# STATE OF NEW HAMPSHIRE
## INTER-DEPARTMENT COMMUNICATION

**DATE:** November 22, 2019

**FROM:** Andrew O'Sullivan
Wetlands Program Manager

**AT (OFFICE):** Department of Transportation
Bureau of Environment

**SUBJECT** Dredge & Fill Application
Stratford, 41788

**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 District 1 for the subject major impact project. This project is classified as major per Env-Wt 303.02(i). The project is located on US Route 3 in the Town of Stratford, NH. The proposed work consists of replacing an existing 4'W x 4.2'H box culvert with a 7'W x 5'H box structure with simulated streambed material throughout. NHDOT in partnership with The Nature Conservancy received a grant from the National Fish and Wildlife Foundation- New England Forests and Rivers to improve wildlife passage for aquatic and terrestrial organisms at this crossing.

This project was reviewed at the Natural Resource Agency Coordination Meetings on November 21, 2018 and December 19, 2018. 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: http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm

Mitigation is not required for this project. Please see the mitigation narrative and meeting minutes included within the application.

The lead people to contact for this project are Philip Beaulieu, Highway Maintenance District 1 (788-4641 or Philip.Beaulieu@dot.nh.gov) or Sarah Large, Wetlands Program Analyst, Bureau of Environment (271-3226 or sarah.large@dot.nh.gov).

A payment voucher has been processed for this application (Voucher #589163) in the amount of $1,484.

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.

AMO:sel
Enclosures

cc:
BOE Original
Town of Stratford (4 copies via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
Carol Henderson, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Mark Kern, US Environmental Protection Agency (via electronic notification)
Michael Hicks, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)

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NHDES-W-06-012

# WETLANDS PERMIT APPLICATION

## Water Division/ Wetlands Bureau
## Land Resources Management

Check the status of your application: www.des.nh.gov/onestop

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

**1. REVIEW TIME:** Indicate your Review Time below. To determine review time, refer to Guidance Document A for instructions.

☒ Standard Review (Minimum, Minor or Major Impact) ☐ Expedited Review (Minimum Impact only)

**2. MITIGATION REQUIREMENT:**

If mitigation is required, a Mitigation-Pre Application meeting must occur prior to submitting this Wetlands Permit Application. To determine if mitigation is required, please refer to the Determine if Mitigation is Required Frequently Asked Questions.

Mitigation Pre-Application Meeting Date: Month: __ Day: __ Year: ____

☒ N/A - Mitigation is not required

**3. PROJECT LOCATION:**

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

ADDRESS: **0.39 miles south of Old Mill Rd** TOWN/CITY: **Stratford**

TAX MAP: BLOCK: LOT: UNIT:

USGS TOPO MAP WATERBODY NAME: ☒ NA STREAM WATERSHED SIZE: **0.36 sq. mi.** ☐ NA

LOCATION COORDINATES (If known): **44.733354, -71.616679** ☒ Latitude/Longitude ☐ UTM ☐ State Plane

**4. PROJECT DESCRIPTION:**

Provide a brief description of the project outlining the scope of work. Attach additional sheets as needed to provide a detailed explanation of your project. DO NOT reply "See Attached" in the space provided below.

**This proposed project involves replacing an existing box culvert beneath US-3. We propose to replace the existing culvert with a larger one that eliminates the current perched outlet and better accomodates aquatic and riparian species passage.**

**5. SHORELINE FRONTAGE:**

☒ N/A This does not have shoreline frontage. SHORELINE FRONTAGE:

*Shoreline Frontage* is calculated by determining the average of the distances of the actual natural navigable shoreline frontage and a straight line drawn between the property lines, both of which are measured at the normal high water line (Env-Wt 101.89).

**6. RELATED NHDES LAND RESOURCES MANAGEMENT PERMIT APPLICATIONS ASSOCIATED WITH THIS PROJECT:**

Please indicate if any of the following permit applications are required and, if required, the status of the application.

To determine if other Land Resources Management Permits are required, refer to the Land Resources Management Webpage.

| Permit Type | Permit Required | File Number | Permit Application Status |
|---|---|---|---|
| Alteration of Terrain Permit Per RSA 485-A:17 | ☐ YES ☒ NO | ____ | ☐ APPROVED ☐ PENDING ☐ DENIED |
| Individual Sewerage Disposal per RSA 485-A:2 | ☐ YES ☒ NO | ____ | ☐ APPROVED ☐ PENDING ☐ DENIED |
| Subdivision Approval Per RSA 485-A | ☐ YES ☒ NO | ____ | ☐ APPROVED ☐ PENDING ☐ DENIED |
| Shoreland Permit Per RSA 483-B | ☐ YES ☒ NO | ____ | ☐ APPROVED ☐ PENDING ☐ DENIED |

**7. NATURAL HERITAGE BUREAU & DESIGNATED RIVERS:**

See the Instructions & Required Attachments document for instructions to complete a & b below.

a. Natural Heritage Bureau File ID: NHB **19** - **3435**.

b. ☐ This project is within a Designated River corridor. The project is within ¼ mile of: _____; and date a copy of the application was sent to the Local River Management Advisory Committee: Month: __ Day: __ Year: ____

☒ N/A – This project is not within a Designated River corridor.

**8. APPLICANT INFORMATION (Desired permit holder)**

| | | | |
|---|---|---|---|
| LAST NAME, FIRST NAME, M.I.: **Beaulieu, Philip** | | | |
| TRUST / COMPANY NAME: **NH DOT Highway Maintenance** | MAILING ADDRESS: **641 Main Street** | | |
| TOWN/CITY: **Lancaster** | | STATE: **NH** | ZIP CODE: **03584** |
| EMAIL or FAX: **Philip.Beaulieu@dot.nh.gov** | PHONE: **603-788-4641** | | |

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

**9. PROPERTY OWNER INFORMATION (If different than applicant)**

| | | | |
|---|---|---|---|
| LAST NAME, FIRST NAME, M.I.: **NH Dept. of Transportation** | | | |
| TRUST / COMPANY NAME: **NH Dept. of Transportation** | MAILING ADDRESS: **PO Box 483** | | |
| TOWN/CITY: **Concord** | | STATE: **NH** | ZIP CODE: **03302** |
| EMAIL or FAX: **Sarah.Large@dot.nh.gov** | PHONE: **603-271-3226** | | |

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

**10. AUTHORIZED AGENT INFORMATION**

| | | | |
|---|---|---|---|
| LAST NAME, FIRST NAME, M.I.: | COMPANY NAME: | | |
| MAILING ADDRESS: | | | |
| TOWN/CITY: | | STATE: | ZIP CODE: |
| EMAIL or FAX: | PHONE: | | |

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

**11. PROPERTY OWNER SIGNATURE:**

See the Instructions & Required Attachments document for clarification of the below statements

By signing the application, I am certifying that:

1. I authorize the applicant and/or agent indicated on this form to act in my behalf in the processing of this application, and to furnish upon request, supplemental information in support of this permit application.
2. I have reviewed and submitted information & attachments outlined in the Instructions and Required Attachment document.
3. All abutters have been identified in accordance with RSA 482-A:3, I and Env-Wt 100-900.
4. I have read and provided the required information outlined in Env-Wt 302.04 for the applicable project type.
5. I have read and understand Env-Wt 302.03 and have chosen the least impacting alternative.
6. Any structure that I am proposing to repair/replace was either previously permitted by the Wetlands Bureau or would be considered grandfathered per Env-Wt 101.47.
7. I have submitted a Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) to the NH State Historic Preservation Officer (SHPO) at the NH Division of Historical Resources to identify the presence of historical/ archeological resources while coordinating with the lead federal agency for National Historic Preservation Act (NHPA) 106 compliance.
8. I authorize NHDES and the municipal conservation commission to inspect the site of the proposed project.
9. I have reviewed the information being submitted and that to the best of my knowledge the information is true and accurate.
10. I understand that the willful submission of falsified or misrepresented information to the NHDES is a criminal act, which may result in legal action.
11. I am aware that the work I am proposing may require additional state, local or federal permits which I am responsible for obtaining.
12. The mailing addresses I have provided are up to date and appropriate for receipt of NHDES correspondence. NHDES will not forward returned mail.

| Property Owner Signature | Print name legibly | Date |
|---|---|---|
| James McMahon III<br>Assistant District Engineer<br>NHDOT District 1 | James McMahon, III | 11/21/19 |

# MUNICIPAL SIGNATURES

## 12. CONSERVATION COMMISSION SIGNATURE

The signature below certifies that the municipal conservation commission has reviewed this application, and:

1. Waives its right to intervene per RSA 482-A:11;
2. Believes that the application and submitted plans accurately represent the proposed project; and
3. Has no objection to permitting the proposed work.

| | Print name legibly | Date |
|---|---|---|
| ⇨ | | |

**DIRECTIONS FOR CONSERVATION COMMISSION**

1. Expedited review ONLY requires that the conservation commission's signature is obtained in the space above.
2. Expedited review requires the Conservation Commission signature be obtained **prior** to the submittal of the original application to the Town/City Clerk for signature.
3. The Conservation Commission may refuse to sign. If the Conservation Commission does not sign this statement for any reason, the application is not eligible for expedited review and the application will be reviewed in the standard review time frame.

## 13. TOWN / CITY CLERK SIGNATURE

As required by Chapter 482-A:3 (amended 2014), 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.

| | Print name legibly | Town/City | Date |
|---|---|---|---|
| ⇨ | | | |

**DIRECTIONS FOR TOWN/CITY CLERK:**

Per RSA 482-A:3,I

1. For applications where "Expedited Review" is checked on page 1, if the Conservation Commission signature is not present, NHDES will accept the permit application, but it will NOT receive the expedited review time.
2. IMMEDIATELY sign the original application form and four copies in the signature space provided above;
3. 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.
4. 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; and
5. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

**DIRECTIONS FOR APPLICANT:**

1. Submit the single, 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.

**14. IMPACT AREA:**

For each jurisdictional area that will be/has been impacted, provide square feet and, if applicable, linear feet of impact.

*Permanent: impacts that will remain after the project is complete.*

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

*Intermittent Streams: linear footage distance of disturbance is measured along the thread of the channel.*

*Perennial Streams/ Rivers: the total linear footage distance is calculated by summing the lengths of disturbance to the channel and each bank.*

| JURISDICTIONAL AREA | PERMANENT Sq. Ft. / Lin. Ft. | | TEMPORARY Sq. Ft. / Lin. Ft. | |
|---|---|---|---|---|
| Forested wetland | | ☐ ATF | | ☐ ATF |
| Scrub-shrub wetland | | ☐ ATF | | ☐ ATF |
| Emergent wetland | 2000 | ☐ ATF | | ☐ ATF |
| Wet meadow | | ☐ ATF | | ☐ ATF |
| Intermittent stream channel | / | ☐ ATF | / | ☐ ATF |
| Perennial Stream / River channel | 255 / 180 | ☐ ATF | 40 / 20 | ☐ ATF |
| Lake / Pond | / | ☐ ATF | / | ☐ ATF |
| Bank - Intermittent stream | / | ☐ ATF | / | ☐ ATF |
| Bank - Perennial stream / River | 1285 / 130 | ☐ ATF | 130 / 20 | ☐ ATF |
| Bank - Lake / Pond | / | ☐ ATF | / | ☐ ATF |
| Tidal water | / | ☐ ATF | / | ☐ ATF |
| Salt marsh | | ☐ ATF | | ☐ ATF |
| Sand dune | | ☐ ATF | | ☐ ATF |
| Prime wetland | | ☐ ATF | | ☐ ATF |
| Prime wetland buffer | | ☐ ATF | | ☐ ATF |
| Undeveloped Tidal Buffer Zone (TBZ) | | ☐ ATF | | ☐ ATF |
| Previously-developed upland in TBZ | | ☐ ATF | | ☐ ATF |
| Docking - Lake / Pond | | ☐ ATF | | ☐ ATF |
| Docking - River | | ☐ ATF | | ☐ ATF |
| Docking - Tidal Water | | ☐ ATF | | ☐ ATF |
| Vernal Pool | | ☐ ATF | | ☐ ATF |
| **TOTAL** | 3540 / 310 | | 170 / 40 | |

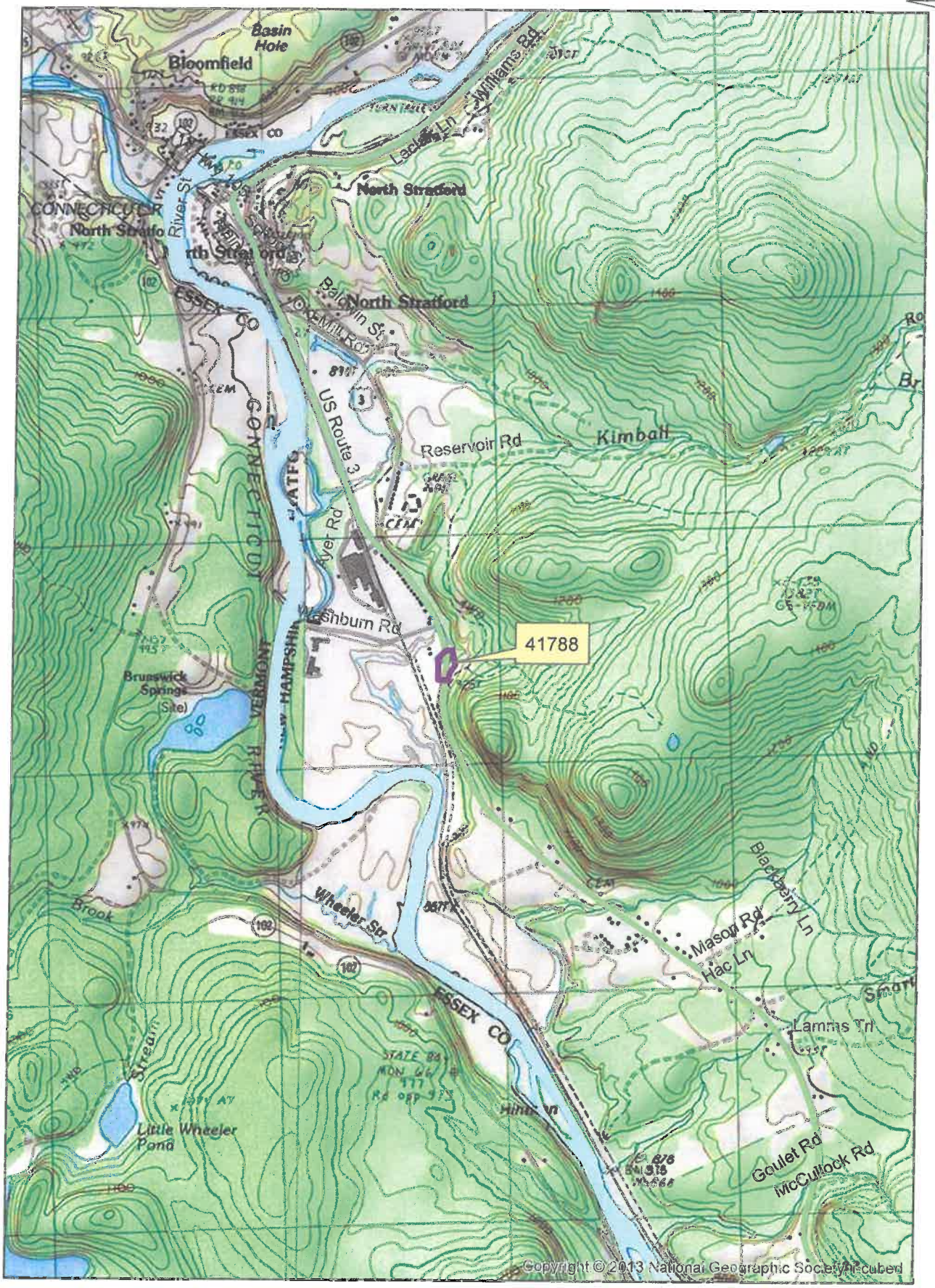
**15. APPLICATION FEE:** See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee or Fee for Non-enforcement related, publicly-funded and supervised restoration projects, regardless of impact classification (see RSA 482-A:3, 1(c)): Flat fee of $ 400

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

| | | | |
|---|---|---|---|
| Permanent and Temporary (non-docking) | **3710** sq. ft. | X $0.40 = | $ **1,484** |
| Temporary (seasonal) docking structure: | sq. ft. | X $2.00 = | $ |
| Permanent docking structure: | sq. ft. | X $4.00 = | $ |
| **Projects proposing shoreline structures (including docks) add $400** = | | | $ |
| Total = | | | $ |
| The Application Fee is the above calculated Total or $400, whichever is greater = | | | $ **1,484** |

# Stratford 41788



NEW HAMPSHIRE DEPARTMENT OF Environmental Services

# WETLANDS PERMIT APPLICATION – ATTACHMENT A
# MINOR AND MAJOR - 20 QUESTIONS

**Land Resources Management**
**Wetlands Bureau**

Check the Status of your application: www.des.nh.gov/onestop

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

**Env-Wt 302.04 Requirements for Application Evaluation - For any major or minor project, the applicant shall demonstrate by plan and example that the following factors have been considered in the project's design in assessing the impact of the proposed project to areas and environments under the department's jurisdiction. Respond with statements demonstrating:**

1. The need for the proposed impact.

**The proposed project would address a culvert located in Stratford on US Route 3 south of the intersection with Washburn Road. The purpose of the project is to address a structurally and environmentally deficient box culvert. The outlet of the structure is significantly perched (more than 3 feet) and the structure currently inhibits aquatic and riparian species passage. The existing culvert was constructed in 1938. The concrete structure has deteriorated over time and is anticipated to pose a safety concern for the roadway in the future, if it were not addressed.**

2. That the alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site.

**The "Do Nothing" Alternative was considered and dismissed because it did not address the vulnerability of the aging infrastructure and it did nothing to improve AOP and connectivity at this location.**

**A bridge consistent with the 1.2 X bank full width +2 ft structure was evaluated and dismissed due to financial constraints as well as constructibility constraints. A structure that meets this criteria would have required substantial road work to allow for the construction of a bridge on a downward sloping road with a equally challenging terraing running perpendicular to the road (steep slopes upstram and downstream on either side of the roadway. For these reasons this alternative was dismissed.**

**The chosen alternative proposes to replace the existing culvert with a larger concrete box culvert. The project would also eliminate the perch at the existing structure outlet. The existing concrete box culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The proposed structure would be 7 feet wide and 5 feet high. The new structure would include streambed simulation and would have a slope of around 6%. The project would restore aquatic connectivity in an unnamed stream located in the Connecticut River Valley for Eastern brook trout. The project also proposes to include within the new structure a dry shelf to improve terrestrial wildlife passage. The project would not include any horizontal or vertical realignment of US Route 3.**

3. The type and classification of the wetlands involved.

**R2UB1**

**Bank**

**PEM1E**

4. The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters.

**The impacts will occur on an unnamed stream that flows to the Connecticut River.**

5. The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area.

**The R2UB1 stream classification is not a rare system in NH.**

6. The surface area of the wetlands that will be impacted.

**2000, SF PEM1E wetlands**

**1285 Permanent Bank**

**255 Permanent Channel**

7. The impact on plants, fish and wildlife including, but not limited to:
   a. Rare, special concern species;
   b. State and federally listed threatened and endangered species;
   c. Species at the extremities of their ranges;
   d. Migratory fish and wildlife;
   e. Exemplary natural communities identified by the DRED-NHB; and
   f. Vernal pools.

**a. IPAC identified NLEB and Canada Lynx. NHDOT has completed 4(d) consultation with USFWS for the NLEB and the Lynx.**

**b. An NHB has been completed for this project area and the results of the review indicated that there were not concerns/no species in this project area.**

**c. None**

**d. None**

**e. None**

**f. No vernal pools were identified at the time of field delineation and surveys.**

8. The impact of the proposed project on public commerce, navigation and recreation.

**The project as proposed will not impact public commerce, navigation or recreation. Completing this project will ensure continued safe travel in this area for public to enjoy the community and resources in this area.**

9. The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake, the applicant shall be required to indicate the type of material to be used and the effect of the construction of the wall on the view of other users of the lake.

**The project as proposed will not interfere with the aesthetic interest of the public. The majority of impacts and visual changes will occure outside the line of sight from the traveling public.**

10. The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel, the applicant shall be required to document the extent to which the dock would block or interfere with the passage through this area.

**The project as proposed will not interfere with public rights of passage. During construction traffic control will be maintained allowing for temporary alternating one way traffic if needed. Upon completion of work all traffic patterns will be restored to normal.**

11. The impact upon abutting owners pursuant to RSA 482-A:11, II. For example, if an applicant is proposing to rip-rap a stream, the applicant shall be required to document the effect of such work on upstream and downstream abutting properties.

**The work as proposed will have no impacts to the upstream or downstream abutters.**

12. The benefit of a project to the health, safety, and well being of the general public.

**The project will ensure that the road does not fail and that it is safe for many more years for the traveling public.**

13. The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands the applicant shall be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site.

**The project as proposed will have no impacts to waterquality beyond normal construction impacts. Appropriate BMPS will be installed prior to construction and mainted until the site is fully stabilzed to ensure no waterquality issues during or after construction.**

14. The potential of a proposed project to cause or increase flooding, erosion, or sedimentation.

**The project as proposed has been designed to Pass the Q50 and accommodate the Q100. There is no history of flooding at this location and upsizing the structure will improve hydrualics at this location. The proposed changes will not result in erosion or sedimentation to occur.**

15. The extent to which a project that is located in surface waters reflects or redirects current or wave energy which might cause damage or hazards.

**The project as designed is not proposing to redirect or reflect flow/energy.**

16. The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owns only a portion of a wetland shall document the applicant's percentage of ownership of that wetland and the percentage of that ownership that would be impacted.

**The propsoed project is located within the NHDOT ROW and it is unlikely that any abutting landowners would be proposing similar work to this wetland complex.**

17. The impact of the proposed project on the values and functions of the total wetland or wetland complex.

**The propsoed project is not going to alter the functions or values of the wetland complex downstream of the crossing. The propsoed crossing will improve connectivity and AOP.**

18. The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication.

**The proposed project is not identified in the National Register of Natural Landmarks.**

19. The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries.

**The project is not located in any of the areas identified within this question.**

20. The degree to which a project redirects water from one watershed to another.

**The propsoed project will not redirect water from one watershed to another. The stream will maintain it's current alignment.**

Additional comments

*This project has not been previously discussed at a Monthly Natural Resource Agency Coordination Meeting.*

**Stratford, #41738**

Jim McMahon provided an overview of the proposed project and described the existing crossing. The Nature Conservancy (TNC) had partnered with District 1 Engineer, Phil Beaulieu, on a project that included camera tracking of wildlife in a larger area in this part of the State. Through the wildlife camera trapping project conversations evolved about the subject crossing and TNC's Pete Steckler partnered with District 1 to secure a grant through the National Fish and Wildlife Foundation – New England Forests and Rivers Fund. TNC was interested in improving the crossing for wildlife and District 1 had determined that the crossing was structurally deficient.

*** Following the meeting Pete Steckler of TNC shared that 'this crossing was identified as the 7th highest priority crossing replacement in the district when we decided to partner on the project.

J. McMahon explained that the existing box culvert is concrete and was built in 1938. The existing culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The outlet of the structure is perched more than 4 feet. The proposed structure would be 7 feet wide and 5 feet high with one foot of embedment. The new structure would include streambed simulation. J. McMahon explained that one of the goals of the design is to flatten the slope. The new structure would have a slope of around 6%. Upstream of the structure the channel is in a forested area and is around 4 feet wide. NHFG's John Magee completed some electrofishing at the site. Upstream of the structure, several young wild brook trout were found. Downstream of the structure there were a larger number of wild brook trout found.

J. McMahon described that downstream of the outlet a natural gas pipeline was installed. It appears that when it was installed the pipeline disturbed the channel of the stream. The stream channel appears to have formerly branched downstream of the outlet with one branch travelling adjacent to the roadway and a second branch traversing a wetland area. J. McMahon explained that as a result of the pipeline installation, the branch adjacent to the roadway appears to have been disconnected/disrupted. The channel through the wetland becomes undistinguishable. As part of the project, District 1 is proposing to reconnect the channel adjacent to the roadway. Some of the flow would be maintained in the branch that travels through the wetland.

Pete Steckler of The Nature Conservancy (TNC) explained that this crossing fits TNC's wildlife connectivity initiative. P. Steckler shared that he was surprised to see the amount of wildlife using the structure, including a blue heron, despite its perched condition. P. Steckler commented that TNC has learned that with 4 feet of headroom a structure can pass mammals as large as black bears.

Dale Keirstead from NH DES inquired if an open bottom structure had been considered. J. McMahon explained that the design was selected in consideration of the plan to complete construction with District forces. Also, there was concern about the footings potentially being undercut if an open bottom structure was selected. A closed bottom structure provides more structural stability.

J. McMahon described that the current thought is that the bottom of the box would be cast with baffles to hold the streambed materials within the structure. Matt Urban explained that because the stream is a Tier 2 stream and the proposed project is an improvement (replacement with a larger structure), the design is in compliance with 904.07.

Lori Sommer recommended monitoring after construction and that it be tracked through NHDOT's mitigation database*. P. Steckler shared that the project is partially funded by NFWF and TNC has requested that the project design includes a wing wall camera mount both upstream and downstream. TNC will be installing a camera once the construction is complete. John Magee from NHF&G commented that he could conduct some electrofishing after construction. However, he believes he would get more information by walking through the structure and photo-documenting the streambed conditions upstream, downstream and within the structure.

Carol Henderson inquired if the design considered other types of baffles or removable baffles. The group discussed concerns about temporary baffles and the feasibility of the structure retaining different sized media. J. Magee shared some information about a Nash Stream project that involved a larger stream and structure and digging quite deep to place very large stone through the structure- this structure is smaller. J. Magee inquired if there were modeled velocities for the new slope of the structure to determine what size stone could hold up to the movement. J. McMahon commented that he could look into this. J. Magee commented that there is a lot of small gravel and fine sediment that would likely fill in any spaces in the material.

The group also discussed potentially grouting stones in place in the structure. J. McMahon commented that there are limitations because he needs to select a design and construction method that would allow Route 3 to be open to traffic through construction. J. McMahon is planning to put together some specifications and send them to some manufacturers to inquire about available options.

L. Sommer inquired about manufactures that might pre-fabricate the structure with the simulated stream bank material. The group also discussed mounting a shelf to the inside of the box.

J. McMahon shared that he hopes to submit a wetland application in the spring with construction in the fall.

Mike Hicks inquired about tree clearing in the portion of the project area where a wetland permit will be needed. Rebecca Martin shared that the USF&WS is providing funding (through NFWF) and will be the lead federal agency. R. Martin sent an inquiry to USFWS regarding the appropriate historic review and about utilizing the 4(d) Project Submittal Process for Federal Agencies.

R. Martin shared some slides about the environmental review. She commented that StreamStats and the Aquatic Restoration Mapper both appear to depict the stream north of its actual location. According to StreamStats the drainage area of the stream is 224 acres. The project area appears to be adjacent to, but not within the 100 year floodplain.

Mark Kern inquired about the funding for the project. The group discussed that the DOT would be providing match with a small amount of match from TNC for the camera monitoring.

L. Sommer commented that this type of crossing would make a good ARM fund candidate.

Carol Henderson mentioned that the NHB report indicated no impacts anticipated for the project.

**Un-related to the project: L. Sommer asked NHDOT to present on NHDOT's mitigation database that Arlene Allen, NHDOT BOE, has been working on. NHDOT plans to set up a meeting external of the Natural Resource Agency meeting.*

*This project has not been previously discussed at the Monthly Natural Resource Agency Coordination Meeting.*

- Chris indicated that the proposed work consisted of installing a 42" polymer coated corrugated metal liner within the existing 48"CMP.
- Existing stone channel protection at the outlet will be reset to match the new outlet invert.
- Existing and proposed structure will pass the Streamstats Q100.
- Temporary impacts at inlet and outlet are to accommodate the work/water diversion required.
    - Anticipate approximately800 SF at the inlet and 300 SF at the outlet.
    - No permanent impacts proposed.
- Incidental work includes repairs to stone inlet and outlet headwalls, extending the 18" slope drain, and replacing a 15" pipe under the I-89 off ramp with an 18" pipe so that the closed drainage system flows to the new slope drain outlet.
- Lori inquired if the proposed work would be impacted by the Bow-Concord project. Chris indicated no and showed the approximate limits of Bow-Concord work in relation to this work.
- Matt asked for concurrence that no mitigation would be needed since the impacts were going to be all temporary. Lori agreed.
- Chris indicated that the Department was hopeful to submit an application within the next couple of weeks.

*This project has not been previously discussed at the Monthly Natural Resource Agency Coordination Meeting.*

**Stratford, #41788**

Rebecca Martin provided a brief overview of the proposed project and described the existing crossing. The Nature Conservancy (TNC) partnered with District 1 to secure a grant through the National Fish and Wildlife Foundation – New England Forests and Rivers Fund. The funds come from US Fish and Wildlife Service. R. Martin explained that the existing box culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The outlet of the structure is perched more than 4 feet. The proposed structure would be 7 feet wide and 5 feet high. The new structure would include streambed simulation and would have a slope of around 6%.

Matt Urban explained that although the project will have permanent impacts on the stream, the project team believes the project to be self-mitigating. M. Urban commented that the project has been discussed at the November NRAC Meeting and was being discussed at this meeting to determine appropriate mitigation. M. Urban shared that at Gino Infascelli' s recommendation, the designer, Jim McMahon from District 1 has adjusted the design from one feet of embedment to two feet of embedment and no baffles.

The group discussed that fish cannot pass upstream through the structure due to the perch. Comments were made about the wide variety of wildlife currently using the perched structure. The group also discussed that the project would be monitored after construction to ensure the design is working as intended.

M. Urban reminded the group that downstream of the outlet a natural gas pipeline was installed. It appears that when it was installed the pipeline disturbed the channel of the stream. As a result of the pipeline installation, the ditch line/branch adjacent to the roadway appears to have been disconnected/disrupted. As part of the project, District 1 is proposing to reconnect the channel adjacent to the roadway.

Lori Sommer inquired about access to the project area. M. Urban commented that the gas pipeline work had utilized an area just south of the culvert to access the outlet area, so without checking with District 1, he assumed this area would be used once again for this project.

L. Sommer shared some details of a box culvert project on Portsmouth Street that is being planned by Michie Corps that will utilize a pre-cast concrete box that is in two pieces, a bottom and a top. The bottom will be installed and the streambed material will be placed inside the box before the notched top piece is connected to the bottom piece.

R. Martin reminded the group that the funding for the project is constrained with NFWF grant funding and the District conducting the work as match for the grant.

L. Sommer and G. Infascelli agreed that the project would be self-mitigating. G. Infascelli commented that if the Department were to apply to replace the structure in-kind without extending the structure or addressing the slope, there would not be the same improvement.

*This project was previously discussed at the 11/21/2018 Monthly Natural Resource Agency Coordination Meeting.*

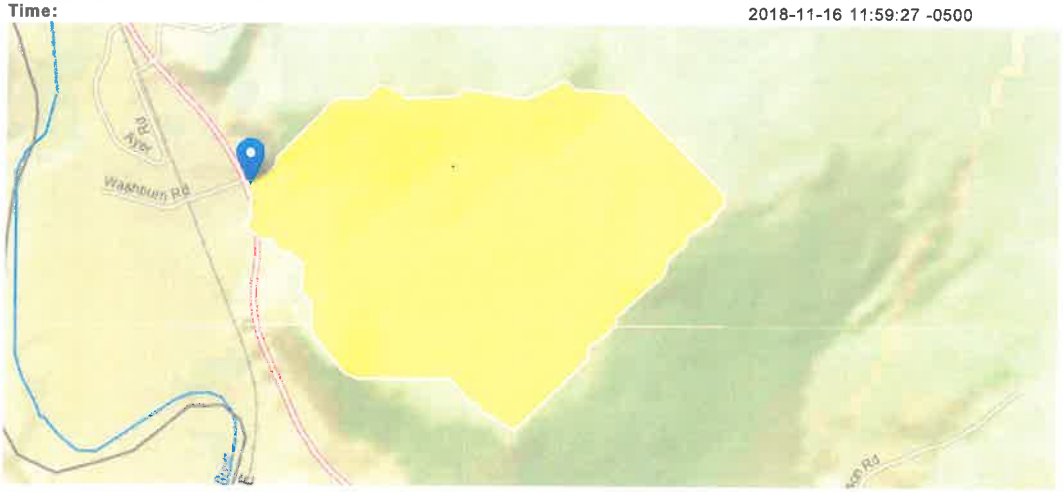
## Mitigation Narrative

The project was brought to the November 21, 2018 and December 18, 2018 Natural Resource Agency Coordination meetings where mitigation was discussed. As discussed at the meetings The Nature Conservancy (TNC) in partnership with NHDOT District 1 received a grant through the National Fish and Wildlife Foundation- New England Forests and Rivers Fund to complete this work. The scope and premise of this project is to enhance and improve wildlife passage for aquatic and terrestrial organisms in the North Country in addition to address some structural and condition issues identified by NHDOT. The proposed replacement for this tier 2 crossing is a significant improvement from the current condition: the box will be widened, slope of the structure changed, and perch eliminated by constructing natural steps and pools to match with the material placed through the crossing. Therefore it was agreed upon at the Natural Resource Agency Coordination meetings (specifically the December 18, 2018 meeting) that mitigation would not be required, as the efforts were considered self-mitigating. Gino Infascelli commented "if NHDOT were to apply to replace the structure in-kind without extending the structure or addressing the slope, there would not be the same improvement."

Lori Sommer, NHDES Mitigation Program, recommended at the November 21, 2018 meeting that NHDOT monitor the project site. Pete Steckler from TNC advised that through the grant a wildlife camera will be installed after construction and Fish and Game offered to electrofish again after construction. It was also recommended that photo documentation of the streambed material be done once the construction is complete.

# StreamStats Report

| | |
|---|---|
| **Region ID:** | NH |
| **Workspace ID:** | NH20181116165914250000 |
| **Clicked Point (Latitude, Longitude):** | 44.73483, -71.61704 |
| **Time:** | 2018-11-16 11:59:27 -0500 |




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

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|---|---|---|---|---|---|
| DRNAREA | Drainage Area | 0.35 | square miles | 0.7 | 1290 |
| APRAVPRE | Mean April Precipitation | 2.905 | inches | 2.79 | 6.23 |
| WETLAND | Percent Wetlands | 0 | percent | 0 | 21.8 |
| CSL10_85 | Stream Slope 10 and 85 Method | 465 | feet per mi | 5.43 | 543 |

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

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

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

| Statistic | Value | Unit |
|---|---|---|
| 2 Year Peak Flood | 16.6 | ft^3/s |
| 5 Year Peak Flood | 28.2 | ft^3/s |
| 10 Year Peak Flood | 38.3 | ft^3/s |
| 25 Year Peak Flood | 52.9 | ft^3/s |
| 50 Year Peak Flood | 65.2 | ft^3/s |
| 100 Year Peak Flood | 80 | ft^3/s |
| 500 Year Peak Flood | 118 | ft^3/s |

*Peak-Flow Statistics Citations*

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

**NH Department of Transportation**
**Bureau of Highway Maintenance**
**Project, #41788**

## Env-Wt 904.07 In-Kind Replacement of Tier 1 or Tier 2 Existing Legal Crossings

- In order to qualify under this section, the crossing cannot have a history of causing or contributing to flooding that damages the crossing or other infrastructure. Does the crossing have a history of flooding?

The existing 4W X 4.2H box culvert does not have a history of flooding.

- The replacement stream crossing shall be the same size and type as the existing OR an upgrade. Please describe how this applies to the subject project.

The proposed 7W X 5H is intended to be an upgrade of the existing structure. The proposed structure is expected to restore aquatic connectivity and enhance terrestrial connectivity.

**If the above criteria do not apply to this project, the crossing does not qualify under this section and must be designed according to 904.02 (Tier 1 crossings) or 904.05 (Tier 2 crossings).**

**If the above criteria apply to this project, please provide the following information.**

The project may qualify as a **minimum** impact project if:
The crossing does not diminish the hydraulic capacity of the crossing. - The proposed upgrade is expected to increase the hydraulic capacity of the crossing.
The crossing does not diminish the capacity of the crossing to accommodate aquatic life passage. - The proposed upgrade is expected to restore aquatic connectivity for Eastern brook trout.
The crossing meets the general design criteria specified in Env-Wt 904.01, as follows:

Env-Wt 904.01
(a) Not be a barrier to sediment transport;
The proposed structure is intended to be imbedded 2' for a 4' wide natural stream simulation, including sediment transport.

(b) Prevent the restriction of high flows and maintain existing low flows;
HY-8 Culvert Analysis was used to approximate flow for various storm events. It appears the replacement structure will lower the high water elevation during large rain events by reducing the restriction at the crossing during high flows.

(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;
The proposed structure is expected to restore aquatic connectivity for Eastern brook trout. A dry ledge is intended to be installed to enhance terrestrial connectivity for mammals including fisher, mink, and bobcat.

(d) Not cause an increase in the frequency of flooding or overtopping of banks;
The proposed structure is expected to reduce the frequency of flooding or overtopping of banks.

(e) Preserve watercourse connectivity where it currently exists;
A 4' stream channel is proposed to increase watercourse connectivity where the existing streambed is.

(f) Restore watercourse connectivity where: (1) Connectivity previously was disrupted as a result of human activity(ies); and (2) Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;
The purpose of the intended structure upgrade is to restore aquatic connectivity where it has previously been lost. There is currently no stream connectivity and the completed project is expected to create 1.62 miles of stream connectivity.

(g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and
The proposed upgrade is intended to reduce the likelihood of erosion, aggradation, or scouring upstream and downstream.

(h) Not cause water quality degradation.
The proposed imbedded structure is intended to create natural stream simulation and improve water quality.

If the project does not qualify as a minimum impact project due to reasons stated above, it may qualify as a **minor** impact project if:
The crossing does not adversely impact the stability of the stream banks or stream bed upstream or downstream of the crossing. The proposed structure is not expected to adversely impact the stability of the stream banks or stream bed upstream or downstream of the crossing.
The crossing does not cause an increase in the frequency of flooding or overtopping of banks. The proposed structure is expected to reduce the frequency of flooding or overtopping of banks.

**If the project does not meet the above criteria for minimum OR minor, the crossing does not qualify under this section and must be designed according to 904.02 (Tier 1 crossings) or 904.05 (Tier 2 crossings).**

# NEW HAMPSHIRE NATURAL HERITAGE BUREAU
## NHB DATACHECK RESULTS LETTER

**To:** Rebecca Martin, NH DOT
7 Hazen Drive
PO Box 483
Concord, NH 03302

**From:** NH Natural Heritage Bureau

**Date:** 10/25/2019 (valid for one year from this date)

**Re:** Review by NH Natural Heritage Bureau of request submitted 10/24/2019

**NHB File ID:** NHB19-3435 **Applicant:** Rebecca Martin

**Location:** Stratford
41788 Box Culvert US Route 3 near Washburn Rd

**Project Description:** 41788: This is an update of NHB18-2086- The project proposes to replace an existing perched box culvert with a larger one that eliminates the perched condition and better accommodates aquatic and riparian species passage. The project will not include any horizontal or vertical realignments of US-3 and only minimal disturbance during construction for traffic control management purposes.

The NH Natural Heritage database has been checked by staff of the NH Natural Heritage Bureau and/or the NH Nongame and Endangered Species Program for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government.

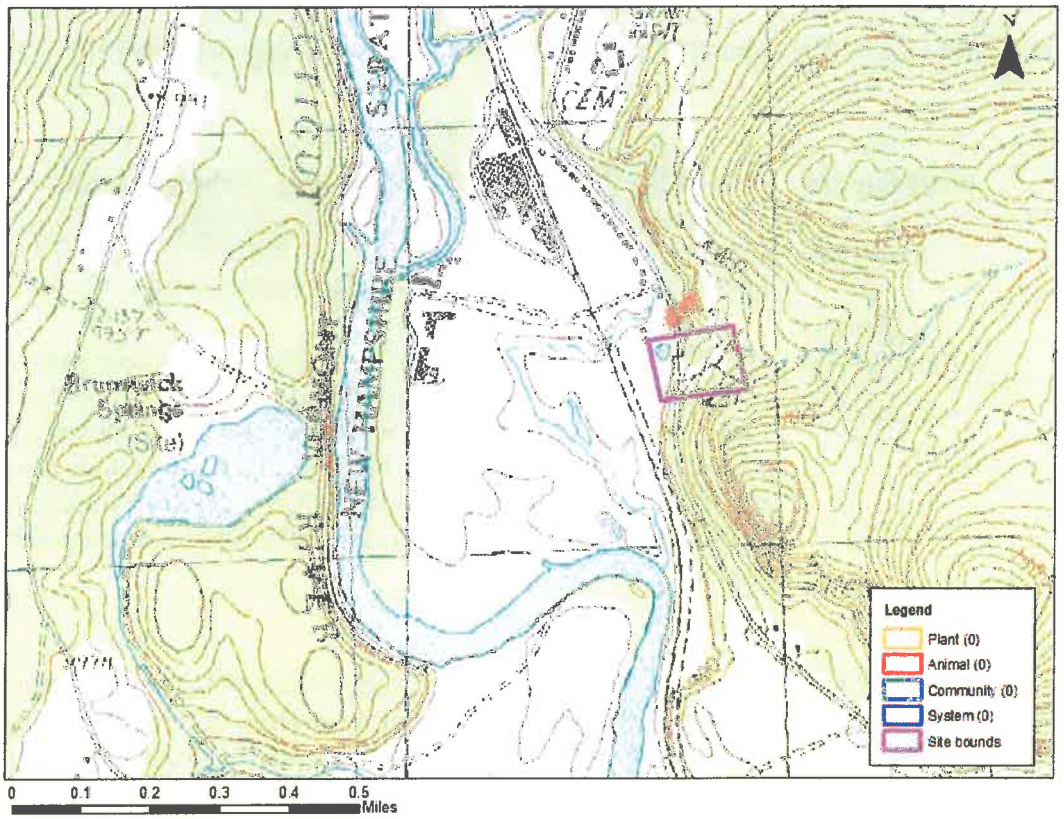
It was determined that, although there was a NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity, we do not expect that it will be impacted by the proposed project. This determination was made based on the project information submitted via the NHB Datacheck Tool on 10/24/2019, and cannot be used for any other project.

Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

# MAP OF PROJECT BOUNDARIES FOR: NHB19-3435

**NHB19-3435**




Department of Natural and Cultural Resources
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DNCR/NHB
172 Pembroke Rd.
Concord, NH 03301

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
http://www.fws.gov/newengland

In Reply Refer To:
Consultation Code: 05E1NE00-2018-SLI-2287
Event Code: 05E1NE00-2018-E-05343
Project Name: Startford 41788

July 05, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

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 feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. 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. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

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. Under sections 7(a)(1) and 7(a)(2) 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 and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, 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 Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. 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:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

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

Consultation Code: 05E1NE00-2018-SLI-2287

Event Code: 05E1NE00-2018-E-05343

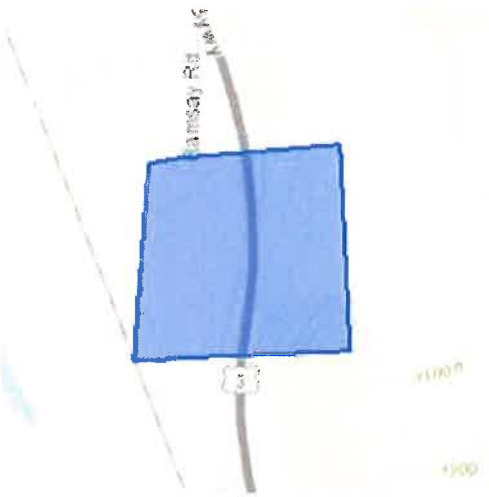
Project Name: Startford 41788

Project Type: TRANSPORTATION

Project Description: The project proposes to replace a box culvert under US Route 3 in Stratford US-3 near Mile Marker 187.4 and approximately 400 feet south of the Washburn Road intersection. The box culvert is structurally and environmentally deficient and is perched. The project would replace the existing culvert with a larger one that eliminates the perched condition and better accommodates aquatic and riparian species passage. The project will not include any horizontal or vertical realignments of US-3 and only minimal disturbance during construction for traffic control management purposes.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/44.73309201538474N71.61679395082447W



Counties: Coos, NH

## 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.

---

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 |
|---|---|
| Canada Lynx *Lynx canadensis*<br>Population: Wherever Found in Contiguous U.S.<br>There is **final** critical habitat for this species. Your location is outside the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/3652 | Threatened |
| Northern Long-eared Bat *Myotis septentrionalis*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9045 | Threatened |

### Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

New Hampshire DOT
Department of Transportation

Victoria F. Sheehan
Commissioner

# THE STATE OF NEW HAMPSHIRE
## DEPARTMENT OF TRANSPORTATION

William Cass, P.E.
Assistant Commissioner

## LETTER OF TRANSMITTAL

Date: 12/19/2018

TO: Susi von Oettingen
Endangered Species Biologist
US Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301

Bureau: Environment
Project: Stratford, Route 3 Box Culvert
Project No.: 41788
Consultation Code: 05E1NE00-2018-SLI-2287

Susi:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via the following items:

| COPIES | DATE | DESCRIPTION |
|---|---|---|
| 1 | 12/19/18 | NLEB 4(d) Rule Streamlined Consultation Form |
| 1 | 12/19/18 | Project Location Map |
| 1 | 12/19/18 | USFWS Official Species List |
| | | |

THESE ARE TRANSMITTED as checked below:

☒ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Returned for your use

REMARKS: Enclosed is the NLEB 4(d) Rule Streamlined Consultation Form and backup information for the above referenced project that proposes to replace a box culvert in the town of Stratford, NH. The NHDOT has determined that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule. The lead Federal Agency is the US Fish and Wildlife Service. The project has received a grant from NFWF Award #F17AP00569, NFWF project # 57676 and the funding came from USFWS.

Your concurrence with this determination is requested. Please contact me if you have any questions.

Rebecca Martin
Senior Environmental Manager
Bureau of Environment, NHDOT
Room 160 - Tel. (603) 271-6781
E-mail Rebecca.martin@dot.state.nh.us

Enc.

## Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if reinitiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take require separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

IPaC Official Species List Consultation Code: 05E1NE00-2018-SLI-2287

| **Information to Determine 4(d) Rule Compliance:** | **YES** | **NO** |
|---|---|---|
| 1. Does the project occur wholly outside of the WNS Zone[1]? | ☐ | ☒ |
| 2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees? | ☒ | ☐ |
| 3. Could the project disturb hibernating NLEBs in a known hibernaculum? | ☐ | ☒ |
| 4. Could the project alter the entrance or interior environment of a known hibernaculum? | ☐ | ☒ |
| 5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year? | ☐ | ☒ |
| 6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31. | ☐ | ☒ |

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

**Agency and Applicant**[3] (Name, Email, Phone No.): NH Department of Transportation: Rebecca Martin, Rebecca.martin@dot.nh.gov, 603-271-6781 on behalf of USFWS Headquarters Stephanie Rickabaugh stephanie_rickabaugh@fws.gov

**Project Name**: Stratford 41788

**Project Location** (include coordinates if known): US Route 3, Stratford, NH

-71.616706 44.733350 Decimal Degrees

**Basic Project Description** (provide narrative below or attach additional information): The project proposes to replace a box culvert in Stratford. The project received grant funding from the NFWF

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

(USFWS funds) because it will restore aquatic connectivity. The existing box culvert is concrete and was built in 1938. The existing culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The outlet of the structure is perched more than 4 feet. The proposed structure would be 7 feet wide and 5 feet high with 2 feet of embedment. The new structure would include streambed simulation. One of the goals of the design is to flatten the slope. The new structure would have a slope of around 6%. Upstream of the structure the channel is in a forested area and is around 4 feet wide. Downstream of the structure is a large wetland. Downstream of the outlet a natural gas pipeline was installed. It appears that when it was installed the pipeline disturbed the channel of the stream. The stream channel appears to have formerly branched downstream of the outlet with one branch travelling adjacent to the roadway and a second branch traversing a wetland area. As a result of the pipeline installation, the branch adjacent to the roadway appears to have been disconnected/disrupted. The channel through the wetland becomes undistinguishable. As part of the project, we are proposing to reconnect the channel adjacent to the roadway. Some of the flow would be maintained in the branch that travels through the wetland.

| **General Project Information** | **YES** | **NO** |
|---|---|---|
| Does the project occur within 0.25 miles of a known hibernaculum? | ☐ | ☒ |
| Does the project occur within 150 feet of a known maternity roost tree? | ☐ | ☒ |
| Does the project include forest conversion[4]? (if yes, report acreage below) | ☒ | ☐ |
| Estimated total acres of forest conversion | 0.25 acres | |
| If known, estimated acres[5] of forest conversion from April 1 to October 31 | 0.25 acres | |
| If known, estimated acres of forest conversion from June 1 to July 31[6] | | |
| Does the project include timber harvest? (if yes, report acreage below) | ☐ | ☒ |
| Estimated total acres of timber harvest | | |
| If known, estimated acres of timber harvest from April 1 to October 31 | | |
| If known, estimated acres of timber harvest from June 1 to July 31 | | |
| Does the project include prescribed fire? (if yes, report acreage below) | ☐ | ☒ |
| Estimated total acres of prescribed fire | | |
| If known, estimated acres of prescribed fire from April 1 to October 31 | | |
| If known, estimated acres of prescribed fire from June 1 to July 31 | | |
| Does the project install new wind turbines? (if yes, report capacity in MW below) | ☐ | ☒ |
| Estimated wind capacity (MW) | | |

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____ Date Submitted: 12/19/2018

**STATE OF NEW HAMPSHIRE**
**DEPARTMENT OF TRANSPORTATION**
**BUREAU OF ENVIRONMENT**

**NOTE TO FILE**

Date: January 8, 2019

From: Rebecca Martin
Senior Environmental Manager
Bureau of Environment

RAM

Project: Stratford
41788

**RE: Canada Lynx, No Effects Anticipated**

The subject project is located on US Route 3 in Stratford near Mile Marker 187.4, approximately 400 feet south of the Washburn Road intersection

The project involves replacement of a structurally and environmentally deficient box culvert beneath US Route 3. The outlet of the structure is significantly perched (more than 3 feet) and the structure currently inhibits aquatic and riparian species passage. The project would restore aquatic connectivity in the stream located in the Connecticut River Valley for Eastern brook trout and enhance terrestrial connectivity for multiple mammal species. The project would not include any horizontal or vertical realignment of US Route 3 and only minimal disturbance during construction for traffic control management purposes.

The NH DOT is coordinating with the National Fish and Wildlife Foundation, the Nature Conservancy and the NH Fish and Game Department and has received some grant funding for the project through the New England Forests and Rivers Fund. The grant funding originated from the US Fish and Wildlife Service (USFWS).

Two federally listed species were included on the USFWS IPaC Official Species list, the Northern Long Eared Bat and the Canada Lynx. A Streamlined 4(d) Form for the Northern Long Eared Bat was submitted to the USFWS New England Field Office on December 19, 2018.

David Simmons, the Assistant Supervisor of the USFWS New England Field Office Endangered Species Program, had indicated that it would likely be appropriate for USFWS to complete the needed Section 7 consultation for the project. In a subsequent voicemail, left for Rebecca Martin on Friday, December 21st at 4:20 pm, David Simmons explained that a government shutdown was possible and that if there was a shutdown, he

would not be available. He also explained that he was having trouble tracking down the appropriate person/branch of USFWS to complete the Section 7 consultation. He commented that in NHDOT were to complete the consultation, the process might be quicker and he was comfortable with this approach (NH DOT completing the Section 7 consultation) because of the experience NHDOT has with Section 7. In the voice message David Simmons also mentioned that he was comfortable with the NHDOT submitting the NLEB Streamlined 4(d) Form. In the voicemail David Simmons shared that if, based on an assessment of the habitat and knowledge of the proposed project impacts, NHDOT determined that a no effect finding for the Canada lynx is appropriate for the project, he would accept that determination as appropriate. Based on the limited project impacts outside of the roadway and the existing conditions on US Route 3 (a busy road), NHDOT has determined that no effects on the Canada lynx are anticipated to result from the project as proposed.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

JUN 28 2017

Jennifer McCarthy
Chief, Regulatory Division
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

RE: Essential Fish Habitat Consultations on the Connecticut River in Vermont and New Hampshire

Dear Ms. McCarthy: :

We are writing in regards to the Essential Fish Habitat (EFH) Consultation process in the States of Vermont and New Hampshire within the Connecticut River. As you know, the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require Federal agencies to consult with one another on activities that may have an adverse effect to EFH. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH Assessments and generally outlines each agencies obligations in this consultation procedure.

In 1998, the New England Fishery Management Council designated EFH for Atlantic Salmon (*salmo salar*) throughout its historic range in New England, including the Connecticut River Watershed in the States of Vermont and New Hampshire. At this time, anadromous Atlantic Salmon are no longer present in the Connecticut River or its tributaries within Vermont and New Hampshire. Therefore, we are not requiring EFH consultations for activities in the Connecticut River and its tributaries within Vermont and New Hampshire. However, we maintain that permanent impacts to diadromous fish habitat be avoided and minimized to ensure viable habitat should the status of the species change. Should this occur, we will notify your office to reassess the EFH consultation process in the Connecticut River in Vermont and New Hampshire.

Should you wish to discuss this matter further, please contact Christopher Boelke at 978-281-9131 or Christopher.boelke@noaa.gov

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
For Habitat Conservation

cc: Tom Nies, NEFMC

EasyGrantsID: 57676

National Fish and Wildlife Foundation – New England Forests and Rivers Fund 2017, Full Proposal

Title: Improving a Road-Stream Crossing in Stratford to Benefit Eastern Brook Trout and Mammals (NH)

Organization: New Hampshire Department of Transportation

## Grant Information

**Title of Project**

Improving a Road-Stream Crossing in Stratford to Benefit Eastern Brook Trout and Mammals (NH)

| | |
|---|---|
| **Total Amount Requested** | $ 138,329.00 |
| **Matching Contributions Proposed** | $181,865.00 |
| **Proposed Grant Period** | 10/02/ 2017 - 10/01/ 2019 |

**Project Description**

Restore aquatic connectivity in the Connecticut River Valley by replacing a culvert in a highly scored priority site for Eastern brook trout and enhance terrestrial connectivity for multiple mammal species. Project will connect 1.6 miles of upstream coldwater habitat and install a dry ledge to allow mammals, including fisher, mink and bobcat to cross safely under nortern New Hampshire's busiest road.

**Project Abstract**

The New Hampshire Department of Transportation will restore aquatic connectivity in the Connecticut River Valley by replacing a culvert in a highly scored priority site for Eastern brook trout and enhance terrestrial connectivity for multiple mammal species that reside in the area. The culvert will provide passage between the Connecticut River valley and the Bunnell-Nash Stream matrix forest block.

Habitat fragmentation threatens the long-term sustainability of healthy wildlife populations across the region.Together, New Hampshire Department of Transportation and The Nature Conservancy began addressing landscape connectivity across the Northeast Kingdom of Vermont and Northern New Hampshire in 2009 as part of the Staying Connected Initiative (SCI). SCI is an ongoing effort by public and nonprofit partners across the northern Appalachian/Acadian forest landscape to sustain a connected and forested landscape for the benefit of nature and people.

Project will connect 1.6 miles of upstream coldwater habitat for wild trout and install a dry ledge to allow mammals, including fisher, mink and bobcat to cross safely under nortern New Hampshire's busiest road.

**Organization and Primary Contact Information**

| | |
|---|---|
| Organization | New Hampshire Department of Transportation |
| Organization Type | State or Local Government |
| City, State, Country | Concord,New Hampshire,North America - United States |
| Region (if international) | |
| **Primary Contact** | Philip Beaulieu |
| Position/Title | |
| Phone and E-mail | x ; philip.beaulieu@dot.nh.gov |

## Project Location Information

| | |
|---|---|
| Project Location Description | Stratford, Coos County, New Hampshire |
| Project Country(ies) | North America - United States |
| Project State(s) | New Hampshire |
| Project Congressional District(s) | District 2 (NH) |

## Permits and Approvals

| | |
|---|---|
| Permits/Approvals Description: | Prepare and submit a NH Department of Environmental Services Wetlands & Non-site specific Permit to impact jurisdictional wetlands. This process involves a number of other State and Federal agencies, including the NH Fish and Game Department, US Environmental Protection Agency, NH Division of Historical Resources, NH Natural Heritage Bureau, and the US Army Corps of Engineers |
| Permits/Approvals Status: | Intend to Apply |
| Permits/Approvals Agency-Contact Person: | New Hampshire Department of Environmental Services |
| Permits/Approvals Submittal-Approval Date: | 06/29/2018 |

## Activities and Outcomes

**Funding Strategy: Habitat Restoration**
Metric: NEFR - Eastern Brook Trout - Fish passage improvements - Miles of stream opened
Required: Optional
Description: Enter the number of miles of stream opened

| | |
|---|---|
| **Starting Value** | 0.00 Miles of stream opened |
| **Target value** | 1.62 Miles of stream opened |

Note:

**Funding Strategy: Habitat Restoration**
Metric: NEFR - Eastern Brook Trout - Fish passage improvements - # passage barriers rectified
Required: Optional
Description: Enter the number of fish passage barriers rectified

| | |
|---|---|
| **Starting Value** | 0.00 # passage barriers rectified |
| **Target value** | 1.00 # passage barriers rectified |

Note:

NFWF

**New England Forests and Rivers Fund 2017:**
**Full-proposal Project Narrative**

**Instructions:** Save this document on your computer and complete the narrative in the format provided. The narrative may not exceed ten (10) pages, and smaller grants with fewer partners may be as few as five pages. Please retain the outline format below, but you may delete the instructions associated with each element. Once complete, upload this document into the on-line application as instructed.

1. **Objectives:** Describe the project's specific objectives, and list the project's anticipated outputs and outcomes. These outputs and outcomes should be consistent with the Metrics section of your online application.

   This project is a strategic partnership between the New Hampshire Department of Transportation (NH DOT) and The Nature Conservancy (TNC) to leverage their respective expertise for the benefit of rivers, wildlife, and society. There are five primary objectives and anticipated outcomes associated with the project, including:

   **I. Design, engineer, permit, and reconstruct a priority road-stream crossing in Stratford, NH**
   NH DOT will complete engineering, environmental permitting, and construction to replace an aging and ecologically incompatible road-stream crossing. This crossing is among NH DOT's highest priority crossings to replace in northern New Hampshire given its age, condition, and barrier for aquatic organism passage.

   **II. Restore aquatic connectivity at a crossing that is a complete barrier to upstream passage**
   The existing structure's outlet is perched more than three feet above the downstream channel. The re-design of the crossing will restore aquatic connectivity to the system's forested headwaters. Approximately 1.6 miles of upstream headwater habitat will be re-connected once the project is complete. The project site lies within an Eastern Brook Trout Joint Venture subwatershed that has among the highest priority score (1.62 out of a possible 1.66)

   *View looking at the perched outlet of the existing crossing structure, which was installed in 1938. The structure is a complete barrier to upstream aquatic organism passage.*

   **III. Incorporate terrestrial wildlife passage features into the restored crossing**
   Six months of wildlife camera trap monitoring at the crossing indicates that the existing culvert is regularly used by small mammals to cross under US Route 3. Mink, long-tailed weasel, and raccoons, among others, were detected. The existing structure has no built-in terrestrial wildlife features and the high outlet drop is likely to impede passage of some species. Reconstruction of the crossing will include features to allow species to move through the structure in the dry, which species such as bobcat are attracted to based on camera trap studies conducted across the northeast. This project objective is to provide safer opportunities for wildlife to cross under northern New Hampshire's busiest road, which is safer for both them and motorists.

   **IV. Build partnerships to address and improve the management of transportation infrastructure and their impacts on fish and wildlife**
   NH DOT and TNC began working on landscape-scale habitat connectivity planning across northern New Hampshire in 2009. We have continued to work together to implement a roadside wildlife camera study and pilot a road kill inventory along a stretch of US Route 3. We are excited to implement the proposed project as the first to hit the ground since the start of our partnership. The project meets multiple benefits at one site, which meets both organization's criteria to move forward: to address an infrastructure and safety need, to improve habitat connectivity

at a promising site with documented functional connectivity, and to address an aquatic connectivity barrier. This project will serve as a demonstration for others to come by providing multiple benefits for both people and nature.

**V. Measure success**
We will measure the ecological success of the project through pre-and post-construction surveys for fish and terrestrial wildlife movement. The New Hampshire Fish and Game Department will complete fish monitoring surveys and TNC will complete camera trap monitoring.

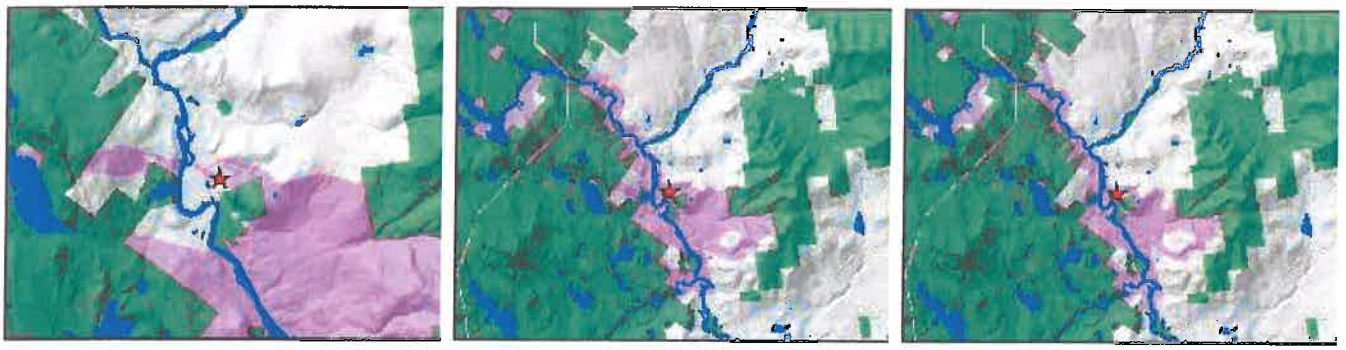
2. **Project Priority:** Briefly explain the need and strategic importance of conducting the project in the specific location, and why the proposed approach or strategy is appropriate for addressing the need.

Together, NH DOT and TNC began addressing landscape connectivity across the Northeast Kingdom of Vermont and Northern NH in 2009 as part of the Staying Connected Initiative (SCI). SCI is an ongoing effort by public and non-profit partners across the northern Appalachian/Acadian forest to sustain a connected and forested landscape for the benefit of nature and people. For more information on SCI see: http://stayingconnectedinitiative.org/.

SCI emerged because habitat fragmentation threatens the long-term sustainability of healthy wildlife populations across the region. The need for landscape connectivity is explicitly referenced in New Hampshire's Wildlife Action Plan because connectivity is essential for daily/seasonal movement and other life history needs, genetic exchange, and the ability for wildlife to migrate and adapt in the face of a changing climate. The Connecticut River valley and the US Route 3 corridor that runs along it is the most significant fragmenting feature in northern NH. This area, which includes the project site, is the primary focus for SCI activities in NH.

TNC lead computer modeling efforts for SCI to identify important wildlife pathways based on habitat structure conducive to the flow of northern NH specific focal species. These models were run between landscape-scale conservation areas, such as those to the west (West Mountain Wildlife Management Area in Vermont, >60,000 acres) and east (Bunnell-Nash Stream Forest, >64,000 acres) of the project site (see uploaded Project Site Location and Conservation Context map). Highly connected habitat for fisher, mink, and otter were identified through the project site to connect between these large established conservation lands (see images below). Through follow-up camera trap monitoring at the site, we subsequently identified the presence of mink and long-tailed weasel—another of our focal species.

*Staying Connected Initiative wildlife connectivity modeling results across the Connecticut River valley, between landscape-scale conervation areas in Vermont and New Hampshire (shown in green). The project site is indicated by the red star. The most permeable corridors (top 10%) for each species based on their respective modeling parameters is shown in pink.*



*Fisher* *Mink* *Otter*

Our regional conservation science efforts through SCI support the proposed ecologically enhanced road-stream crossing replacement at the site. Furthermore, the site is situated between resilient sites identified in TNC's eastern United States Resilient and Connected Landscapes analysis (2016); accommodating species movement between these resilient sites, which is an objective of the project, is critically important. The project's stream network is associated with a highest relative resilience aquatic system based on TNC's landscape level aquatic resilience analysis (2013).

Finally, the project site is approximately 0.5 miles upstream of Connecticut River habitat for the federally and state endangered dwarf wedge mussel (G1/S1).

From an aquatic habitat and connectivity standpoint, the project presents an opportunity to address a complete barrier to the upstream movement of fish into a high-quality headwater system. The outlet of the existing crossing is perched more than three feet. Furthermore, the crossing structure is quite old (installed in 1938) and its perch condition has likely blocked fish for decades. The crossing structure is presenting safety concerns for travel along US Route 3 as well, so the project will address an important public safety infrastructure need.

*Road-killed fisher along a similarly situated riparian corridor as the project site; our modeling efforts identified the project location as a priority corridor for fisher.*

*A leaping mink captured by a camera trap setup to monitor terrestrial wildlife passage through the existing crossing structure.*

*A long-tailed weasel peaks over the severe downstream perch at the existing crossing structure.*

Given all the ecological and human benefits of the project, the strong need and strategic importance for this project is clear. The proposed approach to address the need (see section 4 Work Plan) brings together the necessary stakeholders to achieve the desired outcomes in the most efficient manner. We are leveraging each of the partners' respective expertise to implement a successful project in the most cost efficient manner.

3. **Conservation Plan Context:** Describe how the project relates to a local or regional conservation initiative or plan. Indicate whether this project is a continuation or expansion of an existing project and provide information on the status and results/outcome of the previous work.

As described in section 2, this project is part of a landscape level conservation initiative—the Staying Connected Initiative. SCI spans from the Tug Hill Plateau west of the Adirondacks, across Vermont, Northern NH and Maine, and into the Canadian Maritimes. Its aim is to maintain landscape connections across one of the largest and most intact matrix forests of its type globally, the temperate broadleaf forest. Embedded within SCI are a series of focal linkages. These are regional areas identified as at risk of further habitat fragmentation that could jeopardize connectivity across the whole system.

SCI touches down regionally in NH within the Northeast Kingdom of Vermont to Northern NH (NEK-NNH) linkage, which encompasses the proposed project site. In 2013, TNC released a report summarizing four years of conservation science and planning for the linkage titled *Staying Connected In The Northern Appalachians - Northeast Kingdom to Northern New Hampshire Linkage: Implementation Plan To Maintain And Enhance Landscape Connectivity For Wildlife*. The report details connectivity modeling results and implementation strategies including land protection, road barrier mitigation, and restoration. Road barrier mitigation strategies identified in the report are consistent and supportive of the proposed project, explicitly including the management of road-stream crossings with quality and connecting habitat on both sides of the road. The proposed project is a continuation, or more specifically, an on-the-ground implementation resulting from the in-depth conservation planning and relationship building between NH DOT and TNC since 2009.

The project also falls within an Eastern Brook Trout Joint Venture (EBTJV) subwatershed that has among the highest priority score. Out of a 0 to 1.66 subwatershed score scale across the EBTJV region, the project's subwatershed has a score of 1.62. From EBTJV, "The highest [priority score] values represent the sub watersheds that have a high probability of being intact and are surrounded by neighboring subwatersheds that also have a high probability of being intact." These subwatersheds are classified as "Best For Protection" with "…known and predicted intact subwatersheds with the highest priority scores. These intact subwatersheds have landscape characteristics that are not as vulnerable to an increase in stressors and suggest they are likely to maintain their favorable habitats and current populations. Higher priority scores in this category also suggest that the neighboring subwatersheds also have intact populations and represent patches with higher resiliency and likelihood of persistence." This highest class of subwatersheds have scores ranging between 1.32 and 1.66; the project subwatersheds score of 1.62 is nearly at the top of its class.

4. **Work Plan:** Provide a detailed work plan, including a description of the project's overall methodology or approach, as well as a description of each major activity to be undertaken, including long-term project maintenance; the parties responsible for each activity; and, a schedule for completion of each activity. Explain technical, planning and design expertise that will be utilized at various stages.

The following details the project work plan, including responsible parties and a timeframe for completion:

A. Project Kick-off Meeting, NH DOT Lead Fall 2017
   - An on-site project kick-off meeting will be convened with: NH DOT staff (project manager, lead engineer and appropriate technical staff, Bureau of Environment environmental compliance staff), TNC (terrestrial connectivity lead and associated staff), and NHFG (fisheries biologist, wildlife biologist) and other appropriate stakeholders, as appropriate.
   - The purpose of the meeting will be to review site conditions, design elements for fish and wildlife passage, and other relevant design constraints
   - In addition to establishing contacts, this meeting will assist in forming open lines of communication between design engineers and fish and wildlife professionals

B. Pre-Construction Monitoring, TNC Lead, Summer 2018
   - Camera trap monitoring for terrestrial passage is on-going starting in July 2016, and will continue until construction
   - TNC will coordinate with NHFG to complete pre-construction fish monitoring up and downstream of the crossing over the 2018 field season

C. Field Reviews and Resource Delineations, NH DOT Lead, Fall 2017
   - NH DOT Bureau of Environment will complete a delineation of the wetland and surface waters within and adjacent to the project area
   - In addition, the NH DOT will assess the site for potential hazardous materials, invasive plant and animal species, cultural resources and other resources of concern

D. Topography and Planimetry Survey, NH DOT Lead, Fall/Winter 2017
   - NH DOT will complete a survey of existing features including topography and planimetry
   - A stream profile and cross-sections will also be surveyed.
   - A base plan will be prepared using the surveyed data. The data will also be used for the hydraulic modeling of the culvert and stream channel.

E. Hydrologic Modeling, NH DOT Lead, Winter 2017/2018

- A complete Hydrologic model of the box culvert's contributing drainage area will be prepared. The modeling will be used to determine peak flows during various recurrence interval storm events.

F. Hydraulic Modeling and Alternatives Analysis, NHDOT Lead, Winter 2017/2018
   - Multiple culvert configurations will be identified based on engineering estimation using existing stream dimensions, stream crossing rules, site constraints, and desired habitat parameters.
   - The three most feasible configurations will be hydraulically modeled using the various peak flows calculated from the hydrologic modeling. The model will be used to determine; headwater / tailwater depths, depth of flow within the culverts, velocities within the culverts and at the outlets.
   - The culvert will be designed to pass the peak flow during the 25-year recurrence interval storm at a minimum. It is likely that the actual structure will be able to pass the 100-year storm event given the sizing considerations necessary to meet the fish and wildlife passage objectives of the project

G. Project Team Review, NHDOT Lead, Winter 2018
   - The project team (NH DOT, TNC, NHFG) will review the results of the alternatives analysis and discuss how the alternatives function to meet multiple project objectives to include; design peak flows, fish passage, and terrestrial wildlife passage
   - The project team will select the preferred alternative and agree on next steps for project review/collaboration.

H. Conceptual Design, NH DOT Lead, Spring 2018
   - A conceptual design of the chosen alternative will be completed. The design will include a plan and profile detailing the proposed culvert and stream channel work.
   - The conceptual plans will also include sufficient detail for construction sequencing including proposed traffic control, dewatering, and erosion control elements to identify all temporary and permanent impacts to natural resources and private properties outside of the highway right-of-way. These plans will be used to assist in acquiring any needed easements from the abutting landowners and review with pertinent State and Federal permitting agencies

I. Project Team and Environmental Resource Agencies Review, NH DOT Lead, Spring/Summer 2018
   - Project team (NH DOT, TNC, NHFG) will meet to review and provide feedback on conceptual plans
   - In addition, the NH DOT will attend a meeting with the State and Federal regulatory resource agencies to discuss the proposal and impacts. This meeting will be used to identify significant issues and viable mitigation measures to be analyzed during the project's final development

J. 90% Design Completion and Project Review, NH DOT Lead, Summer/Fall 2018
   - Based on input gathered from meetings with project team and the various resource agencies, the Department will prepare 90% design plans
   - Plans will be reviewed by the project team prior to submittal for environmental permitting

K. Environmental Permitting and Easement Acquisition, NH DOT Lead, Spring/Summer 2018
   - The Department will prepare and submit a NH Department of Environmental Services – Wetlands & Non-site specific Permit to impact jurisdictional wetlands within the project area. In addition to NHDES this permitting process will involve several other State and Federal agencies responsible for reviewing the application to ensure compliance with the various laws and standards that exist. These agencies include; NH Fish and Game Department, US Environmental Protection Agency, NH Division of Historical Resources, NH Natural Heritage Bureau, and the US Army Corps of Engineers
   - It is likely that easements will be required for work to occur outside of the highway Right-of-Way. The magnitude of these easements will not be known until the conceptual design has been completed. However, we envision that short-term easements related to temporary impacts to private property during construction

will be needed. In addition, we may also need to acquire permanent easements to facilitate the long-term maintenance operations related to the new culvert

L. Final Design and Construction Specification, NH DOT Lead, Summer/Fall 2018
- The NH DOT will prepare final design plans and specifications for the project proposal.
- The plans will detail the proposed culvert replacement including; grading plans, erosion and sediment control measures, construction sequencing, traffic control plan and phasing, utility relocation work and any work proposed in the adjacent stream channels.
- The final design plans will be submitted to the environmental permitting agencies and project team members.

M. Order Structure/materials, NH DOT Lead, Winter/Spring 2018/2019
- The NH DOT will solicit bids from vendors wishing to supply the culvert structure.
- Once a successful bidder is awarded the contract, the NH DOT will order the structure and inspect the structure at the plant as it is built.
- The Department will order all the other materials necessary to complete the work and stage in a location close to the jobsite.

N. Construction, NH DOT Lead, **Summer/Fall 2019**
- The NH DOT will conduct the heavy construction at the site using State owned forces and equipment. Some specialized work including the utility relocation, excavator operation, and guardrail installation will be sub-contracted to various vendors.
- Day-to-day construction activities will be orchestrated by a NH DOT construction foreman and maintenance supervisor who are well versed in culvert and roadway construction projects. The engineering staff out of the Lancaster maintenance office will be in constant contact with onsite personnel and vendors ensuring the construction is proceeding appropriately and that any questions are answered in a timely manner.
- Starting in the early summer of 2019, the NH DOT will commence with construction. The initial phase of construction will include preparing the project area for the required traffic control. This entails installing initial traffic control devices including signing and message boards warning of the changing traffic patterns.
- We envision the use of a temporary traffic signal will be required during construction to allow for traffic to be confined to one lane and diverted in phases to avoid the active construction site.
- A clean water bypass will be installed to convey clean runoff from the stream around the jobsite so that sediment resulting from the construction does not enter the downstream watershed. This bypass will be maintained throughout construction until the new structure is in place.
- Construction will proceed working in phases attempting to minimize impacts on traffic. It is anticipated that work impacting the stream will be conducted during periods of low-water flow to minimize potential for unnecessary environmental impacts.
- Final clean-up work on the site including; vegetative stabilization, pavement installation, gravel shoulder installation and utility re-location will occur in the late summer / early fall of 2019.

O. Post-Construction Monitoring, TNC Lead, Summer/Fall 2020
- Camera trap monitoring for one additional year post-construction
- TNC will coordinate with NHFG to complete post-construction fish monitoring up and downstream of the crossing the following field season after construction (2020)

5. **Monitoring and Measuring Performance:** Describe how progress toward objectives will be monitored and measured, including how the project will verify and document quantifiable results.

The following details how progress toward objectives will be monitored and measured, including how the project will verify and document quantifiable results.

**Objective I.**
- Final design and construction specifications complete (Y/N)
- Necessary environmental permits in-hand (Y/N)
- Construction complete (Y/N)

**Objective II.**
- Coordination with NHFG fisheries biologist to develop and review fish-friendly crossing replacement design (Y/N)
- Eliminate perched outlet; restore aquatic organism passage (Y/N)
- 1.6 miles of upstream habitat reconnected (Y/N)
- Comparison of pre- vs. post-construction fish sampling data. Is there a measurable increase in upstream species abundance vs. downstream? Quantify fish sampling results.

**Objective III.**
- Incorporate dry upland shelf for terrestrial wildlife passage through the crossing structure (Y/N)
- Comparison of pre- vs. post-construction camera trap data. Is there a measurable increase in the diversity of species utilizing the structure and the per day rate of detection? Quantify camera trap results.

**Objective IV.**
- Is the sum of the organizational partnership greater than its parts? Through the collaborative effort, was NH DOT and TNC able to leverage their respective expertise to increase the benefit and ecological impact of the project (Y/N)
- Following the completion of the project, will NH DOT and TNC partner on other transportation and wildlife projects? (Y/N)

**Objective V.**
- Were metrics applied and measured as described for objectives I through IV above? (Y/N)

6. **Partner Justification:** Describe how all appropriate partners necessary to ensure project success have been engaged. Describe the strength, qualifications and nature of the contribution of the applicant and other collaborating organizations to the project, including level of landowner engagement. Indicate whether the proposed project has been reviewed by or otherwise involves the participation of appropriate local, state or federal government agencies.

**New Hampshire Department of Transportation**
The NH DOT is responsible for providing safe, efficient and reliable transportation opportunities to all the State's residents, visitors, businesses, and transport haulers. The NH DOT promotes transportation systems that support interstate and intrastate connectivity and mobility. US Route 3 is one of the State's most important North/South corridors for economic development. This is inclusive of the North Country, where so many individuals rely on the free movement of tourists and goods to keep the North Country's economy functioning. The project site is located within a highway right-of-way owned and managed by the NH DOT.

The NH DOT employs dozens of engineers, surveyors, environmental professionals, support staff, and construction professionals capable of completing the necessary survey, design, permitting and oversight during construction. In addition, the NH DOT also employs hundreds of laborers and related management staff capable of conducting the heavy construction components of the project. The NH DOT has the experience and resources to complete nearly any complex construction project. The NH DOT routinely works with various State and Federal agencies on similar

projects to ensure that all potential impacts have been identified and mitigated. This project would utilize the NH DOT's existing connections and processes to ensure a streamlined project approach from start to finish.

The Nature Conservancy

TNC is a nonprofit organization dedicated to conservation for the benefit of people and nature. Our mission is to conserve the lands and waters on which all life depends. We address the most urgent conservation challenges at the largest scale by pursuing collaborative, pragmatic, science- and market-based solutions. Our vision is to leave a sustainable world for future generations.

TNC's on-the-ground conservation work is carried out in all 50 states and in 69 countries around the world with the support of approximately one million members. Since 1961, TNC has helped to protect over 290,000 acres of land in New Hampshire by utilizing sound conservation science. We are working with communities and a wide variety of public and private partners across the state to establish resilient, connected landscapes; foster healthy rivers and freshwater systems; build sustainable fisheries; restore estuarine health; and create a clean energy future for New Hampshire. The Conservancy has approximately 10,000 supporters in New Hampshire.

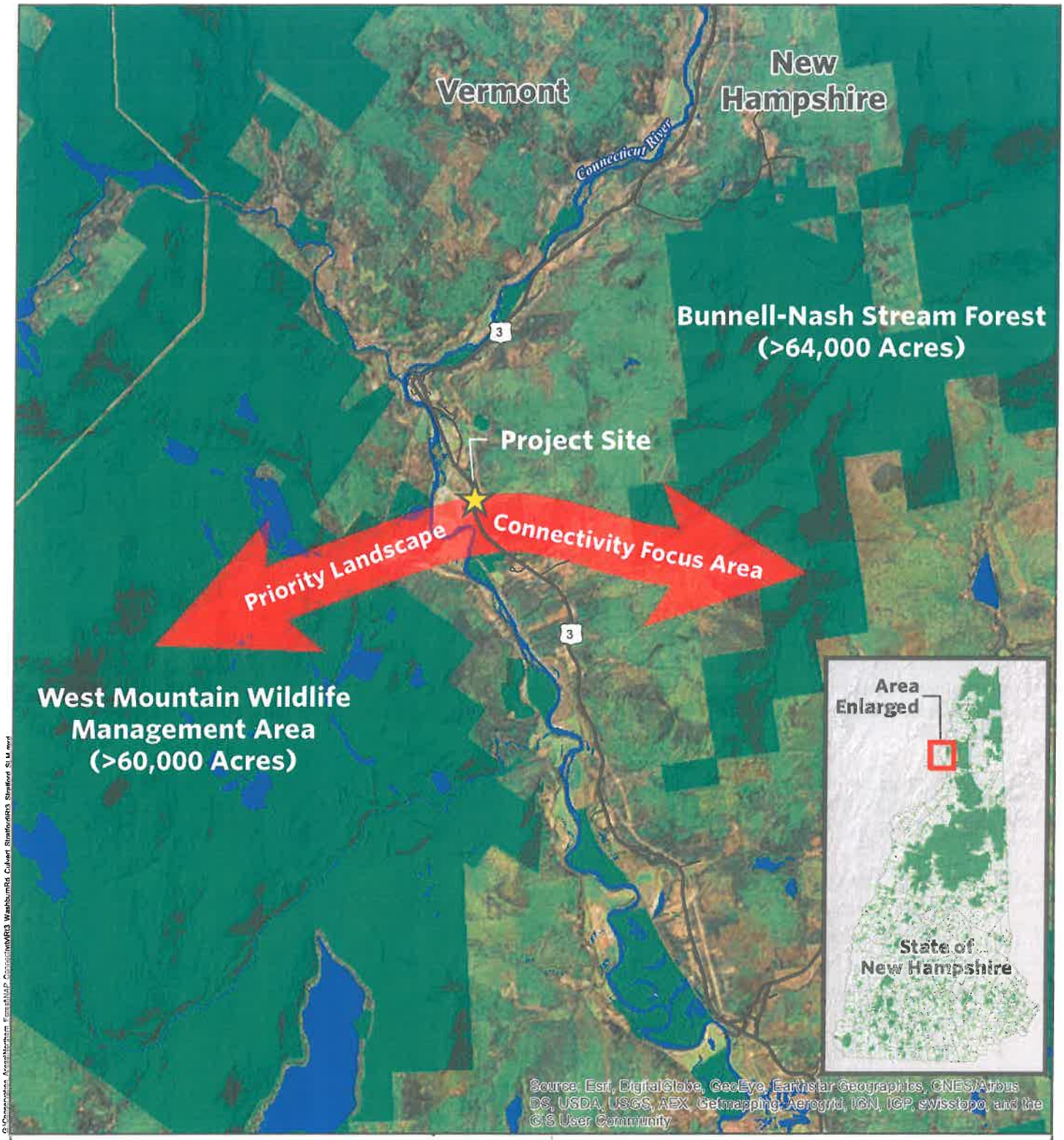
As demonstrated throughout the proposal narrative, TNC has been central to northern NH wildlife connectivity efforts since 2009. TNC's project relevant track record with conservation science and planning, roadside wildlife camera trapping, and partner collaboration will help to ensure project success.

7. **Dissemination and Transferability of Results:** Describe how the results of the project will be transferred to other parts of New England or integrated into broader policies and programs to restore New England forest and river systems. Describe how results will be communicated to appropriate audiences. Describe the methods, techniques and/or findings of this project that can best be used by others, and discuss the strength of these applications to different locales, future years, and other organizations.

We are excited to move this project forward to complete a meaningful site specific restoration project and to explore alternative approaches to NH DOT's management of road infrastructure around the state. This project site is just one of tens of thousands of road-stream crossings in NH alone; the opportunity to transfer results to other appropriate sites is vast.

Similarly, there are ample opportunities to disseminate project results to appropriate audiences in New Hampshire and across the region. We will pursue presentation opportunities to the following regularly held conferences and workshops regionally and locally, as well as other national opportunities as they become available:

- Northeast Transportation and Wildlife Conference (biennial)
- NH DOT Lunch & Learn Presentation open to all staff (scheduled as-appropriate)
- Staying Connected Initiate Workshops/Retreats/Webinars
- Saving Special Places (NH's annual land trust conference)
- New Hampshire Water and Watershed conference (annual)
- New Hampshire Association of Natural Resource Scientists (quarterly meeting or annual meeting)
- American Society of Civil Engineers – NH Section (annual meeting)




**Legend**

- Project Site Location
- Conservation/Public Land
- Surface Water
- State Road
- Local Road

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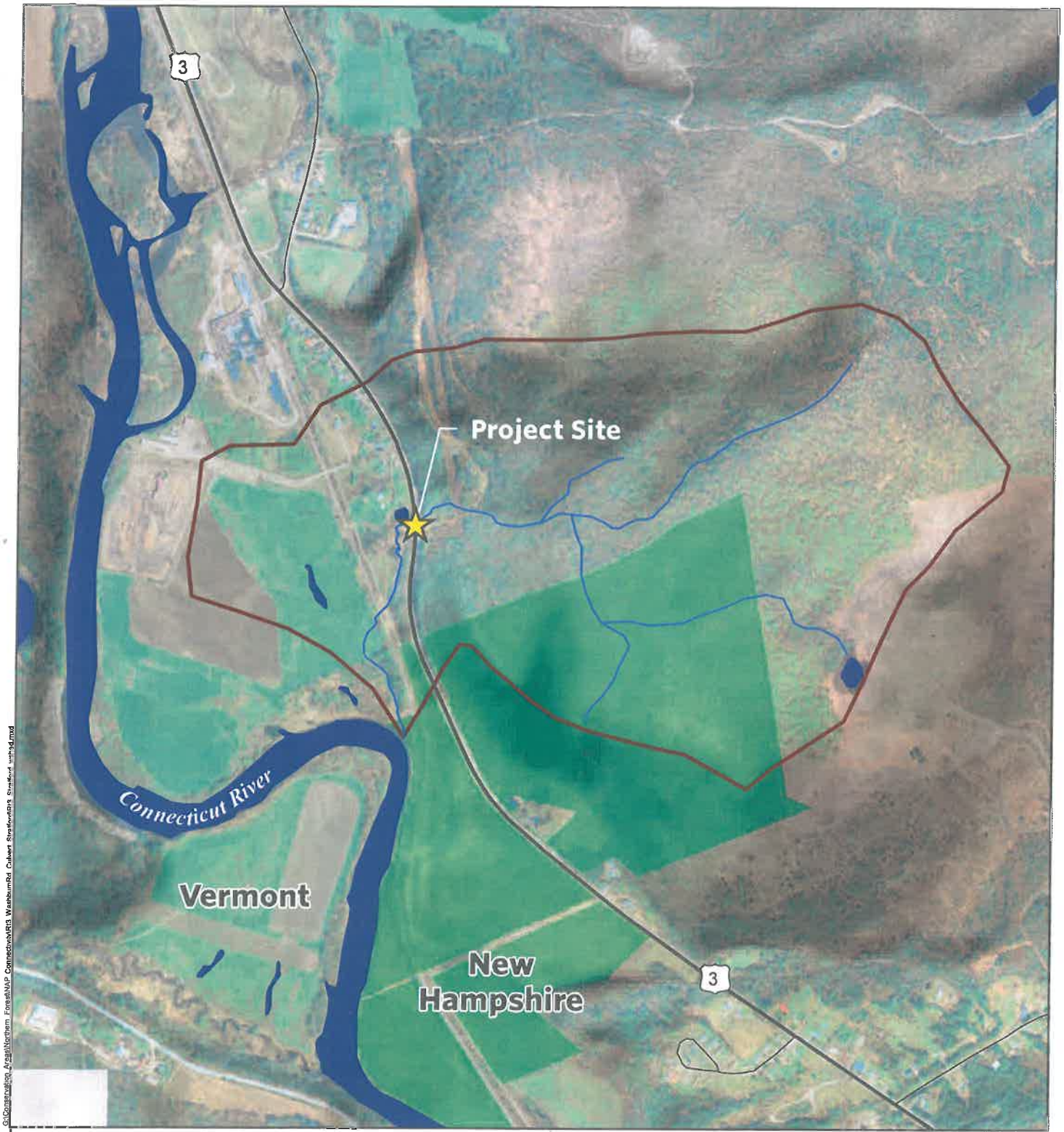
Feet

## Project Site Location and Conservation Context

### US Route 3 Culvert Replacement

### Stratford, New Hampshire

*Created: May 9, 2017*
*Data Source: NH GRANIT, TNC & Esri*

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**Legend**

- Project Site Location
- Stream Network
- Project Watershed
- Conservation/ Public Land
- Surface Water
- State Road
- Local Road

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# Project Watershed and Stream Network Map

## US Route 3 Culvert Replacement

## Stratford, New Hampshire

*Created: May 9, 2017*
*Data Source: NH GRANIT, TNC & Esri*

The Nature Conservancy
New Hampshire

The Nature Conservancy in New Hampshire
22 Bridge Street, 4th Floor
Concord, New Hampshire 03301-4987

tel [603] 224.5853
fax [603] 228.2459
nature.org/new hampshire

May 9, 2017

Philip L. Beaulieu, P.E.
District Engineer
NH Department of Transportation
Highway Maintenance - District 1
641 Main Street
Lancaster, NH 03584

RE: **NFWF New England Forests and Rivers Grant Application for an Ecological Road-Stream Crossing Replacement on US Route 3 in Stratford, NH**

Dear Mr. Beaulieu,

As Executive Director of the New Hampshire Chapter of The Nature Conservancy (TNC), I am pleased to submit this letter of commitment and express strong support for a NFWF New England Forests and Rivers Grant by the New Hampshire Department of Transportation (NH DOT) to restore and enhance aquatic organism and terrestrial wildlife passage at a US Route 3 road-stream crossing in Stratford, NH. TNC will be an active participant in the project.

The proposed project will address a severely perched culvert along a headwater stream system that is a complete barrier for aquatic organism passage. Simultaneously, the project will enhance under-road terrestrial wildlife passage across northern New Hampshire's busiest road to improve safety for both motorists and wildlife. Preliminary designs look to double the width of the existing four-foot box culvert and increase the structure height to achieve the project's fish and wildlife passage objectives.

NH DOT and TNC began working on landscape-scale habitat connectivity across northern New Hampshire in 2009. We have continued to work together to implement a roadside wildlife camera study and pilot a road kill inventory along a stretch of US Route 3. We are excited to implement the proposed project as the first to hit the ground since the start of our partnership and as a direct result of our efforts together. As such, the project meets both organization's criteria to move forward: to address an infrastructure and safety need, to improve habitat connectivity at a promising site with documented functional connectivity (based on our roadside wildlife camera study), and to address an aquatic connectivity barrier. This project will serve as a demonstration for others to come by providing multiple benefits for both people and nature.

As an active project participant, TNC will participate in all project team activities including concept development and design plan reviews. TNC will contribute its terrestrial wildlife passage expertise at all phases of the project, and will ensure that fish passage expertise is pulled into the project at appropriate points in the design process. TNC will coordinate with the New Hampshire Fish and Game Department to

complete pre-and post-construction fish monitoring, and TNC will lead pre-and post-construction camera trapping to evaluate terrestrial wildlife passage. TNC will provide $12,993 in match to the project to cover TNC staff time, travel, supplies, and indirect costs.

We hope that this proposal will be favorably viewed by the review committee, and thank you for your consideration.

Sincerely,

Mark Zankel
State Director

New Hampshire
Fish and Game Department

**HEADQUARTERS:** 11 Hazen Drive, Concord, NH 03301-6500
(603) 271-3421
FAX (603) 271-1438

**www.WildNH.com**
e-mail: info@wildlife.nh.gov
TDD Access: Relay NH 1-800-735-2964

May 8, 2017

Philip L. Beaulieu, P.E.
NH Department of Transportation
Highway Maintenance – District 1
District Engineer
641 Main Street
Lancaster, NH 03584

Reference: NFWF New England Forests and Rivers Grant Application for the Ecological Road-Stream Crossing Replacement on US Route 3 in Stratford, NH

Dear Mr. Beaulieu,

On behalf of the New Hampshire Fish and Game Department (NHFGD) I would like to express our support for a NFWF New England Forests and Rivers grant application by the New Hampshire Department of Transportation (NHDOT) to restore and enhance aquatic organism and terrestrial wildlife passage at a US Route 3 road-stream crossing in Stratford, NH. NHFGD will participate in the project in the following capacities:

(1) Participate in an on-site project kick-off meeting. Provide guidance to project engineers for restoring aquatic organism passage including channel design options and slope considerations.
(2) Sample upstream and downstream fish communities, pre and post-construction. Provide findings to NHDOT.
(3) Review and provide feedback on conceptual and near-final design plans regarding fish passage accommodations.

If funded, we look forward to working with NHDOT and its partners to design a culvert that provides aquatic connectivity for fish and wildlife while reducing the safety hazards of an aging crossing structure. Please feel free to contact me (john.magee@wildlife.nh.gov) at our main office in Concord, NH, (603) 271-2744, if you have further questions or concerns regarding our commitment and support of this project.

Sincerely,

John Magee
Fish Habitat Biologist

**REGION 1**
629B Main Street
Lancaster, NH 03584-3612
(603) 788-3164
FAX (603) 788-4823
email: reg1@wildlife.nh.gov

**REGION 2**
PO Box 417
New Hampton, NH 03256
(603) 744-5470
FAX (603) 744-6302
email: reg2@wildlife.nh.gov

**REGION 3**
225 Main Street
Durham, NH 03824-4732
(603) 868-1095
FAX (603) 868-3305
email: reg3@wildlife.nh.gov

**REGION 4**
15 Ash Brook Court
Keene, NH 03431
(603) 352-9669
FAX (603) 352-8798
email: reg4@wildlife.nh.gov

New Hampshire DOT
Department of Transportation

*Victoria F. Sheehan*
*Commissioner*

# *THE STATE OF NEW HAMPSHIRE*
## *DEPARTMENT OF TRANSPORTATION*

*William Cass, P.E.*
*Assistant Commissioner*

**STRATFORD**
**41788**
RPR 10290

**No Historic Properties Affected Memo**

Pursuant to the Request for Project Review signed on December 17, 2018, and For the purpose of compliance with regulations of the National Historic Preservation Act and the Advisory Council on Historic Preservation's *Procedures for the Protection of Historic Properties* (36 CFR 800), the NH Division of Historical Resources (NHDHR) and the US Army Corps of Engineers' *Appendix C*; the NH Division of Historical Resources, the US Army Corps of Engineers (ACOE), and the NH Department of Transportation have coordinated the identification and evaluation of historical and archaeological resources with plans to replace a concrete box culvert which carries an unnamed stream beneath US Route 3 in the Town of Stratford, New Hampshire.

Project Description:
To address the concerns of the current ca. 1938 concrete box culvert the Department proposes to replace the structurally and environmentally deficient culvert beneath US Route 3 near Mile Marker 187.4, approximately 400 feet south of the Washburn Road intersection. The outlet of the structure is significantly perched (more than 3 feet) and the structure currently inhibits aquatic and riparian species passage. The project would restore aquatic connectivity in the Connecticut River Valley for Eastern brook trout and enhance terrestrial connectivity for multiple mammal species. The project would not include any horizontal or vertical realignment of US Route 3 and only minimal disturbance during construction for traffic control management purposes. The existing box culvert is 4 feet wide and 4.2 feet high and has a slope of approximately 19%. The proposed replacement box culvert would be 7 feet wide and 5 feet high with 2 feet of embedment and a slope of around 6%.

Analysis:
Based on a review pursuant to 36 CFR 800.4, we agree that no historic or archaeological resources are affected in the project area and that no further survey work is needed. The ca. 1938 concrete box culvert is of standard design and construction. Concrete boxes became popular in NH starting around 1918 and by the mid-1900s were regularly built throughout the state.

Due to the limited ground disturbance in an area that has previously been disturbed by construction of the roadway and the adjacent natural gas pipeline, no archaeological review is necessary.

Public Consultation:
NHDOT initial contact letters were sent to the Town Select Board, Planning Board, and Cohos Historical Society. Additional letters were sent to the Conservation Land Stewardship Program, LCHIP, and the NH LWCF Program Specialist. No concerns have been raised to date and the project has no Consulting Parties.

Determination of Effect:
Based on a review pursuant to 36 CFR 800.4, we agree that no historic or archaeological resources are affected in the project area and that no further survey work is needed. Should project impacts change, NHDOT will notify USFWS and NHDHR to determine if any additional survey is warranted.

In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

Jill Edelmann 1/17/2019

Jill Edelmann
Cultural Resources Manager

Date

Concurred with by the NH State Historic Preservation Officer:

Elizabeth H. Muzzey DSHPO 2/1/19

Elizabeth H. Muzzey
State Historic Preservation Officer
NH Division of Historical Resources

Date

c.c. Stephanie Rickabaugh, USFWS
James McMahon, DOT
Chris St. Louis, NHDHR
Rebecca Martin, DOT
Philip Beaulieu, DOT

S:\Environment\PROJECTS\STRATFORD\41788\Cultural\41788NoHistPropAffected_Update.docx

US Army Corps of Engineers
New England District

**New Hampshire General Permits (GPs)**
**Appendix B - Corps Secondary Impacts Checklist**
**(for inland wetland/waterway fill projects in New Hampshire)**

1. Attach any explanations to this checklist. Lack of information could delay a Corps 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 5. regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

| 1. Impaired Waters | Yes | No |
|---|---|---|
| 1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section-401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.* | | 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 SAS, special wetlands. 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://www2.des.state.nh.us/nhb_datacheck/. The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH. | | 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? | N/A | |
| 2.7 What is the area of the proposed fill in wetlands? | 2000 SF | |
| 2.8 What is the % of previously and proposed fill in wetlands to the overall project site? | N/A | |
| **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://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index | | 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:<br>• PDF: www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/highest_ranking_habitat.htm.<br>• Data Mapper: www.granit.unh.edu<br>• 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 21? | 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 Request for Project Review (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 11 GC 8(d) of the GP document** | X | |

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.
** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

Impact Area A (east of US 3)- permanent channel & Impact Area B (east of US 3)- permanent bank

Impact Area A (east of US 3)- permanent channel & Impact Area B (east of US 3)- permanent bank

Impact Area B (east of US 3)- permanent bank

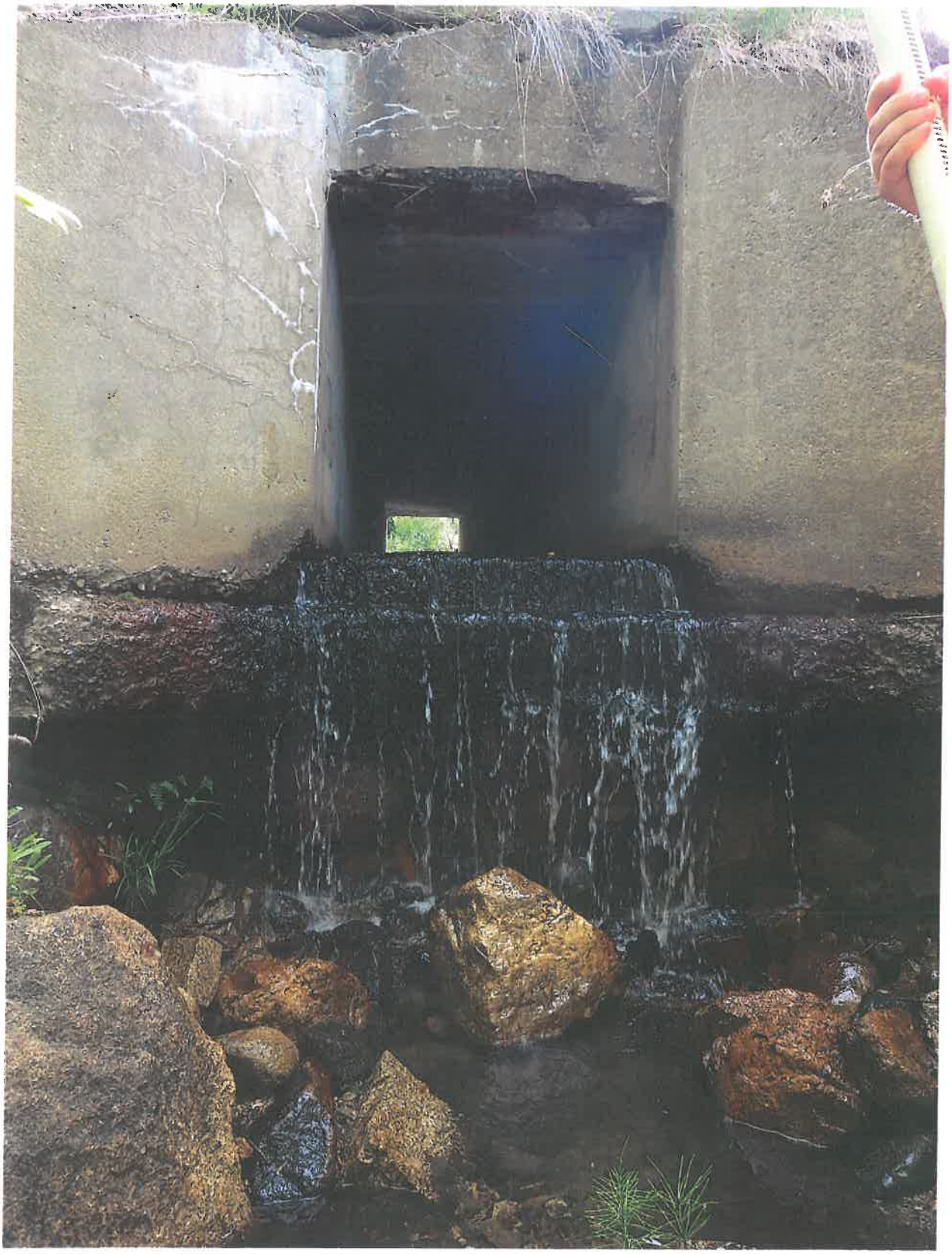
Impact Area B (east of US 3)- permanent bank & Impact Area G (east of US 3)- temporary bank

Impact Area F (east of US 3)- temporary channel & Impact Area G (east of US 3)- temporary bank: facing east away from the culvert

Impact Area F (east of US 3)- temporary channel & Impact Area G (east of US 3)- temporary bank: facing east away from the culvert

Stratford 41788

Impact Area C (west of US 3)- permanent channel



Impact Area C (west of US 3)- permanent channel

Impact Area D (west of US 3)- permanent bank & Impact Area C (west of US 3)- permanent channel

Impact Area D (west of US 3)- permanent bank & Impact Area C (west of US 3)- permanent channel

Impact Area E (west of US 3)- permanent wetland (Palustrine emergent)

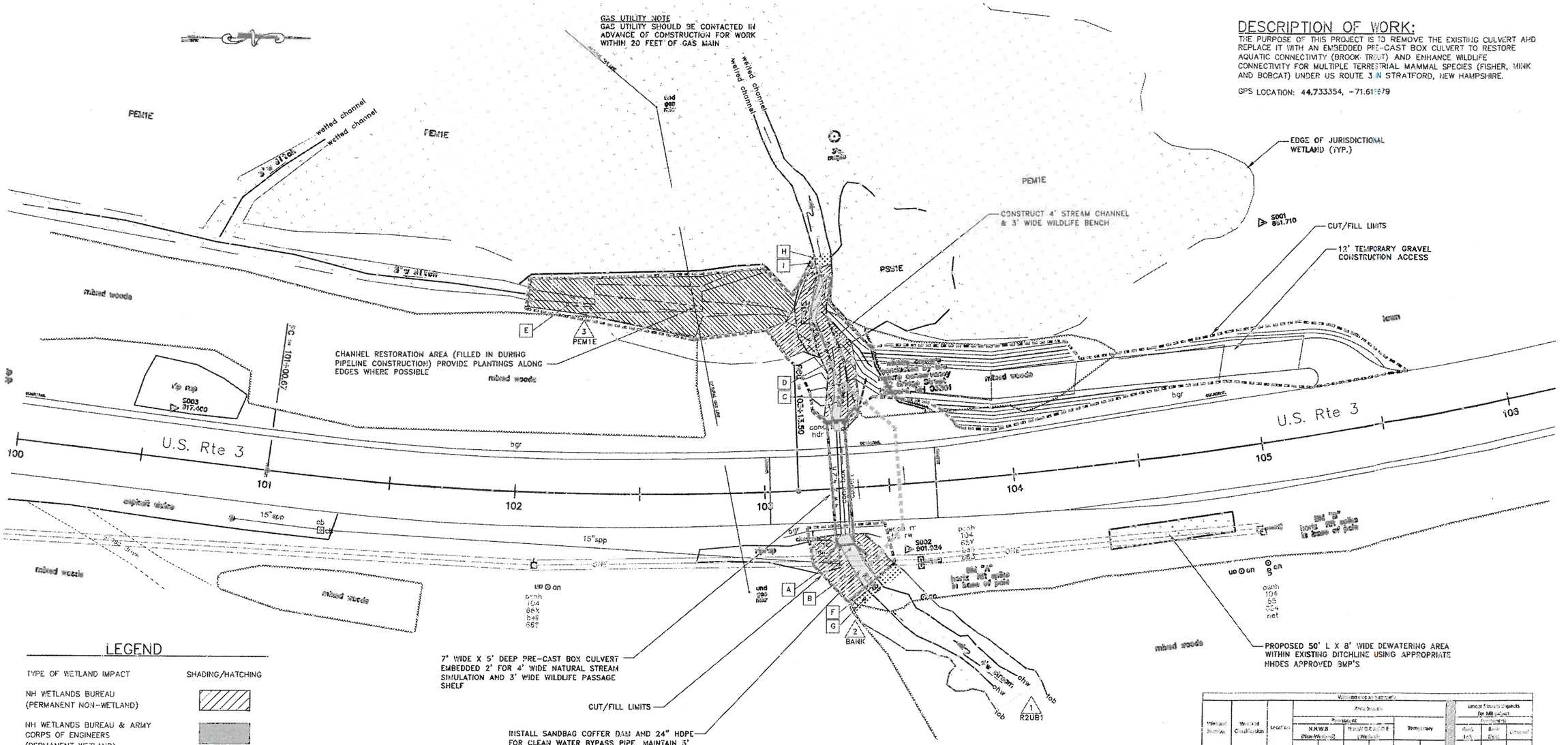
Impact Area H (west of US 3)- temporary channel & Impact Area I (west of US 3)- temporary bank

GAS UTILITY NOTE
GAS UTILITY SHOULD BE CONTACTED IN ADVANCE OF CONSTRUCTION FOR WORK WITHIN 20 FEET OF GAS MAIN

## DESCRIPTION OF WORK:

THE PURPOSE OF THIS PROJECT IS TO REMOVE THE EXISTING CULVERT AND REPLACE IT WITH AN EMBEDDED PRE-CAST BOX CULVERT TO RESTORE AQUATIC CONNECTIVITY (BROOK TROUT) AND ENHANCE WILDLIFE CONNECTIVITY FOR MULTIPLE TERRESTRIAL MAMMAL SPECIES (FISHER, MINK AND BOBCAT) UNDER US ROUTE 3 IN STRATFORD, NEW HAMPSHIRE.

GPS LOCATION: 44.733354, -71.618679




## LEGEND

| TYPE OF WETLAND IMPACT | SHADING/HATCHING |
|---|---|
| NH WETLANDS BUREAU (PERMANENT NON-WETLAND) | |
| NH WETLANDS BUREAU & ARMY CORPS OF ENGINEERS (PERMANENT WETLAND) | |
| TEMPORARY IMPACTS | |

- WETLAND DESIGNATION NUMBER
- WETLAND IMPACT LOCATION
- WETLAND MITIGATION AREA
- MITIGATION

| Wetland Number | Wetland Classification | Location | Wetlands and Waterways Area Impacts (sf) | | | | | | Linear Stream Impacts for NH Wetlands (LF) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Permanent | | | | Temporary | | Bank | Bottom | 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 | R2UB1 | A | - | - | 130 | 98 | - | - | 25 | 25 | 50 |
| 2 | BANK | B | 415 | 90 | - | - | - | - | 45 | 34 | 62 |
| 3 | PEM1E | C | - | - | 430 | 140 | - | - | 84 | 84 | 168 |
| 4 | BANK | D | 671 | 94 | - | - | - | - | 36 | 36 | 72 |
| 5 | PEM1E | E | - | - | 1000 | 85 | - | - | 20 | 21 | 42 |
| 1 | R2UB1 | F | - | - | - | - | 10 | 24 | 3 | 3 | 6 |
| 2 | BANK | G | - | - | - | - | 83 | 19 | 11 | 11 | 21 |
| 1 | R2UB1 | H | - | - | - | - | 10 | 16 | 5 | 5 | 10 |
| 2 | BANK | I | - | - | - | - | 59 | 10 | 11 | 5 | 16 |
| | TOTAL | | 1086 | 184 | 2473 | 323 | 162 | 69 | 196 | 146 | 396 |

| Wetland Number | Wetland Classification Code |
|---|---|
| R2UB2 | Riverine, Lower Perennial, Unconsolidated Bottom, Cobble-Gravel Joint |
| PEM1E | Palustrine, Emergent, Persistent, Seasonally Flooded, Excavated |

Permanent Impacts: 3,201 + 2,253 = 5,453 SF
Temporary Impacts: 162 SF
Total Impacts: 5,615 + 162 = 5,777 SF

PLAN REFERENCE:
1. SURVEY COMPLETED BY NHDOT ON JUNE 26, 2018 FOR NHDOT PROJECT NO. 41788.
2. WETLANDS MAPPED BY MATT URBAN & SARAH LARGE JUNE 2018.
3. RIGHT OF WAY LIMITS FROM AS-BUILT PLANS FA-221(1) 1938 AND P-2421 1955.

0 10 20 40
SCALE IN FEET


PROJECT CONTACT:
JAMES MCMAHON III, P.E.
ASSISTANT DISTRICT ENGINEER
DISTRICT 1 MAINTENANCE
(603) 788-4641

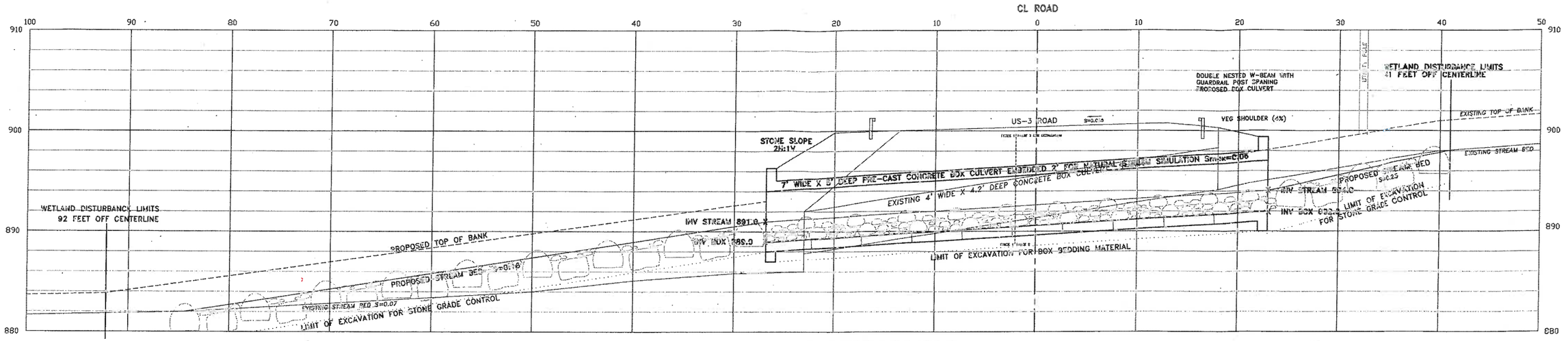
STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY MAINTENANCE
DISTRICT ONE
641 MAIN STREET, LANCASTER, NEW HAMPSHIRE 03584
TEL:(603)788-4641 FAX:(603)788-4260


# 41788 STRATFORD
## NFWF US-3 CULVERT REPLACEMENT

STRATFORD, NEW HAMPSHIRE

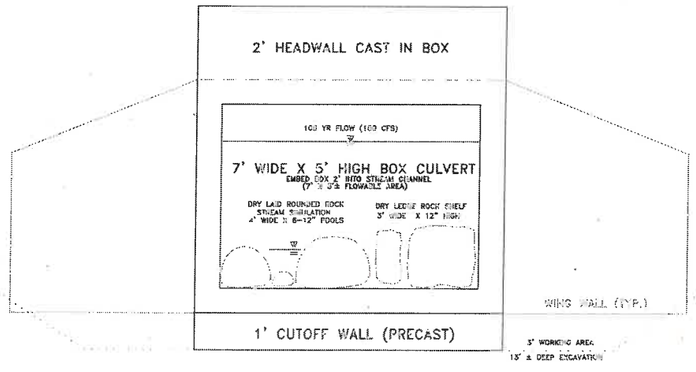
OVERALL SITE PLAN

| | |
|---|---|
| SURVEYED BY: | NHDOT |
| WETLANDS BY: | NHDOT |
| DRAWN BY: | JFM |
| CHECKED BY: | PLD |
| SCALE: | AS NOTED |
| DATE: | 10/27/18 |
| OVERALL SITE PLAN | |




## CULVERT & STREAM RESTORATION PROFILE

HORIZONTAL SCALE: 1"=5'
VERTICAL SCALE: 1"=5'




## BOX CULVERT

SCALE: 1"=2'

## CULVERT INSTALLATION NOTES:

1. NO VEHICLES INCLUDING CONSTRUCTION EQUIPMENT SHALL BE DRIVEN OVER THE PIPE UNTIL THE MINIMUM DEPTH OF COVER HAS BEEN PLACED.
2. THE CONTRACTOR SHALL NOT PLACE BEDDING MATERIAL UNTIL THE ENGINEER HAS INSPECTED THE FOUNDATION/UNDISTURBED EARTH. REMOVE ROCK OR OTHER UNYIELDING FOUNDATIONS MATERIAL AS NECESSARY TO PLACE BEDDING TO MINIMUM THICKNESS. OVER-EXCAVATE UNSUITABLE FOUNDATION MATERIAL SUCH AS SOFT, SPRINGY, ORGANIC, OR OTHERWISE EXCESSIVELY YIELDING MATERIAL TO A DEPTH OF AT LEAST 12" BELOW BOTTOM OF BEDDING AND REPLACE WITH SUITABLE MATERIAL PRIOR TO PLACEMENT OF BEDDING.
3. PLACE & COMPACT CULVERT BEDDING MATERIAL. BEDDING MATERIAL SHALL MEET NHDOT STRUCUTRAL FILL ITEM NO. 508. PEA GRAVEL (3/8") MAY BE USED FOR THE TOP 2" OF CONSOLIDATED STONE TO ASSIST FINISH GRADING OF BEDDING MATERIAL.
4. SET BOX CULVERT SECTIONS AND WING WALLS AT THE DOWNSTREAM END OF THE CULVERT AND WORK TOWARDS THE UPSTREAM END OF THE CULVERT.
5. PIPE BACKFILL MATERIAL SHALL MEET THE REQUIREMENT FOR PIPE BEDDING MATERIAL WITHIN 2 FEET OF THE CULVERT, INCLUDING ON TOP OF THE PIPE. THE REMAINDER OF THE TRENCH SHALL BE FILLED AND COMPACTED WITH THE EXISTING STOCKPILED ROAD BASE MATERIALS REMOVED FROM THE EXCAVATION, EXCLUDING ANY UNSUITABLE MATERIALS.
6. PLACE PIPE BACKFILL EQUALLY ON BOTH SIDES OF CULVERT AND UP TO THE ELEVATION OF THE CULVERT SPAN. PLACE BACKFILL MATERIAL IN 6-8" LIFTS COMPACTED WITH A VIBRATORY PLATE COMPACTOR TO 95% STANDARD PROCTOR DENSITY. HAND TAMP OR USE VIBRATORY "JUMPING JACK" IN AREAS WHERE THE COMPACTION EQUIPMENT CANNOT REACH.
7. UNSUITABLE MATERIAL INCLUDES, BUT NOT LIMITED TO, ORGANIC MATERIAL, FROZEN LUMPS, SOILS SUCH AS PEAT OR BOG, OVERSATURATED SILTS, CLAYS OR SANDS WHOSE WATER CONTENT PREVENTS SPECIFIED COMPACTION, AND STONE OR ROCK FRAGMENTS GREATER THAN 3 INCHES.

## DRAINAGE CALCULATIONS:

CULERT DRAINAGE AREA: 231 ACRES

TIER 2 CROSSING PER NHDES STREAM CROSSING RULES

DESIGN FOR 100-YEAR FLOOD EVENT FLOOD:

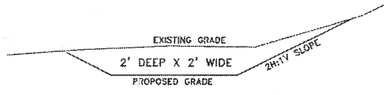
| METHOD | 2-YR | 50-YR | 100-YR | |
|---|---|---|---|---|
| #1 USGS STREAMSTATS | 17 | 67 | 82 | CFS |
| #2 TR-55 (SFS) | 10 | 140 | 180 | CFS <--USE |
| #3 RATIONAL METHOD* | N/A | 140 | N/A | CFS |

*NOTE: DRAINAGE AREA EXCEEDS METHOD LIMITATION

NO HISTORY OF FLOODING OVER ROAD (US-3) AT THIS LOCAITON.

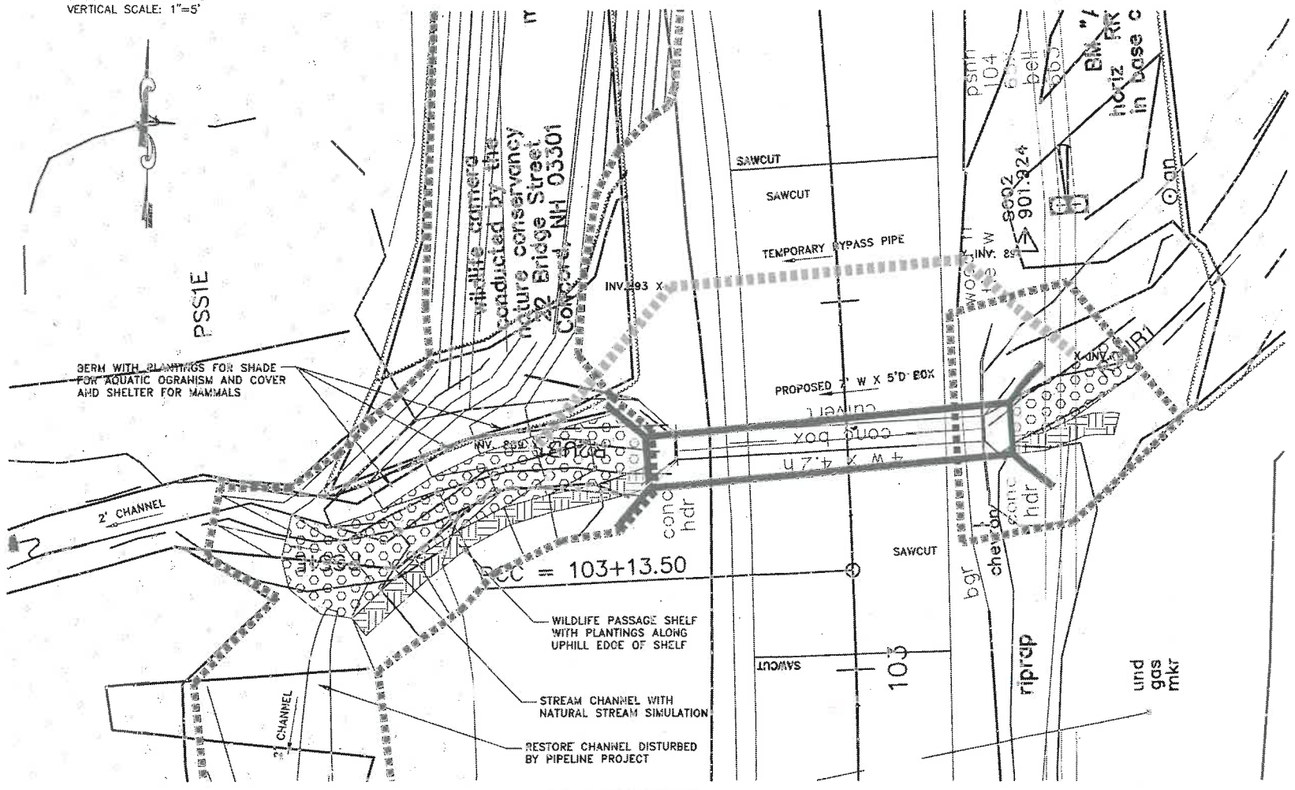
OVERTOPPING FLOW FOR EXISTING 4'W X4.2'H BOX CULVERT: 183 CFS

OVERTOPPING FLOW FOR PROPOSED 7'WX5'H BOX CULVERT: 305 CFS




## DITCH/CHANNEL RESTORATION

NOT TO SCALE




## BOX CULVERT

SCALE: 1"=10'

PROJECT CONTACT:
JAMES MCMAHON III, P.E.
ASSISTANT DISTRICT ENGINEER
DISTRICT 1 MAINTENANCE
(603) 788-4641

STATE OF NEW HAMPSHIRE
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY MAINTENANCE
DISTRICT ONE
641 MAIN STREET, LANCASTER, NEW HAMPSHIRE 03584
TEL: (603)788-4641 FAX: (603)788-4260

# 41788 STRATFORD
## NFWF US-3 CULVERT REPLACEMENT

STRATFORD, NEW HAMPSHIRE

CULVERT & STREAM RESTORATION PROFILE

| | |
|---|---|
| SURVEYED BY: | NHDOT |
| WETLANDS BY: | NHDOT |
| DRAWN BY: | JFM |
| CHECKED BY: | PLB |
| SCALE: | AS NOTED |
| DATE: | 10/27/18 |

CULVERT & STREAM RESTORATION PROFILE
SHEET 2 OF 3

## CONSTRUCTION SEQUENCE:

1. CONTACT DIGSAFE AND UTILITY COMPANIES FOR MARKING ANY UTILITIES WITHIN THE WORK AREA. STOCKPILE MATERIALS AT THE NEAREST PATROL SHED.
2. INSTALL DEMARCATION FOR TREE CLEARING AND CONSTRUCTION LIMITS.
3. PROVIDE PUBLIC NOTICE AND SIGNAGE. SAWCUT PAVEMENT AT EXCAVATION LIMITS.
4. INSTALL DEWATERING AREA, DOWNSTREAM PERMITER CONTROL, AND ADDITIONAL EROSION CONTROLS MEETING NHDES AND NHDOT REQUIREMENTS, AS DIRECTED BY THE ENGINEER.
5. EXCAVATE/SHAPE STREAM CHANNELS AT CULVERT OUTLET. PROVIDE TEMPORARY 24" PIPE CROSSING OR TIMBER MAT SPANNING EXISTING CHANNEL TO CROSS DOWNSTREAM OF EXISTING BOX CULVERT. USE CAUTION WHEN EXCAVATING NEAR THE PROPANE LINE. UTILITY COMPANY SHALL BE ON SITE TO LOCATE AND EXPOSE PIPE.
6. INSTALL STREAM CHANNEL STONES AND STABILIZE OUTLET CHANNEL AS INDICATED ON THE PLAN. SEE CLEAN WATER BYPASS & DIVERSION NOTES.
7. INSTALL TEMPORARY BYPASS/DIVERSION MEASURES, STARTING AT OUTLET AND WORKING UPSTREAM.
8. REMOVE GUARDRAIL & INSTALL CONCRETE BARRIERS ALONG TOP OF FILL SLOPE MEETING NHDOT REQUIREMENTS.
9. INSTALL 24" PIPE AT INLET OF EXISTING BOX CULVERT TO 25' OFF CENTERLINE (MIN) AND INSTALL TEMPORARY ROAD BASE MATERIALS FOR ONE-WAY TRAFFIC BYPASS ON THE NORTHBOUND SIDE OF US-3. PROVIDE ONE-WAY ALTERNATING TRAFFIC WITH CONCRETE BARRIERS, PORTABLE TRAFFIC SIGNALS, PORTABLE LIGHTING AND APPROPRIATE SIGNAGE IN ADVANCE OF THE PROJECT AREA.
10. REMOVE THE LOWER HALF OF THE EXISTING CULVERT, WHILE PROVIDING ENOUGH ROOM FOR DETOUR ON UPPER HALF. EXCAVATE A MINIMUM OF 3' BEYOND NEW CULVERT DIMENSION WITH 1.5H:1V SLOPE.
11. PREPARE CULVERT BEDDING MATERIAL TO LIMITS OF EXCAVATION. EXCAVATE FOR CUTOFF WALLS AND INSTALL PRE-CAST CUTOFF WALL.
12. SET WING WALLS AND BOX CULVERT SECTION(S). PLACE CULVERT INFILL MATERIAL (NATURAL STREAM SIMULATION) INSIDE EACH SET SECTION BEFORE PROCEEDING TO THE NEXT UPSTREAM SECTION. CARE SHOULD BE TAKEN NOT TO DAMAGE THE CULVERT OR WEIRS DURING PLACEMENT.
13. BACKFILL SIDES AND TOP OF CULVERT WITH GRANULAR BACKFILL. PROVIDE 12" CRUSHED MILLINGS ON TOP OF STRUCTURAL FILL FOR TEMPORARY TRAFFIC DETOUR SURFACE TREATMENT.
14. DETOUR TRAFFIC ONTO NEW CULVERT SECTION, REMOVE UPPER HALF OF EXISTING CULVERT, AND INSTALL UPPER CULVERT SECTIONS WITH CULVERT INFILL (NATURAL STREAM SIMULATION) MATERIAL.
15. RESTORE USTREAM AND DOWNSTREAM CHANNELS.
16. REMOVE TEMPORARY DIVERSION/BYPASS PIPE.
17. INSTALL ROAD BASE MATERIALS AND SELECT MATERIALS TO FINISH GRADES AND PLACEMENT OF PAVEMENT REQUIREMENTS.
18. THE NHDOT DISTRICT ONE ENGINEER OR HIS REPRESENTATIVE MAY MODIFY THE PROPOSED GRADING IF EXISTING FIELD CONDITIONS HAVE SIGNIFICANTLY CHANGED OR UNEXPECTED CONDITIONS ARISE (I.E. BEDROCK, LEDGE, OTHER OBSTRUCTIONS, ETC).

## CONSTRUCTION NOTES:

1. ALL WORK MUST BE DONE OUTSIDE OF FLOWING WATER TO MINIMIZE THE POTENTIAL FOR THE RELEASE OR DISCHARGE OF TURBID OR SEDIMENT LADEN WATER. TO THE EXTENT PRACTICAL, CONSTRUCTION ACTIVITIES SHALL BE DONE IN THE DRY OR ISOLATED FROM THE FLOWING WATER.
2. THE TEMPORARY BYPASS/DIVERSION DETAIL PROVIDES A GENERAL DESCRIPTION FOR A SUITABLE METHOD OF CONTROLLING WATER DURING CONSTRUCTION.
3. SITE CONDITIONS MAY DIFFER FROM THOSE SHOWN ON THE DRAWINGS DUE TO SEASONAL WATER LEVELS, SEDIMENT DEPOSITION, AND EROSION SINCE THE TIME OF THE SURVEY.
4. LOCATE STAGING AREAS AND WORKING PLATFORMS AWAY FROM SENSITIVE AREAS INCLUDING WETLANDS AND STREAM BUFFERS.
5. ANY TREES CUT OUTSIDE THE DISTURBED AREA AND WITHIN 50 FEET OF THE STREAM, SHALL BE CUT AS FLUSH AS POSSIBLE TO THE EXISTING GRADE. ANY STUMPS WITHIN 20 FEET OF THE EDGE OF PAVEMENT SHALL BE REMOVED.
6. CONTRACTOR SHALL LAY OUT THE CONSTRUCTION BASELINE AND STAKE OUT THE CLEARING LIMITS AND DISTURBANCE LIMITS OF PROPOSED WORK PRIOR TO CONSTRUCTION.
7. NO CHANNEL DISTURBANCE, INCLUDING MOVEMENT OF EQUIPMENT, WILL BE ALLOWED OUTSIDE THE CONSTRUCTION LIMITS IDENTIFIED ON THE PLAN. WORKING OUTSIDE THESE LIMITS MAY REQUIRE ADDITIONAL PERMITTING REQUIREMENTS AND/OR LANDOWNER PERMISSION.

## CLEAN WATER BYPASS & DIVERSION NOTES:

1. INSTALL THE TEMPORARY BYPASS PIPE AT LEAST 20 FEET FROM THE OUTER EDGE OF THE PROPOSED CULVERT OR WING WALL, OR 1.5H:1V FROM THE BOTTOM OF THE CUVLERT EXCAVATION.
2. TEMPORARILY STABILIZE ANY DISTURBED AREAS AND INSTALL SILT FENCE OR OTHER APPROVED PERIMETER CONTROL ALONG THE DOWNSTREAM EDGES. PROVIDE TWO LAYERS OF PERIMETER CONTROL ALONG STREAM BANKS AND/OR JURISDICTIONAL WETLAND BOUNDARY.
3. INSTALL A SANDBAG COFFER DAM UPSTREAM OF THE EXISTING CULVERT.
4. PIPE OR PUMP WATER FROM THE COFFER DAM TO THE TEMPORARY BYPASS PIPE LOCATED DOWNGRADIENT.
5. INSPECT DIVERSION PIPE AND COFFER DAM DAILY AND AFTER RAIN EVENTS GREATER THAN 1".
6. AFTER THE NEW CULVERT IS INSTALLED AND THE STREAM AND BANKS RESTORED, REMOVE THE COFFER DAM AND TEMPORARY BYPASS PIPE.
7. REMOVE SILT FENCE OR OTHER APPROVED PERIMETER CONTROL WHEN THE DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE ENGINEER.

## EROSION & SEDIMENT CONTROL NOTES:

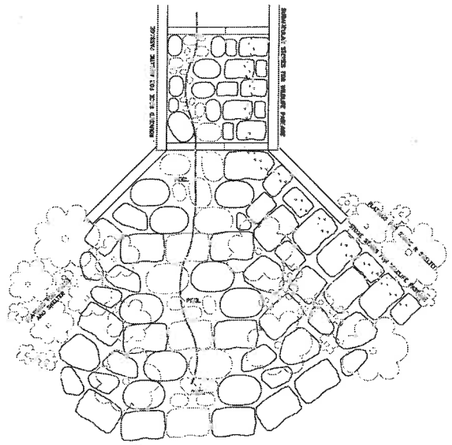
1. EROSION AND SEDIMENT CONTROL MEASURES MEETING NHDES AND NHDOT REQUIREMENTS ARE REQUIRED THROUGH THE CONSTRUCTION PERIOD AND UNTIL THE PROJECT IS COMPLETE AND THE DISTURBED AREAS ARE STABILIZED TO THE SATISFACTION OF THE ENGINEER.
2. THE CONTRACTOR SHOULD REVIEW THE WEATHER FORECAST CLOSELY PRIOR TO SCHEDULING WORK ACTIVITIES TO PREVENT WORKING IN THE RAIN.
3. DISTURBED AREAS WITH THE POTENTIAL TO DISCHARGE SEDIMENT LADEN WATER INTO STREAM, JURISDICTIONAL WETLANDS OR OFF THE SITE MUST BE PROTECTED WITH TEMPORARY EROSION CONTROL MEASURES, SUCH AS SILT FENCE OR OTHER APPROVED PERIMETER CONTROL AT THE END OF EACH WORK DAY.
4. ALL MATERIAL STOCKPILE AREAS SHALL BE SURROUNDED BY SILT FENCE AT THE END OF EACH DAY AND PRIOR TO A FORCASTED PRECIPITATION EVENT.
5. THE EXISTING VEGETATION IS TO REMAIN UNDISTURBED TO THE EXTENT POSSIBLE. NO TREES ARE TO BE REMOVED FROM AREAS OUTSIDE THE CONSTRUCTION LIMITS. STUMPS SHALL BE CUT FLUSH WITHIN 50 FEET OF THE STREAM OR WETLAND, UNLESS WITHIN CULVERT REPLACEMENT OR STREAM CHANNEL RESTORATION LIMITS IN WHICH CASE STUMPS AND ROOT MASS SHALL BE REMOVED COMPLETELY.
6. ALL SLOPES AND DISTURBED AREAS SHALL BE SCARIFIED TO A DEPTH OF 1-2 INCHES PARALLEL TO CONTOURS. DO NOT SMOOTH FINISHED SURFACE PRIOR TO SEEDING AND MULCHING.
7. INSTALLATION OF SILT FENCE, OR OTHER ENGINEER APPROVED PERIMETER CONTROL, SHALL BE COMPLETED PRIOR TO THE START OF ANY EARTH WORK IN ANY GIVEN AREA. SILT FENCE SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
8. SILT FENCES SHALL BE KEPT CLEAN DURING CONSTRUCTION AND REMOVE WHEN ALL SLOPES HAVE MORE THAN 85% COVERAGE BY HEALTHY VEGETATION. EROSION CONTROL MEASURES MUST BE INSPECTED ON A WEEKLY BASIS AND AFTER EVERY RAINFALL.

## RESTORATION OF SURFACES:

1. AFTER WORK IS COMPLETE, THE CONSTRUCTION/SITE ACCESS, CONSTRUCTION VEHICLE PARKING, STOCKPILE AND STAGING AREAS SHALL BE STABILIZED AND RESTORED TO PRE-CONSTRUCTION CONDITION. RESTORATION MAY INCLUDE INSTALLING TOPSOIL, GRASS SEED, FERTILIZER AND MULCH TO AFFECTED AREA.
2. ALL DISTURBED AREAS TO BE REVEGETATED MUST BE SEEDED AND PROTECTED FROM EROSION AS SOON AS PRACTICAL AFTER ACHIEVING FINISH GRADE.
3. INVASIVE OR NOXIOUS SPECIES SHOULD NOT BE USED AND SHOULD BE DISPOSED OF AS REQUIRED BY NHDES REQUIREMENTS.
4. PROTECT ALL DISTURBED AREAS SEEDED (OR HYDROSEEDED, USING ENGINEER APPROVED METHOD AND MIX) WITH EROSION CONTROL FABRIC OR BLANKETS ON SLOPES GREATER THAN 3H:1V. LOOSE MULCH IS ACCEPTABLE ON DISTURBED SLOPES FLATTER THAN 3H:1V.

## DEWATERING NOTES:

1. AREAS REQUIRING DEWATERING WITHIN THE CUVLERT TRENCH EXCAVATION SHALL BE DISCHARGED TO THE DEWATERING PAD LOCATION SHOWN ON THE SITE PLAN. ANY SATURATED SOLIDS SHOULD BE TRANSPORTED TO THE NEAREST PATROL SHED GRAVEL STOCKPILE AREA FOR DEWATERING.
2. THE DEWATERING AREA SHOULD BE NO CLOSER THAN 50 FEET FROM A JURISDICTIONAL WETLAND OR SURFACE WATER WITHOUT ENGINEER AND NHDES APPROVAL. ALL DOWNSTREAM SURFACE WATERS AND WETLANDS SHALL BE PROTECTED.
3. A STONE SUMP INTAKE SHALL BE CONSTRUCTED IN AREAS WHERE THE WATER TABLE MUST BE LOWERED TO INSTALL PIPE BEDDING OR STREAMBED GRADE CONTROL STRUCTURES.
4. NO SEDIMENT LAIDEN WATERS SHOULD BE DISCHARGED TO THE TEMPORARY WATER BYPASS PIPE OR TO THE STABILIZED DOWNSTREAM CHANNEL.
5. EXISTING STREAMBANK MATERIALS EXCAVATED FOR REUSE WITHIN THE CONSTRUCTED CHANNEL OR TO BE USED FOR CULVERT INFILL SHALL BE STOCKPILED AT THE PATROL SHED UNTIL DRY.




SIMULATED STREAM BED & DRY SHELF DETAIL

## STREAMBED MATERIAL NOTES:

1. THE STREAMBED MATERIAL IS TO BE PLACED IMMEDIATELY UPSTREAM AND DOWNSTREAM OF CULVERT, AS SHOWN ON THE DESIGN PLANS. ALL EFFORTS SHALL BE MADE TO REPLICATE THE EXISTING STREAM WITHIN THE CULVERT AND ADJACENT TO THE WORK AREA.
2. THE STREAMBED MATERIAL SHALL CONSIST OF NATIVE COBBLES, BOULDERS AND STONES MIXED WITH EXISTING STREAM BED MATERIAL. ANGULAR, SUBANGULAR, OR SUB-ROUNDED ROCK (FLAT-BOTTOMED ROCK) IS PREFERRED OVER ROUND ROCK, MEETING THE FOLLOWING SPECIFICATIONS:

2.1. BOULDERS AND STONES 1.5' TO 3' DIAMETER ROCKS SHALL BE PLACED AS SHOWN ON PLANS AND DETAILS.

2.2. COBBLES, BOULDERS AND STONES 3" TO 18" DIAMETER.

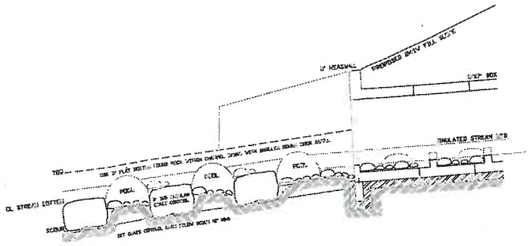
| STONE SIZE | %PASSING BY WEIGHT |
|---|---|
| 18" | 60% |
| 6" | 30% |
| 4" | 5% |

2.3. COBBLES AND GRAVEL 2" AND UNDER.

| STONE SIZE | %PASSING BY WEIGHT |
|---|---|
| 2" | 95% |
| 3/4" | 20-25% |
| #4 | 10-15% |
| #8 | 0-5% |

2.4 CRUSHED OR PROCESSED STONE SHALL NOT BE USED WITHIN THE STREAM CHANNEL UNDER BANK FULL CONDITIONS (2-YR RECURRANCE FLOWS).

3. THE EXISTING STREAM BED MATERIAL SHALL BE REMOVED, DRAINED AND STOCKPILED FOR REUSE.
4. STONE MATERIALS UNDER 18" SHALL BE PRE-BLENDED OUTSIDE THE PROJECT AREA AND MIXED AT A RATIO OF 3" TO 18" AT 55% AND LESS THAN 2" AT 45% RESPECTIVELY. THE PRE-BLENDING SHALL BE DONE IN A WAY THAT WILL PREVENT THE STREAMBED MIX FROM BEING CONTAMINATED BY WORK SITE OR SELECT ROAD BASE & CULVERT BEDDING MATERIALS.
5. STONE MATERIALS OVER 18" SHALL BE PLACED DURING THE PLACEMENT OF THE BLENDED MATERIALS UNDER 18". THE LARGER STONES SHALL BE PLACED FIRST IN A RANDOM FASHION WITHIN THE LIMITS SHOWN ON THE PLAN AND WITHIN THE CROSS SECTION SHOWN ON THE PLANS.
6. ALL STREAMBED MATERIAL SHALL BE PLACED AND LOCKED TIGHTLY TOGETHER TO PREVENT MOVEMENT DURING HIGH FLOWS.
7. STONES WITHIN THE DOWNSTREAM END OF THE CULVERT SHALL BE PLACED RANDOMLY BUT WITH A MINIMUM DISTANCE OF 5 FEET AND MAXIMUM DISTANCE OF 15 FEET APART. THE LARGER STONES SHALL BE SET WITHIN THE STREAM CHANNEL AT LEAST 1' EXPOSED ABOVE THE FINISHED STREAM PROFILE.
8. THE LARGER STONES SET WITHIN 10' OF THE CULVERT SHALL BE SET AS FLUSH AS POSSIBLE WITH THE STREAM PROFILE AND IN NO HIGHER THAN 6" ABOVE THE FINISHED STREAM PROFILE.
9. NHDOT RIPRAP CLASS V (18" NOMINAL, 24" MAX) SHALL BE USED FOR SLOPE STABILIZATION AT THE CORNER OF THE CULVERTS AND OTHER AREAS OUTSIDE THE STREAM CHANNEL. SEE PLANS FOR STONE SIZING.
10. SMALL NATIVE TREES (20%), SHRUBS (40%), AND WILDFLOWERS (20%) SHALL BE PLANTED ALONG THE EDGES OF THE CONSTRUCTED STREAM BED AND BETWEEN STONES WHERE POSSIBLE TO PROVIDE SHADING FOR STREAMBED AND COVER FOR WILDLIFE PASSAGE.




SIMULATED STREAM BED WITHIN BOX CULVERT DETAIL

## CULVERT INFILL MATERIAL NOTES:

1. THE INTENT OF THE CULVERT INFILL/EMBEDMENT MATERIAL IS TO CREATE A NATURAL STREAM CHANNEL WITHIN THE CULVERT THAT SIMULATES THE NEARBY CHANNEL TO ENCOURAGE FISH PASSAGE AND RESIST SCOUR DURING LARGER SEASONAL RAIN EVENTS.
2. CONTRACTOR SHALL TAKE PRECAUTIONS DURING PLACEMENT OF EMBEDMENT MATERIAL TO AVOID DAMAGE OR DEFORMATION TO THE CULVERT.
3. CONTRACTOR SHALL BALANCE THE ELEVATION OF THE PRECAST WEIR OF THE PIPE WITH THE ELEVATION OF EMBEDMENT MATERIAL PLACED INSIDE AS NEEDED TO PREVENT DAMAGE.
4. A 3-INCH CUSHION OF EXISTING STREAMBED MATERIAL IS RECOMMENDED TO PROTECT THE PIPE FROM DAMAGE DUE TO PLACEMENT OF COBBLES AND SMALL BOULDERS.
5. EMBEDMENT MATERIAL SHALL CONSIST OF WELL-GRADED, 12" MINUS, FLAT BOTTOM, NATURAL RIVER MATERIAL.

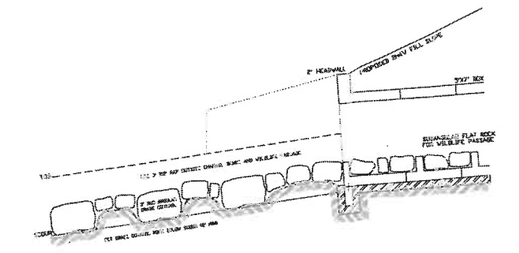
COBBLES, BOULDERS AND SMALL STONES 3" TO 12" DIAMETER.

| STONE SIZE | %PASSING BY WEIGHT |
|---|---|
| 12" | 80% |
| 6" | 30% |
| 4" | 5% |

2.3. COBBLES AND GRAVEL 2" AND UNDER.

| STONE SIZE | %PASSING BY WEIGHT |
|---|---|
| 2" | 95% |
| 3/4" | 20-25% |
| #4 | 10-15% |
| #8 | 0-5% |

6. COBBLES, BOULDERS & SMALL STONES MEASURING LESS THAN 12" SHALL BE DISTRIBUTED THROUGHOUT THE CULVERT LENGTH, FLATEST SIDE DOWN, WITH THE REMAINING EMBEDMENT MATERIAL PLACED AROUND THEM. THE LOWEST POINT OF THE CONSTRUCTED STREAM BED SHALL BE OFFSET BETWEEN THE WEIRS 12-18" EITHER SIDE OF THE BOX AND BETWEEN THE SMALL POOLS (6" POOL) TO CREATE A SINUOUS (CURVE-LIKE) ALIGNMENT BETWEEN THE V-NOTCH WEIRS CAST INTO THE BOTTOM OF THE CULVERT.
7. THE EMBEDMENT MATERIAL SHALL BE PLACED SUCH THAT THERE ARE NO ABRUPT VERTICAL DROPS IN EXCESS OF 3 INCHES, AND SO THAT THE FLOW OF WATER IS GENERAL CONCENTRATED IN THE CENTER OF THE CONSTRUCTED CHANNEL RATHER THAN DISPERSED ACROSS THE ENTIRE WIDTH OF THE CHANNEL.




TERRESTRIAL PASSAGE DETAIL

## WILDLIFE PASSAGE NOTES:

1. THE MATERIALS USED FOR THE DRY LEDGE PASSAGE IS TO BE PLACED WITHIN THE CULVERT AND IMMEDIATELY UPSTREAM AND DOWNSTREAM OF CULVERT, AS SHOWN ON THE DESIGN PLANS. ALL EFFORTS SHALL BE MADE TO PROVIDE A SAFE & TRAVERSABLE CROSSING WITHIN THE CULVERT AND ADJACENT TO THE WORK AREA FOR TERRESTRIAL MAMMALS SUCH AS FISHER, MINK AND BOBCAT.
2. THE DRY LEDGE/STONE MATERIAL SHALL CONSIST OF RELATIVELY FLAT ROCK MEASURING 12" H X 18" W X 24" L IN SIZE. STONE SHALL HAVE A TOLERANCE OF 3" IN HEIGHT, BUT CAN VARY IN 12" IN WIDTH AND LENGTH ONLY IN SIZE WITHIN THE CHANNEL. NATIVE SUBANGULAR ROCK IS PREFERRED OVER ROUND ROCK TO IMPROVE GRIPPING FOR MAMMALS.
3. ALL ROCK SHELF MATERIAL SHALL BE PLACED AND LOCKED TIGHTLY TOGETHER TO PREVENT MOVEMENT DURING HIGH FLOWS. THERE SHOULD BE NO MORE THAN A 12" DROP BETWEEN STONES.
4. THE LARGER STONES SET WITHIN THE CULVERT SHALL BE SET AS FLUSH AS POSSIBLE WITH THE STREAM PROFILE AND IN NO HIGHER THAN 6" ABOVE THE FINISHED STREAM PROFILE.
5. NHDOT RIPRAP SHALL BE USED FOR SLOPE STABILIZATION AT THE CORNER OF THE CULVERTS AND OTHER AREAS OUTSIDE THE STREAM CHANNEL. SEE PLANS FOR STONE SIZING.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# 41788 STRATFORD
## NFWF US-3 CULVERT REPLACEMENT

STRATFORD, NEW HAMPSHIRE

MISCELLANEOUS NOTES & DETAILS

| | |
|---|---|
| SURVEYED BY: | NHDOT |
| WETLANDS BY: | NHDOT |
| DRAWN BY: | JFM |
| CHECKED BY: | PLC |
| SCALE: | AS NOTED |
| DATE: | 10/27/18 |
| MISCELLANEOUS NOTES & DETAILS | SHEET 3 OF 3 |