviewed the area of potential effects (Study Area, Attachment A) for the NHDOT 41715 project in Londonderry for Nuttall's reed grass (*Calamagrostis coarcta* syn. *Calamagrostis cinnoides*) on August 29, 2022. All potential habitat within the project area was reviewed. No Nuttall's reed grass was observed in the project area.

On August 29, 2022 I reviewed the Study Area for Nuttall's Reed grass. Nuttall's Reed grass is a perennial grass most similar to Canada reed grass (*Calamagrostis canadensis*) and neglected reed grass (*Calamagrostis stricta*). Nuttall's reed grass approaches the northern edge of its range in New Hampshire, and most occurrences are found in the southeastern part of the state. It is a habitat generalist, occurring in a variety of open wetland habitats, and its rarity appears to be primarily range limited in New Hampshire. The species typically fruits in late summer, with plants reaching maturity between August and October. The entire Study Area was walked slowly and grasses within the Study Area were closely examined to locate species in the genus *Calamagrostis*. If any *Calamagrostis* grasses were found, they were reviewed under magnification in the field to determine the species. Special attention was given to habitats more likely to support Nuttall's reed grass, including wetlands and drainage features. If plants could not be identified readily in the field, they were collected for laboratory identification. A GPS capable of submeter accuracy was used to locate any potential observations of Nuttall's reed grass.

Wetlands within the project area were typically tall-shrub or forested wetlands, and were therefore not ideal habitat for this species. A ditch running along the north side of NH Route 28 was the sole emergent wetland observed within the project area. Common herbaceous species located within wetlands in the project area included purple loosestrife (*Lythrum salicaria*), reed canary grass (*Phalaris arundicacea*), Canada reed grass,rice cut grass (*Leersia oryzoides*), and sensitive fern (*Onoclea sensibilis*). Nuttall's reed grass was not located in the Study Area. Canada reed grass (*Calamagrostis canadensis*) was found in four locations within the Study Area (Photos 1 and 2). In all four instances, the plants were initially suspected to be Canada reed grass on account of the smaller florets typical of this species. Identification was confirmed in the field by the location of the awn on the lemma. In Canada reed grass the awn extends from the basal half of the lemma, while in Nuttall's reed grass the awn extends from the distal portion of the lemma (Photo 3). All plants were readily identified under magnification in the field based on these characteristics and no plants were collected as a result.

If you have any questions, or require additional information about the results of this survey, please do not hesitate to contact me, either by email at bgriffith@normandeau.com or by phone at 603-637-1136.

Sincerely,
NORMANDEAU ASSOCIATES INC.

Benjamin Griffith, NHCWS
Senior Wetland Scientist

ATTACHMENT A

STUDY AREA

Woodhenge Circle

NH Route 28

Stonehenge Rd

I-93 Northbound

Photo 1

Photos 2 and 3

F.W. Webb Company

Pic Home Pros

41715 Londonderry
Area of Potential Effects

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

ATTACHMENT B

PHOTOS

Photo 1. *Calamagrostis canadensis* (foreground) growing in a ditch along NH Route 28.

Photo 2. *Calamagrostis canadensis* in an emergent wetland along NH Route 28.

Photo 3. Detail of *Calamagrostis canadensis* inflorescence. The awn originating at the base of the lemma is visible on the floret in the center of the photo.

ATTACHMENT C

RESUME

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

BENJAMIN P. GRIFFITH

Wetland Scientist/Wildlife Biologist

Mr. Griffith is a Certified Wetland Scientist and wildlife biologist with fourteen years of professional experience conducting various natural resource studies. He has a diverse set of wetlands and wildlife skills including wetland delineations, vertebrate and invertebrate fauna surveys, botanical surveys, and habitat assessments. In addition to his field skills, he has experience producing technical reports, permit applications, and GIS-based graphics.

EDUCATION

B.A, Biology, University of Rochester, Rochester, NY, Cum Laude

PROFESSIONAL EXPERIENCE

2014-Present	Normandeau Associates
2012-2013	New Earth Ecological Consulting
2011	Normandeau Associates, Inc.
2009-2011	University of Vermont, Research and Teaching Assistantship
2008-2009	Smithsonian Institution
2008	United States Geological Survey

PROFESSIONAL CERTIFICATIONS

- NH Certified Wetland Scientist #298
- Cybertracker Level I Track and Sign

PROFESSIONAL AFFILIATIONS

- NH Association of Natural Resource Scientists

REPRESENTATIVE PROJECT EXPERIENCE

P106 Line Structure and OPGW Replacement Project, Eversource Energy (2022-Present). Normandeau is supporting Eversource's upgrade of sixteen structures on the existing P106 line in Goffstown and Manchester, New Hampshire. Mr. Griffith led a team of Normandeau botanists to respond to a survey request from the NH NHB and documented numerous occurrences of NH State-listed plant species; Normandeau assisted with in-depth coordination with NH NHB and recommended favorable Best Management Practices that allowed for the project to commence while protecting the identified plant species. Botanist.

Portsmouth Sewer Permitting, NH. Woodard and Curran (2022-Present). Woodard and Curran requested Normandeau's assistance with permitting remediation to Portsmouth's existing sewer system. Mr. Griffith conducted natural resource surveys in preparation of permit submissions, including wetland delineations and conducted rare threatened and endangered species surveys as requested by New Hampshire Natural Heritage Bureau. Mr. Griffith documented four new occurrences of three listed species in the project area. Wetland Scientist.

Errol Dam Relicensing, Brookfield White Pine Hydro, NH-ME (2018-Present). Brookfield is relicensing this 2 MW hydroelectric project through FERC's Integrated Licensing Process. Normandeau is providing terrestrial services for wetland mapping, rare and invasive plant species surveys, bats, odonates (dragonflies), mussels and incidental wildlife observations on Project-affected lands surrounding Lake Umbagog, its tributaries and the tailwaters in the Androscoggin River. Normandeau developed the Preliminary and Revised Study Plans, participated in stakeholder meetings, and conducted two years of field studies. Mr. Griffith was the task lead for odonate surveys and was also responsible for assessing habitat of listed wildlife within the project area and assisted with rare plant surveys. Wildlife Biologist.

Essex No. 19 Hydroelectric Project, FERC Relicensing, Green Mountain Power (GMP) (2021-Present). As Normandeau's Lead Botanist, Mr. Griffith participated in rare, threatened and endangered (RTE) botanical surveys as part of a larger effort to support GMP's FERC Relicensing of the existing Essex No. 19 Hydroelectric Project in Chittenden County, Vermont. Normandeau has completed the development of study plans, and teamed with local experts to complete one season of RTE vascular and non-vascular plant surveys within the project area, including the powerhouse, bypassed reach, recreation areas and 7 mile long impoundment. Normandeau's team has completed the Initial Study Report (ISR) and participated in the ISR Meeting with stakeholders. Botanist.

NORMANDEAU ASSOCIATES
ENVIRONMENTAL CONSULTANTS

Bulls Bridge and Falls Village Critical Habitat Monitoring, FirstLight Power Resources, Northwestern CT (2016-2019). Normandeau implemented a FERC license requirement of long-term monitoring and management recommendations for 26 listed rare plant and terrestrial invertebrate species including Northern Metalmark occurring within the study limits of two hydroelectric projects on the Housatonic River. Normandeau's efforts included establishing permanent sampling plots, annual sampling, and active habitat management of canopy thinning and control of multiple woody invasive species. Botanist.

Vineyard Golf Club, Edgartown, MA (2017-2018). The Vineyard Golf Club is required to monitor for and manage invasive species within a buffer zone to rare species habitat on the golf club property. Mr. Griffith has conducted semi-annual monitoring efforts followed by summary reports including photographs and GIS mapping of invasive species populations. He also conducted a training program for golf course personnel in the identification and proper management techniques for the most prevalent invasive plant, spotted knapweed. Botanist

Biodiversity Assessments. Veolia Energy North America Holdings, Inc., MA, CT, AZ, GA, CA, TX, LA, and WI (2017-Present). Normandeau is conducting biodiversity assessments for Veolia operating sites throughout the United States. Mr. Griffith visited and developed species lists at nine sites in Massachusetts, Georgia, California, Louisiana, Texas, and Wisconsin, including assessment of sites for the potential to support rare, threatened and endangered species. He also contributed to reports and recommended opportunities for increasing biodiversity. Wildlife Biologist

Industri-Plex Superfund Site Remediation, Industri-plex Site Remedial Trust, Woburn, MA (2015). The Industri-plex Superfund Site was contaminated with arsenic, chromium, and other contaminants associated with its long tanning and manufacturing history. Remediation included sediment capping in wetlands and soil capping in uplands to reduce contaminant exposure for plants and wildlife. Mr. Griffith conducted wetland vegetation sampling at the site. Wetland Scientist.

Biodiversity Assessments. Veolia Energy North America Holdings, Inc., MA, GA, CA, TX, LA, and WI (2017-Present). Normandeau is conducting biodiversity assessments for Veolia operating sites throughout the United States. Mr. Griffith visited and developed species lists at nine sites in Massachusetts, Georgia, California, Louisiana, Texas, and Wisconsin, including assessment of sites for the potential to support rare, threatened and endangered species. He also contributed to reports and recommended opportunities for increasing biodiversity. Wildlife Biologist.

Dover Landfill Superfund Site Remediation, Dover Landfill Remedial Trust, Dover, NH (2015-Present). The 50-acre Dover Landfill Superfund Site required both sediment and groundwater remediation for arsenic and other contaminants. Mr. Griffith conducted wetland vegetation sampling at permanently established plots to document the changes in vegetation within the remediation area after restoration. Wetland Scientist.

Mitigation Monitoring, Pease Development Authority, NH (2015-2016). As mitigation for wetland impacts during golf course construction, Pease Development Authority was required to restore four wetland areas within their golf course. Mr. Griffith was responsible for monitoring these restoration sites, including determining plant survivorship and invasive species monitoring. Botanist

Invasive Species Monitoring, Enel Green Power North America, Lee, MA (2016). Enel Green Power North America is required to monitor invasive species as one of the conditions of its FERC license for operation of the Glendale Hydroelectric Dam. Mr. Griffith was responsible for identifying and mapping populations of invasive terrestrial and aquatic plants in the project area. Botanist.

Brown, Joshua

From: Newton, Kevin
Sent: Friday, April 12, 2024 1:37 PM
To: Martin, Rebecca
Cc: FGC: NHFG review; Brown, Joshua; Sullivan, Kevin
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Rebecca,

I was able to review these recommendations this afternoon. I support their inclusion in the wetland permit application and have no further comment at this time.

Thank you for your attention to this.

Have a good weekend.

Kevin Newton
Wildlife Biologist
NH Fish and Game Department
Wildlife Division
11 Hazen Drive, Concord NH 03301
Phone: 603-271- 5860

From: Newton, Kevin
Sent: Wednesday, April 10, 2024 12:41 PM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Sullivan, Kevin <Kevin.M.Sullivan@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Good afternoon Rebecca,

I wanted to acknowledge that I received your email. I was away all of last week and have had a few appointments this week. I will review and reply as soon as possible as I catch up.

Thanks,

Kevin Newton
Wildlife Biologist
NH Fish and Game Department
Wildlife Division
11 Hazen Drive, Concord NH 03301
Phone: 603-271- 5860

New Hampshire Fish and Game requirements for environmental review consultation can be found at: https://gencourt.state.nh.us/rules/state_agencies/fis1000.html. ALL requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent hardcopy by mail. **The NHB datacheck results letter number needs to be included in the email subject line to read as "NHB*xx-xxxx_Project Name*_FIS 1004 Consultation Submittal".**

The requirements for consultation (Fis 1004) shall not apply to the following: statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule. Review requests for these projects or other project types should be submitted to NHFGreview@wildlife.nh.gov or can be sent hardcopy by mail – email or mail subject line for these review requests should read **"NHBxx-xxxx_Project Name_ Env. Review Request".**

Please provide shapefiles/KMZ/KMLs of the project site (and relevant features if applicable) with your submittal. Review statements provided in the NHB Datacheck Results letter for additional guidance.

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Wednesday, April 10, 2024 11:50 AM
To: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Sullivan, Kevin <Kevin.M.Sullivan@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Hi Kevin,

Josh Brown is working towards submitting the Londonderry 41715 wetlands permit application, hopefully this week. He asked me for the latest on the conservation recommendations to include in the application. Below are the recommendations, with the NH DOT requested alterations, that I have on file. Please let me know if any of these are different than what you expect. Thank you for your assistance.

Best wishes,
Rebecca

- Blanding's Turtle (State endangered), Eastern Box Turtle (State endangered), Northern Black Racer (state threatened), and Spotted Turtle (state threatened) occur within the vicinity of the project area. Site operators shall be informed of the potential presence of these species and shall be provided flyers that help to identify these species along with NHFG contact information.
- Rare species information (e.g. identification, observation and reporting of observations, when to contact NHFG immediately and NHFG contact information) shall be communicated during the project's preconstruction meeting prior to work and rare species flyers shall be included on the project's bulletin board. The rare species commitments shall be included in the project's Summary of Environmental Issues and the rare species flyers shall be included in the project's contract.
- Northern Black Racers shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Brendan Clifford (603-944-0885). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.
- Turtles may be attracted to disturbed ground during nesting season (May 15th – June 30th). All turtle species nests are protected by NH laws. If a nest is observed or suspected, operators shall contact Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802) at NHFG immediately for further consultation.
- Sightings of Eastern box shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.
- Catch basin grate size shall be reduced to 2.5" by 2.5" within the project area.
- Impacts to wetlands shall be in accordance with recommendations from NHDES Wetlands Bureau.
- Wetland impacts shall be minimized and buffers to wetlands are encouraged to be included in project designs when possible.
- Staging of construction equipment and materials shall be located as far away from wetlands as practicable. The staging area shall be visually surveyed for rare snakes and turtles. Immediately after the visual survey is conducted, the area shall be enclosed with siltation fence to prevent wildlife from entering. This area shall remain enclosed at all times, except for when equipment is being moved in or out of the enclosed area.

- Improvements to the existing drainage shall incorporate equally sized or larger culverts than currently exist on site. CMP's, RCP's, or box culverts shall be utilized in place of HDPE culverts to facilitate the passage of small fish, amphibians, or turtles.
- All manufactured erosion and sediment control products, with the exception of turf reinforcement mats, utilized for, but not limited to, slope protection, runoff diversion, slope interruption, perimeter control, inlet protection, check dams, and sediment traps shall not contain plastic, or multifilament or monofilament polypropylene netting or mesh with an opening size of greater than 1/8 inches;
- All observations of threatened or endangered species on the project site shall be reported immediately to the NHFG nongame and endangered wildlife environmental review program by phone at 603-271-2461 and by email at NHFGreview@wildlife.nh.gov, with the email subject line containing the NHB DataCheck tool results letter assigned number, the project name, and the term Wildlife Species Observation;
- Photographs of the observed species and nearby elements of habitat or areas of land disturbance shall be provided to NHFG in digital format at the above email address for verification, as feasible;
- In the event a threatened or endangered species is observed on the project site during the term of the permit, the species shall not be disturbed, handled, or harmed in any way prior to consultation with NHFG and implementation of corrective actions recommended by NHFG, if any, to assure the project does not appreciably jeopardize the continued existence of threatened and endangered species as defined in Fis 1002.04; and
- NHFG, including its employees and authorized agents, shall have access to the property during the term of the permit. NHFG shall contact the NHDOT's Contract Administrator or Environmental Coordinator for the project to coordinate access to the site. In the case of an emergency need for immediate access, NHFG shall contact Kevin Nyhan at 603-271-3226.

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Monday, April 1, 2024 9:08 AM
To: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Sullivan, Kevin <Kevin.M.Sullivan@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Hi Kevin,

Josh Brown provided the wetland plans (attached). These are from the set about to be submitted with the wetland application. On the top of pdf page 3 there is the drainage standard symbols, including existing and proposed catch basins.

The information from the project's public hearing is available here:
Londonderry 41715 | Department of Transportation (nh.gov)

I believe Josh is planning to submit the application package to NHDES soon. Please let me know if you have any questions about the project or the plans.

Best wishes,
Rebecca

From: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Sent: Friday, March 29, 2024 11:31 AM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>; Sullivan, Kevin <Kevin.M.Sullivan@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Hi Rebecca,

I am doing okay, and hope things are going well for you too. Thank you for the update on this project. We are approaching two years since we last connected on this, can you please remind me if the project team has finalized a design alternative? When this was first brought to my attention, the preliminary plans we're pretty minimal, and I think only detailed one catch basin. Are there any updated plans we could review so we can come to an understanding of what is being proposed?

I am away this coming week, but I spoke with Kevin Sullivan, new environmental review supervisor, and we would be more than happy to have a discussion with you guys (teams or other avenue) to hash this one out if preferred.

Thanks,

Kevin Newton
Wildlife Biologist
NH Fish and Game Department
Wildlife Division
11 Hazen Drive, Concord NH 03301
Phone: 603-271- 5860

New Hampshire Fish and Game requirements for environmental review consultation can be found at: https://gencourt.state.nh.us/rules/state_agencies/fis1000.html. ALL requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent hardcopy by mail. **The NHB datacheck results letter number needs to be included in the email subject line to read as "NHB*xx-xxxx_Project Name*_FIS 1004 Consultation Submittal".**

The requirements for consultation (Fis 1004) shall not apply to the following: statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule. Review requests for these projects or other project types should be submitted to NHFGreview@wildlife.nh.gov or can be sent hardcopy by mail – email or mail subject line for these review requests should read **"NHBxx-xxxx_Project Name_ Env. Review Request".**

Please provide shapefiles/KMZ/KMLs of the project site (and relevant features if applicable) with your submittal. Review statements provided in the NHB Datacheck Results letter for additional guidance.

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Wednesday, March 27, 2024 8:21 AM
To: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Brown, Joshua <Joshua.R.Brown@dot.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested, NHB23-1685

Hello Kevin,

I hope this message finds you well. I am writing about the Londonderry 41715 project. Josh Brown has taken over as the project's Environmental Manager and is preparing the wetland permit application for submission to NHDES. Attached please see the new NHB report for the project, the species are the same as the 2021 NHB report. I know plant species are not the primary concern for F&G, but I wanted to mention that the Nuttall's reed grass survey was completed by one of the Department's consultants in 2022 and the species was not found in the project area. We have some requested changes to the recommended conservation measures for the project, which are noted below.

I expect that Kevin Nyhan, our Bureau Administrator, will likely be reaching out more generally about catch basin grate size soon. Our hydraulics engineer has looked at a few different options, as noted in the Newton 29617 correspondence,

and recommended a grate size (2.5" by 2.5") that in his best professional judgement would still allow for safe management of water and is reduced from our typical.

Please let me know if these recommended changes are acceptable or if you would like to discuss.

Best Wishes,
Rebecca

New Hampshire Fish and Game Conservation Recommendations– Wildlife Protection Notes:

- **Blandings Turtle (State endangered), Eastern Box Turtle (State endangered), Northern Black Racer (state threatened), and Spotted Turtle (state threatened) occur within the vicinity of the project area. Site operators shall be informed of the potential presence of these species and shall be provided flyers that help to identify these species along with NHFG contact information. See Plan Sheet xxxxxx.** ***Include attached flyers to plan sheet set.***
    - ***NHDOT Recommendation:*** ***Blanding's Turtle (State endangered), Eastern Box Turtle (State endangered), Northern Black Racer (state threatened), and Spotted Turtle (state threatened) occur within the vicinity of the project area. Site operators shall be informed of the potential presence of these species and shall be provided flyers that help to identify these species along with NHFG contact information.***
    - ***NHDOT Recommendation:*** ***Rare species information (e.g. identification, observation and reporting of observations, when to contact NHFG immediately and NHFG contact information) shall be communicated during the project's preconstruction meeting prior to work and rare species flyers shall be included on the project's bulletin board. The rare species commitments shall be included in the project's Summary of Environmental Issues and the rare species flyers shall be included in the project's contract.***
- Northern Black Racers shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Brendan Clifford (603-944-0885). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.
- Turtles may be attracted to disturbed ground during nesting season (May 15th – June 30th). All turtle species nests are protected by NH laws. If a nest is observed or suspected, operators shall contact Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802) at NHFG immediately for further consultation.
- Sightings of Eastern box shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.
- **No sumps shall be included in the design of catch basins or outlet control structures.**
    - **If sumps cannot be avoided, specifically for this project, grate sizes of catch basins should be reduced to 2" x 2" or smaller.**
    - ***NHDOT Recommendation:*** ***Catch basin grate size shall be reduced to 2.5" by 2.5" within the project area.***
- Impacts to wetlands shall be in accordance with recommendations from NHDES Wetlands Bureau.
    - Wetland impacts shall be minimized and buffers to wetlands are encouraged to be included in project designs when possible.
- Surveys for Nuttall's reedgrass shall be conducted in accordance with recommendations from New Hampshire Natural Heritage Bureau. – Completed.
- **Staging of construction equipment and materials shall be located in a predetermined location, as far away from wetlands as possible. This area shall be visually surveyed by a qualified biologist for rare snakes and turtles. Immediately after the visual survey is conducted, the area shall be enclosed with siltation fence to prevent wildlife from entering. This area shall remain gated and enclosed at all times when, except for when equipment is being moved in or out of the enclosed area.**
    - ***NHDOT Recommendation:*** ***Staging of construction equipment and materials shall be located as far away from wetlands as practicable. The staging area shall be visually surveyed for rare snakes and turtles. Immediately after the visual survey is conducted, the area shall be enclosed with siltation***

fence to prevent wildlife from entering. This area shall remain enclosed at all times, except for when equipment is being moved in or out of the enclosed area.

- Improvements to the existing drainage shall incorporate equally sized or larger culverts than currently exist on site. CMP's, RCP's, or box culverts shall be utilized in place of HDPE culverts to facilitate the passage of small fish, amphibians, or turtles.
- All manufactured erosion and sediment control products, with the exception of turf reinforcement mats, utilized for, but not limited to, slope protection, runoff diversion, slope interruption, perimeter control, inlet protection, check dams, and sediment traps shall not contain plastic, or multi[1]filament or monofilament polypropylene netting or mesh with an opening size of greater than 1/8 inches;
- All observations of threatened or endangered species on the project site shall be reported immediately to the NHFG nongame and endangered wildlife environmental review program by phone at 603-271-2461 and by email at NHFGreview@wildlife.nh.gov, with the email subject line containing the NHB DataCheck tool results letter assigned number, the project name, and the term Wildlife Species Observation;
- Photographs of the observed species and nearby elements of habitat or areas of land disturbance shall be provided to NHFG in digital format at the above email address for verification, as feasible;
- In the event a threatened or endangered species is observed on the project site during the term of the permit, the species shall not be disturbed, handled, or harmed in any way prior to consultation with NHFG and implementation of corrective actions recommended by NHFG, if any, to assure the project does not appreciably jeopardize the continued existence of threatened and endangered species as defined in Fis 1002.04; and
- **The NHFG, including its employees and authorized agents, shall have access to the property during the term of the permit.**
    - ***NHDOT Recommendation:*** ***NHFG, including its employees and authorized agents, shall have access to the property during the term of the permit. NHFG shall contact the NHDOT's Contract Administrator or Environmental Coordinator for the project to coordinate access to the site. In the case of an emergency need for immediate access, NHFG shall contact Kevin Nyhan at 603-271-3226.***

From: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Sent: Tuesday, August 16, 2022 8:56 AM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Cc: FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>; Winters, Melissa <Melissa.J.Winters@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hi Rebecca,

Happy to share with you some preliminary comments, which will need to be refined when an alternative is selected and we have plans to review. Do you anticipate if any mitigation will be required for the wetlands permit?

I was away last week and Melissa is away this week. We have not had an opportunity to look at these together. Hopefully this can provide some initial guidance for your team.

New Hampshire Fish and Game Permit Conditions in accordance with Env-Wq 1503.33 – Wildlife Protection Notes:

- Blandings Turtle (State endangered), Eastern Box Turtle (State endangered), Northern Black Racer (state threatened), and Spotted Turtle (state threatened) occur within the vicinity of the project area. Site operators shall be informed of the potential presence of these species and shall be provided flyers that help to identify these species along with NHFG contact information. See Plan Sheet xxxxxx. *Include attached flyers to plan sheet set.*
- Northern Black Racers shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Brendan Clifford (603-944-0885). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.

- Turtles may be attracted to disturbed ground during nesting season (May 15th – June 30th). All turtle species nests are protected by NH laws. If a nest is observed or suspected, operators shall contact Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802) at NHFG immediately for further consultation.
- Sightings of Eastern box shall be reported immediately to NHFG wildlife biologists Melissa Winters (603-479-1129) or Josh Megyesy (978-578-0802). Immediate reporting of observations is critical as NHFG biologists will need to collect data on the individual.
- No sumps shall be included in the design of catch basins or outlet control structures.
    - If sumps cannot be avoided, specifically for this project, grate sizes of catch basins should be reduced to 2" x 2" or smaller.
- Impacts to wetlands shall be in accordance with recommendations from NHDES Wetlands Bureau.
    - Wetland impacts shall be minimized and buffers to wetlands are encouraged to be included in project designs when possible.
- Surveys for Nuttall's reedgrass shall be conducted in accordance with recommendations from New Hampshire Natural Heritage Bureau.
- Staging of construction equipment and materials shall be located in a predetermined location, as far away from wetlands as possible. This area shall be visually surveyed by a qualified biologist for rare snakes and turtles. Immediately after the visual survey is conducted, the area shall be enclosed with siltation fence to prevent wildlife from entering. This area shall remain gated and enclosed at all times when, except for when equipment is being moved in or out of the enclosed area.
- Improvements to the existing drainage shall incorporate equally sized or larger culverts than currently exist on site. CMP's, RCP's, or box culverts shall be utilized in place of HDPE culverts to facilitate the passage of small fish, amphibians, or turtles.
- All manufactured erosion and sediment control products, with the exception of turf reinforcement mats, utilized for, but not limited to, slope protection, runoff diversion, slope interruption, perimeter control, inlet protection, check dams, and sediment traps shall not contain plastic, or multi[1]filament or monofilament polypropylene netting or mesh with an opening size of greater than 1/8 inches;
- All observations of threatened or endangered species on the project site shall be reported immediately to the NHFG nongame and endangered wildlife environmental review program by phone at 603-271-2461 and by email at NHFGreview@wildlife.nh.gov, with the email subject line containing the NHB DataCheck tool results letter assigned number, the project name, and the term Wildlife Species Observation;
- Photographs of the observed species and nearby elements of habitat or areas of land disturbance shall be provided to NHFG in digital format at the above email address for verification, as feasible;
- In the event a threatened or endangered species is observed on the project site during the term of the permit, the species shall not be disturbed, handled, or harmed in any way prior to consultation with NHFG and implementation of corrective actions recommended by NHFG, if any, to assure the project does not appreciably jeopardize the continued existence of threatened and endangered species as defined in Fis 1002.04; and
- The NHFG, including its employees and authorized agents, shall have access to the property during the term of the permit.

Thanks,

Kevin

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Tuesday, August 16, 2022 7:48 AM
To: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Cc: Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hi Kevin,

Kim shared that you will be taking the lead on the Londonderry 41715 review. The project team is planning for a public meeting and were hoping to have F&G comments prior. Could you please provide an estimate of when we might expect your response to the request that was sent on June 24 with supplemental information sent on July 1?

Thank you,
Rebecca

From: Martin, Rebecca
Sent: Wednesday, August 3, 2022 8:20 AM
To: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Cc: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hi Kim,

We are hoping to coordinate early on in the design so that we have more flexibility to adjust the design as needed. At this point there are still two alternatives being considered, a roundabout or a signal with added lanes. The two alternatives would have similar footprints and stormwater treatment needs, so the design team was able to provide an idea of what they anticipate for drainage (see below).

The project was reviewed at the March 2022 Natural Resources Meeting while I was on leave. Most folks seem to have been concerned about the vernal pool study. As you will see in the wetland report, there were no vernal pool species found during either of the spring site visits, so the area does not meet the definition of a vernal pool. There were also questions about the design for the stream crossing for Stream 1/Beaver Brook, as described below, the design team is proposing to replace the existing 30" with a 60" RCP in approximately the same location. We will need to apply for an alternative design. There was also a comment about a site visit that had been conducted, I wonder if that was in reference to the nearby Exit 4A project as I am not aware of a site visit for this project.

The project is anticipated to need a wetland permit, so does require formal consultation with F&G. No AoT permit needed as DOT has an MOA with NHDES regarding our substantially equivalent practices.

Please let me know if there was anything else not covered in the packet that might be helpful.

Best,
Rebecca

From: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Sent: Tuesday, August 2, 2022 3:10 PM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Cc: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Has this project been discussed at the monthly Natural Resource Coordination Meeting? What did the agencies recommend? I do not have a good sense of what is going – sounds complicated. Will there be an AoT with this one?

Thanks,

Kim Tuttle
Wildlife Biologist

NH Fish and Game
11 Hazen Drive
Concord, NH 03301
603-271-6544

As of February 3, 2022, New Hampshire Fish and Game requirements for environmental review consultation have changed. To review the new rules, please go to Proposed Rules | Legislative | New Hampshire Fish and Game Department (state.nh.us). All requests for consultation and submittals should be sent via email to NHFGreview@wildlife.nh.gov or can be sent by mail. **The NHB datacheck results letter number needs to be included in the email subject line.**

The requirements for consultation (Fis 1004) shall not apply to the following: statutory permit by notification, permit by rule, permit by notification, routine roadway registration, docking structure registration, or conditional authorization by rule. Review requests for these projects can be sent directly to kim.tuttle@wildlife.nh.gov.

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Tuesday, August 2, 2022 1:49 PM
To: FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Cc: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>; Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Good afternoon,

The project team for the Londonderry 41715 project is making plans for a public informational meeting and asked when we should anticipate a response to the Fish and Game request for review. I was wondering if you could please tell me where this projects sits in the queue for review?

Thank you,
Rebecca

From: Martin, Rebecca
Sent: Friday, July 1, 2022 10:47 AM
To: FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Cc: Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>; Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Good morning,

The design team was able to provide some preliminary drainage information for the Londonderry 41715 project- since the two alternatives (roundabout and signal with added lanes) would have similar footprints and stormwater treatment needs, they were able to offer more information than I previously understood at this early stage of the design.

Stream 2- crosses under the intersection, slightly north of Stonehenge Rd. Tier 1 drainage size, but Tier 3 because is in the floodplain. The watershed area is approximately 48 acres. From a wetland north of the project area Stream 2 passes through backyards (some people have put culverts in) and then enters a closed drainage system at the intersection and combines with catch basin drainage to pass through a 24" pipe under Rt 28. The outlet is perched.
Propose to separate the stream from the closed drainage and upsize the pipe to a 30" Reinforced Concrete Pipe (RCP). The new pipe will not be perched. The compliant sized structure would be larger (12.76 feet), so the project will apply for an alternative design.

South of the intersection unnamed non-jurisdictional water- from Wetland A passes under an old road located south of the intersection, then through a manmade ditch to a 24" RCP and over to the other side of NH 28.
Propose to extend this pipe as it is in good condition and is large enough to pass the small amount of water in the non-jurisdictional drainage area (NJDA).

Stream 1- South east of the 24" pipe is the Beaver Brook Crossing, the watershed area is approximately 400 acres, Tier 2 drainage size, but Tier 3 because is in the floodplain. The stream currently passes under NH 28 through a 30" culvert. The pipe should be 60" pipe to pass the 100 year storm.
Propose to replace the 30" with 60" RCP in approximately the same location. The larger structure will reduce the water velocity. The compliant sized structure would be larger (16.5 feet), so the project will apply for an alternative design.

Around 800 feet south of the intersection an 18" pipe carries non-jurisdictional water. Currently, with the roundabout alternative, we are not impacting this crossing, however, we do need to revisit this crossing as we further refine the proposed layout.

The project area is currently not curbed. There are two catch basins located north of the intersection on Rt 28. The project will include a closed drainage system to collect and send some pavement runoff to stormwater treatment facilities. The exact number of catch basins has not been determined as it is design dependent. There will be more curbing and catch basins with both of the proposed alternatives than is present in the existing condition.

Thanks very much,
Rebecca

Rebecca Martin
Plant and Wildlife Program Manager
NH DOT Bureau of Environment
7 Hazen Drive
Concord, NH 03302
(603)271-6781
Rebecca.A.Martin@dot.nh.gov

From: Martin, Rebecca
Sent: Monday, June 27, 2022 3:05 PM
To: FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Cc: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; Winters, Melissa <Melissa.J.Winters@wildlife.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hello Luke,

Thanks for your help. I checked in with the design team and they have a very slightly adjusted APE (area of potential effects) map to share. It is very similar to the one I sent previously (the thin dashed red lines show the previous limits). The design team confirmed this is the worst-case scenario as we understand it today for any alternative. The impact area could end up being smaller but should not exceed this area. If that were to change, we would continue to communicate.

Best,
Rebecca

From: FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Sent: Monday, June 27, 2022 2:16 PM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>; Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>
Cc: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Winters, Melissa <Melissa.J.Winters@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Good afternoon Rebecca,

I talked with Melissa and received clarification regarding the MOA. I just have one final question for you before I pass this project to the team for preliminary feedback- does the area of potential effects denoted in red include all possible project alternatives? In other words, is there a possibility for the final project to extend beyond this denoted area? We always find it helpful to see all of the alternatives you are exploring.

Thank you,

Luke Douglas (Kim S. is out this week)
Wildlife Biologist
NH Fish and Game Department
Wildlife Division
11 Hazen Drive
Concord, NH 03301
(603) 271-0788

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Monday, June 27, 2022 7:53 AM
To: Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>
Cc: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>; Winters, Melissa <Melissa.J.Winters@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hello Kimberly,

Thank you for confirming receipt. My understanding is that F&G will begin consultation with NHDOT once available information is received (see the attached MOA). During development of the MOA we had discussed that if F&G should request a design change, for example, if F&G were to recommend to upsize a culvert for critter passage for this project, we will be in a much better position to try to accommodate those types of recommendations early on in the design timeline. We are happy to discuss further as the design advances, but NHDOT values the opportunity to begin consultation now. Melissa Winters might be able to shed some light on the attached MOA if you have any questions.

Best,
Rebecca

From: Snyder, Kimberly <Kimberly.C.Snyder@wildlife.nh.gov>
Sent: Friday, June 24, 2022 1:20 PM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>; FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Cc: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>; Newton, Kevin <Kevin.M.Newton@wildlife.nh.gov>
Subject: RE: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hi Rebecca,
Email was received.

Once we receive your site plan, we can begin consultation. If you want to submit a draft plan while you are selecting the alternative, we can begin consultation with that but will still need to wait for the final site plan to issue our recommendations.

Kim S.

From: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Sent: Friday, June 24, 2022 12:38 PM
To: FGC: NHFG review <NHFGreview@wildlife.nh.gov>
Cc: Tuttle, Kim <Kim.A.Tuttle@wildlife.nh.gov>
Subject: NHB21-3738 Londonderry 41715 Formal Consultation Requested

Hello,

NHDOT is requesting consultation with F&G for the Londonderry 41715 project (NHB21-3738). Alternatives for the intersection improvement are currently being developed. We do have a draft wetland report to share at this time. We expect that the project will need a Standard Dredge and Fill permit from NHDES and coverage under the ACOE PGP. Please let me know if there are any questions or clarifications needed. Could you please confirm receipt of this email?

Thank you,

Rebecca Martin
Plant and Wildlife Program Manager
NH DOT Bureau of Environment
7 Hazen Drive
Concord, NH 03302
(603)271-6781
Rebecca.A.Martin@dot.nh.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project Code: 2023-0019394
Project Name: Londonderry 41715

August 15, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act
Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2023-0019394
Project Name: Londonderry 41715
Project Type: Road/Hwy - Maintenance/Modification
Project Description: The project proposes to address safety and capacity issues at the intersection of NH Route 28 and Stonehenge Road in Londonderry. The preferred alternative is a roundabout. Drainage improvements and a stormwater treatment BMP will also be included in the project.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.903256299999995,-71.36112907384455,14z

Counties: Rockingham County, New Hampshire

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: New Hampshire Department of Transportation
Name: Rebecca Martin
Address: 7 Hazen Drive
City: Concord
State: NH
Zip: 03302
Email rebecca.a.martin@dot.nh.gov
Phone: 6032716781

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project code: 2023-0065331
Project Name: Londonderry 41715 Update

April 05, 2023

Subject: Consistency letter for the 'Londonderry 41715 Update' project under the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (NLEB).

To whom it may concern:

The U.S. Fish and Wildlife Service (Service) has received your request dated April 05, 2023 to verify that the **Londonderry 41715 Update** (Proposed Action) may rely on the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat (PBO) to satisfy requirements under section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 *et seq.*).

Based on the information you provided (Project Description shown below), you have determined that the Proposed Action is within the scope and adheres to the criteria of the PBO, including the adoption of applicable avoidance and minimization measures, and may affect, and is likely to adversely affect the endangered Indiana bat (*Myotis sodalis*) and/or the endangered northern long-eared bat (*Myotis septentrionalis*). Consultation with the Service pursuant to section 7(a)(2) of the ESA (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) is required.

This "may affect - likely to adversely affect" determination becomes effective when the lead Federal action agency or designated non-federal representative requests the Service rely on the PBO to satisfy the agency's consultation requirements for this project. Please provide this consistency letter to the lead Federal action agency or its designated non-federal representative for review, and as the agency deems appropriate, transmit to this Service Office for verification that the project is consistent with the PBO.

This Service Office will respond by letter to the requesting Federal action agency or designated non-federal representative within 30 calendar days after receiving request for verification to:

- verify that the Proposed Action is consistent with the scope of actions covered under the PBO;
- verify that all applicable avoidance, minimization, and compensation measures are included in the action proposal;
- identify any action-specific monitoring and reporting requirements, consistent with the monitoring and reporting requirements of the PBO, and
- identify anticipated incidental take.

ESA Section 7 compliance for this Proposed Action is not complete until the Federal action agency or its designated non-federal representative receives a verification letter from the Service.

If the Proposed Action is modified, or new information reveals that it may affect the Indiana bat and/or Northern long-eared bat in a manner or to an extent not considered in the PBO, further review to conclude the requirements of ESA Section 7(a)(2) may be required.

For Proposed Actions that include bridge/culvert or structure removal, replacement, and/or maintenance activities: If your initial bridge/culvert or structure assessments failed to detect Indiana bats, but you later detect bats prior to, or during construction, please submit the Post Assessment Discovery of Bats at Bridge/Culvert or Structure Form (User Guide Appendix E) to this Service Office. In these instances, potential incidental take of Indiana bats may be exempted provided that the take is reported to the Service.

If the Proposed Action may affect any other federally-listed or proposed species and/or designated critical habitat, additional consultation between the lead Federal action agency and this Service Office is required. If the proposed action has the potential to take bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act may also be required. In either of these circumstances, please advise the lead Federal action agency accordingly.

The following species may occur in your project area and **are not** covered by this determination:

- Monarch Butterfly *Danaus plexippus* Candidate

PROJECT DESCRIPTION

The following project name and description was collected in IPaC as part of the endangered species review process.

NAME

Londonderry 41715 Update

DESCRIPTION

Intersection improvement at Route 28 and Stonehenge Road

DETERMINATION KEY RESULT

Based on your answers provided, this project is likely to adversely affect the endangered Indiana bat and/or the endangered northern long-eared bat. Therefore, consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required. However, also based on your answers provided, this project may rely on the conclusion and Incidental Take Statement provided in the amended February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion (dated March 23, 2023) for Transportation Projects within the Range of the Indiana Bat and Northern Long-eared Bat.

QUALIFICATION INTERVIEW

1. Is the project within the range of the Indiana bat[1]?

   [1] See Indiana bat species profile

   Automatically answered
   No

2. Is the project within the range of the northern long-eared bat[1]?

   [1] See northern long-eared bat species profile

   Automatically answered
   Yes

3. Which Federal Agency is the lead for the action?

   A) Federal Highway Administration (FHWA)

4. Are *all* project activities limited to non-construction[1] activities only? (examples of non-construction activities include: bridge/abandoned structure assessments, surveys, planning and technical studies, property inspections, and property sales)

   [1] Construction refers to activities involving ground disturbance, percussive noise, and/or lighting.

   No

5. Does the project include *any* activities that are **greater than** 300 feet from existing road/rail surfaces[1]?

   [1] Road surface is defined as the actively used [e.g. motorized vehicles] driving surface and shoulders [may be pavement, gravel, etc.] and rail surface is defined as the edge of the actively used rail ballast.

   No

6. Does the project include *any* activities **within** 0.5 miles of a known Indiana bat and/or NLEB hibernaculum[1]?

   [1] For the purpose of this consultation, a hibernaculum is a site, most often a cave or mine, where bats hibernate during the winter (see suitable habitat), but could also include bridges and structures if bats are found to be hibernating there during the winter.

   No

7. Is the project located **within** a karst area?

   No

8. Is there *any* suitable[1] summer habitat for Indiana Bat or NLEB **within** the project action area[2]? (includes any trees suitable for maternity, roosting, foraging, or travelling habitat)

   [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

   [2] The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR Section 402.02). Further clarification is provided by the User's Guide for the Range-wide Programmatic Consultation for Indiana Bat and Northern Long-eared Bat.

   Yes

9. Will the project remove *any* suitable summer habitat[1] and/or remove/trim any existing trees **within** suitable summer habitat?

   [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

   Yes

10. Will the project clear more than 20 acres of suitable habitat per 5-mile section of road/rail?

    No

11. Have presence/probable absence (P/A) summer surveys[1][2] been conducted[3][4] **within** the suitable habitat located within your project action area?

    [1] See the Service's summer survey guidance for our current definitions of suitable habitat.

    [2] Presence/probable absence summer surveys conducted within the fall swarming/spring emergence home range of a documented Indiana bat hibernaculum (contact local Service Field Office for appropriate distance from hibernacula) that result in a negative finding requires additional consultation with the local Service Field Office to determine if clearing of forested habitat is appropriate and/or if seasonal clearing restrictions are needed to avoid and minimize potential adverse effects on fall swarming and spring emerging Indiana bats.

    [3] For projects within the range of either the Indiana bat or NLEB in which suitable habitat is present, and no bat surveys have been conducted, the transportation agency will assume presence of the appropriate species. This assumption of presence should be based upon the presence of suitable habitat and the capability of bats to occupy it because of their mobility.

    [4] Negative presence/probable absence survey results obtained using the summer survey guidance are valid for a minimum of two years from the completion of the survey unless new information (e.g., other nearby surveys) suggest otherwise.

    No

12. Does the project include activities **within documented NLEB habitat**[1][2]?

    [1] Documented roosting or foraging habitat – for the purposes of this consultation, we are considering documented habitat as that where Indiana bats and/or NLEB have actually been captured and tracked using (1) radio telemetry to roosts; (2) radio telemetry biangulation/triangulation to estimate foraging areas; or (3) foraging areas with repeated use documented using acoustics. Documented roosting habitat is also considered as suitable summer habitat within 0.25 miles of documented roosts.)

    [2] For the purposes of this key, we are considering documented corridors as that where Indiana bats and/or NLEB have actually been captured and tracked to using (1) radio telemetry; or (2) treed corridors located directly between documented roosting and foraging habitat.

    No

13. Will the removal or trimming of habitat or trees occur **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors?

    Yes

14. What time of year will the removal or trimming of habitat or trees **within** suitable but **undocumented NLEB** roosting/foraging habitat or travel corridors occur?

    C) During both the active and inactive seasons

15. Will *any* tree trimming or removal occur **within** 100 feet of existing road/rail surfaces?

    Yes

16. Will **more than** 10 trees be removed **between** 0-100 feet of the road/rail surface *during* the active season[1]?

    [1] Areas containing more than 10 trees will be assessed by the local Service Field Office on a case-by-case basis with the project proponent.

    Yes

17. Will *any* tree trimming or removal occur **between** 100-300 feet of existing road/rail surfaces?

    Yes

18. Are *all* trees that are being removed clearly demarcated?

    Yes

19. Will the removal of habitat or the removal/trimming of trees involve the use of **temporary** lighting?

    No

20. Will the removal of habitat or the removal/trimming of trees include installing new or replacing existing **permanent** lighting?

    No

21. Does the project include wetland or stream protection activities associated with compensatory wetland mitigation?

    No

22. Does the project include slash pile burning?

    No

23. Does the project include *any* bridge removal, replacement, and/or maintenance activities (e.g., any bridge repair, retrofit, maintenance, and/or rehabilitation work)?

    No

24. Does the project include the removal, replacement, and/or maintenance of *any* structure other than a bridge? (e.g., rest areas, offices, sheds, outbuildings, barns, parking garages, etc.)

    No

25. Will the project involve the use of **temporary** lighting *during* the active season?

    Yes

26. Is there *any* suitable habitat **within** 1,000 feet of the location(s) where **temporary** lighting will be used?

    Yes

27. Will the project install new or replace existing **permanent** lighting?

    Yes

28. Is there *any* suitable habitat **within** 1,000 feet of the location(s) where **permanent** lighting will be installed or replaced?

    Yes

29. Does the project include percussives or other activities (**not including tree removal/ trimming or bridge/structure work**) that will increase noise levels above existing traffic/ background levels?

    Yes

30. Will the activities that use percussives (**not including tree removal/trimming or bridge/ structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the active season[1]?

    [1] Coordinate with the local Service Field Office for appropriate dates.

    Yes

31. Will *any* activities that use percussives (**not including tree removal/trimming or bridge/ structure work**) and/or increase noise levels above existing traffic/background levels be conducted *during* the inactive season[1]?

    [1] Coordinate with the local Service Field Office for appropriate dates.

    Yes

32. Are *all* project activities that are **not associated with** habitat removal, tree removal/ trimming, bridge and/or structure activities, temporary or permanent lighting, or use of percussives, limited to actions that DO NOT cause any additional stressors to the bat species?

    Examples: lining roadways, unlighted signage , rail road crossing signals, signal lighting, and minor road repair such as asphalt fill of potholes, etc.

    Yes

33. Will the project raise the road profile **above the tree canopy**?

    No

34. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) consistent with a Not Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the active season within undocumented habitat.

35. Are the project activities that use percussives (not including tree removal/trimming or bridge/structure work) and/or increase noise levels above existing traffic/background levels consistent with a No Effect determination in this key?

    Automatically answered
    Yes, because the activities are within 300 feet of the existing road/rail surface, greater than 0.5 miles from a hibernacula, and conducted during the inactive season

36. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is less than 100 feet from the existing road/rail surface, and is not in documented NLEB roosting/foraging habitat or travel corridors, and a visual emergence survey has not been conducted

37. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because tree removal that occurs within the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is 100-300 feet from the existing road/rail surface and is not in documented NLEB roosting/foraging habitat or travel corridors.

38. Is the habitat removal portion of this project consistent with a Not Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because the tree removal/trimming that occurs outside of the NLEB's active season occurs greater than 0.5 miles from the nearest hibernaculum, is less than 100 feet from the existing road/rail surface, includes clear demarcation of the trees that are to be removed, and does not alter documented roosts and/or surrounding summer habitat within 0.25 miles of a documented roost.

39. Is the habitat removal portion of this project consistent with a Likely to Adversely Affect determination in this key?

    Automatically answered
    Yes, because the tree removal that occurs outside the NLEB's active season is 100-300 feet from the existing road/rail surface, and is not in documented roosting/foraging habitat or travel corridors.

PROJECT QUESTIONNAIRE

1. How many acres[1] of trees are proposed for removal between 0-100 feet of the existing road/rail surface?

   [1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

   1.5

2. How many acres[1] of trees are proposed for removal between 100-300 feet of the existing road/rail surface?

   [1] If described as number of trees, multiply by 0.09 to convert to acreage and enter that number.

   0.25

DETERMINATION KEY DESCRIPTION: FHWA, FRA, FTA PROGRAMMATIC CONSULTATION FOR TRANSPORTATION PROJECTS AFFECTING NLEB OR INDIANA BAT

This key was last updated in IPaC on April 03, 2023. Keys are subject to periodic revision.

This decision key is intended for projects/activities funded or authorized by the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and/or Federal Transit Administration (FTA), which may require consultation with the U.S. Fish and Wildlife Service (Service) under Section 7 of the Endangered Species Act (ESA) for the endangered **Indiana bat** (*Myotis sodalis*) and the endangered **northern long-eared bat** (NLEB) (*Myotis septentrionalis*).

This decision key should only be used to verify project applicability with the Service's February 5, 2018, FHWA, FRA, FTA Programmatic Biological Opinion for Transportation Projects. The programmatic biological opinion covers limited transportation activities that may affect either bat species, and addresses situations that are both likely and not likely to adversely affect either bat species. This decision key will assist in identifying the effect of a specific project/activity and applicability of the programmatic consultation. The programmatic biological opinion is not intended to cover all types of transportation actions. Activities outside the scope of the programmatic biological opinion, or that may affect ESA-listed species other than the Indiana bat or NLEB, or any designated critical habitat, may require additional ESA Section 7 consultation.

IPAC USER CONTACT INFORMATION

Agency: New Hampshire Department of Transportation
Name: Rebecca Martin
Address: 7 Hazen Drive
City: Concord
State: NH
Zip: 03302
Email rebecca.a.martin@dot.nh.gov
Phone: 6032716781

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Highway Administration

Martin, Rebecca

From: Kaitlyn Shaw - NOAA Federal <kaitlyn.shaw@noaa.gov>
Sent: Wednesday, June 14, 2023 4:29 PM
To: Martin, Rebecca; Jamie Sikora
Subject: Re: Londonderry 41715 EFH Assessment Form RE: NHDOT Londonderry 41715 Beaver Brook Question
Attachments: Appendix-C-NMFS-GARFO-FHWA-BMP-spreadsheet.xlsx

Hi Rebecca,
It was nice to meet you last week!
The worksheet saved oddly, I needed to click on each section to have the information appear, but I was able to review it that way.
I agree with the inclusion of the ILF payment for any permanent adverse effects to wetlands from this project but do not have additional conservation recommendations to provide.
Please send along the final permit for the project when obtained to close out our records. If the project is revised in such a manner that affects the basis for the EFH determination, re-initiation of the consultation may be necessary.

On a related note- have you ever used the FHWA programmatic agreement?
If there is EFH or diadromous NOAA trust species present in the project area, but the construction impacts fall below our Federal Highways Programmatic Agreement thresholds (more information about our programmatic agreements here), you may be able to just submit this form instead of the worksheet. You can find the activities that require a project specific consultation (ie. "excluded activities" from the programmatic) on pages 5 and 6 of the FHWA programmatic document.

If the project activities fall under those covered by the programmatic, then you can fill out and submit an Appendix B verification form to me to review and sign. If the project activities are excluded from the programmatic, then the NOAA Fisheries Greater Atlantic Regional Fisheries Office
Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Consultation Worksheet can be submitted.

I feel like this project as well as others we have received from NHDOT may be a good fit for that verification form, given they fall below the threshold for an individual consultation.
I've attached an excel spreadsheet where you can find more information about BMP's for specific stressors.

I have shared your request for clarification on the NH GP EFH water body list and the water bodies with diadromous resources. I will let you know what I find out.

Best,

Kaitlyn Shaw
Marine Habitat Resource Specialist
Habitat and Ecosystem Services Division
NOAA/ National Marine Fisheries Service
Gloucester, MA
Office: 978-282-8457
Pronouns: she/her
kaitlyn.shaw@noaa.gov

www.nmfs.noaa.gov

On Tue, Jun 13, 2023 at 8:53 AM Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov> wrote:

Hello Kaitlyn,

It was very nice to meet you in person at the ICOET conference last week. I attended some interesting sessions and I hope that you also had a positive ICOET experience.

I completed the EFH worksheet for the Londonderry 41715 intersection improvement project that we had corresponded about previously (please see attached). Could you please review? The project is still in preliminary design. The project proposes to replace a 30" RC Pipe that carries a tributary of Beaver Brook. The replacement pipe is currently envisioned to be 60" and a small amount longer. I have also attached a map to help with location and the preliminary design plan for the intersection. Please let me know if any additional information might assist with your review.

Thank you,

Rebecca

From: Kaitlyn Shaw - NOAA Federal <kaitlyn.shaw@noaa.gov>
Sent: Friday, October 28, 2022 11:59 AM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Subject: Re: NHDOT Londonderry 41715 Beaver Brook Question

Hello,

I reached out to my GIS colleague at headquarters to get an answer regarding the EFH mapper results you shared and the basis for the end of the mapped EFH in that section of Beaver Brook. I'll let you know what I find out. For the reasons identified in the pop-up when you use the mapper, it is best to use both the mapper and the text descriptions in the omnibus habitat amendment when determining whether a consultation is needed.

Typically if a site contains NOAA trust resources, is listed in the omnibus habitat amendment or is mapped as EFH (and has not received a concurrence that consultation is not required via letter between Federal action agencies- such as the case with NH and VT tribs to the CT river) it will still need to be consulted on as an abbreviated consultation. The worksheet identifies these components of a project (species present) and the proposed BMP's and CR's being applied to avoid, minimize and mitigate adverse effects to EFH and NOAA trust resources. Other pertinent information to include in early coordination would be if there is no, or limited access to the site due to dams or other obstructions, as well as whether passage is being pursued downstream. These items help to expedite the review when these questions arise and can alleviate the need for the worksheet if they are contained in the early coordination request.

Best,

Kaitlyn Shaw

Marine Resources Management Specialist

Habitat and Ecosystem Services Division

NOAA/ National Marine Fisheries Service

Gloucester, MA

Office: 978-282-8457

Pronouns: she/her

kaitlyn.shaw@noaa.gov

www.nmfs.noaa.gov

On Mon, Oct 24, 2022 at 9:59 AM Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov> wrote:

> Hi Kaitlyn,
>
> Thank you for explaining- I did not realize that the EFH lines vs. polygons would cause a problem with representation in the reports. I have an intersection improvement project in Londonderry on a stream that is in some places referred to as the headwaters of Beaver Brook. Beaver Brook is listed in the Omnibus amendment as Atlantic salmon EFH (tributary to the Merrimack River). There is no Atlantic salmon indicated in the project area.

NOAA FISHERIES
National Oceanic and Atmospheric Administration

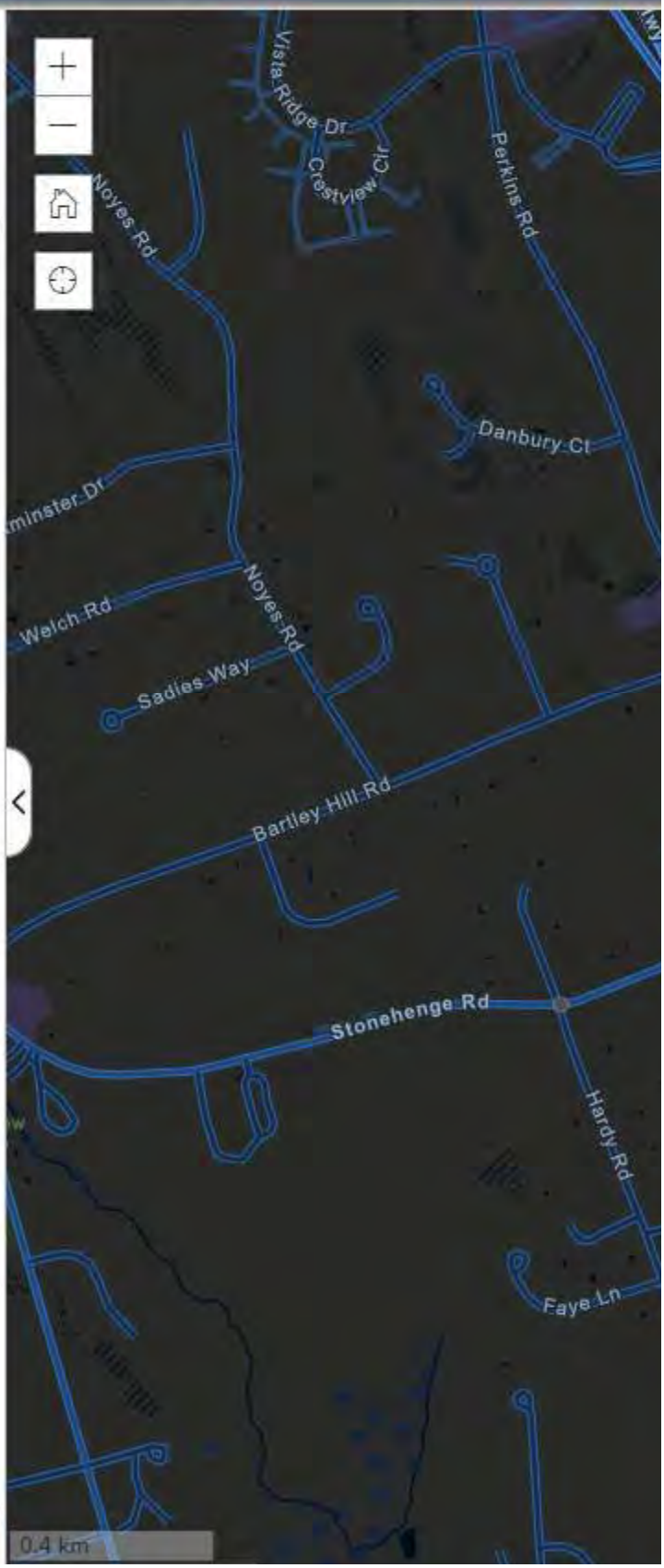
☰ MENU

New England / Mid-Atlantic

? View Legend

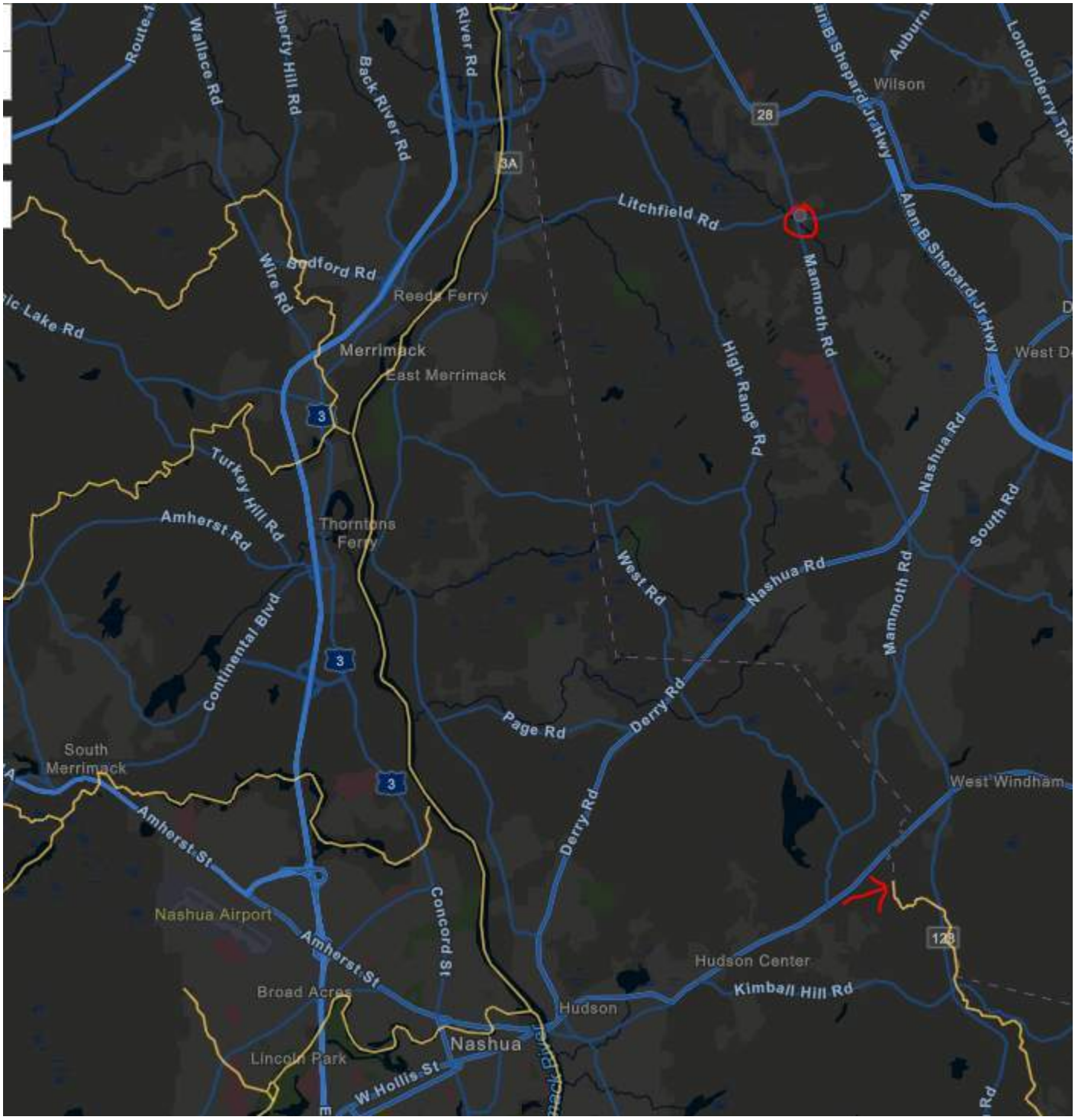
Contents

- EFH Areas Protected From Fishing ···
- ▷ Habitat Areas of Particular Concern ···
- ▽ Essential Fish Habitat ···
  - New England / Mid-Atlantic EFH Species
  - Atlantic salmon EFH
  - Highly Migratory Species EFH
- ▷ Reference Data ···



Choose Another Council | Generate Report

A few towns down in Windham, Beaver Brook does show up as EFH. I circled the project are in red below and you can see where Beaver Brook shows up as EFH in yellow at the southern portion of the map (red arrow). I had at first assumed not EFH, but after looking at the Omnibus Amendment I want to check in with you to ask if you would recommend an assessment for this location?



Thank you,

Rebecca

From: Kaitlyn Shaw - NOAA Federal <kaitlyn.shaw@noaa.gov>
Sent: Monday, October 24, 2022 8:48 AM
To: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>
Cc: Chris Boelke <Christopher.Boelke@noaa.gov>; Dube, Melilotus <Melilotus.M.Dube@dot.nh.gov>
Subject: Re: NHDOT Warner 15907 EFH Question

Hi Rebecca,

There is a pop-up when you enter into the EFH mapper that outlines constraints to the mapper. "Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources".

Because the Atlantic salmon EFH is a line and not a polygon, this may be causing the site not to display when you are generating a report. It is always a good idea to use the omnibus habitat descriptions and investigate the layers prior to generating a report.

Apologies for the confusion with the mapper. This will be an abbreviated consultation due to the presence of this in the omnibus habitat amendment, so it should be very expedited once the worksheet is sent over. Please CC the FHWA POC when you submit the form.

Best,

Kaitlyn Shaw

Habitat and Ecosystem Services Division

NOAA/ National Marine Fisheries Service

Gloucester, MA

Office: 978-282-8457

Pronouns: she/her

kaitlyn.shaw@noaa.gov

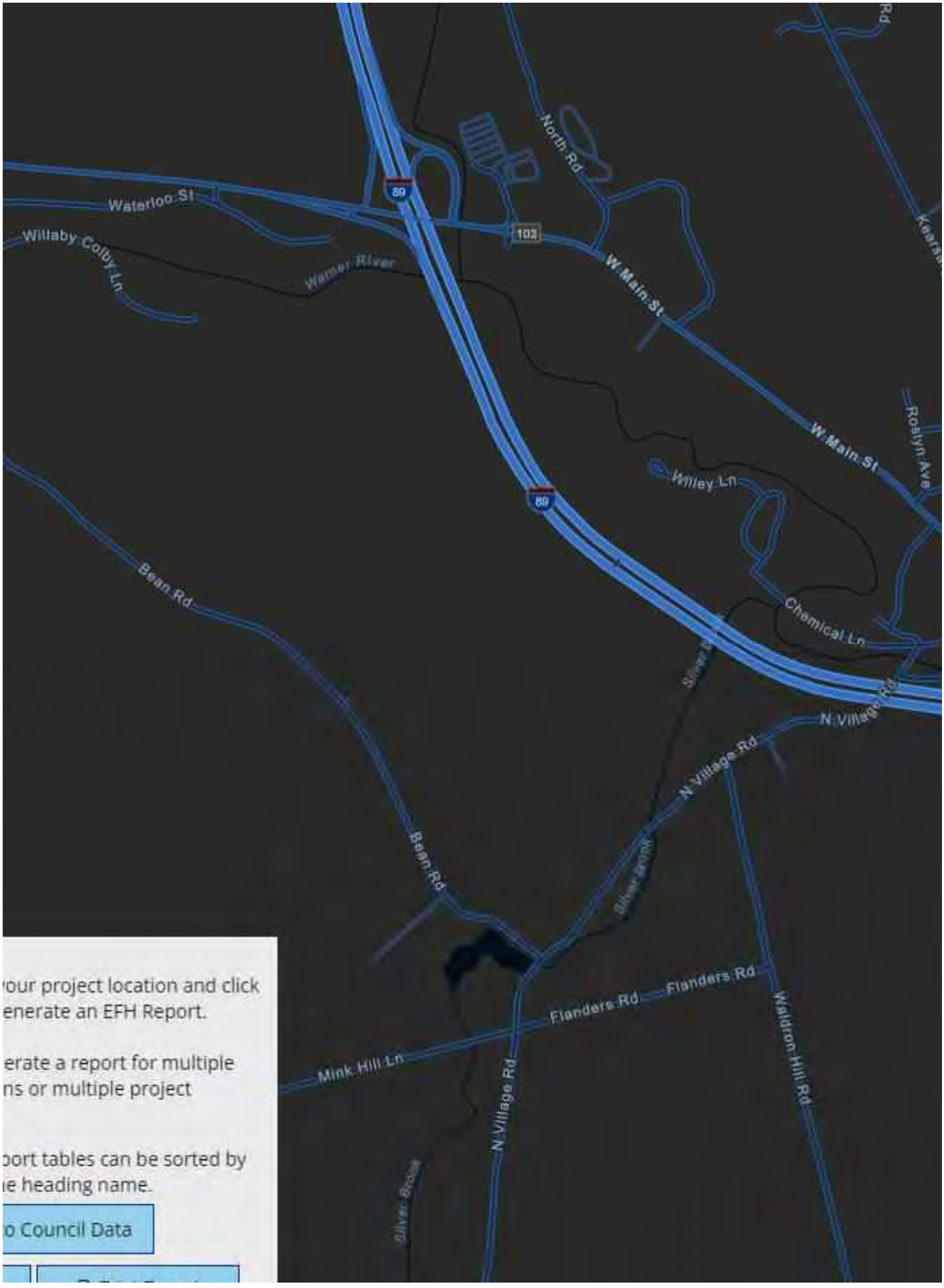
www.nmfs.noaa.gov

On Mon, Oct 24, 2022 at 8:38 AM Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov> wrote:

> Hi Kaitlyn,
>
> Thanks very much for your help. Is it typical that Atlantic Salmon EFH does not show up when you query a location (see below) to generate a report? The Warner River shows up as Atlantic salmon EFH in the mapper, but if we generate a report, it indicates no EFH were identified at the report location.

Best,

Rebecca



our project location and click
enerate an EFH Report.

erate a report for multiple
ns or multiple project

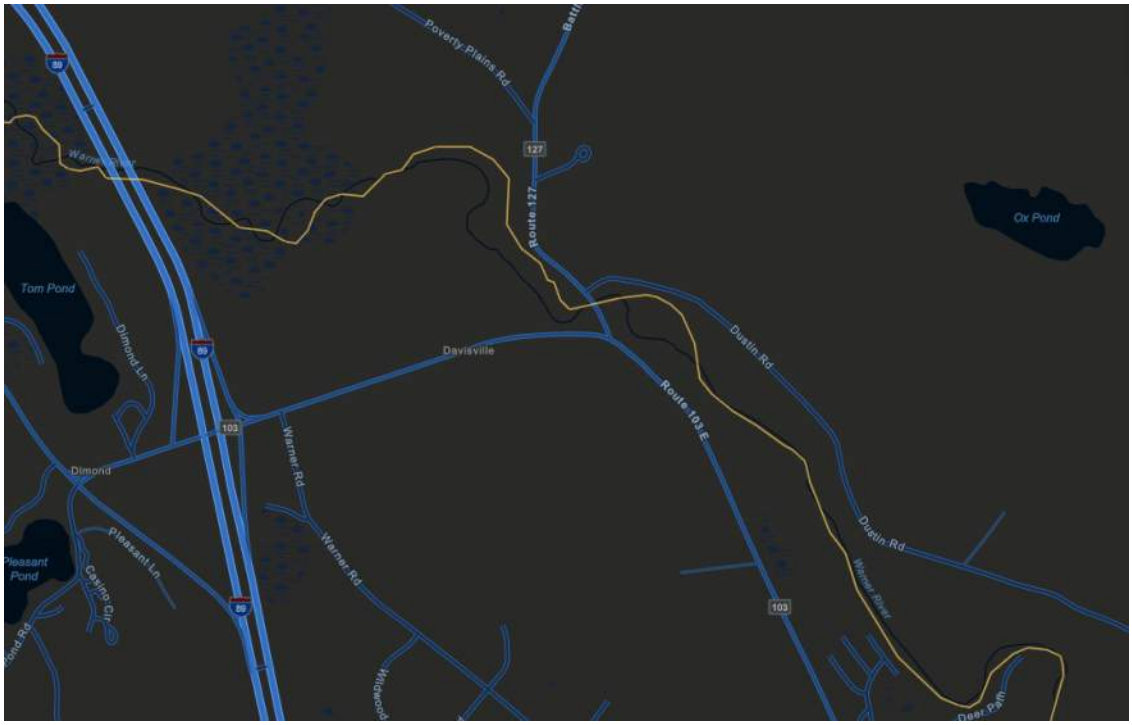
port tables can be sorted by
e heading name.

o Council Data

From: Kaitlyn Shaw - NOAA Federal <kaitlyn.shaw@noaa.gov>
Sent: Friday, October 21, 2022 12:19 PM
To: Dube, Melilotus <Melilotus.M.Dube@dot.nh.gov>
Cc: Martin, Rebecca <Rebecca.A.Martin@dot.nh.gov>; Chris Boelke <Christopher.Boelke@noaa.gov>
Subject: Re: NHDOT Warner 15907 EFH Question

Hello,

According to the Omnibus Essential Fish Habitat Amendment 2 Volume 2, on page 99 (of pdf), the Warner river is still designated as EFH for Atlantic Salmon (status quo). I'm not sure of the EPA CGP document you are referring to, however the omnibus habitat amendment linked above is the best source of information for EFH designations. From the EFH mapper, the yellow line indicates that Atlantic salmon EFH is still designated, meaning that an abbreviated EFH consultation is still required. Please send the worksheet and project information including proposed BMP's to limit in-water adverse effects and I will get back to you to close the loop on the consultation. Please also CC the FHWA representative on correspondence regarding EFH consultation, as our consultation takes place with the designated federal action agency.



Best and please let me know if you have any other questions,

Kaitlyn Shaw

Marine Resources Management Specialist

Habitat and Ecosystem Services Division

NOAA/ National Marine Fisheries Service

Gloucester, MA

Office: 978-282-8457

Pronouns: she/her

kaitlyn.shaw@noaa.gov

www.nmfs.noaa.gov

On Thu, Oct 20, 2022 at 11:55 AM Dube, Melilotus <Melilotus.M.Dube@dot.nh.gov> wrote:

> Hi Kaitlyn,
>
> I don't think I have had the occasion yet to reach out to you directly, but I am one of the Environmental Manager at NHDOT. I am currently reviewing a project which proposes to replace the bridge carrying NH Route 127 over the Warner River in the Town of Warner (see attached maps). One of my outstanding items is the EFH consultation, which has been on my to-do list for quite some time now. I had checked the EFH mapper back in 2019, but at that time it came with plenty of disclaimers that it was missing data, so I also cross referenced Table 31 in the EPA CGP which DID list the Warner River as EFH for Atlantic salmon, so I have been under the assumption that consultation with NMFS is necessary. As I was preparing to submit the worksheet to you, I decided to pull an updated report from the mapper, and it has obviously been updated since the last time I checked it. The current report that I just pulled states that there is NO EFH, including for salmon, in the project area. My understanding is that there is a new CGP, but it has not yet been made available to use so I have not been able to check it to see if the Warner River is listed there or if it has been removed from the list of EFH for Atlantic salmon completely.
>
> For reference, the in water work associated with this bridge work would occur in the March/April timeframe and would involve installing cofferdams to dewater around the existing 2 piers, remove the piers down to the sub-footing and then cover over with natural stream bed material so that the final post-construction condition will actually be an increased hydraulic opening with a consistent stream bed all the way through the crossing. There are several obstructions, including multiple dams, between this point in the Warner River and the Atlantic ocean, so it is not anticipated that salmon are actively using this river.
>
> Can you please confirm that the Warner River is still considered EFH for Atlantic salmon, and if so, that a worksheet is necessary for consultation?
>
> Thank you!
>
> Meli

US Army Corps of Engineers®
New England District

Appendix B
New Hampshire General Permits
Required Information and USACE Section 404Checklist

USACE Section 404 Checklist

1. Attach any explanations to this checklist. Lack of information could delay a USACE permit determination.
2. All references to "work" include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 3 for information on single and complete projects.
4. Contact USACE at (978) 318-8832 with any questions.
5. The information requested below is generally required in the NHDES Wetland Application. See page 61 for NHDES references and Admin Rules as they relate to the information below.

1. Impaired Waters	Yes	No
1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See the following to determine if there is an impaired water in the vicinity of your work area. * https://nhdes-surface-water-quality-assessment-site-nhdes.hub.arcgis.com/ https://www.des.nh.gov/water/rivers-and-lakes/water-quality-assessment https://www4.des.state.nh.us/onestopdatamapper/onestopmapper.aspx	X	
2. Wetlands	Yes	No
2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?	X	
2.2 Are there proposed impacts to tidal SAS, prime wetlands, or priority resource areas? Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www4.des.state.nh.us/NHB-DataCheck/.	X	
2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage?	X	
2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.)		X
2.5 The overall project site is more than 40 acres?		X
2.6 What is the area of the previously filled wetlands?	UNKNOWN	
2.7 What is the area of the proposed fill in wetlands?	3,616 SF	
2.8 What % of the overall project sire will be previously and proposed filled wetlands?	UNKNOWN	
3. Wildlife	Yes	No
3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www4.des.state.nh.us/NHB-DataCheck/. USFWS IPAC website: https://ipac.ecosphere.fws.gov/	X	

3.2 Would work occur in any area identified as either "Highest Ranked Habitat in N.H." or "Highest Ranked Habitat in Ecological Region"? (These areas are colored magenta and green, respectively, on NH Fish and Game's map, "2010 Highest Ranked Wildlife Habitat by Ecological Condition.") Map information can be found at: • PDF: https://wildlife.state.nh.us/wildlife/wap-high-rank.html. • Data Mapper: www.granit.unh.edu. • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html.	X	
3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)?		X
3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development?		X
3.5 Are stream crossings designed in accordance with the GC 31?	X	
4. Flooding/Floodplain Values	Yes	No
4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream?	X	
4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage?		N/A
5. Historic/Archaeological Resources		
For a minimum, minor or major impact project - a copy of the RPR Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 37 GC 14(d) of the GP document**	X	
6. Minimal Impact Determination (for projects that exceed 1 acre of permanent impact)	Yes	No
Projects with greater than 1 acre of permanent impact must include the following: • Functional assessment for aquatic resources in the project area. • On and off-site alternative analysis. • Provide additional information and description for how the below criteria are met.		
6.1 Will there be complete loss of aquatic resources on site?		X
6.2 Have the impacts to the aquatic resources been avoided and minimized to the greatest extent practicable?	X	
6.3 Will all aquatic resource function be lost?		X
6.4 Does the aquatic resource (s) have regional significance (watershed or ecoregion)?		X
6.5 Is there an on-site alternative with less impact?		X
6.6 Is there an off-site alternative with less impact?		X
6.7 Will there be a loss to a resource dependent species?		X
6.8 Are indirect impacts greater than 1 acre within and adjacent to the project area?		X
6.9 Does the proposed mitigation replace aquatic resource function for direct, indirect, and cumulative impacts?	X	

*Although this checklist utilizes state information, its submittal to USACE is a federal requirement.

** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

New Hampshire Department of Transportation

NH 28 & Stonehenge Road, Londonderry - 41715

ACOE Appendix B Supplemental Narrative

1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water?

According to the NHDES 303(d) List (most recent available) Beaver Brook (NHRIV700061203-11) is located within the project site. This segment of Beaver Brook is impaired by Chloride and Mercury.

One treatment swale is proposed to treatment stormwater for approximately 1.48 Acres. The proposed project is not anticipated to cause or contribute to surface water impairments.

2.1 Are there streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work?

As mentioned above in Section 1.1, Beaver Brook is a perennial stream and that flows east through the project via a 30" RCP. There is an additional unnamed stream that flows east under NH 28 just north of Stonehenge Road.

2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport, & wildlife passage?

Stream 1 (Beaver Brook) crosses under NH 28 about 400' south of Stonehenge Road through a 30" RCP. This will be replaced with a 60" RCP. The proposed pipe will be approximately 150' in length. The slope of the pipe and stream channel is less than 1%. A backwater condition exists up to the outlet of the existing 30" culvert but does not extend through the pipe.

Stream 2 crosses NH 28 through a 24" RCP just north of Stonehenge Rd and will be replaced with a 30" RCP. The existing pipe has a stormwater catch basin mid-way through the culvert. The existing outlet is perched. Removing these conditions and replacing them with a single, upsized culvert will provide an overall benefit to the stream system and aquatic organism passage.

Both proposed culvert replacements meet the criteria of Env-Wt 904.10, Alternative Designs.

3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project?

The NH Natural Heritage Bureau (NHB) reviewed the project area and identified documented records of the following species in the vicinity of the proposed project area:

- Blanding's, Eastern Box and Spotted Turtles
- Northern Black Racer
    - Coordination with NHF&G has begun regarding the turtles and Northern Black Racer
- Jefferson/Blue-Spotted Salamander
- Banded Sunfish and Redfin Pickerel
- Northern Long-Eared Bat
- Monarch Butterfly
- Tricolored Bat
    - Coordination to occur once the species is listed

The following measures will be implemented to avoid or minimize impacts to wildlife species:

• The contractor will be required to use erosion control berm, white Filtrexx Degradable Woven Silt Sock, or other "wildlife friendly" options such as woven organic material (e.g. coco or jute matting such as North American Green SC150BN or equivalent) instead of welded plastic or "biodegradable plastic" netting or thread for erosion control matting. Specific products used shall be detailed in the contractor's SWPPP.

• Staging of construction equipment and materials shall be located in a predetermined location, as far away from wetlands as possible. This area shall be visually surveyed by a qualified biologist for rare snakes and turtles. Immediately after the visual survey is conducted, the area shall be enclosed with siltation fence to prevent wildlife from entering. This area shall remain gated and enclosed at all times except for when equipment is being moved in or out of the enclosed area.

• Construction workers will be made aware of the potential to encounter protected turtles from April through November at the site. If spotted or Blanding's turtles are found laying eggs in a work area, NHFG will be contacted for further instructions (Melissa Doperalski (603-479-1129) or Josh Megyesy (cell 978-578-0802)).

• NHFG flyers/photos of snakes and turtles will be included in the contract.

3.1 Would work occur in any area identified as either "Highest Ranked Habitat in N.H." or "Highest Ranked Habitat in Ecological Region"? (These areas are colored magenta and green, respectively, on NH Fish and Game's map, "2010 Highest Ranked Wildlife Habitat by Ecological Condition.")

There is no "Highest Ranked Habitat in N.H" in the project area. There is an area of "Highest Ranked Habitat in Ecological Region" and "Supporting Landscape" that overlaps with PRA wetland easterly of the project area. The proposed impacts in this area will not substantially change the value of the habitat for wildlife.

New Hampshire Department of Transportation

NH 28 & Stonehenge Road, Londonderry - 41715

ACOE Appendix B Supplemental Narrative

5. Historic/Archaeological Resources

The Request for Project Review (RPR) was sent to NH DHR and Section 106 consultation was carried out for the project. It was determined that the proposed project would have no adverse effect on known or potential cultural, historic, or archaeological resources. The No Adverse Effect memo is included with this submittal.

6.2 Have the impacts to the aquatic resources been avoided and minimized to the extent practicable?

Avoidance and minimization measures include refining and steepening roadway slopes to specifically avoid and minimize wetland and stream impacts. Stormwater treatment BMPs have also been incorporated into the design in order to treat runoff from additional pavement surfaces, thereby ensuring water quality of surface waters in the vicinity is maintained.

13631

New Hampshire DOT
Department of Transportation

William Cass, P.E.
Commissioner

THE STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

David Rodrigue, P.E.
Assistant Commissioner
Andre Briere, Colonel, USAF (RET)
Deputy Commissioner

LONDONDERRY
X-A004(724)
41715
RPR 13631

No Historic Properties Affected Memo

In order to assist the Federal Highway Administration (FHWA) in eomplying with Seetion 106 of the National Historie Preservation Aet of 1966 and its amendments, the New Hampshire Department of Transportation (NHDOT), in eonsultation with the New Hampshire Division of Historieal Resourees (SHPO), reviewed this undertaking aeeording to the standards and proeedures detailed in the 2018 Programmatie Agreement regarding the Federal-Aid Highway Program in New Hampshire.

Projeet Deseription

This projeet would improve the NH Route 28 and Stonehenge Road interseetion operations and address safety in Londonderry. The purpose of the projeet is to improve safety and mobility at the interseetion. The proposed improvements will address the following:

- Traffie Operations: Currently, Stonehenge Road drivers experienee long delays during peak hours resulting in a very poor level of serviee (LOS). Due to the delays, drivers enter NH 28 with insuffieient gaps between vehieles, ereating safety eoneerns.
- Interseetion Control: The existing traffie volumes eurrently meet volumes that would justify traffie signal installation per FHWA's *Manual of Uniform Traffic Control Devices*.
- Safety: The intersection experienees a high number of erashes within the eorridor. Approximately 50 erashes were reported between 2010 and 2019.

The Area of Potential Effeet (APE) will begin on NH 28 approximately 1,000 feet south of Stonehenge Road and extend north approximately 1,700 feet to the vieinity of the southern leg of Woodhenge Cirele. It further extends on Stonehenge Road west approximately 500 feet from NH 28, ending east of the I-93 northbound bridge strueture.

The proposed alternative seleeted is a single-lane roundabout design with an additional southbound right-turn lane. The improvements will include full-depth reeonstruetion of the roadway, pavement widening, eurbing, and elosed drainage within the interseetion area and approaehes. The projeet also ineludes the reeonstruetion of two stream-erossing eulverts and the addition of a stormwater treatment swale to meet water quality requirements.

Identifieation & Analysis

Above Ground Resources

In Mareh 2022, an RPR was submitted to NHDHR. Threc above-ground properties werc identificd, inventoried, and evaluatcd for National Rcgister eligibility:

- Reed Paigc Clark Homestcad at 79 Stonehenge Road (LON0114), determined National (and Statc) Register cligible, howcver thc parccl docs not extcnd east of I-93 into thc project arca;
- Daskey Housc at 85 Rockingham Road (LON0568), dctermined not National Rcgister cligiblc;
- Cardello Housc at 2 Woodhcnge Circlc (LON0569), determined not National Rcgister cligible.

Adjaccnt to the APE is a 1919 eorrugated mctal pipe culvert with concretc headwalls that was part of a former roadbcd, it will not bc impactcd as part of this projcct.

Archaeological Resources

NHDHR reviewcd the RPR in 2022 and noted that thc projcct area was archacologically scnsitive. Monadnock Archaeological Consulting conducted a Phase IA Archacological Sensitivity Assessment and Phasc IB Intensive Archaeological Invcstigation of thc project area. Although a largc majority of the project arca was disturbed by construction of existing roads, structurcs, and associated utilities, the study resulted in doeumentation of a singlc historic archacologieal site. Thc badly disturbed late 19th ccntury Clark Cellar Hole site (27-RK-0596) lies adjacent and outside of thc project area boundaries. It was dctcrmined that the proposed project will have minimal adverse effect on historic resourccs, and no furthcr study was rccommcndcd.

NHDHR concurred on Scptcmber 27, 2022 with thc results of the Phase IAIB investigations that rccommended no further study.

Stoncwall asscssments werc conducted following the NHDOT's Stonewall Policy and none of the stonc walls qualify for reconstruction as defined in the policy.

Public Consultation

NHDOT initial contact letters wcrc sent on November 3, 2020 to the Town, including thc Town Conscrvation Commission, Hcritage Commission, Planning Board, Fire and Police Chief, Public Works and Town Manager. Onc rcsponse was received from thc Police Department Captain Kim Bcrnard dated Novembcr 9, 2020 noting no issues with the DOT plans.

This project was prcscntcd at a Public Informational Meeting on September I, 2022 at thc Londondcrry Town Hall and broadcasted and recorded on the Londonderry Access Community Telcvision.

The Scction 106 process was initiated with NHDHR via the Rcquest for Project Rcview which was scnt to thcir office in March 2022. No Consulting Parties were identified.

Determination of Effect

Based on a review pursuant to 36 CFR 800.4, we have determined that the proposed action would have no effect on historic or archaeological resources and no further survey work is needed.

The only identified eligible resources in the area are the Reed Paige Clark Homestead at 79 Stonehenge Road (LON0114) and the Clark Cellar Hole site (27-RK-0596), which are both located outside of the APE.

As stated in the identification section, the 1919 culvert concrete headwall will not be impacted. Additional concrete pipe culverts that were built later and have limited integrity due to extensions, material replacement, and deteriorated condition will be removed and replaced as part of this project. As they have limited integrity in situ, inventory was not completed.

The result of identification and evaluation for the proposed contract is a finding of **No Historic Properties Affected**.

In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

Jill L Edelmann 6/16/2023

Jill Edelmann — Date
NHDOT Cultural Resources Program Manager

Concurred with by the NH State Historic Preservation Officer:

Nadine Miller, DSHPO 6/23/23

Nadine Miller — Date
Deputy State Historic Preservation Officer
NH Division of Historical Resources

c.c. Jason Ayotte, NHDOT
Rebecca Martin, NHDOT
Sheila Charles, NHDOT
Marika Labash, NHDHR

CONSTRUCTION SEQUENCE NARRATIVE

Londonderry 41715 – NH 28 & Stonehenge Road

Phase 1:

1. Widen NH 28 to the east while maintaining existing cross-slopes. Maintain two-way traffic with two 11-foot lanes and 2-foot minimum shoulders on NH 28 and Stonehenge Road.

Phase 2:

1. Install portable concrete barriers and impact attenuators along NH 28 and Stonehenge Road. Maintain access to existing driveways. Set up temporary pavement markings.
2. Remove the extent of existing concrete pavement within the phase 2 limits.
3. Construct as much of the work as possible on the western half of the roundabout and the northern and southern approaches of NH 28. This work includes all drainage structures and pipes within the phase 2 limits.
4. Note the following sequencing of construction for the drainage pipes crossing under NH 28:
    a. Install the headwall and tie the new 24” RCP culvert into the existing 24” RCP (STA 601+35 RT).
    b. The existing 24” CMP and 24” RCP (STA 219+31 RT to STA 219+70 LT) shall remain until the proposed 30” cross-culvert (STA 219+26 RT to STA 219+58 LT) has been fully installed during phase 3A.
    c. Remove the portion of the existing 30” RCP culvert (STA 603+96 RT to STA 604+58 LT) located within the phase 2 work zone. Provide a cofferdam to channel flow from the new 60” RCP to the existing 30” RCP. The remaining portion of the new 60” RCP will be installed during phase 3A.
5. To complete phase 2, Stonehenge Road will require one-lane alternating two-way traffic to install the remaining drainage items and raise the grade to the proposed level.
6. Construct temporary widening in the southwest and northwest quadrants of the intersection to facilitate the phase 3A traffic shifts. Maintain 11 ft lanes with 2 ft shoulders.

Phase 3A:

1. Shift traffic to the proposed NH 28 lanes. The southern leg of NH 28 will require one-lane alternating two-way traffic.
2. Remove all existing pavement (including temporary widening) inside the phase 3A work zone. Remove existing concrete pavement within the phase 3A limits.
3. Construct the remainder of the roundabout embankment and select materials. Construct guardrail and curbing on the east side of the roundabout.
4. Construct the BMP treatment swale, remaining drainage items, and side slopes on the east side of NH 28. Once the 30” RCP (STA 219+26 RT to STA 219+58 LT) has been fully installed, remove the existing 24” CMP and 24” RCP (STA 219+31 RT to STA 219+70 LT) to the greatest extent practical. Fill the remaining pipe and inlet structure with flowable fill or excavate and remove entirely.

Phase 3B:

1. Shift traffic to the easterly side of the roundabout and construct the westerly portion of the concrete truck apron (14-day cure period).
2. Utilizing one-lane alternating two-way traffic, construct the new 18” RCP (STA 608+25 RT to STA 608+22 LT) under the proposed NH 28 travelway.
3. Utilizing one-lane alternating two-way traffic, remove the remaining existing pavement, including temporary widening and existing concrete pavement.

Phase 4:

1. Install splitter islands, guardrail, and curbing not previously constructed.
2. Remove any remaining temporary pavement widening.
3. Construct any remaining slope work and ditches.
4. Pave wearing course.
5. Paint final pavement markings and install signs.

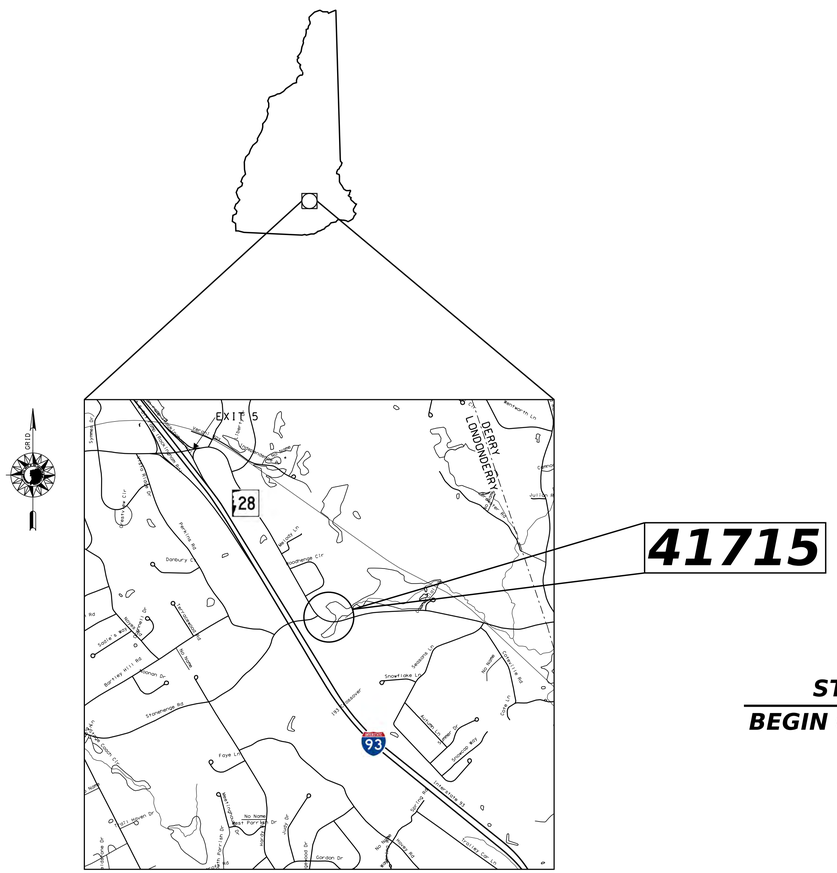
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION

WETLAND PLANS
FEDERAL AID PROJECT

X-A004(724)

N.H. PROJECT NO. 41715
NH ROUTE 28

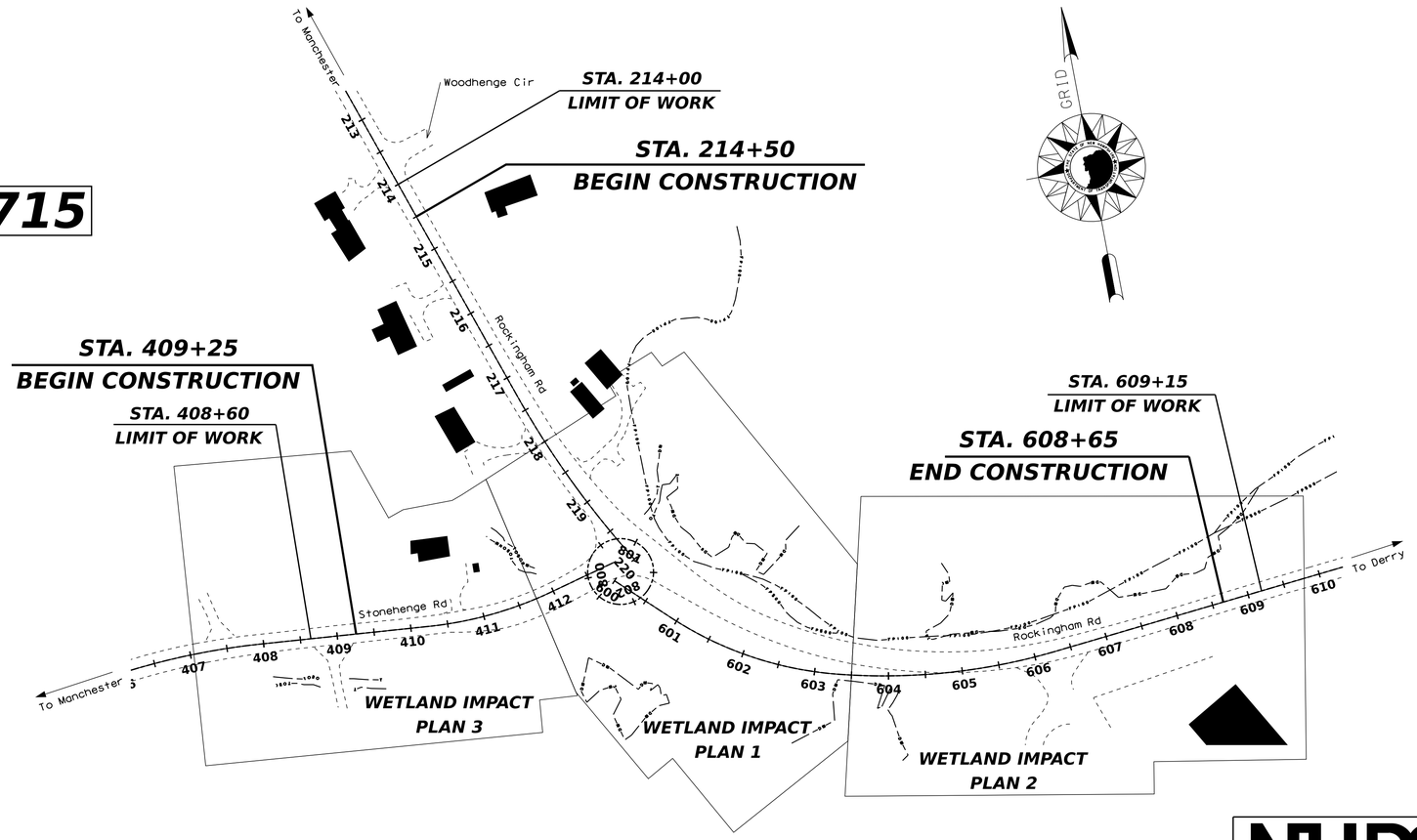
DESIGN DATA		NH 28	STONEHENGE
AVERAGE DAILY TRAFFIC	2020/21	17,900 VPD	4,952 VPD
AVERAGE DAILY TRAFFIC	2044	22,700 VPD	N/A
PERCENT OF TRUCKS		8%	N/A
DESIGN SPEED		45 MPH	35 MPH
LENGTH OF PROJECT		1515 FT	415 FT



LOCATION MAP

1 1/2 0 1 2 mi.

GRAPHIC SCALE



TOWN OF LONDONDERRY, NH

COUNTY OF ROCKINGHAM

SCALE: 1" = 100'

LENGTH OF PROJECT: 0.4 MILES

FOR CONSTRUCTION AND ALIGNMENT DETAILS - SEE THE CONSTRUCTION PLANS

DRAWN BY TJW DATE 1/2024

CHECKED BY KLH DATE 1/2024

GPI Greenman-Pedersen, Inc.
Engineering & Construction Services
116 S River Rd Building B Suite 1, Bedford, NH 03110
Tel: (603) 776-8259 Fax: (978) 658-3044
http://www.gpinet.com

NHDOT THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR APPROVAL:

DIRECTOR OF PROJECT DEVELOPMENT — DATE

MUNICIPAL HIGHWAYS ENGINEER
BUREAU OF PLANNING AND COMMUNITY ASSISTANCE — DATE

APPROVED:

ASSISTANT COMMISSIONER AND CHIEF ENGINEER — DATE

FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
X-A004(724)	41715	1	11

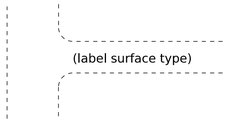
GENERAL

EDGE OF PAVEMENT — PROPOSED ROADWAY

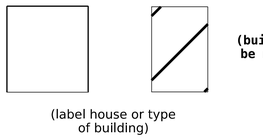
TRAVELED WAY — existing roadway

(pavement removed outside slope lines)

DRIVEWAYS



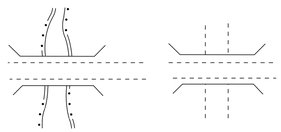
BUILDINGS



FOUNDATION

LEACH FIELD

BRIDGE CROSSINGS

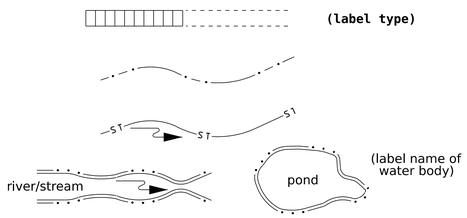


STEPS AND WALK — (label type)

DITCH LINE

INTERMITTENT WATER COURSE/STREAM

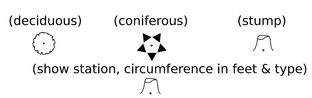
SHORE LINE



POTENTIAL WET AREA SYMBOL

BRUSH OR WOODS LINE

TREES (PLANS)



TREE OR STUMP (CROSS-SECTIONS)

HEDGE — (label type)

MONITORING WELL

WELL

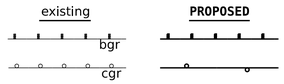
FLAG POLE — fp

ORIGINAL GROUND (TYPICALS)

ROCK OUTCROP

ROCK LINE (TYPICALS & SECTIONS ONLY)

GUARDRAIL (label type)



JERSEY BARRIER

CURB (LABEL TYPE)

STONE WALL

RETAINING WALL (LABEL TYPE) — (points toward retained ground)

FENCE (LABEL TYPE)

SIGNS — (single post) (double post)

GAS PUMP — gp

FUEL TANK (ABOVE GROUND) — ft (label size & type)

STORAGE TANK FILLER CAP — fc

SEPTIC TANK — S

GRAVE — gr

MAILBOX — mb

VENT PIPE — vp

SATELLITE DISH ANTENNA — da

PHONE — ph

GROUND LIGHT/LAMP POST — gl lp

BORING LOCATION

TEST PIT

INTERSTATE NUMBERED HIGHWAY — 93

UNITED STATES NUMBERED HIGHWAY — 3

STATE NUMBERED HIGHWAY — 102

SHORELAND - WETLAND

WETLAND DESIGNATION AND TYPE — 2 PUB2E

DELINEATED WETLAND — DW

ORDINARY HIGH WATER — OHW

TOP OF BANK — TOB

TOP OF BANK & ORDINARY HIGH WATER — TOBOHW

NORMAL HIGH WATER — NHW

WIDTH AT BANK FULL — WBF

PRIME WETLAND — PWET

PRIME WETLAND 100' BUFFER — PWET100

NON-JURISDICTIONAL DRAINAGE AREA — DA — NJDA

COWARDIN DISTINCTION LINE — CDL

TIDAL BUFFER ZONE — TBZ

DEVELOPED TIDAL BUFFER ZONE — DTBZ

HIGHEST OBSERVABLE TIDE LINE — HOTL

MEAN HIGH WATER — MHW

MEAN LOW WATER — MLW

VERNAL POOL — VP

SPECIAL AQUATIC SITE — SAS

REFERENCE LINE — REF

WATER FRONT BUFFER — WB50

NATURAL WOODLAND BUFFER — NWB150

PROTECTED SHORELAND — PS250

INVASIVE SPECIES LABEL — I.S. I I.S. II

INVASIVE SPECIES — INV

FLOODPLAIN / FLOODWAY

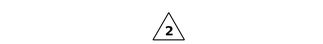
500 YEAR FLOODPLAIN BOUNDARY — FP500

100 YEAR FLOODPLAIN BOUNDARY — FP100

FLOODWAY — FW

ENGINEERING

CONSTRUCTION BASELINE



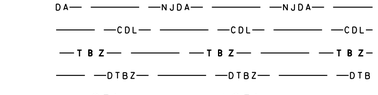
PC, PT, POT (ON CONST BASELINE)

PI (IN CONSTRUCTION BASELINES)

INTERSECTION OR EQUATION OF TWO LINES

ORIGINAL GROUND LINE (PROFILES AND CROSS-SECTIONS)

PROFILE GRADE LINE (PROFILES AND CROSS-SECTIONS)



CLEARING LINE

SLOPE LINE

SLOPE LINE (FILL)

SLOPE LINE (CUT)

PROFILES AND CROSS SECTIONS:

ORIGINAL GROUND ELEVATION (LEFT) — 72.5

FINISHED GRADE ELEVATION (RIGHT) — 79.14

72.5
79.14

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
07-31-2023	stdsymb1-2-ce	41715	2	11

STD SYMB SHT 1 OF 2

DRAINAGE

MANHOLE

CATCH BASIN — cb

DROP INLET — di

(existing) / (PROPOSED)

DRAINAGE PIPE (existing) — DP — DP — (label size & type)

DRAINAGE PIPE (PROPOSED) — PDP — PDP

UNDERDRAIN (existing) W/ FLUSHING BASIN — DP — fb — DP — (label size & type)

UNDERDRAIN (PROPOSED) W/ FLUSHING BASIN — PDP — PDP

show direction of flow

HEADER (existing & PROPOSED) — DP — PDP — (with stone outlet protection)

END SECTION (existing & PROPOSED) — METAL or PLASTIC; RCP

OPEN DITCH (PROPOSED)

EROSION CONTROL/ STONE SLOPE PROTECTION

BOUNDARIES / RIGHT-OF-WAY

RIGHT-OF-WAY LINE — (label type)

RR RIGHT-OF-WAY LINE

PROPERTY LINE

PROPERTY LINE (COMMON OWNER) — Z — Z

TOWN LINE — BOW / CONCORD

COUNTY LINE — COOS / GRAFTON

STATE LINE — MAINE / NEW HAMPSHIRE

NATIONAL FOREST

CONSERVATION LAND — LC — LC

BENCH MARK / SURVEY DISK

BOUND — (PROPOSED) — bnd

STATE LINE/ TOWN LINE MONUMENT — S/L — T/L

NHDOT PROJECT MARKER

IRON PIPE OR PIN — ip

DRILL HOLE IN ROCK — dh

TAX MAP AND LOT NUMBER — 156 / 14 — 1642/341 — 6.80 Ac.±

PROPERTY PARCEL NUMBER — 12

HISTORIC PROPERTY — H

UTILITIES

TELEPHONE POLE

POWER POLE

JOINT OCCUPANCY

MISCELLANEOUS/UNKNOWN POLE

GUY POLE OR PUSH BRACE

LIGHT POLE

LIGHT ON POWER POLE

LIGHT ON JOINT POLE

existing / PROPOSED

(plot point at face not center of symbol)

POLE STATUS: REMOVE, LEAVE, PROPOSED, OR TEMPORARY AS APPLICABLE e.g.: R, L, P+04 25.0', T+04 25.0'

RAILROAD — (label ownership)

RAILROAD SIGN

RAILROAD SIGNAL

UTILITY JUNCTION BOX — jb — JB

OVERHEAD WIRE — OW — OW — (label type)

UNDERGROUND UTILITIES

WATER (on existing lines label size, type and note if abandoned) — W — W — PW — PW

SEWER — S — S — PS — PS

TELEPHONE — T — T — PT — PT

ELECTRIC — E — E — PE — PE

GAS — G — G — PG — PG

LIGHTING — L — L — PL — PL

INTELLIGENT TRANSPORTATION SYSTEM — ITS — ITS — PITS — PITS

FIBER OPTIC — FO — FO — PFO — PFO

WATER SHUT OFF — WSO

GAS SHUT OFF — GSO

HYDRANT — HYD

MANHOLES

SEWER — MHS

TELEPHONE — MHT

ELECTRICAL — MHE

GAS — MHG

UNKNOWN

WATER — MHW

TRAFFIC SIGNALS / ITS

existing / PROPOSED

MAST ARM — 30' MA (NOTE ANGLE FROM R)

OPTICOM RECEIVER

OPTICOM STROBE

TRAFFIC SIGNAL

PEDESTAL WITH PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON UNIT

SIGNAL CONDUIT — C — C — C — PC — PC — PC

CONTROLLER CABINET — cc — CC

METER PEDESTAL — mp — MP

PULL BOX — pb — PB

LOOP DETECTOR (QUADRUPOLE) — (label size)

LOOP DETECTOR (RECTANGULAR) — (label size)

CAMERA POLE (CCTV)

FIBER OPTIC DELINEATOR — fod — FOD

FIBER OPTIC SPLICE VAULT — SVF

ITS EQUIPMENT CABINET — its — ITS

MOTOR VEHICLE DETECTION SYSTEM (MVDS)

VARIABLE SPEED LIMIT SIGN

DYNAMIC MESSAGE SIGN

ROAD AND WEATHER INFO SYSTEM

CONSTRUCTION NOTES

CURB MARK NUMBER - BITUMINOUS — B-1

CURB MARK NUMBER - GRANITE — G-1

CLEARING AND GRUBBING AREA — A

DRAINAGE NOTE — 1

EROSION CONTROL NOTE — A

FENCING NOTE — A

GUARDRAIL NOTE — 1

ITS NOTE — 1

LIGHTING NOTE — A

TRAFFIC SIGNAL NOTE — 1

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

STANDARD SYMBOLS

REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
07-31-2023	stdsymb1-2-ce	41715	3	11

STD SYMB SHT 2 OF 2

WETLAND IMPACT SUMMARY									LINEAR STREAM IMPACTS FOR MITIGATION		
WETLAND NUMBER	WETLAND CLASSIFICATION	LOCATION	AREA IMPACTS						PERMANENT		
			PERMANENT				TEMPORARY		BANK LEFT	BANK RIGHT	CHANNEL
			N.H.W.B. (NON-WETLAND)		N.H.W.B. & A.C.O.E. (WETLAND)						
			SF	LF	SF	LF	SF	LF	LF	LF	LF
1	R3UB1/2	A				10	324	36			
2	R3UB1/2	B			202	66	65	10			
3	PFO1/PSS1E	C			266		275				
5	PUB3/4/PSS1/PEM1H	D			2521		534				
6	R3UB1/2	E			314	84	7	1			
7	PEM1/PSS1E	F			313		92				
7	PEM1/PSS1E	G					389				
		TOTAL			3616	160	1464	47			

PERMANENT IMPACTS: 3.616 SF
TEMPORARY IMPACTS: 1.686 SF
TOTAL IMPACTS: 5.302 SF

STA 603+50 MATCH TO WETLAND IMPACT PLAN SHEET 2

STA 411+75 MATCH TO WETLAND IMPACT PLAN SHEET 3

DRAINAGE EASEMENT +50.0 77'LT

DRAINAGE EASEMENT

+84.0 93'LT

+77.0 58'LT

+50.0 93'LT

+84.0 50'LT

+38.0 48' RT

+89.5 90'LT

+32.4 50' RT

+54.0 50'RT

+15.0 51'RT

+04.0 99'RT

+36.0 110'RT

R=875' +29.4 50' RT

R=525'

R=350'

PROP. ROW LINE

DRAINAGE EASEMENT

EXIST. R.O.W.

5 MARK S. & CAROL L. ZIMMERMAN

9 MARK & CAROL LYNN ZIMMERMAN

2 R3UB1/2

3 PFO1/PSS1E

8 TOWN OF LONDONDERRY R3UB1/2

7 JAMIE MANTINI

10 CLARK IRREVOCABLE TRUST GERARD CLARK AND JEANNE CLARK BAXTER TRUSTEES

4 PFO1E

5 PUB3/4 / PSS1 / PEM1H

11 TOWN OF LONDONDERRY

A B C D

12" RCP 15" RCP 18" RCP 24" RCP 30" RCP 12" PP 18" PP 24" PP PDP

600 601 602 603 604 605 606 607 608 609 610 611 612 800 801 802

220

LEGEND

TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

WETLAND DESIGNATION NUMBER
WETLAND IMPACT LOCATION
WETLAND MITIGATION AREA
MITIGATION

WETLAND CLASSIFICATION CODES	
PFO1/PSS1E	PALUSTRINE, FORESTED / SCRUB/SHRUB, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PUB3/4/PSS1/PEM1H	PALUSTRINE, UNCONSOLIDATED BOTTOM / SCRUB/SHRUB / EMERGENT, MUD/ORGANIC / BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PEM1/PSS1E	PALUSTRINE, EMERGENT / SCRUB/SHRUB, PERSISTENT / BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
PFO1E	PALUSTRINE, FORESTED, BROAD-LEAVED DECIDUOUS, SEASONALLY FLOODED/SATURATED
R3UB1/2	RIVERINE, UPPER PERENNIAL, UNCONSOLIDATED BOTTOM, COBBLE/SAND

20 0 20 40
SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

SDR PROCESSED DATE
NEW DESIGN DATE
SHEET CHECKED DATE
AS BUILT DETAILS DATE

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT PLANS
SHEET 1 OF 3

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Wetland1 41715_Wetland_Plans	41715	4	11

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION	STATION

SDR PROCESSED DATE
NEW DESIGN DATE
SHEET CHECKED DATE
AS BUILT DETAILS DATE

STA 603+50 MATCH TO WETLAND IMPACT PLAN SHEET 1

GRID

9 MARK & CAROL LYNN ZIMMERMAN

13 SAMARA PROPERTIES LLC

N/F RC ENTERPRISE LLC

15 RC ENTERPRISE LLC

14 LADY MADONNA LLC

11 TOWN OF LONDONDERRY

10 CLARK IRREVOCABLE TRUST GERARD CLARK AND JEANNE CLARK BAXTER TRUSTEES

12 LONNI REALTY LLC

7 PEM1/PSS1E

6 R3UB1/2

5 PUB3/4 / PSS1 / PEM1H

EXIST. R.O.W.

DRAINAGE EASEMENT

+70.0 101'LT

+50.0 77'LT

+93.0 61'LT

F

+07.0 80'LT

+35.0 80'LT

G

+07.0 50'LT

+35.0 50'LT

606

607

608

609

605

604

60' RCP

18" RCP

POP

+45.0 50'RT

+45.0 54'RT

+05.0 54'RT

+05.0 50'RT

DRAINAGE EASEMENT

+54.6 50' RT

+29.4 50' RT

+50.0 50'RT

+00.0 55'RT

+50.0 50'RT

+72.0 50'RT

+50.0 65'RT

+72.0 58'RT

D

E

+20.0 50'RT

+30.1 55'RT

+35.3 65'RT

+20.0 56'RT

TEMPORARY CONSTRUCTION EASEMENT

PROP. ROW LINE

R=875'

DRAINAGE EASEMENT

TEMPORARY CONSTRUCTION EASEMENT

12-CS-60#-1990

3/4" 2000

2" ASPLEEVE

I.S. 1

20 0 20 40

SCALE IN FEET

LEGEND

TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

WETLAND DESIGNATION NUMBER

WETLAND IMPACT LOCATION

WETLAND MITIGATION AREA

MITIGATION

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT PLANS SHEET 2 OF 3

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Wetland2	41715_Wetland_Plans	41715	5	11

LEGEND

TYPE OF WETLAND IMPACT	SHADING/ HATCHING
NEW HAMPSHIRE WETLANDS BUREAU (PERMANENT NON-WETLAND)	
NEW HAMPSHIRE WETLANDS BUREAU & ARMY CORP OF ENGINEERS (PERMANENT WETLAND)	
TEMPORARY IMPACTS	

- # — WETLAND DESIGNATION NUMBER
- # — WETLAND IMPACT LOCATION
- # — WETLAND MITIGATION AREA
- MITIGATION

GRID

6
THE JOHN ARANOSIAN
REVOCABLE TRUST OF 1994,
JOHN ARANOSIAN, TRUSTEE
&
THE ISABELLE E. HODGSON
REVOCABLE TRUST OF 1994,
FLOYD W. HAYES, III, TRUSTEE
&
THE GLADYS R. HAYES
REVOCABLE TRUST OF 1997,
FLOYD W. HAYES, III, TRUSTEE

7
JAMIE MANTINI

1
R3UB1/2

A

PROP. ROW LINE

+66.3
54' LT
R=125'

+56.0
31' LT

STA 411+75 MATCH TO WETLAND IMPACT PLAN SHEET 1

EXIST. R.O.W.

12" RCP

408 409 410 411

+44.6
43' RT
R=350'

PROP. ROW LINE

EXIST. R.O.W.

EXIST. L.A.R.O.W.

APPROXIMATE LOCATION
OF EXISTING ACCESS &
UTILITY EASEMENT.
6454/1679

10
CLARK
IRREVOCABLE
TRUST
GERARD CLARK
AND JEANNE CLARK BAXTER
TRUSTEES

20 0 20 40
SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	DATE
NEW DESIGN	DATE
SHEET CHECKED	DATE
AS BUILT DETAILS	DATE

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

WETLAND IMPACT PLANS
SHEET 3 OF 3

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Wetland3 41715_Wetland_Plans	41715	6	11

EROSION CONTROL NOTES AND STRATEGIES

1. Erosion Control/Stormwater Control Selection, Sequencing and Maintenance
   - 1.1. Comply with RSA 485-A:17 Terrain Alteration.
   - 1.2. Install and maintain all erosion control/stormwater controls in accordance with the New Hampshire Stormwater Management Manual, Volume 3, Erosion and Sediment Controls During Construction, December 2008 (BMP Manual), available from the NH Department of Environmental Services (NHDES).
   - 1.3. Install erosion control/stormwater control measures prior to the start of work and in accordance with the manufacturer's recommendations.
   - 1.4. Select erosion control/stormwater control measures based on the size and nature of the project and physical characteristics of the site, including slope, soil type, vegetative cover, and proximity to jurisdictional areas.
   - 1.5. Install perimeter controls prior to earth disturbing activities.
   - 1.6. Install stormwater treatment ponds and drainage swales before rough grading the site.
   - 1.7. Clean, replace, and augment stormwater control measures and infiltration basins as necessary to prevent sedimentation beyond project limits throughout the project duration.
   - 1.8. Inspect erosion and sediment control measures in accordance with Section 645 of the specifications, weekly, and within 24 hours (during normal work hours), of any storm event greater than 0.25 inches of rain in a 24-hour period.
   - 1.9. Contain stockpiles with temporary perimeter controls. Protect inactive soil stockpiles with soil stabilization measures (temporary erosion control seed mix and mulch, soil binder) or cover them with anchored tarps. If the stockpile is to remain undisturbed for more than 14 days, mulch the stockpile.
   - 1.10. Maintain temporary erosion and stormwater control measures in place until the area has been permanently stabilized.
   - 1.11. An area is considered stable if one of the following has occurred:
     - Base course gravels have been installed in areas to be paved;
     - A minimum of 85% vegetative growth has been established;
     - A minimum of 3”of non-erosive material such as stone or rip-rap has been installed;
     - Temporary slope stabilization has been properly installed (see Table 1).
   - 1.12. Direct runoff to temporary practices until permanent stormwater infrastructure is constructed and stabilized.
   - 1.13. Use temporary mulching, permanent mulching, temporary vegetative cover, and permanent vegetative cover to reduce the need for dust control. Use mechanical sweepers on paved surfaces where necessary to prevent dust buildup. Apply water, or other dust inhibiting agents or tackifiers.
   - 1.14. Plan activities to account for sensitive site conditions
     - Sequence construction to limit the duration and area of exposed soils.
     - Clearly flag areas to be protected in the field and provide construction barrier to prevent trafficking outside of work areas.
     - Protect and maximize existing native vegetation and natural forest buffers between construction activities and sensitive areas.
     - When work is undertaken in a flowing watercourse, implement stream flow diversion methods prior to any excavation or filling activity.
   - 1.15. Utilize storm drain inlet protection to prevent sediment from entering a storm drainage system prior to the permanent stabilization of the contributing disturbed area.
   - 1.16. Use care to ensure that sediments do not enter any existing catch basins during construction. Place temporary inlet protection at inlets in areas of soil disturbance that are subject to sedimentation.
   - 1.17. Construct, stabilize, and maintain temporary and permanent ditches in a manner that will minimize scour. Direct temporary and permanent ditches to drain to sediment basins or stormwater collection areas.
   - 1.18. Supplement channel protection measures with perimeter control measures when ditch lines occur at the bottom of long fill slopes. Install the perimeter controls on the fill slope to minimize the potential for fill slope sediment deposits in the ditch line.
   - 1.19. Divert sediment laden water away from drainage inlet structures to the extent possible.
   - 1.20. Install sediment barriers and sediment traps at drainage inlets to prevent sediment from entering the drainage system.
   - 1.21. Clean catch basins, drainage pipes, and culverts if significant sediment is deposited.
   - 1.22. Construct and stabilize dewatering infiltration basins prior to any excavation that may require dewatering.
   - 1.23. Place and stabilize temporary sediment basins or traps at locations where concentrated flow (channels and pipes) discharge to the surrounding environment from areas of unstabilized earth disturbing activities.
   - 1.24. Stabilize, to appropriate anticipated velocities, conveyance channels or pumping systems needed to convey construction stormwater to basins and discharge locations prior to use.
   - 1.25. Size temporary sediment basins to contain the 2-year, 24 hour storm event.
   - 1.26. Size temporary sediment traps to contain 3,600 cubic feet of storage for each acre of drainage area.
   - 1.27. Construct detention basins to accommodate the 2-year, 24-hour storm event.

2. Construction Planning
   - 2.1. Divert off site runoff or clean water away from the construction activities to reduce the volume that needs to be treated on site.
   - 2.2. Divert storm runoff from upslope drainage areas away from disturbed areas, slopes and around active work areas to a stabilized outlet location.
   - 2.3. Construct impermeable barriers, as necessary, to collect or divert concentrated flows from work or disturbed areas.
   - 2.4. Locate staging areas and stockpiles outside of wetlands jurisdiction.
   - 2.5. Do not store, maintain, or repair mobile heavy equipment in wetlands, unless equipment cannot be practicably removed and secondary containment is provided.
   - 2.6. Provide a water truck to control excessive dust, at the discretion of the Contract Administrator.

3. Site Stabilization
   - 3.1. Stabilize all areas of unstabilized soil as soon as practicable, but no later than 45 days after initial disturbance.
   - 3.2. Limit unstabilized soil to a maximum of 5 acres unless documentation is provided that demonstrates that cuts and fills are such that 5 acres is unreasonable.
   - 3.3. Use erosion control seed mix in all inactive construction areas that will not be permanently seeded within two weeks of disturbance and prior to September 15th of any given year in order to achieve vegetative stabilization prior to the end of the growing season.
   - 3.4. Apply, and reapply as necessary, soil tackifiers in accordance with the manufacturer’s specifications to minimize soil and mulch loss until permanent vegetation is established.
   - 3.5. Stabilize basins, ditches and swales prior to directing runoff to them.
   - 3.6. Stabilize roadway and parking areas within 72 hours of achieving finished grade.
   - 3.7. Stabilize cut and fill slopes within 72 hours of achieving finished grade.
   - 3.8. When temporarily stabilizing soils and slopes, utilize the techniques outlined in Table 1.
   - 3.9. Stabilize all areas that can be stabilized prior to opening up new areas to construction activities.
   - 3.10. Utilize Table 1 when selecting temporary soil stabilization measures.
   - 3.11. Divert off-site water through the project in an appropriate manner so as not to disturb the upstream or downstream soils, vegetation or hydrology beyond the permitted area.
   - 3.12. Install and maintain construction exits anywhere traffic leaves a construction site onto a public right-of-way.
   - 3.13. Sweep all construction related debris and soil from the adjacent paved roadways, as necessary.

4. Slope Protection
   - 4.1. Intercept and divert storm runoff from upslope drainage areas away from unprotected and newly established areas and slopes to a stabilized outlet or conveyance.
   - 4.2. Consider how groundwater seepage on cut slopes may impact slope stability and incorporate appropriate measures to minimize erosion.
   - 4.3. Convey storm water down the slope in a stabilized channel or slope drain.
   - 4.4. The outer face of the fill slope should be in a loose, ruffled condition prior to turf establishment.

5. Winter Construction
   - 5.1. To minimize erosion and sedimentation impacts, limit the extent and duration of winter excavation and earthwork activities. The maximum amount of disturbed earth shall not exceed a total of 5 acres from May 1st through October 15th, or exceed one acre during winter months, unless the contractor demonstrates to the Department that the additional area of disturbance is necessary to meet the contractor’s Critical Path Method (CPM) schedule, and the contractor has adequate resources available to ensure that environmental requirements will be met.
   - 5.2. Construction performed any time between October 15th and May 1st of any year is considered winter construction. During winter construction:
     - Stabilize all proposed vegetation areas which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, in accordance with Table 1.
     - Stabilize all ditches or swales which do not exhibit a minimum of 85% vegetative growth by October 15th, or which are disturbed after October 15th, in accordance with Table 1.
     - Protect incomplete road surfaces, where base course gravels have not been installed, and where work has stopped for the season after October 15th, in accordance with Table 1.
     - Unless a winter construction plan has been approved by NHDOT, conduct winter excavation and earthwork such that no more than 1 acre of the project is without stabilization an any one time.

6. Wildlife Protection Measures
   - 6.1. Report all observations of threatened and endangered species on the project site to the Department’s Bureau of Environment by phone at 603-271-3226 or by email at Bureau16@dot.nh.gov, indicating in the subject line the project name, number, and that a threatened/endangered species was found.
   - 6.2. Photograph the observed species and nearby elements of habitat or areas of land disturbance and provide them to the Department’s Bureau of Environment at the above email address.
   - 6.3. In the event that a threatened or endangered species is observed on the project during work, the species shall not be disturbed, handled, or harmed prior to receiving direction from the Bureau of Environment.
   - 6.4. Utilize wildlife friendly erosion control methods when:
     - Erosion control blankets are used,
     - A protected species or habitat is documented,
     - The proposed work is in or adjacent to a priority resource area, and/or when specifically requested by NHB or NHF&G

GUIDANCE ON SELECTING TEMPORARY SOIL STABILIZATION MEASURES
TABLE 1

APPLICATION AREAS	DRY MULCH METHODS				HYDRAULICALLY APPLIED MULCHES[2]				ROLLED EROSION CONTROL BLANKETS[3]			
	HMT	WC	SG	CB	HM	SMM	BFM	FRM	SNSB	DNSB	DNSCB	DNCB
SLOPES[1]												
STEEPER THAN 2:1	NO	NO	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES
2:1 SLOPE	YES1	YES[1]	YES	YES	NO	NO	YES	YES	NO	YES	YES	YES
3:1 SLOPE	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:1 SLOPE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO
WINTER STABILIZATION	4T/AC	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES
CHANNELS												
LOW FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES
HIGH FLOW CHANNELS	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES

ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE	ABBREV.	STABILIZATION MEASURE
HMT	HAY MULCH & TACK	HM	HYDRAULIC MULCH	SNSB	SINGLE NET STRAW BLANKET
WC	WOOD CHIPS	SMM	STABILIZED MULCH MATRIX	DNSB	DOUBLE NET STRAW BLANKET
SG	STUMP GRINDINGS	BFM	BONDED FIBER MATRIX	DNSCB	2 NET STRAW-COCONUT BLANKET
CB	COMPOST BLANKET	FRM	FIBER REINFORCED MEDIUM	DNCB	2 NET COCONUT BLANKET

NOTES:
1. All slope stabilization options assume a slope length ≤ 10 times the horizontal distance component of the slope, in feet.
2. Do not apply products containing polyacrylamide (PAM) directly to, or within 100 feet of any surface water without NHDES approval.
3. Install all methods in Table 1 per the manufacturer’s recommendation for time of year and steepness of slope.

STATE OF NEW HAMPSHIRE
SPECIAL DETAILS
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS

	REVISION DATE	DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
erosstrat-ce	02-29-2024	sd-erostrat-02292024	41715	7	11

30" CULVERT SEQUENCING NOTES

1. TEMPORARILY EXTEND THE EASTERN END OF THE EXISTING 24" CULVERT BEYOND THE LIMITS OF THE PROPOSED ROUNDABOUT FILL SLOPE. CONSTRUCT TEMPORARY HEADWALL AND PROTECTION STONE. MAINTAIN FLOW THROUGH THE EXISTING 24" CULVERT.

2. CONSTRUCT THE PROPOSED 30" CULVERT (2 PHASES). REMOVE THE PORTION OF THE EXISTING 24" CULVERT AND HEADWALL ADJCENT TO THE PROPOSED 30" CULVERT INLET AND CONSTRUCT HEADWALL, AND PROTECTION STONE DURING SAME-DAY OPERATION. PERMANENTLY DIVERT FLOW INTO THE PROPOSED 30" CULVERT.

3. REMOVE THE TEMPORARY 24" PIPE EXTENSION AND FILL AND ABANDON THE REMAINING PORTION OF THE EXISTING 24" CULVERT.

GRID

STA 218+00 MATCH TO EROSION CONTROL PLAN SHEET 2

STA 411+75 MATCH TO EROSION CONTROL PLAN SHEET 4

STA 603+50 MATCH TO EROSION CONTROL PLAN SHEET 3

DRAINAGE EASEMENT

PROP. ROW LINE

DRAINAGE EASEMENT

PROP. ROW LINE

1 R3UB1/2

2 R3UB1/2

3 PFO1/PSS1E

4 PFO1E

5 PUB3/4 / PSS1 / PEM1H

335'

340'

345'

350'

12" RCP

15" RCP

18" RCP

24" RCP

30" RCP

24" PP

12" PP

801

802

600

220

16°13'57.0"

35°21'10.9"

603

601

EROSION CONTROL PLAN LEGEND

- PERIMETER CONTROL
  - SILT FENCE
  - EROSION CONTROL MIX BERM
  - EROSION CONTROL MIX SOX
  - TURBIDITY CURTAIN
  - SHEET PILE
  - COFFER DAM
- NATURAL BUFFER/PERIMETER CONTROL
  - SILT FENCE
  - EROSION CONTROL MIX BERM
  - EROSION CONTROL MIX SOX
  - TURBIDITY CURTAIN
  - SHEET PILE
  - COFFER DAM
- CHANNEL PROTECTION
  - STONE CHECK DAMS
  - STRAW WATTLES
  - CHANNEL MATTING
  - CLASS D EROSION STONE
  - CLASS C STONE
- STREAM DIVERSION
  - PUMP THROUGH PIPE
  - DRAIN THROUGH PIPE OR CHANNEL
- UNIMPACTED RIVERINE SURFACE WATERS
  - NO WORK AND/OR IMPACT
- ROUTINE ROADWAY QUALIFYING ACTIVITY
  - BMP

20 0 20 40

SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

	DATE
SDR PROCESSED	
NEW DESIGN	
SHEET CHECKED	
AS BUILT DETAILS	

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS SHEET 1 OF 4

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Gen01 41715_ErosionControl_Plans	41715	8	11

EROSION CONTROL PLAN LEGEND

PC — PC	PERIMETER CONTROL
	SILT FENCE
	EROSION CONTROL MIX BERM
	EROSION CONTROL MIX SOX
	TURBIDITY CURTAIN
	SHEET PILE
	COFFER DAM
NB/PC — NB/PC	NATURAL BUFFER/PERIMETER CONTROL
	SILT FENCE
	EROSION CONTROL MIX BERM
	EROSION CONTROL MIX SOX
	TURBIDITY CURTAIN
	SHEET PILE
	COFFER DAM
CP → CP → CP	CHANNEL PROTECTION
	STONE CHECK DAMS
	STRAW WATTLES
	CHANNEL MATTING
	CLASS D EROSION STONE
	CLASS C STONE
SD → SD → SD	STREAM DIVERSION
	PUMP THROUGH PIPE
	DRAIN THROUGH PIPE OR CHANNEL
URS → URS → URS	UNIMPACTED RIVERINE SURFACE WATERS
	NO WORK AND/OR IMPACT
ROA → ROA → ROA	ROUTINE ROADWAY QUALIFYING ACTIVITY
	BMP

PROP. ROW LINE

STA 218+00 MATCH TO EROSION CONTROL PLAN SHEET 1

213 214 215 216 217

S18°41'33.0"E

360' 355' 350' 360' 355' 360' 355' 360' 355'

15" RCP 15" RCP 18" RCP

20 0 20 40

SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED DATE

NEW DESIGN DATE

SHEET CHECKED DATE

AS BUILT DETAILS DATE

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS
SHEET 2 OF 4

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Gen02 41715_ErosionControl_Plans	41715	9	11

EROSION CONTROL PLAN LEGEND

PERIMETER CONTROL
SILT FENCE
EROSION CONTROL MIX BERM
EROSION CONTROL MIX SOX
TURBIDITY CURTAIN
SHEET PILE
COFFER DAM

NATURAL BUFFER/PERIMETER CONTROL
SILT FENCE
EROSION CONTROL MIX BERM
EROSION CONTROL MIX SOX
TURBIDITY CURTAIN
SHEET PILE
COFFER DAM

CHANNEL PROTECTION
STONE CHECK DAMS
STRAW WATTLES
CHANNEL MATTING
CLASS D EROSION STONE
CLASS C STONE

STREAM DIVERSION
PUMP THROUGH PIPE
DRAIN THROUGH PIPE OR CHANNEL

UNIMPACTED RIVERINE SURFACE WATERS
NO WORK AND/OR IMPACT

ROUTINE ROADWAY QUALIFYING ACTIVITY
BMP

GRID

DRAINAGE EASEMENT

PERMANENT TREATMENT SWALE FEATURES

PROVIDE TEMPORARY COFFERDAM IN TCP PHASE 2 TO CHANNEL WATER FROM PROP. 60" CULVERT TO EXIST. 30" CULVERT SEE TRAFFIC CONTROL PLANS AND CROSS SECTIONS

7
PEM1/PSS1E

BEAVER BROOK

STA 603+50 MATCH TO EROSION CONTROL PLAN SHEET 1

6
R3UB1/2

BEAVER BROOK

5
PUB3/4 / PSS1 / PEM1H

MAINTENANCE ACCESS

TEMPORARY CONSTRUCTION EASEMENT

PROP. ROW LINE

DRAINAGE EASEMENT

TEMPORARY CONSTRUCTION EASEMENT

DRAINAGE EASEMENT

DRAINAGE EASEMENT

I.S. 1

N84°17'27.0"E
R=70'

20 0 20 40
SCALE IN FEET

BEAVER BROOK CULVERT REPLACEMENT SEQUENCING NOTES

1. TEMPORARILY DIVERT ALL BEAVER BROOK FLOW USING PUMPS AND SANDBAG COFFERDAMS.
2. REMOVE THE PORTION OF THE EXISTING 30" CULVERT LOCATED WITHIN THE PHASE 2 WORK ZONE AND CONSTRUCT THE HEADWALL AND PORTION OF THE PROPOSED 60" CULVERT LOCATED IN THE PHASE 2 WORK ZONE (WESTERN PORTION). PROVIDE A COFFERDAM TO CHANNEL FLOW FROM THE PROPOSED 60" CULVERT INTO THE EXISTING 30" CULVERT.
3. REMOVE THE REMAINING (EASTERN) PORTION OF THE EXISTING 30" CULVERT AND CONSTRUCT THE REMAINING PORTION OF THE PROPOSED 60" CULVERT, HEADWALL, AND OUTLET PROTECTION AT THE DOWNSTREAM END.
4. REMOVE TEMPORARY WATER DIVERSION AND RESTORE FLOW INTO THE PROPOSED 60" CULVERT.

REVISIONS AFTER PROPOSAL

NUMBER	DESCRIPTION	DATE	STATION

SDR PROCESSED DATE
NEW DESIGN DATE
SHEET CHECKED DATE
AS BUILT DETAILS DATE

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS SHEET 3 OF 4

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Gen03 41715_ErosionControl_Plans	41715	10	11

EROSION CONTROL PLAN LEGEND

PC — PERIMETER CONTROL
- SILT FENCE
- EROSION CONTROL MIX BERM
- EROSION CONTROL MIX SOX
- TURBIDITY CURTAIN
- SHEET PILE
- COFFER DAM

NB/PC — NATURAL BUFFER/PERIMETER CONTROL
- SILT FENCE
- EROSION CONTROL MIX BERM
- EROSION CONTROL MIX SOX
- TURBIDITY CURTAIN
- SHEET PILE
- COFFER DAM

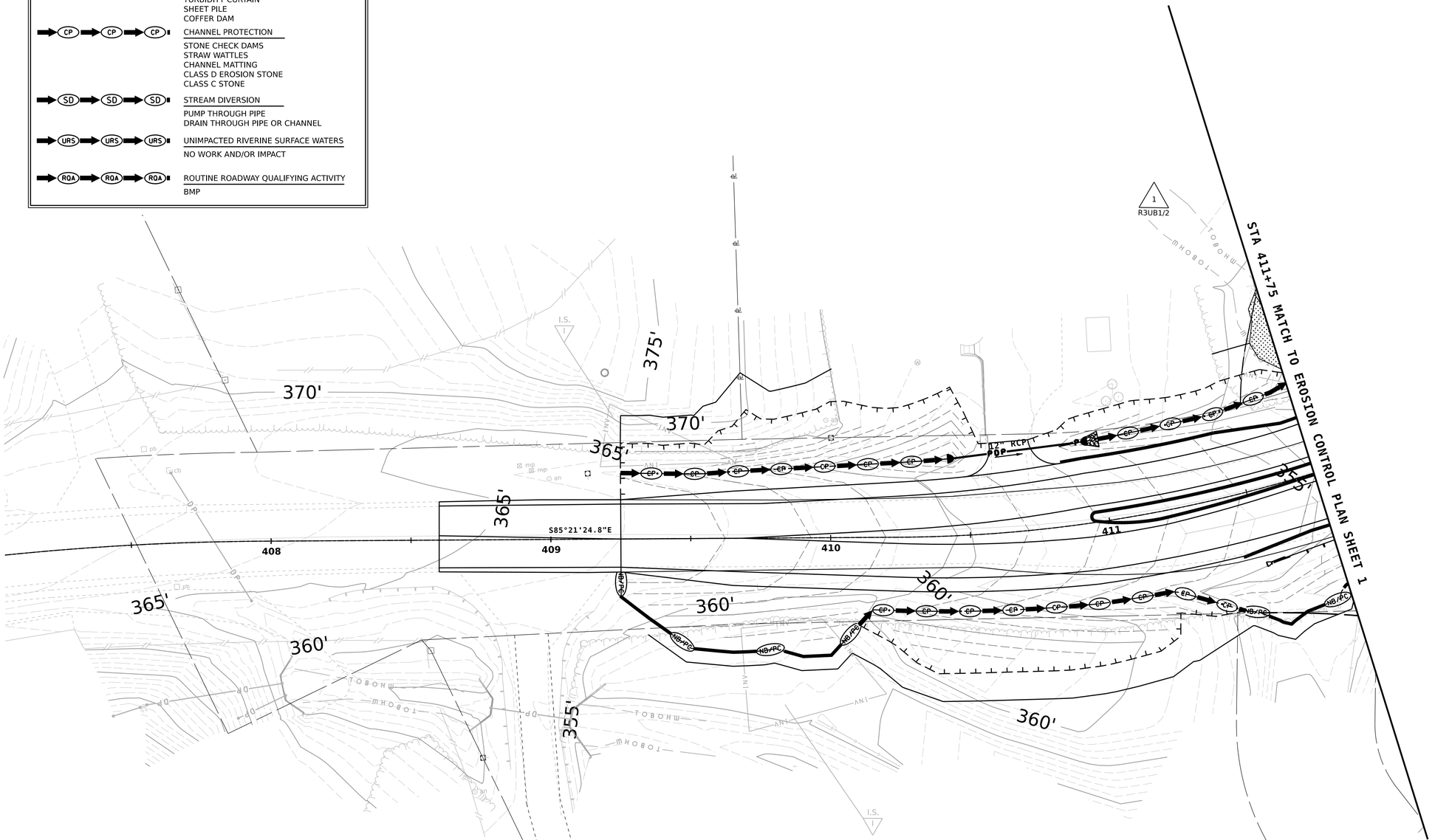
CP — CHANNEL PROTECTION
- STONE CHECK DAMS
- STRAW WATTLES
- CHANNEL MATTING
- CLASS D EROSION STONE
- CLASS C STONE

SD — STREAM DIVERSION
- PUMP THROUGH PIPE
- DRAIN THROUGH PIPE OR CHANNEL

URS — UNIMPACTED RIVERINE SURFACE WATERS
- NO WORK AND/OR IMPACT

ROA — ROUTINE ROADWAY QUALIFYING ACTIVITY
- BMP

GRID



20 0 20 40
SCALE IN FEET

REVISIONS AFTER PROPOSAL

NUMBER	DATE	STATION	DESCRIPTION

SDR PROCESSED	DATE
NEW DESIGN	DATE
SHEET CHECKED	DATE
AS BUILT DETAILS	DATE

STATE OF NEW HAMPSHIRE
LONDONDERRY
DEPARTMENT OF TRANSPORTATION ○ BUREAU OF HIGHWAY DESIGN

EROSION CONTROL PLANS
SHEET 4 OF 4

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
Gen04 41715_ErosionControl_Plans	41715	11	11