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September 21, 2020

Ms. Penny Jaques
Conservation Chair
Shutesbury Conservation Commission
Shutesbury, MA 01072

RE: Nitsch Project #12396.1
Conservation Responses
Locks Pond Road NOI
Shutesbury, MA

Dear Ms. Jaques:

Nitsch Engineering has reviewed the Massachusetts Department of Environmental Protection's (MassDEP) comments on the Locks Pond Road Notice of Intent (NOI). Our responses to MassDEP's comment and enclosed plan set also reflect the discussion during the Shutesbury Conservation Hearing on September 3, 2020 and our site walk on September 11, 2020.

For clarity, the MassDEP comments are provided below and Nitsch Engineering's response to each comment is provided in **bold** font.

1. The Sawmill River is a Cold Water Fishery Resource. Preventing sediment from entering the water and maintaining and/or increasing shading of the water column is important to protecting this valuable resource. Coldwater streams and rivers are critical habitat for a variety of fish including rare (American Brook Lamprey, Longnose Sucker, Lake Chub) and recreationally-important (Brook Trout) species.

   Nitsch Response: The culvert replacement was designed to consider the vulnerabilities of cold-water fisheries by improving stream connectivity, implementing construction period erosion and sediment controls, and providing permanent stabilization measures. To maintain shading, all existing trees will be protected and maintained throughout the duration of the project. We have added a note to our plans to clarify this intent.

2. DEP guidance on dewatering activities will be provided in the file number notification email. During dewatering, aquatic organisms (fish, salamanders, crayfish, mussels) that may be stranded during dewatering should be preserved.

   Nitsch Response: The Dewatering Plan will be prepared by the Contractor prior to the start of construction; however, we have prepared the following general guidance as it relates to the dewatering process:

   - **Coordinate with the Town of Shutesbury (the Town) to lower the level of Lake Wyola in the weeks preceding construction, then restrict dam outflow to the minimum allowable;**
   - **Use sandbags as a temporary dam upstream of the culvert;**
   - **Use pumps and hose lines to divert the flow in the stream over the roadway embankment. The Contractor will be responsible for sizing the pumps and hoses;**
   - **Treat the pumped water prior to discharge back to the resource areas;**
   - **Use erosion and sedimentation controls at the discharge orifices of the pump hoses as necessary;**
   - **Salvage any sessile aquatic organisms (vertebrates, crayfish, freshwater mussels, etc.) stranded during dewatering and relocate downstream based on guidance from the Shutesbury Conservation Commission, Army Corp, and MassDEP; and**
   - **Prepare the streambed substrate including the low-flow thalweg prior to reestablishment of the flow through the culvert.**

Based on the anticipated low-flow conditions during the time of construction, we do not anticipate that the Contractor will use cofferdams or flume pipes for water control.

We will add notes to the plans and project specifications to require the Contractor to submit a formal dewatering plans which shall include at a minimum:

- **The primary method of water control, such as pumps and hose, diversions, cofferdams, flume pipes, etc.;**
- **The primary method used to dam or isolate the work area, such as sandbags, and their locations;**
- **The rating, type, and location of all pumps, and the intake and discharge positions of all hoses that shall be used;**
- **The treatment techniques for the pumped water prior to discharge back to the resource areas;**
- **The erosion and sedimentation controls at the discharge of pump hoses; and**
- **The salvage of any sessile aquatic organisms stranded during dewatering.**

3. The NOI report fails to include sufficient bankfull width information for determining compliance to the maximum extent practicable for the stream crossing replacement. What should be highlighted in the NOI is what is the existing average bankfull width primarily measured at various points downstream and then how the work complies with 310 CMR 10.53(8) which doesn't appear anywhere. Streamstats information on bankfull width did not appear to be included, and the commission should note that Streamstats calculated it at 32.8 feet due to the size of the watershed.

   Nitsch Response: Bankfull width calculations were performed in the upstream and downstream reaches of the stream as it relates to the culvert. The average upstream bankfull width is approximately 15.1 feet and the average downstream bankfull width (downstream of the existing scour hole) is 17.4 feet. It is important to note that the bankfull width as suggested by StreamStats does not appear to account for the controlled nature of the flow by the Lake Wyola dam, which has significantly impacted the flow regime of the stream located upstream of the culvert.

We have provided the table below to clarify how the proposed stream crossing meets the intent of the Massachusetts Stream Crossing Standards for replacement crossings.

Stream Crossing Standard	Existing Culvert	Proposed Culvert
Type of Crossing *Spans are strongly preferred, bridges are optimum*	Corrugated metal pipe Diameter = 10 feet Length = 61 feet	4-sided box culvert Dimensions = 9 feet by 10 feet Length = 44 feet
Embedment *All culvert should be embedded a minimum of 2 feet*	Not embedded	Embedded 2 feet *(Improvement)*
Crossing Span *Spans channel width a minimum of 1.2 x bankfull width (general) and has sufficient headroom to provide dry passage for wildlife*	0.5-0.57 x bankfull width Sufficient headroom for dry passage of wildlife	0.67 x bankfull width Sufficient headroom for dry passage of wildlife *(Improvement)*
Openness *Openness ratio of at least 0.82 feet (general) or 1.64 (optimum)*	1.28	1.59 *(Improvement)*
Substrate *Natural bottom substrate matching the upstream and downstream substrates. The substrate and design should resist displacement during floods and maintain an appropriate bottom during normal flows.*	Not embedded	Embedded with natural bottom substrate designed to resist displacement during various flow conditions *(Improvement)*
Water Depth and Velocity *Water depths and velocities are comparable to those found in the natural channel at a variety of flows*	Flow parameters including water depth and velocity are controlled by dam	The proposed culvert was designed to mimic existing hydraulic regime, including existing flow depths and velocities.

4. A worksheet to assist the parties in understanding compliance with 310 CMR 10.53(8) will be provided in the file number notification email. What is the cost difference between the proposed crossing and an open bottom box culvert of the proposed size and a larger size? This question and others the commission has the legal ability to ask. 310 CMR 10.53(8)(a) states that "If the project includes replacement of an existing non-tidal crossing, the applicant demonstrates to the satisfaction of the Issuing Authority that the crossing complies with the Massachusetts Stream Crossing Standards to the maximum extent practicable".

Nitsch Response: 310 CMR 10.53(8) is provided below for reference:

Any person proposing the replacement of an existing stream crossing shall demonstrate to the Issuing Authority that the impacts of the crossing have been avoided where possible, and when not possible have been minimized and that mitigation measures have been provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40. An applicant will be presumed to have made this showing if the project is designed as follows:

(a) If the project includes replacement of an existing non-tidal crossing, the applicant demonstrates to the satisfaction of the Issuing Authority that the crossing complies with the Massachusetts Stream Crossing Standards to the maximum extent practicable.

(b) If the project includes replacement of an existing tidal crossing that restricts tidal flow, the applicant demonstrates to the satisfaction of the Issuing Authority that tidal restriction will be eliminated to the maximum extent practicable.

This presumption may be rebutted by credible evidence from a competent source that the impacts of the project have not been avoided, minimized, or mitigated to the maximum extent practicable.

At a minimum, in evaluating the potential to comply with the standards to the maximum extent practicable the applicant shall consider site constraints in meeting the standard, undesirable effects of risk in meeting the standard and the environmental benefit of meeting the standard compared to the cost by evaluating the following:

- *The potential for downstream flooding;*
- *Upstream and downstream habitat (in-stream habitat, wetlands);*
- *Potential for erosion and head-cutting;*
- *Stream stability;*
- *Habitat fragmentation caused by the crossing;*
- *The amount of stream mileage made accessible by the improvements;*
- *Storm flow conveyance;*
- *Engineering design constraints specific to the crossing;*
- *Hydrologic constraints specific to the crossing;*
- *Impacts to wetlands that would occur by improving the crossing;*
- *Potential to affect property and infrastructure; and*
- *Cost of replacement.*

The culvert replacement was designed to meet the intent of 310 CMR 10.53(8) as summarized below and detailed within the Notice of Intent and Hydraulic Report:

The existing culvert is corroding and there is evidence of soil undermining the area around the culvert. The existing culvert provides a hydraulic connection between the Lake Wyola dam and downstream reaches of the Sawmill River, however the existing culvert is not designed to meet the Massachusetts Stream Crossing Standards for type of crossing, embedment, crossing span, or substrate.

Nitsch Engineering recommends replacing the existing culvert with a 9-foot by 10-foot concrete box culvert as part of the Locks Pond roadway improvement project. The culvert is proposed as a closed-bottom box culvert, with 2 feet embedded to provide a natural stream bed. The Massachusetts Stream Crossing Standards were met to the maximum extent practicable as outlined in the response to Comment #3.

The culvert will match the existing inverts of the upstream and downstream ends to reduce the need for grading within the disturbed area. The proposed concrete culvert will reconnect upstream and downstream habitat, stabilize the stream and reduce the potential for erosion and head-cutting, and will provide hydraulic performance like the existing culvert.

Specific to storm flow conveyance and hydrologic constraints, both the existing and proposed culverts are inlet controlled, which results in storage of runoff between the Lake Wyola dam and the culvert in the 25-year storm. As demonstrated in the Hydraulic Report, the proposed culvert meets MassDOT design criteria for rural major collector roadways and has sufficient capacity for the 25-year storm event with the allowable 2 feet of freeboard before the roadway surface.

It should be noted that alternative designs including a larger crossing span and an open-bottom culvert were also considered for the proposed culvert replacement:

- **A larger crossing span would increase the cost of the project and impact design complexity related to the structure, grading, and ownership of adjacent properties. The cost of a larger size depends of the length of the span, but these costs generally increase exponentially rather than linearly. For this project, it is likely that a larger span would result in a traditional bridge rather than a box culverts and would result in a cost increase of two to three (2 to 3) times the cost of the current proposed culvert. This project is not viable at that cost due to local and state funding constraints; and**

- **An open-bottom culvert would have increased structural footing requirements that impact the construction cost and schedule. Given the project's location on a major rural connector road, reducing community impacts and road closures are preferred. We estimate that a three-sided (3-sided) box culvert of the same size would be approximately 5% to 10% more expensive to account for the increased labor and construction time. The larger impact would be the increased time of construction and duration of the detour.**

5. No information was apparently included in the NOI showing a construction sequence, how the work will be done or time of year it will be done, clearly not done during high flow conditions. The commission needs to understand how the work will be done during the NOI process. A PCN is likely needed from the Army Corps of Engineers unless sufficient information is provided showing only an SV is needed.

Nitsch Response: We have provided a suggested construction sequence below. The Contractor shall prepare and submit a Construction Plan outlining their construction sequence for review and approval by the Engineer and Conservation Commission prior to mobilization.

Anticipated Construction Timeframe: August to September for lowest stream flow conditions. This timing will be finalized during conversations with the Town regarding drawdown of Lake Wyola and dam flow management.

1. **Pre-Mobilization**
   a. **Lower Lake Wyola in preparation for construction. Lowering the lake will allow construction to occur in the lowest stream flow condition and will create a buffer for any storms that occur during construction;**
   b. **Relocate overhead utility pole adjacent to existing culvert; and**
   c. **Preconstruction meeting with the Conservation Commission and Contractor.**

2. **Mobilize Equipment**
   a. **Mobilize to the site;**
   b. **Set up roadway detour;**
   c. **Install sediment and erosion control devices;**
   d. **Construct temporary staging areas; and**
   e. **Construct temporary water bypass system.**

3. **Demolition**
   a. **Demolition of existing wingwalls. Stone wingwall located in the BVW resource area shall be demolished by hand;**
   b. **Remove existing guardrail and excavate the roadway; and**
   c. **Excavate the roadway embankment and remove existing culvert.**

4. **Construction of New Culverts and Wingwalls**
   a. **Prepare and compact the subbase for the proposed culvert and wing wall footings;**
   b. **Deliver prefabricated culvert sections and wingwalls to the site;**
   c. **Lower and join precast culvert sections into place;**
   d. **Lower and join precast wingwalls into place;**
   e. **Install culvert headwalls and construct closure pours;**
   f. **Place natural streambed substrate along the bottom of the culvert;**
   g. **Place rip rap blanket in the outlet basin; and**
   h. **Remove temporary water bypass system.**

5. **Backfill and Regrade the Site**
   a. **Backfill around the culvert and wingwalls;**
   b. **Reseed the site and stabilize slopes;**
   c. **Reconstruct roadway with gravel and asphalt base; and**
   d. **Remove detour.**

6. **Opening of roadway**
   a. **Install roadway guardrails;**
   b. **Final paving and roadway markings;**
   c. **Site inspection and punch list; and**
   d. **Demobilize.**

7. **Remove Erosion Controls when the site has been reestablished and approval has been granted by the Conservation Commission.**

Based on the thresholds outlined in the Army Corps of Engineers Massachusetts General Permit #10, we anticipate that the project will be eligible for a Self Verification Form. We will consult with the Army Corps and the Wetland Scientist to obtain required approvals from Army Corps prior to the start of construction. If this coordination requires substantial plan changes, the Commission will be notified.

6. In order to provide appropriate water depths and velocities at a variety of flows and especially low flows it is necessary to reconstruct the streambed within the structure. It is important that a continuous thalweg (deepest portion of the channel) be maintained through the structure. When constructing the streambed special attention should be paid to the sizing and arrangement of materials within the structure.

   Nitsch Response: We have updated our details to reflect natural stream materials and placement such that a continuous thalweg will be maintained throughout the structure. The details will specify review and acceptance of the final stream construction by the Engineer, Wetland Scientist, and Conservation Commission.

7. The NOI notes that 25 s.f. of BVW will be lost in the work, no replication is proposed. Is the BVW to be lost in a fingerlike projection? The work is eligible to be reviewed as a limited project per 310 CMR 10.53(3)(i) at the discretion of the commission and to waive full compliance with the standards that cannot be met, however, the applicant must still attempt to comply.

   Nitsch Response: The wetland impact of 25 square feet was carried as a conservative estimate for temporary impacts to remove the existing stone wall that is located adjacent to the southern wetland boundary. During the site visit on September 11, 2020, we reviewed the proximity of stone wall to wetland line and determined that careful planning and construction management could avoid wetland impacts entirely. The plans have been updated to indicate hand removal of stone and installation of silt fence and straw bale at upgradient of the wetland boundary. We also note that new wetland is likely to be created by the new layout of the wingwalls and shortened culvert, which is a positive impact of the project.

8. The table of contents shows a stormwater report to be included under separate cover, but no copy was provided to MassDEP. If no new point source is proposed, then not subject to the stormwater standards.

   Nitsch Response: The reference to the "Stormwater Report" was a typo that should have read "Hydraulic Report." The Hydraulic Report, which documented the design of the replacement culvert, was provided with the Notice of Intent application.

Please let us know if you have further questions or comments.

Very truly yours,

Nitsch Engineering, Inc.

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Project Manager

MLC/JLJ/MMS/ajc

Enclosures: Revised Culvert Plans

cc: Becky Torres, Linda Avis Scott

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