HANOVER POND DAM HYDROELECTRIC PROJECT (FERC #P-14550)

9 Cutlery Ave, Meriden, New Haven County, CT Quinnipiac River

July 22, 2019

Application for Low Impact Hydropower Institute (LIHI) Certification



Submitted To: Low Impact Hydropower Institute P.O. Box 194 Harrington Park, NJ 07640

Submitted By:



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1. Introduction

New England Hydropower Company, LLC (NEHC), on behalf of Hanover Pond Hydro, LLC, submits this Application for Certification by the Low Impact Hydropower Institute (LIHI) for the Hanover Pond Dam Hydroelectric Project (Facility) located on the Quinnipiac River (River) in Meriden, CT. The Hanover Pond Dam (Dam) has not been used to power machinery since the late 1920s and no Federal Energy Regulatory Commission (FERC) license has previously been issued for power generation at the Dam. On May 19, 2016, FERC issued the Facility an Exemption from Licensing (<10 MW) under Docket Number P-14550 (Exemption) for the Facility.

The Facility is owned by Hanover Pond Hydro, LLC and was created as the first in the nation hydroelectric facility to employ the Archimedes Screw Turbine (AST) for power generation. The AST uses the head of an existing, previously non-powered dam to produce electricity through a slowly turning screw attached to a variable speed gear box and generator, which distributes the electricity produced out to the grid. The AST is known for its ability to pass fish safely downstream and has been chosen for installation at this location because of this attribute. Please see Figures 4, 5 and 6 for photographs of the AST and Facility.

This application is laid out in the following format:

Sections 2 and 3, following, discuss the Facility and LIHI Standards respectively. Section 4, Supporting Information, is broken into two subsections, each discussing one of the two Zones of Effect (ZoE).

Section 4.1 discusses all applicable standards for criteria in ZoE 1, the impoundment above the Dam.

Section 4.2 discusses all applicable standards for criteria in ZoE 2, the downstream area below the Dam. The bypassed reach is approximately 65 feet and is discussed in this section where appropriate.

Figures 1 and 2 show the two ZoEs.

2. Facility Description

The Facility operates in a true run-of-river manner, and water levels do not change as a result of Facility operation. Agreed upon minimum flows pass over the low-flow notch in the Dam, seasonally through the existing fishway, and then are allocated to the AST. The intake of water to the AST is controlled by a hydraulically powered sluice gate. This system maintains true run-of-river flow consumption by continuous remote monitoring of a head pond water level gage upstream of the intake, and automatically adjusts the height of the sluice gate to maintain a pre-set flow level. This system, along with the fixed spillway, maintains the current Pond elevation. If insufficient flows exist after satisfying the needs of the low-flow notch and seasonally operated fishway, the AST automatically ceases operation until flows increase. Figure 3 shows an aerial photograph of the Facility layout. Figures 7 and 8 show the flows schematic, and the Facility's Human-Machine Interface allowing for instantaneous monitoring.

The Facility consists of an intake, located in the bank, just upstream of the Dam face, a powerhouse sitting atop the earthen section of the Dam, the AST housed in a concrete trough sloping down the downstream face of the earthen section of the Dam, and the short tailrace immediately emptying into the River below the Dam.



The generator, gearbox, electrics and other controls are located inside the powerhouse. The entire Facility is adjacent to an existing fishway installed by the City of Meriden when the Dam was reconstructed in 2005.

| Information Type | Variable Description | Response (and reference to further details) |
|-------------------------|--|---|
| Name of the Facility | Facility name (use FERC Facility name if possible) | Hanover Pond Dam Hydroelectric Facility, FERC Facility No. 14550 |
| | River name (USGS proper name) | Quinnipiac River Main Stem |
| | River basin name | Quinnipiac River Watershed |
| | Nearest town, county, and state | Meriden, New Haven County, CT |
| Location | River mile of dam above next major river | River mile at Hanover Pond Dam = approximately 22.5 |
| | Geographic latitude | 41.519996 |
| | Geographic longitude | -72.826537 |
| | Application contact names (IMPORTANT: you | Glendon Barnes |
| | must also complete the Facilities Contact Form) | Carol Wasserman |
| Facility Owner | - Facility owner (individual and company names) | Hanover Pond Hydro LLC |
| | - Operating affiliate (if different from owner) | NEHC |
| | - Representative in LIHI certification | Carol Wasserman |
| | FERC Facility Number (e.g., P-xxxxx), issuance | FERC Facility No. P-14550 |
| Regulatory Status | and expiration dates | FERC Exemption Issued May 19, 2016 (Perpetual) |
| | FERC license type or special classification (e.g., "qualified conduit") | Exemption from Licensing (10 MW or Less) |
| | Water Quality Certificate identifier and issuance | Section 401 Water Quality Certification No. WQC-201506301 |
| | date, plus source agency name | Issued by CT DEEP on April 16, 2016 |

Table 2-1 Facility Description Information for the Hanover Pond Hydroelectric Facility



| Information Type | Variable Description | Response (and reference to further details) |
|---------------------|---|--|
| Information Type | Variable Description | Response (and reference to further details)FERC Project P-14550 - Significant documents in these records are:Agency Determination on T&E species: (note the submittal says "northern long-eared owl" but should say "northern long-eared bat") https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=14176330City of Meriden Wetlands Approval: https://elibrary.ferc.gov/idmws/common/open |
| | | Order granting the Exemption: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=14251954 |
| | Hyperlinks to key electronic records on FERC e- library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.) | Transfer of WQC to Hanover Pond Hydro: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=14360404 |
| | | Notice of Commercial Generation: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=14502118 |
| | | Order approving Fish Channel Plan: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=14552356 |
| | | Preliminary Fish Injury and Mortality Report: <u>https://elibrary.ferc.gov/idmws/common/open</u> nat.asp?fileID=14632951 |
| | | Fishway Utilization Report: <u>https://elibrary.ferc.gov/idmws/common/open</u> nat.asp?fileID=14683916 |
| | | Letter granting extension of time to perform studies: <u>https://elibrary.ferc.gov/idmws/common/open</u> <u>nat.asp?fileID=14964832</u> |



| Information Type | Variable Description | Response (and reference to further details) |
|--|---|--|
| | | Water Quality Monitoring Report: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=15212375 |
| | | Eel Mortality study with agency comments: https://elibrary.ferc.gov/idmws/common/open nat.asp?fileID=15185281 |
| | Date of initial operation (past or future for operational applications) | February 23, 2017 |
| | Total name-plate capacity (MW) | 220kW |
| | Average annual generation (MWh) | 900 MWh |
| Power Plant Character- istics | Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit | One Archimedes Screw Turbine (AST), 46.5 ft long, 11.65 foot diameter, min:10cfs, max: 194cfs |
| | Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.) | Run-of-River |
| | Dates and types of major equipment upgrades | No power plants of any kind have existed at this dam since it was reconstructed in 2005. Facility with AST is new construction in 2017. Dam was non-powered until installation of this generating unit in 2017. |
| | Dates, purpose, and type of any recent operational changes | New power plant construction, no changes |
| | Plans, authorization, and regulatory activities for any facility upgrades | None |
| | Date of construction | Dam was completely rebuilt in 2005 by the owner, the City of Meriden, and a fishway was installed at that time. |
| Character- istics of Dam, Diversion, or Conduit | Dam height | 25 ft |
| | Spillway elevation and hydraulic capacity | A 247-foot-long concrete spillway composed of five sections, including: (1) a 40-foot-long portion with an ogee crest elevation of 87.3 feet National Geodetic Vertical Datum 1929 (NGVD 29), (2) a 147-foot-long portion with a broad crest elevation of 87.3 feet NGVD 29, (3) a 40- foot-long portion with an ogee crest elevation of |



| Information Type | Variable Description | Response (and reference to further details) |
|---|---|--|
| | | 87.0 feet NGVD 29, (4) a 6-foot-long portion (i.e., low-flow notch) with an ogee crest elevation of 86.3 feet NGVD 29, and (5) a 14-foot-long portion with an ogee crest elevation of 88.3 feet NGVD 29. |
| | | A maximum flow of 5,962cfs occurred at Hanover Pond Dam in 1982. As reconstructed in 2005-2006, the Dam is intended to withstand this capacity. |
| | Tailwater elevation | 71.29 feet NGVD |
| | Length and type of all penstocks and water conveyance structures between reservoir and powerhouse | 78 foot long, 12 foot wide, 8 foot deep buried concrete penstock channel |
| | Dates and types of major, generation-related infrastructure improvements | February 1-2, 2017: new transformer and power poles installed by Connecticut Light & Power d/b/a/ Eversource Energy. |
| | Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.) | Power generation, flood control, downstream fish passage |
| | Water source | Hanover Pond created by the Hanover Pond Dam impounding the Quinnipiac River |
| | Water discharge location or facility | Water used to operate the AST is taken from the upstream side of Hanover Pond Dam and discharged approximately 65 feet downstream. Remaining water passes through fishway (seasonally) and over Dam crest and low flow spillways directly to the river below. |
| Characte- | Gross volume and surface area at full pool | Storage Capacity of Pond: 1,800 acre-feet (according to NID records) Surface area: 71 acres |
| ristics of Reservoir and Watershed | Maximum water surface elevation (ft. MSL) | Normal surface elevation is 87.3 ft NGVD29 subject to seasonal variation. FEMA Base Flood Elevation is 91 ft NGVD29. Maximum water surface elevation is not available but can be inferred to be between the two elevations. |



| Information Type | Variable Description | Response (and reference to further details) |
|-----------------------|--|--|
| | Maximum and minimum volume and water surface elevations for designated power pool, if available | Not applicable, Run-of-River operations |
| | Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile | No upstream dams. Carpenter's Dam in Meriden and Clarks Brothers Dam in Southington have both been removed. |
| | Downstream dam(s) by name, ownership, FERC | Wallace Dam in Wallingford, owned by the Town of Wallingford, CT, CT ID# 14823; river mile 16.6 |
| | number (if applicable), and river mile | Britannia Spoon Dam in Wallingford, was located approximate river mile 19.5. No current information available, breached. |
| | Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation | Not applicable. No upstream or downstream reservoirs. |
| | Area inside FERC Facility boundary, where appropriate | The area inside the FERC Facility boundary includes the Hanover Pond, approximately 71 acres. In addition, approximately 0.9 acres is upland where the powerhouse and access road are located. |
| | Average annual flow at the dam | 185 cfs (from 1930-2013) |
| Hydrologic Setting | Average monthly flows | Approximated average monthly flows at Hanover Pond Dam derived from closest USGS gage at Wallingford - from 1930-2016 Jan. 215 cfs Feb. 225 cfs Mar. 317 cfs Apr. 297cfs May 207 cfs June 165 cfs July 100 cfs Aug. 94 cfs Sept. 99 cfs Oct. 122 cfs Nov. 159 cfs Dec. 203 cfs |
| | Location and name of relevant stream gauging stations above and below the facility | There are no relevant/operational upstream gages. |



| Information Type | Variable Description | Response (and reference to further details) |
|----------------------------------|---|---|
| | | The Wallingford gage (No. 01196500) is located downstream of the facility |
| | Watershed area at the dam | 95 sq mi |
| Designated Zones of Effect | Number of zones of effect | 2: upstream impoundment and downstream of Facility and Dam Small bypassed reach is included in downstream ZoE |
| | Upstream and downstream locations by river miles | Impoundment upstream of the Dam. Approximately 65 feet downstream of the Dam where the water discharges from the AST tailrace, back into the river. River miles are not applicable. |
| | Type of waterbody (river, impoundment, by- passed reach, etc.) | Impoundment created by Dam River where tailrace water rejoins |
| | Delimiting structures | Hanover Pond Dam |
| | Designated uses by state water quality agency | Habitat for fish and other aquatic life Wildlife habitat Recreation Industrial and/or agricultural supply Navigation |
| Additional Contact | Names, addresses, phone numbers, and e-mail for local state and federal resource agencies | See Attachment B |
| Information | Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders | See Attachment B |
| Photographs | Photographs of key features of the facility and each of the designated zones of effect | See Figures section following text. Figures are referenced where appropriate in text. |
| and Maps | Maps, aerial photos, and/or plan view diagrams of facility area and river basin | See Figures section following text, Figures are referenced where appropriate in text. |

3. Standards Matrices

As mentioned above, two Zones of Effect (ZoE) exist for the Facility at the Hanover Pond Dam. The first ZoE (ZoE 1) is Hanover Pond, an impoundment created by the Hanover Pond Dam, fed by the inflow from the



Quinnipiac River. The second ZoE (ZoE 2) is downstream of the Dam and where water passing through the AST rejoins the River. A bypassed reach has been identified as being approximately 65 feet in length, however as approximately 46.5 feet of this length is the turbine itself, the bypassed reach is extremely short. As a result, any discussion of it has been included in the discussion of ZoE 2.

Facility Name: Hanover Pond Dam Hydropower FacilityZone of Effect 1: Impoundment

| | | | Alte | rnative . | Standard | ls |
|-----------|---|---|------|-----------|----------|------|
| Criterion | | 1 | 2 | 3 | 4 | Plus |
| Α | Ecological Flow Regimes | X | | | | |
| В | Water Quality | | | X | | |
| С | Upstream Fish Passage | X | | | | |
| D | Downstream Fish Passage | X | | | | X |
| Е | Watershed and Shoreline Protection | X | | | | |
| F | Threatened and Endangered Species Protection | X | | | | |
| G | Cultural and Historic Resources Protection | X | | | | |
| Н | Recreational Resources | | | X | | X |

Facility Name: Hanover Pond Dam Hydropower Facility Zone of Effect 2: Downstream of Dam

| | | Alternative Standards | | | | |
|-----------|--|-----------------------|---|---|---|------|
| Criterion | | 1 | 2 | 3 | 4 | Plus |
| Α | Ecological Flow Regimes | | X | | | |
| В | Water Quality | | | X | | |
| С | Upstream Fish Passage | | X | | | |
| D | Downstream Fish Passage | X | | | | X |
| Ε | Watershed and Shoreline Protection | X | | | | |
| F | Threatened and Endangered Species Protection | X | | | | |
| G | Cultural and Historic Resources Protection | X | | | | |
| Н | Recreational Resources | | | X | | X |

4. Supporting Information

Below is the supporting information for each criterion. The Alternative Standards are listed individually and grouped by Zone of Effect. Bulleted, italicized text represents the instructions listed in the LIHI Certification Handbook 2nd Edition. Applicant's response follows each instruction in standard text.

4.1. Zone of Effect 1: Impoundment Upstream of Facility

This area includes the Hanover Pond upstream of the Dam which is created by the inflow of the Quinnipiac River from the northwest corner of the Pond. This man-made waterbody has a surface area of approximately 71 acres, a maximum depth of approximately 7.0 feet, and an estimated mean depth of 2.5 feet. According to the United States Geological Survey (USGS), the average hydraulic residence time is 0.5 days.

4.1.1. Ecological Flow Regimes

The Facility satisfies Standard A-1 for ecological flow regimes.



| Criterion | Standard | Instructions |
|-----------|----------|--|
| А | 1 | Not Applicable / De Minimis Effect: |
| | | Confirm the location of the powerhouse relative to other |
| | | dam/diversion structures to establish that there are no bypassed |
| | | reaches at the facility. |
| | | • If Run-of-River operation, provide details on how flows, water levels, |
| | | and operation are monitored to ensure such an operational mode is |
| | | maintained. |
| | | • In a conduit Facility, identify the water source and discharge points |
| | | for the conduit system within which the hydropower plant is located. |
| | | • For impoundment zones only, explain how fish and wildlife habitat |
| | | within the zone is evaluated and managed – NOTE: this is required |
| | | information, but it will not be used to determine whether the |
| | | Ecological Flows criterion has been satisfied. All impoundment zones |
| | | can apply Criterion A-1 to pass this criterion. |

STANDARD A-1. Not Applicable/De Minimis Effect

• Confirm the location of the powerhouse relative to other dam/diversion structures to establish that there are no bypassed reaches at the facility.

The powerhouse is located adjacent to the Dam on the western side of the River. Using the LIHI Handbook diagrams depicting bypassed reaches, which appears to be the distance from dam to the powerhouse or the dam to the tailrace, there is no bypassed reach for ZoE 1 (see p.6, and the diagrams at pp.18 – 19 of the LIHI Handbook 2nd Edition – Rev. 2.03). The short bypassed reach, which appears to be almost completely the turbine itself, is included in ZoE 2 discussed in section 4.2. Please see Figures 1 – 4 for photographs of the Facility and site.

• If Run-of-River operation, provide details on how flows, water levels, and operation are monitored to ensure such an operational mode is maintained.

The Facility is operated in run-of-river mode, and therefore does not change the surface elevations of Hanover Pond. All incoming flows pass through the AST, down the fishway, over the low flow notch and over the main spillway based on seasonal flows. No flow is retained in the impoundment greater than pre-Facility conditions. Please see Figure 7 for a diagram of flow distribution. See also the Facility flow monitoring plan located at:

https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14777991

The intake from Hanover Pond is controlled by a hydraulically powered sluice gate. This system maintains true run-of-river flow by continuous remote monitoring of a head pond water level gage upstream of the intake, and automatically adjusts the height of the sluice gate to maintain a pre-set river level. This system, along with the fixed spillway, maintains the current elevation in Hanover Pond.

Operation of all components is carried out by a Programmable Logic Controller system (PLC) with input through a touch screen Human-Machine Interface (HMI). The PLC holds adjustable set points



which dictate how the system starts, stops and reacts to changing flow conditions in the River and water levels in the impoundment.

The PLC takes data from various system sensors, and inputs them to control the sluice gate and variable frequency drive (VFD). This ensures the system only takes the water flows available from the River and no more, maintaining the level of the impoundment upstream. The reserve flow over the low flow notch and flow through the fish pass structures are also maintained through the settings established in the PLC.

As part of the Terms and Conditions of granting an Exemption from Licensing, FERC, the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the Connecticut Department of Energy and Environmental Protection (CT DEEP) assisted NEHC in drafting and implementing an approved flow monitoring plan. Please see the Flow Monitoring Plan link provided above. The Plan is intended to ensure all the correct safeguards are set in place and the system is configured in a way to provide not only clean, renewable energy, but also maintain the prescribed flows and fish habitat protection.

The Exemption requires a reserve flow of 30 cfs to pass partially over the low flow spillway, seasonally through the fishway, and for the downstream fish passage channel to be wetted to a depth of two feet. These amounts were based on a sound understanding of aquatic habitat and ecological flow needs.

• In a conduit Facility, identify the water source and discharge points for the conduit system within which the hydropower plant is located.

This is not applicable as the Facility is not located within a conduit.

• For impoundment zones only, explain how fish and wildlife habitat within the zone is evaluated and managed – **NOTE:** this is required information, but it will not be used to determine whether the Ecological Flows criterion has been satisfied. All impoundment zones can apply Criterion A-1 to pass this criterion.

The impoundment is owned by the City of Meriden, and wildlife habitat within the impoundment zone is not actively evaluated or managed by the City. Hanover Pond is generally managed as a recreational resource, not as wildlife habitat. Regardless, the Pond attracts various bird species. In addition, the CT DEEP annually stocks Hanover Pond with trout for recreational fishing. Installed fish passage at the Hanover Pond Dam, as well as at the Wallace Dam downstream of the Facility, help pass some migratory fish species. No additional dams exist upstream of the Facility, allowing any migrants passing up the fish passage the ability to travel approximately 16 additional miles to the headwaters of the Quinnipiac River.

To establish a baseline for freshwater mussels and invasive species, NEHC has conducted a freshwater mussel survey:

https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14292342 and drafted an invasive species monitoring and control plan: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14510038.



4.1.2. Water Quality

The Facility satisfies Standard B-3 for water quality in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| В | 3 | Site-Specific Monitoring Studies: |
| | | • If facility is located on a Water Quality Limited river reach, provide a |
| | | link to the state's most recent impaired waters list and indicate the |
| | | page(s) therein that apply to facility waters. If possible, provide an |
| | | agency letter stating that the facility is not a cause of such limitation. |
| | | Document consultation with appropriate water quality agency to |
| | | determine what water quality parameters and sampling methods are |
| | | required. |
| | | Present recent water quality data from the facility or from other |
| | | sources in the vicinity of the facility (e.g., data collected from the |
| | | state, watershed associations, or others who collected data under |
| | | generally accepted sampling protocols and quality assurance |
| | | procedures) and explain and demonstrate how it satisfies current |
| | | applicable water quality standards including designated uses, or |
| | | provide a letter from the appropriate state or other regulatory agency |
| | | accepting the data. |

STANDARD B-3. Site-Specific Monitoring Studies

• If facility is located on a Water Quality Limited river reach, provide a link to the state's most recent impaired waters list and indicate the page(s) therein that apply to facility waters. If possible, provide an agency letter stating that the facility is not a cause of such limitation.

The 2010, 2014, and 2016 State of Connecticut Integrated Water Quality Reports include Hanover Pond on its list of impaired waterbodies for which total maximum daily loads (TMDLs) are necessary to address unacceptable loading of Enterococcus Bacteria, Nutrient/Eutrophication Biological Indicators, Polychlorinated Biphenyls (PCBs) and Sediment/Siltation. This report states Hanover Pond, in addition to the TMDL Assessment and Recommendations, is also impaired for Fish Consumption, Fish Habitat, and Recreation. For reference, the 2010, 2014, and 2016 reports can be found here:

http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/ctiwqr10final.pdf

http://www.ct.gov/deep/lib/deep/water/water quality management/305b/2014 iwqr 305b 303 d_final.pdf

http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf



As the above listed water quality assessment findings were published prior to initiation of construction and commencement of operation of the Facility in February 2017, the Facility cannot be the cause of such water quality limitation.

• Document consultation with appropriate water quality agency to determine what water quality parameters and sampling methods are required.

NEHC has been aware of the water quality issues in the Quinnipiac River and Hanover Pond since the inception of the Project. Prior to construction, NEHC drafted a Standard Operating Procedure for low-flow water quality sampling, which was reviewed and approved by CT DEEP. Water quality sampling commenced to establish baseline data at three locations around Hanover Pond Dam (one upstream of the Dam and two downstream of the Dam) for dissolved oxygen (DO) and water temperature, during the 2014 and 2015 low flow season (July through September), when DO levels are typically lowest and temperatures are typically highest.

Following this baseline data collection, NEHC coordinated with CT DEEP to draft a post-construction water sampling plan which would continue with the water sampling as it had begun in the years prior to construction.

The protocol was submitted to and approved by CT DEEP and FERC. Please see: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14692474

Links to the data collected and reports drafted can be found below.

• Present recent water quality data from the facility or from other sources in the vicinity of the facility (e.g., data collected from the state, watershed associations, or others who collected data under generally accepted sampling protocols and quality assurance procedures) and explain and demonstrate how it satisfies current applicable water quality standards including designated uses, or provide a letter from the appropriate state or other regulatory agency accepting the data.

In accordance with the Terms and Conditions set forth in the FERC Exemption, NEHC has performed, and will continue to perform water quality sampling at the Facility. Water feeding the AST travels through a fixed intake structure and therefore the AST does not disturb sediments in the impoundment. The turbine structure itself sits in a trough attached to, and immediately downstream of, the powerhouse and therefore has no effect on the water quality in the impoundment. Post construction water quality sampling in low flow seasons commenced in 2017 and will conclude in 2020.

Based on a comparison of the results of low-flow water quality sampling for pre-operation years 2014 – 2016 and post-operation years 2017 - 2018, the Project has not affected water quality at the impoundment. NEHC will continue to sample and to monitor DO and temperature during the low-flow seasons for the years 2019, and 2020. The water quality results will continue to be provided in an annual report submitted to the USFWS, CT DEEP and FERC.

2017 NEHC Water Quality Sampling Report: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14773252





2018 NEHC Water Quality Sampling Report:

https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15212375

4.1.3. Upstream Fish Passage

The Facility satisfies Standard C-1.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| С | 1 | Not Applicable / De Minimis Effect: |
| | | • Explain why the facility does not impose a barrier to upstream fish passage in the designated zone. |
| | | Document available fish distribution data and the lack of migratory fish species in the vicinity. If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this. |

STANDARD C-1. Not Applicable/De Minimis Effect

• Explain why the facility does not impose a barrier to upstream fish passage in the designated zone.

ZoE 1 is the impoundment above the Dam known as Hanover Pond. There are no additional known obstructions or dams on the Quinnipiac River upstream of the Hanover Pond Dam and the Facility. This allows fish the ability to swim from ZoE 1 to the headwaters of the Quinnipiac River. In addition, the Facility was constructed completely within the earthen section of the existing Hanover Pond Dam. It was not constructed in a location where fish could previously pass. The Facility was carefully sited adjacent to an existing Denil fish pass, the exit to which is located in ZoE 1. The exit of the fishway is, in no way, blocked by the Facility. Please see Figures 3 and 4 for photographs of the site and location of fishway. Please see also section 4.2.3 below, which discusses the fishway, located in ZoE 2, in further detail.

• Document available fish distribution data and the lack of migratory fish species in the vicinity.

CT DEEP has identified the Quinnipiac River as a high priority for anadromous fish restoration, particularly for Alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), and Blueback herring (*Alosa aestivalis*). As part of CT DEEP's anadromous populations restoration, fish and American eel passage have been constructed at both the downstream Wallace Dam and the Hanover Pond Dam. Very few fish species are known to regularly inhabit Hanover Pond. As mentioned previously, CT DEEP stocks the Pond annually with trout for recreational fishing. Some migrants are known to utilize the fishway and exit into ZoE 1, though they are not monitored once they reach the Pond. The following fish have been documented within the Quinnipiac River Watershed and may be present in ZoE 1.



| Popular Name | Scientific Name | Popular Name | Scientific Name |
|-------------------|-------------------------|--------------------|-------------------------|
| American eel | Anguilla rostrata | Sea lamprey | Petromyzon marinus |
| Banded killifish | Fundulus diaphanous | Spottail shiner | Notropis hudsonius |
| Blacknose dace | Rhinichthys atrarulus | Striped bass | Morone saxatilis |
| Brook trout | Salvvelimus fontinalis | Tessellated darter | Etheostoma olmstedi |
| Brown bullhead | Ameiurus nebulosus | Tomcod | Microgadus tomcod |
| Brown trout | Salmo trutta | White perch | Morone americana |
| Fathead minnow | Pimephales promelas | White Sucker | Catostomus commersonii |
| Gizzard shad | Dorosoma cepedianum | Yellow bullhead | Ameiurus natalis |
| Golden shiner | Notemigonus crysoleucas | Yellow perch | Perca flavescens |
| Longnose dace | Rhinichthys cataractae | Black crappie | Promoxis nigromaculatus |
| Minnow | Cyprinidae spp. | Bluegill sunfish | Lepomis macrochirus |
| Pumpkinseed | Lepomis gibbosus | Carp | Family: Cyprinidae |
| Redbreast sunfish | Lepomis auritus | Rainbow trout | Oncorhynchus mykiss |
| Redfin pickerel | Esox americanus | | |

Table 4.1.3.1Quinnipiac River Watershed Fish Species

• If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

Historically, over 100 Industrial Revolution-era dams existed on the Quinnipiac River. All of these dams existed prior to the creation of fishways and few fish made it past the larger ones. In addition, many of the dams powered industrial facilities which discharged pollutants and wastes directly into the River. With the removal of all but two actively used dams, both of which have installed fishways, the once infrequent passage of migratory species has slowly begun to rebound.

As Facility operation commenced in February 2017, long after the prolific industrial damming of the Quinnipiac River, it could not be a cause of migratory fish species extirpation.

4.1.4. Downstream Fish Passage

The Facility satisfies Standard D-1 and qualifies for the Plus Standard for downstream fish passage for both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| D | 1 | Not Applicable / De Minimis Effect: |
| | | • Explain why the facility does not impose a barrier to downstream |
| | | fish passage in the designated zone, considering both physical |
| | | obstruction and increased mortality relative to natural downstream |
| | | movement (e.g., entrainment into hydropower turbines). |
| | | • For riverine fish populations that are known to move downstream, |
| | | explain why the facility does not contribute adversely to the |
| | | sustainability of these populations or to their access to habitat |



| Criterion | Standard | Instructions |
|-----------|----------|---|
| | | necessary for successful completion of their life cycles. |
| | | • Document available fish distribution data and the lack of migratory |
| | | fish species in the vicinity. |
| | | • If migratory fish species have been extirpated from the area, explain |
| | | why the facility is or was not the cause of this. |

STANDARD D-1. Not Applicable/De Minimis Effect

• Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines).

Somewhere around 250 B.C. the Archimedes Screw was invented for the simple purpose of raising water from a lower level to a higher one. Modern uses of Archimedes Screw pumps have been deployed in Europe, the United Kingdom and North America specifically as a safe means to transport fish (and of course, water) in an upward manner for various purposes. Fish hatcheries have employed this technology to transfer fish from tank to truck and it has been used as an active fish lift in some locations, replacing a passive fishway. Only in the past 20 years has the Archimedes Screw pump been turned around to generate electricity. That has not diminished its ability to pass fish safely. Earlier models once contained pinch points and other properties that could harm some fish, but current models have bumpers installed on the flights as well as design changes to eliminate pinch points. Some companies in Europe offer Archimedes Screws in both pump and turbine operations so both can be deployed simultaneously where appropriate. Please see Attachment D for additional resources. See also Figure 11 demonstrating the upstream and downstream transit of fish in the Archimedes Screw pump and Turbine.

The AST has now been tested at the Hanover Pond Facility to the satisfaction of CT DEEP staff and the studies performed by NEHC have been accepted by FERC. In accordance with the Terms and Conditions of the Exemption, NEHC drafted an Injury and Mortality assessment to be carried out once the AST became operational. NEHC performed this assessment with the assistance of CT DEEP staff in the spring of 2017. Alewives and American shad (both target species) were released into the AST in two separate tests and their condition was documented upon exiting the screw. No injuries or fatalities were reported as a result of transiting through the screw. The report can be found here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14632951

CT DEEP staff decided additional testing (using additional species) was not necessary and determined that the AST is considered safe for downstream fish passage. A similar study using American eels (*Anguilla rostrate*) was also conducted and the report can be found here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15185281

As the design of the AST provides for large, slow moving pockets of water to travel downstream, any fish entering the AST, enter at the top and be deposited at the base of the screw without injury. The AST itself provides for safe downstream passage of fish, but other design elements were incorporated to accommodate fish specifically targeted for restoration by CT DEEP. The design of the Facility was



completed with input from CT DEEP fisheries staff to ensure fish-safe feature were included. Nineinch clear bar spacing of the trash rack was specifically designed to allow shad, a species targeted for restoration, ample space to enter the AST without impingement on the trash rack, while still providing a safety barrier for people and trapping large debris such as logs. Sharp edges and pinchpoints have been designed out to avoid any damage to fish and the bottom end bearing of the AST sits on a reinforced concrete block in the center of the flow, faired to allow smooth passage of water and fish around it.

• For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles.

Unlike most conventional hydropower facilities which either impinge downstream migrants against a fine mesh trash rack or prove fatal to fish upon entrance to the turbine itself, the AST is specifically designed to allow fish access to the screw through generously spaced trash rack bars and transport them downstream in a safer manner than plunging over the low flow notch in the Dam. The installation of the AST will not contribute adversely to the sustainability of populations migrating downstream to complete their life cycles. Instead, the AST will allow a second, more benign, method of transiting fish to migrate downstream.

• Document available fish distribution data and the lack of migratory fish species in the vicinity.

CT DEEP has identified the Quinnipiac River as a high priority for anadromous fish restoration, particularly for Alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), and Blueback herring (*Alosa aestivalis*). As part of CT DEEP's anadromous populations restoration, fish and American eel passage have been constructed at both the downstream Wallace Dam and the Hanover Pond Dam.

Please see Table 4.1.3.1 above for fish species present in the Quinnipiac River watershed.

• If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

Historically, over 100 Industrial Revolution-era dams were constructed on the Quinnipiac River, all of which existed long before the construction or operation of the Facility. These dams, along with the pollution they created, prohibited the safe downstream migration of most fish once native to the River. All but two of the dams once installed on the River have been breached or removed and both active dams now have fishways, allowing for upstream migration. Those that head back downstream will encounter almost no barriers along the Quinnipiac since the installation of a low flow notch at the Hanover Pond Dam and the low head height of the Wallace Dam. In addition, since the commencement of Facility operation, the AST has been proven as safe mode of downstream transit for migrating fish and provides a second, safer mode of downstream passage.

As Facility operation commenced in February 2017, long after the prolific industrial damming of the Quinnipiac River, it could not be a cause of migratory fish species extirpation. On the contrary, the



Facility will encourage the return of once extirpated species as they will now be able to fully complete their migratory life cycles.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| D | PLUS | Bonus Activities: |
| | | • If advanced technology has been or will be deployed, explain how it will increase fish passage success relative to other options. |
| | | • If a basin-scale redevelopment strategy is being pursued, explain how it will increase the abundance and sustainability of migratory fish species in the river system. |
| | | • If adaptive management is being applied, describe the management objectives, the monitoring program pursuant to evaluating performance against those objectives, and the management actions that will be taken in response to monitoring results. |

STANDARD D-PLUS:

• If advanced technology has been or will be deployed, explain how it will increase fish passage success relative to other options.

The use of the AST itself in a hydroelectric facility is a form of advanced technology that will increase fish passage success as it will offer a safe, alternative downstream passage. Prior to construction and operation of the Facility, the only downstream passage for fish was directly over the Dam spillway or through the low flow notch. Now fish can safely travel the height of the Dam in a slow-moving pocket of water. In addition, 9-inch clear bar spacing was used on the trashrack to allow fish to easily enter the AST and use it as a means to pass safely downstream.

• If a basin-scale redevelopment strategy is being pursued, explain how it will increase the abundance and sustainability of migratory fish species in the river system.

The state of Connecticut with assistance of several interest groups has undertaken a basin-wide dam removal initiative along the Quinnipiac River. As of the writing of this application only two dams still exist on the River. Both are actively in use and have monitored fishways.

CT DEEP has listed specific species targeted for restoration as American shad (*Alosa sapidissima*), Alewife (*Alosa pseudoharengus*), Blueback herring (*Alosa aestivalis*), Sea lamprey (*Petromyzon marinus*), and American eel (*Anguilla rostrata*). In addition, resident brown trout (*Salmo trutto*) are regularly stocked in various locations along the Quinnipiac River to support recreational fishing.

Removal or breach of all but the two remaining, active dams, in combination with installation of monitored fishways will help increase the abundance and sustainability of migratory fish species in the River.

• If adaptive management is being applied, describe the management objectives, the monitoring program pursuant to evaluating performance against those objectives, and the management actions that will be taken in response to monitoring results.



No adaptive management plans above what has been agreed to in the Terms and Conditions of the Exemption have been implemented.

4.1.5. Watershed and Shoreline Protection

The Facility satisfies Standard E-1 for watershed and shoreline protection in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| Е | 1 | Not Applicable / De Minimis Effect: |
| | | • If there are no lands with significant ecological value associated with |
| | | the facility, document and justify this (e.g., describe the land use and |
| | | land cover within the Facility boundary). |
| | | • Document that there have been no Shoreline Management Plans or |
| | | similar protection requirements for the facility. |

STANDARD E-1. Not Applicable/De Minimis Effect

• If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the Facility boundary).

The Facility is located on the south side of Hanover Pond in the southwestern section of the City of Meriden. In both ZoE 1 and ZoE 2, the lands occupied and utilized by the Facility are leased to the applicant by the City of Meriden. The City retains ownership of the Dam as well as the fishway. The land surrounding the Facility Site consists of single and multi-family residential housing to the east and west, a commercial automotive facility to the south at 33 Main Street, other small commercial establishments and restaurants along Main Street, and the City-owned Habershon Field recreational complex to the northwest along Hanover Pond. Developed land surrounding Hanover Pond consists of predominantly single-family residences and recreational areas. Zoning within the Facility boundary include: C2- General Commercial, R1- Single Family Residence, R2- Two and Three Family Residence and NCDD- Neighborhood Commercial Design District.

• Document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

Searches of the City of Meriden's publicly available documents yielded reference to a downtown master plan, a flood plan for Harbor Brook and revitalization initiatives. No Shoreline Management Plan has been issued or drafted for anywhere within the Facility boundary, including the impoundment of Hanover Pond and was not required for construction or operation of the Facility. In order to construct the Facility, a soil erosion and sediment control plan to protect Hanover Pond and the Quinnipiac River was drafted and filed with FERC.

Soil Erosion and Sediment Control Plan for the Facility can be found here: <u>https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14296619</u>

The FERC order approving the Soil Erosion and Sediment Control Plan can be found here: <u>https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14325806</u>



In addition, an invasive species survey, originally scheduled for the summer of 2018 will be performed in the summer of 2019. The reason for the postponement was the unscheduled maintenance of the Facility requiring the AST remain inoperable for several months and the ground disturbance this maintenance caused. It was decided no plant species, native or invasive would re-establish in the upland area prior to the summer of 2019. The order can be read here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14964832

4.1.6. Threatened and Endangered Species Protection

The Facility Satisfies Standard F-1 for threatened and endangered species protection in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| F | 1 | Not Applicable / De Minimis Effect: |
| | | • Document that there are no listed species in the facility area or affected riverine zones downstream of the facility. |
| | | • If listed species are known to have existed in the facility area in the past but are not currently present, explain why the facility was not the cause of the extirpation of such species. |
| | | • If the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken. |

STANDARD F-1. Not Applicable/De Minimis Effect

• Document that there are no listed species in the facility area or affected riverine zones downstream of the facility.

NEHC obtained an official USFWS species list for the Facility boundary stating there were no listed species within the area. A copy if this letter can be found at Attachment C.

NEHC contacted CT DEEP and requested a review of State Threatened and Endangered Species and Species of State Concern. A copy of the response can be found at Attachment C. CT DEEP stated the box turtle and wood turtle are both listed as State Species of Special Concern and could be found within the Facility site. CT DEEP also stated a historic sedge had once been in the Facility area as well. Mitigation measures were proposed for the turtle species based on suggestions from CT DEEP. No further action was required by CT DEEP for the sedge.

• If listed species are known to have existed in the facility area in the past but are not currently present, explain why the facility was not the cause of the extirpation of such species.

NEHC consulted with the USFWS and CT DEEP regarding Threatened and Endangered species and State Listed Species of Concern in 2015, prior to the construction and operation of the Facility. NEHC received notice that there were no federally listed threatened or endangered species in the Facility area. CT DEEP stated two extant turtle species and a historic sedge were listed as species of concern. The mitigation measures NEHC proposed were adequate for protection of the existing turtle species



and the historic record of the sedge did not require any protection considerations, according to CT DEEP staff. Please see Attachment C for copies of correspondence from both agencies.

Since consultation with the above listed agencies took place, the northern long-eared bat has been listed in CT. As the Facility is constructed and landscaped, no trees are planned to be cut. No known hibernaculum nor any roost trees exist anywhere at the Facility site. In addition, the operation of the Facility will have no affect on the northern long-eared bat.

• If the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken.

There are no significant efforts to reintroduce extirpated species.

4.1.7. Cultural and Historic Resource Protection

The Facility satisfies Standard G-1 for cultural and historic resources in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| G | 1 | Not Applicable / De Minimis Effect: |
| | | • Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility. |
| | | • Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands. |

STANDARD G-1. Not Applicable/De Minimis Effect

• Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility.

A dam was originally built at the approximate location of the existing Dam in the 1850s and Hanover Pond was impounded to provide hydropower to the former Meriden Cutlery Factory. The factory buildings were located downstream and south of the Facility Site. All buildings associated with the factory, which closed in the 1920s, were demolished in the 1930s.

The only known portions of the factory complex on the Facility Site were the original timber crib dam (now demolished and fully rebuilt) and a former north-south oriented water intake canal that once traversed the western portion of the Facility Site (abandoned and filled sometime between 1934 and 1951). No Facility excavations occurred at the location of the former intake canal.

Significant ground disturbance occurred during the reconstruction of the Dam in 2005-2006 across the approximately 2.7-acre Facility Site.

The CT State Historic Preservation Officer indicated no impacts would result to cultural or historic resources as a result of Facility construction. Please see Attachment D for correspondence.



• Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands.

The Facility was constructed between September, 2016 and February, 2017. It became operational in late February, 2017. As no cultural or historic resources were present prior to the construction and operation of the Facility, none were adversely affected. Please see above for complete description of area.

4.1.8. Recreational Resources

The Facility satisfies Standard H-3 and Plus Standard for recreational resources in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| Н | 3 | Assured Accessibility: |
| | | • In lieu of existing recommendations and plans for recreational uses, document the facility's current and future commitment to accommodate reasonable requests from recreation interests for adequate public access for recreational use of lands and waters of the facility, including appropriate recreational water flows and levels, without fees or charges. |

STANDARD H-3. Assured Accessibility:

• In lieu of existing recommendations and plans for recreational uses, document the facility's current and future commitment to accommodate reasonable requests from recreation interests for adequate public access for recreational use of lands and waters of the facility, including appropriate recreational water flows and levels, without fees or charges

Hanover Pond is owned and managed by the City of Meriden. Despite the USEPA Assessment and Recommendations regarding TMDL¹ development for the Quinnipiac Mainstem, the City allows recreational activities such as fishing and boating, and the Facility's installation and operation has not impacted those recreational activities.

Prior to the construction of the Facility, most recreational boaters portaged around the Hanover Pond Dam through tall grass anywhere along the earthen portion of the Dam. Informal take-out and put-in locations existed in the form of patches of eroded and compacted shoreline As part of the construction of the Facility NEHC has installed signage upstream and downstream of the Facility to indicate appropriate take-out and put-in locations for non-motorized boats desiring to portage around the Dam and Facility. The Facility also has well landscaped, clean grounds surrounding it and warning signs of the Facility's intake and outflow. To keep boaters a safe distance from the Dam's

¹ Water quality is not meeting the designated uses, including habitat for fish, other aquatic life, wildlife habitat; and recreation. In 2008, a TMDL for indicator bacteria was adopted by CT DEEP.



spillway and low flow notch, a floating safety boom was strung across the River, just upstream of the Dam.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| Н | PLUS | Bonus Activities: |
| | | • Document any new public recreational opportunities that have been created on facility lands or waters beyond those required by agencies (e.g., campgrounds, whitewater parks, boating access facilities and trails). |
| | | • Document that such new recreational opportunities did not create unmitigated impacts to other resources. |

As mentioned above, the grounds around Facility have been upgraded with a more formal, maintained portage location. The Facility itself is fenced for safety, but the portage trail is located on a gentler slope of the earthen portion of the Dam. Gravel put-in and take-out locations have been installed for easy identification of portage landings, and the landings are located safely away from the Facility's intake and outflow.

Allowing for safer, more identified access to portage around the Dam has not created unmitigated impacts to other resources. The site is simply more accessible and clearly marked. Activities that took place at the site prior to the construction of the Facility have been formally recognized and provided for.

4.2. Zone of Effect 2: Downstream of the Dam

The second ZoE (ZoE 2) is located at the outflow of the water from the Dam and tailrace of the AST, below the Dam. Where information provided for ZoE 2 is identical to that of ZoE 1 above, it is noted.

4.2.1. Ecological Flow Regimes

The Facility satisfies Standard A-2 for ecological flows.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| А | 2 | Agency Recommendation: |
| | | Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally protective). Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. Explain how the recommendation relates to agency management goals and objectives for fish and wildlife. Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instruction). |



STANDARD A-2: Agency Recommendation

• Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally protective.

As part of the Terms and Conditions drafted through consultation with USFWS, NMFS, CT DEEP and NEHC, the Facility is to operate in run-of-river mode. These Terms and Conditions were incorporated into the FERC License (Exemption) for the Facility issued on May 19, 2016. The Facility has the ability to regulate flows through the turbine via a gage linked to the automatically adjusting sluice gate. Reserve flows remain at 30cfs at all times, subject to River flow. This flow is to satisfy the fishway (seasonally) with the remainder flowing over the low level spillway. Above this flow, the sluice gate will allow any additional flow into the AST. Delegating a minimum flow to the fishway and the low level spillway prior to taking any flow for Facility operation ensures protection of the River resources. Please see the Order granting exemption:

https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14251954

In addition, the Plan for monitoring bypass flows can be read here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14777991

• Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement.

Gage data was compiled from the gage at Wallingford as well as data from StreamStats² to aid in the proper understanding of an appropriate minimum flow. The minimum flow amount was agreed upon through basic understanding of River flow at the site, agency knowledge of flows needed to operate the fishway and appropriate flow over the low flow spillway to protect downstream resources.

• Explain how the recommendation relates to agency management goals and objectives for fish and wildlife.

Agency goals include short term maintenance and long term improvement of current conditions. The Facility contributes to the long term goals of the agencies by assisting in ecological flow management. The river levels downstream are monitored and maintained at a designated depth subject to inflow. during regular operation.

Flows sufficient to pass fish upstream through the fishway as well as sufficient for ecological maintenance of the downstream area help further the agencies' goals of re-establishing habitat for state species of concerns.

² <u>https://www.usgs.gov/mission-areas/water-resources/science/streamstats-streamflow-statistics-and-spatial-analysis-tools?qt-science_center_objects=0#qt-science_center_objects</u>



• Explain how the recommendation provides fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations.

As part of the Terms and Conditions of granting an Exemption from Licensing, FERC, the USFWS, NMFS, and CT DEEP required NEHC to draft and implement a flow monitoring plan. The Plan is referenced above and helps to ensure all the correct safeguards are in place and the system is configured in a way to provide not only clean, renewable energy, but also the prescribed flows for fish habitat protection.

The Exemption requires a reserve flow of 30 cfs to pass partially over the low flow spillway, seasonally through the fishway and for the fish passage channel at the base of the Dam to be wetted to a depth of two feet. This amount was based on a sound understanding of aquatic habitat and ecological flow needs.

If through data collection, the agreed upon 30-cfs minimum flow does not provide the required two feet of water in the fish passage channel, allow for operation of the existing fishway, and provide adequate flow through the low-flow notch, NEHC will increase the minimum flow, with the assistance and collaboration of USFWS and CT DEEP, to the appropriate amount. If NEHC finds that the PLC is not maintaining the required depth of 2 feet when operating in fully automatic mode, the parameters in the PLC will be altered to achieve the necessary water depth in the fish channel.

4.2.2. Water Quality

| The Facility satisfies Standard B-3 for water qu | ıality. |
|--|---------|
|--|---------|

| 3 | |
|---|--|
| 5 | <u>Site-Specific Monitoring Studies:</u> |
| | • If facility is located on a <u>Water Quality Limited</u> river reach, provide a link to the state's most recent impaired waters list and indicate the page(s) therein that apply to facility waters. If possible, provide an agency letter stating that the facility is not a cause of such limitation. |
| | • Document consultation with appropriate water quality agency to determine what water quality parameters and sampling methods are required. |
| | • Present recent water quality data from the facility or from other sources in the vicinity of the facility (e.g., data collected from the state, watershed associations, or others who collected data under generally accepted sampling protocols and quality assurance procedures) and explain and demonstrate how it satisfies current applicable water quality standards including designated uses, or provide a letter from the appropriate state or other regulatory |
| | |

STANDARD B-3. Site-Specific Monitoring Studies



• If facility is located on a Water Quality Limited river reach, provide a link to the state's most recent impaired waters list and indicate the page(s) therein that apply to facility waters. If possible, provide an agency letter stating that the facility is not a cause of such limitation.

The 2010, 2014, and 2016 State of Connecticut Integrated Water Quality Reports include Hanover Pond on its list of impaired waterbodies for which total maximum daily loads (TMDLs) are necessary to address unacceptable loading of Enterococcus Bacteria, Nutrient/Eutrophication Biological Indicators, Polychlorinated Biphenyls (PCBs) and Sediment/Siltation. This report states Hanover Pond, in addition to the TMDL Assessment and Recommendations, is also impaired for Fish Consumption, Fish Habitat, and Recreation. For reference, the 2010, 2014, and 2016 reports can be found here:

http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/ctiwqr10final.pdf

http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2014_iwqr_305b_303 d_final.pdf

http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf

As the above listed water quality assessment findings were published prior to initiation of construction and commencement of operation of the Facility in February 2017, the Facility cannot be the cause of such water quality limitation.

• Document consultation with appropriate water quality agency to determine what water quality parameters and sampling methods are required.

NEHC has been aware of the water quality issues in the Quinnipiac River and Hanover Pond since the inception of the Project. Prior to construction, NEHC drafted a Standard Operating Procedure for low-flow water quality sampling, which was reviewed and approved by CT DEEP. Water quality sampling commenced to establish baseline data at three locations around Hanover Pond Dam (one upstream of the Dam and two downstream of the Dam) for dissolved oxygen (DO) and water temperature, during the 2014 and 2015 low flow season (July through September), when DO levels are typically lowest and temperatures are typically highest.

Following this baseline data collection, NEHC coordinated with CT DEEP to draft a post-construction water sampling plan which would continue with the water sampling as it had begun in the years prior to construction.

The protocol was submitted to and approved by CT DEEP and FERC. Please see: <u>https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14692474</u>

Links to the data collected and reports drafted can be found below.

• Present recent water quality data from the facility or from other sources in the vicinity of the facility (e.g., data collected from the state, watershed associations, or others who collected data under generally accepted sampling protocols and quality assurance procedures) and explain and demonstrate how it



satisfies current applicable water quality standards including designated uses, or provide a letter from the appropriate state or other regulatory agency accepting the data.

In accordance with the Terms and Conditions set forth in the FERC Exemption, NEHC has performed, and will continue to perform water quality sampling at the Facility. Water flowing from the AST tailrace is churned and may, under certain conditions, provide additional DO in ZoE 2. Generally, the impoundment is subject to supersaturation from algal blooms and has shown higher concentrations of DO than downstream locations. So far, the monitoring has shown this to be the case. Post construction water quality sampling in low flow seasons commenced in 2017 and will conclude in 2020.

Based on a comparison of the results of low-flow water quality sampling for pre-operation years 2014 – 2016 and post-operation years 2017 - 2018, the Project has not affected water quality downstream of the Dam. NEHC will continue to sample and to monitor DO and temperature during the low-flow seasons for the years 2019, and 2020. The water quality results will continue to be provided in an annual report submitted to the USFWS, CT DEEP and FERC.

2017 NEHC Water Quality Sampling Report: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14773252

2018 NEHC Water Quality Sampling Report:

https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15212375

4.2.3. Upstream Fish Passage

The Facility satisfies Standard C-2 and qualifies for the Plus Standard for upstream fish passage.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| С | 2 | Agency Recommendation: |
| | | Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally protective). Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement. Describe any provisions for fish passage monitoring or effectiveness |
| | | determinations that are part of the agency recommendation, and how these are being implemented. |

STANDARD C-2. Agency Recommendation

• Identify the proceeding and source, date, and specifics of the agency recommendation applied (NOTE: there may be more than one; identify and explain which is most environmentally protective).

As part of the Terms and Conditions drafted through consultation with USFWS, NMFS, CT DEEP and NEHC, the Facility has monitored and reported on the upstream use of the existing fishway and



installed and operated an eel trap. The Terms and Conditions were incorporated into the FERC License (Exemption) for the Facility issued on May 19, 2016. Please see the Order granting exemption https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14251954

In addition, as outlined in the Terms and Conditions of the Exemption, an eel trap was constructed at the base of the Facility tailrace. Eels would be collected in the trap, counted, and manually transported to Hanover Pond. The eel trap report can be found here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15107120

• Explain the scientific or technical basis for the agency recommendation, including methods and data used. This is required regardless of whether the recommendation is or is not part of a Settlement Agreement

Since the installation of the fishway, no agency had monitored it to know its efficacy. NEHC designed a system for CT DEEP that includes a custom built fish crowder, underwater camera and SalmonSoft counting software installed in a laptop. The camera captures the images of fish as they exit the fishway into the Pond. Post processing images by the SalmonSoft software allows for an accurate accounting of the migratory species utilizing the fishway.

Similarly, no accounting of eels had ever been undertaken at the site and no eel trap or eel pass existed prior to construction of the Facility. American eels now are monitored for upstream passage at this location.

• Describe any provisions for fish passage monitoring or effectiveness determinations that are part of the agency recommendation, and how these are being implemented

As mentioned above, a custom built monitoring station was developed for the existing fishway at the Facility. The Terms and Conditions of the Exemption required monitoring pre- and post-construction to determine if the Facility had any impact on the migration of species or the use of the fishway. The baseline data is available for one year prior to construction of the Facility and will be available for three years following construction. The 2018 fishway utilization report can be found here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14999771

In addition, as part of the construction process and as a requirement outlined in the Terms and Conditions of the Exemption, NEHC installed a fish passage channel at the base of the Dam. This channel is intended to provide a steady stream of water, when flows allow, to encourage upstream migrants to navigate towards the entrance of the fishway. The fish channel can be seen as a row of boulders at the bottom center of the photograph at Figure 3. The Order approving fish channel plan can be found here: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14552356

As mentioned above, eels have also been monitored since the construction of the Facility and the Eel Trap Report is referenced and linked above.

4.2.4. Downstream Fish Passage

The Facility satisfies Standard D-1 for downstream fish passage.



| Criterion | Standard | Instructions |
|-----------|----------|--|
| D | 1 | Not Applicable / De Minimis Effect: |
| | | Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines). For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles. Document available fish distribution data and the lack of migratory fish species in the vicinity. If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this |

STANDARD D-1. Not Applicable/De Minimis Effect

• Explain why the facility does not impose a barrier to downstream fish passage in the designated zone, considering both physical obstruction and increased mortality relative to natural downstream movement (e.g., entrainment into hydropower turbines).

As mentioned in Section 4.1.4 above, the AST provides safe downstream passage by allowing downstream migrants who enter the intake from the impoundment a slow downstream transport within the pockets of water formed between the blades of the AST. Should any downstream migrants not access the AST for downstream travel, there is still a low-flow notch with a plunge pool at the base of the Dam that migrants can use to gain access to the River below the Dam. The low flow notch has a minimum reserve flow, subject to River flow, to ensure downstream migrants this form of passage.

• For riverine fish populations that are known to move downstream, explain why the facility does not contribute adversely to the sustainability of these populations or to their access to habitat necessary for successful completion of their life cycles.

As mentioned above, any downstream migrants now have two means of downstream passage whereas prior to construction of the Facility, they had only one. The Facility actually increased the ability of migrant species to travel safely downstream. Recognizing that some species may not enter the intake of the AST, the low flow notch retains a minimum flow.

In addition, mortality studies have been performed in the UK as well as at the Facility. The UK studies can be accessed at Attachment D. The studies performed in collaboration with CT DEEP at the Facility can be accessed here:

Downstream eel mortality report: https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15153826

Fish Injury and Mortality Study:



https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14632951

• Document available fish distribution data and the lack of migratory fish species in the vicinity.

The documented fish in the Quinnipiac River Watershed can be found in Table 4.1.3.1. In addition, the fishway utilization report referenced above contains data collected on species using the fishway at the Facility.

• If migratory fish species have been extirpated from the area, explain why the facility is or was not the cause of this.

Historically, over 100 Industrial Revolution-era dams existed on the Quinnipiac River, all of which existed long before the construction or operation of the Facility. These dams, along with the pollution they created prohibited the safe downstream migration of most fish once native to the River. All but two of the dams once installed on the River have been breached or removed and both active dams now have fishways, allowing for upstream migration. Those that head back downstream will encounter almost no barriers along the Quinnipiac since the installation of a low flow notch at the Hanover Pond Dam and the low head height of the Wallace Dam. In addition, since the commencement of Facility operation, the AST has been proven as safe mode of downstream transit for migrating fish and provides a second, safer mode of downstream passage.

As Facility operation commenced in February 2017, long after the prolific industrial damming of the Quinnipiac River, it could not be a cause of migratory fish species extirpation. On the contrary, the Facility will encourage the return of once extirpated species as they will now be able to fully complete their migratory life cycles.

4.2.5. Watershed and Shoreline Protection

| Criterion | Standard | Instructions |
|-----------|----------|--|
| E | 1 | Not Applicable / De Minimis Effect: |
| | | • If there are no lands with significant ecological value associated with the facility, document and justify this (e.g., describe the land use and land cover within the Facility boundary). |
| | | • Document that there have been no Shoreline Management Plans or similar protection requirements for the facility. |

The Facility satisfies Standard E-1 for watershed and shoreline protection for both ZoE 1 and ZoE 2.

Please see the discussion in Section 4.1.5, ZoE 1.

4.2.6. Threatened and Endangered Species Protection

The Facility Satisfies Standard F.1 for threatened and endangered species protection in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|-------------------------------------|
| F | 1 | Not Applicable / De Minimis Effect: |



| • Document that there are no listed species in the facility area or affected riverine zones downstream of the facility. |
|---|
| • If listed species are known to have existed in the facility area in the past but are not currently present, explain why the facility was not the cause of the autimation of such apacies. |
| If the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken. |

Please see the discussion in Section 4.1.6, ZoE 1.

4.2.7. Cultural and Historic Resource Protection

The Facility satisfies Standard G.1 for cultural and historic resources.

| Criterion | Standard | Instructions |
|-----------|----------|--|
| G | 1 | Not Applicable / De Minimis Effect: |
| | | • Document that there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility. |
| | | • Document that the facility construction and operation have not in the past adversely affected any cultural or historic resources that are present on facility lands. |

Please see the discussion in Section 4.1.7, ZoE 1.

4.2.8. Recreational Resources

The Facility satisfies Standard H-3 for recreational resources in both ZoE 1 and ZoE 2.

| Criterion | Standard | Instructions |
|-----------|----------|---|
| Н | 3 | Assured Accessibility: |
| | | • In lieu of existing recommendations and plans for recreational uses, document the facility's current and future commitment to accommodate reasonable requests from recreation interests for adequate public access for recreational use of lands and waters of the facility, including appropriate recreational water flows and levels, without fees or charges. |

Please see the discussion in Section 4.1.8, ZoE 1.

Figures





FIGURE 1: Zones of Effect 1 and 2 Overview Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: Google Earth with NEHC edits North





FIGURE 2: Zones of Effect 1 and 2 Close-up Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: Google Earth with NEHC edits North





FIGURE 3: Aerial Photograph of Hanover Pond Hydroelectric Project Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: NEHC

North

June 2019




FIGURE 4: AST, Powerhouse (left), Fishway (right) and Hanover Pond Dam (far right) Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: NEHC North







FIGURE 6: Components - AST Outlet with Safety Screen Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: NEHC

North









AST allowing safe transport of migratory fish downstream





Screw pump used traditionally at fish hatcheries as lift, and for upstream transport



FIGURE 11: Fish Travel: Downstream via AST and Upstream via Pump Hanover Pond Dam Hydroelectric Project, Meriden, CT Source: Fishflow innovations with NEHC edits North

June 2019

Attachment A Sworn Statement

B.3 Sworn Statement and Waiver Form

All applications for LIHI Certification must include the following sworn statement before they can be reviewed by LIHI:

SWORN STATEMENT

As an Authorized Representative of New England Hydropower Company, LLC, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's certification program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The Undersigned further acknowledges that if LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified[®].

The Undersigned further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's certification program.

Company Name: New England Hydropower Company, LLC on behalf of Hanover Pond Hydro, LLC

Authorized Representative:

Name: ____Glendon Barnes_____

Title: _____ Sr. Regulatory and Environmental Manager_____

Authorized Signature: ______

Date: _____7 June 2019

Attachment B Contacts

FACILITY CONTACTS FORM

1. All applications for LIHI Certification must include complete contact information to be reviewed.

| Project Owner: | | | |
|---|---|--|--|
| Name and Title | Michael Kerr, Founder and CEO | | |
| Company | Hanover Pond Hydro, LLC (Subsidiary of New England Hydropower Company, LLC) | | |
| Phone | 978.360.2547 | | |
| Email Address | michael@nehydropower.com | | |
| Mailing Address | P.O Box 5524, Beverly Farms, MA 01915 | | |
| Project Operator | (if different from Owner): | | |
| Name and Title | Michael Kerr, Founder and CEO | | |
| Company | New England Hydropower Company, LLC | | |
| Phone | 978.360.2547 | | |
| Email Address | michael@nehydropower.com | | |
| Mailing Address | 100 Cummings Center, Ste 451C, Beverly, MA 01915 | | |
| Consulting Firm | Agent for LIHI Program (if different from above): | | |
| Name and Title | Glendon Barnes, Sr. Regulatory and Environmental Manager | | |
| Company | New England Hydropower Company, LLC | | |
| Phone | 508.843.2077 | | |
| Email Address | glendon@nehydropower.com | | |
| Mailing Address | 100 Cummings Center, Ste 451C, Beverly, MA 01915 | | |
| Compliance Contact (responsible for LIHI Program requirements): | | | |
| Name and Title | Glendon Barnes, Sr. Regulatory and Environmental Manager | | |
| Company | New England Hydropower Company, LLC | | |
| Phone | 508.843.2077 | | |
| Email Address | glendon@nehydropower.com | | |
| Mailing Address | 100 Cummings Center, Ste 451C, Beverly, MA 01915 | | |
| Party responsible for accounts payable: | | | |
| Name and Title | Michael Kerr, Founder and CEO | | |
| Company | New England Hydropower, LLC | | |
| Phone | 978.360.2547 | | |
| Email Address | michael@nehydropower.com | | |
| Mailing Address | 100 Cummings Center, Ste 451C, Beverly, MA 01915 | | |

2. Applicant must identify the most current and relevant state, federal, provincial, and tribal resource agency contacts (copy and repeat the following table as needed).

| Agency Contact (Check area of responsibility: Flows_X_, Water Quality, Fish/Wildlife | | |
|--|---|--|
| Resources _X_, WatershedsX, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | Connecticut Department of Energy and Environmental Protection | |
| Name and Title | Steve Gephard, Supervising Fisheries Biologist | |
| Phone | (860) 447-4316 | |
| Email address | Steve.gephard@ct.gov | |
| Mailing Address | 79 Elm Street, Hartford, CT 06106 | |

| Agency Contact (Check area of responsibility: Flows_X_, Water Quality, Fish/Wildlife | | |
|--|---|--|
| Resources, Watersheds, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | FERC Dam Safety | |
| Name and Title | John Spain, Branch Chief | |
| Phone | 212.273.5954 | |
| Email address | John.spain@ferc.gov | |
| Mailing Address | 19 West 34th Street, Ste 400, New York, NY 10001-3006 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality _X_, Fish/Wildlife | | |
|---|---|--|
| Resources, Watersheds, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | Connecticut Department of Energy and Environmental Protection | |
| Name and Title | Robert Hannon, Program Planning and Development | |
| Phone | 860.424.3245 | |
| Email address | Robert.Hannon@ct.gov | |
| Mailing Address | 79 Elm Street, Hartford, CT 06106 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality _X_, Fish/Wildlife | | |
|---|--|--|
| Resources, Watersheds, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | United States Fish and Wildlife Service | |
| Name and Title | Melissa Grader, Fish and Wildlife Biologist | |
| Phone | 413.548.8002 ext 8124 | |
| Email address | Melissa_Grader@fws.gov | |
| Mailing Address | 103 East Plumtree Road, Sunderland, MA 01375 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|---|--|
| Resources _X_, Watersheds, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | Connecticut Department of Energy and Environmental Protection | |
| Name and Title | Steve Gephard, Supervising Fisheries Biologist | |
| Phone | 860.424.3474 | |
| Email address | Steve.gephard@ct.gov | |
| Mailing Address | CT DEEP 79 Elm Street, Hartford, CT 06106 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|---|--|
| Resources, Watersheds _X_, T/E Spp, Cultural/Historic Resources, Recreation): | | |
| Agency Name | Connecticut Department of Energy and Environmental Protection | |
| Name and Title | Robert Hannon, Program Planning and Development | |
| Phone | 860.424.3245 | |
| Email address | Robert.Hannon@ct.gov | |
| Mailing Address | CT DEEP 79 Elm Street, Hartford, CT 06106 | |

| Agency Cont | act (Check area | of responsi | bility: Flows_ | _, Water Quality | , Fish/Wildlife | |
|-------------|-----------------|-------------|----------------|--------------------|-----------------|----|
| Resources | , Watersheds | , T/E Spp. | X , Cultural/ | Historic Resources | , Recreation |): |

| Agency Name | United States Fish and Wildlife Service | |
|-----------------|--|--|
| Name and Title | Susi von Oettingen, Endangered Species Biologist | |
| Phone | 603.223.2541 ext 6418 | |
| Email address | Susi_vonoettingen@fws.gov | |
| Mailing Address | 70 Commercial St, Ste 300, Concord, NH 03301 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|---|--|
| Resources, Watersheds, T/E SppX_, Cultural/Historic Resources, Recreation): | | |
| Agency Name | Connecticut Department of Energy and Environmental Protection | |
| Name and Title | Dawn McKay, Environmental Analyst 3 | |
| Phone | 860.424.3592 | |
| Email address | Dawn.mckay@ct.gov | |
| Mailing Address | 79 Elm St., Hartford, CT 06106 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|--|--|
| Resources, Watersheds, T/E Spp, Cultural/Historic Resources _X_, Recreation): | | |
| Agency Name | Mashantucket Pequot Tribal Nation | |
| Name and Title | Kathleen Knowles, Tribal Historic Preservation Officer | |
| Phone | 860.396.6887 | |
| Email address | kknowles@mptn-nsn.gov | |
| Mailing Address | 550 Trolley Line Blvd., P.O.Box 3202, Mashantucket, CT 06338 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|--|--|
| Resources, Watersheds, T/E Spp, Cultural/Historic Resources _X_, Recreation): | | |
| Agency Name | Connecticut State Historic Preservation Office | |
| Name and Title | Todd Levine, Construction Grants Coordinator | |
| Phone | 860.256.2800 | |
| Email address | todd.levine@ct.gov | |
| Mailing Address | One Constitution Plaza, Hartford, CT 06103 | |

| Agency Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife | | |
|---|---|--|
| Resources, Wa | atersheds, T/E Spp, Cultural/Historic Resources, Recreation _X_): | |
| Agency Name | City of Meriden | |
| Name and Title | Deborah Moore, Law Department | |
| Phone | 203.630.4045 | |
| Email address | dmoore@meridenct.gov | |
| Mailing Address | City of Meriden, 142 E. Main St. Meriden, CT 06450 | |

3. Stakeholders

| Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife Resources, | | | |
|--|--|--|--|
| Watersheds, T | <pre>/E Spp, Cultural/Historic Resources, Recreation _X_):</pre> | | |
| Agency Name | Quinnipiac River Watershed Association | | |
| Name and Title | David James | | |
| Phone | 203.237.2237 | | |
| Email address | qrwainfo@att.net | | |
| Mailing Address | P.O.Box 2825, Meriden, CT 06450 | | |

| Contact (Check area of responsibility: Flows, Water Quality, Fish/Wildlife Resources, | | | |
|--|--|--|--|
| Watersheds, T | <pre>/E Spp, Cultural/Historic Resources, Recreation):</pre> | | |
| Agency Name | Bert Hunter, Executive VP and CIO | | |
| Name and Title | Connecticut Green Bank | | |
| Phone | (860) 563-0015 | | |
| Email address | Burt.Hunter@ctgreenbank.com | | |
| Mailing Address | 845 Brook Street, Rocky Hill, CT 06067 | | |

Attachment C Pertinent Correspondence

Hanover Pond Dam Hydroelectric Project LIHI Application

USFWS Official Species List



United States Department of the Interior

FISH AND WILDLIFE SERVICE NEW ENGLAND ECOLOGICAL SERVICES FIELD OFFICE 70 COMMERCIAL STREET, SUITE 300 CONCORD, NH 03301 PHONE: (603)223-2541 FAX: (603)223-0104 URL: www.fws.gov/newengland



Consultation Tracking Number: 05E1NE00-2014-SLI-0021 Project Name: Hanover Pond Dam Hydeoelectric Project October 23, 2013

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, and proposed species, designated critical habitat, and candidate species 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



Project name: Hanover Pond Dam Hydeoelectric Project

Official Species List

Provided by:

NEW ENGLAND ECOLOGICAL SERVICES FIELD OFFICE 70 COMMERCIAL STREET, SUITE 300 CONCORD, NH 03301 (603) 223-2541 http://www.fws.gov/newengland

Consultation Tracking Number: 05E1NE00-2014-SLI-0021

Project Type: Power Generation

Project Description: The Peoject will consist of installation of a new, approximately 50-foot-long, 10.5-foot wide Archimedes screw generator unit, with an installed capacity of 165 kilowatts on the existing Hanover Pond Dam. A powerhouse to contain the gearbox and a new interconnection line to tie in with the existing electric distribution system will also be constructed. The Project will supply clean, fish friendly, renewable electricity into the grid.



Project name: Hanover Pond Dam Hydeoelectric Project

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-72.8283694 41.5266933, -72.828365 41.5266934, -72.8283577 41.5266907, -72.8282517 41.5266247, -72.8282462 41.5266195, -72.8282429 41.5266127, -72.8282425 41.5266052, -72.8282448 41.526598, -72.8282497 41.5265922, -72.8286864 41.5262368, -72.8286921 41.5262335, -72.8286986 41.5262323, -72.8297465 41.5262101, -72.829884 41.5260378, -72.8298792 41.5255938, -72.8297632 41.5252194, -72.8296542 41.5251491, -72.829648 41.5251428, -72.8296451 41.5251345, -72.829635 41.5250413, -72.8295607 41.5250121, -72.8293029 41.525034, -72.8292593 41.5251395, -72.8292557 41.5251453, -72.8292504 41.5251494, -72.829244 41.5251516, -72.8291179 41.5251721, -72.8291108 41.525172, -72.8291042 41.5251694, -72.8287438 41.5249471, -72.8285568 41.5249393, -72.8283895 41.5249539, -72.828345 41.5250977, -72.8283424 41.5251032, -72.8283182 41.5251076, -72.8281902 41.5251628, -72.8279857 41.5251592, -72.8281778 41.6, -72.8281712 41.5252264, -72.827992 41.5251628, -72.8279857 41.5251592, -72.8279811 41.5251536, -72.8279789 41.5251467, -72.8279448 41.5248938, -72.8277049 41.5243213, -72.8275628 41.5240757, -72.8266654 41.5234576, -72.8259852 41.5230852, -



Project name: Hanover Pond Dam Hydeoelectric Project

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Project name: Hanover Pond Dam Hydeoelectric Project

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Project name: Hanover Pond Dam Hydeoelectric Project

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Project Counties: New Haven, CT



Project name: Hanover Pond Dam Hydeoelectric Project

Endangered Species Act Species List

Species lists are not entirely based upon the current range of a species but may also take into consideration actions that affect a species that exists in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Please contact the designated FWS office if you have questions.

There are no listed species identified for the vicinity of your project.

Hanover Pond Dam Hydroelectric Project LIHI Application

CTDEEP State Species of Concern Correspondence



Connecticut Department of

ENERGY & ENVIRONMENTAL PROTECTION

January 29, 2015

Ms. Glendon Barnes New England Hydropower Company, LLC P.O. Box 5524 Beverly Farms, MA 01915 <u>glendon@nehydropwer.com</u>

Project: Construction of Hanover Pond Hydroelectric Project at Hanover Pond in Meriden, Connecticut NDDB Determination No.: 201411114 (Previously NDDB Preliminary Assessment No. 201305425—November 2013)

Dear Glendon,

I have re-reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the proposed construction of Hanover Pond Hydroelectric Project at Hanover Pond in Meriden, Connecticut. In previous correspondence in November of 2013 we indicated that there are extant populations of State Special Concern *Terrapene carolina carolina* (eastern box turtle) and *Glyptemys insculpta* (wood turtle) in the area where this construction will occur. We also have historic records of *Carex squarrosa* (sedge) from this area of Meriden.

Thank you for submitting the biological assessment and proposed mitigation strategies to avoid adverse impacts to these species. We concur that by implementing these protection strategies the impacts will be minimized on both the wood turtle and box turtle. Our program ecologist, Mr. Nelson DeBarros is satisfied that there are no concerns with the historic record of *Carex squarrosa* and no additional protection measures need to be taken. Again we recommend the following protection strategies be implemented in order to protect the turtles:

- Silt fencing should be installed around the work area prior to construction;
- After silt fencing is installed and prior to construction, a sweep of the work area should be conducted to look for turtles;
- Workers should be apprised of the possible presence of turtles, and provided a description of the species (http://www.ct.gov/dep/cwp/view.asp?a=2723&q=473472&depNav_GID=1655);
- Any turtles that are discovered should be moved, unharmed, to an area immediately
 outside of the fenced area, and position in the same direction that it was walking;
- No vehicles or heavy machinery should be parked in any turtle habitat;

79 Elm Street, Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

- Work conducted during early morning and evening hours should occur with special care not to harm basking or foraging individuals; and
- All silt fencing should be removed after work is completed and soils are stable so that reptile and amphibian movement between uplands and wetlands is not restricted.

Please re-submit an NDDB Request for Review if the scope of work changes or if work has not begun on this project by January 29, 2016.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or <u>dawn.mckay@ct.gov</u>. Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn m. mckay

Dawn M. McKay Environmental Analyst 3

WILDLIFE IN CONNECTICUT

STATE SPECIES OF SPECIAL CONCERN

Eastern Box Turtle

Terrapene carolina carolina

Description

The eastern box turtle is probably the most familiar of the 8 species of turtles found in Connecticut's landscape. It is known for its high-domed carapace (top shell). The carapace has irregular yellow or orange blotches on a brown to black background that mimic sunlight dappling on the forest floor. The plastron (under shell) may be brown or black and may have an irregular pattern of cream or vellow. The length of the carapace usually ranges from 4.5 to 6.5 inches, but can measure up to 8 inches long. The shell is made up of a combination of scales and bones, and it includes the ribs and much of the backbone.

Each individual turtle has distinctive head markings. Males usually have red eyes and a concave plastron, while females have brown eyes and a flat

plastron. Box turtles also have a horny beak, stout limbs, and feet that are webbed at the base. This turtle gets its name from its ability to completely withdraw into its shell, closing itself in with a hinged plastron. Box turtles are the only Connecticut turtle with this ability.

Range

Eastern box turtles are found throughout Connecticut, except at the highest elevations. They range from southeastern Maine to southeastern New York, west to central Illinois, and south to northern Florida.

Habitat and Diet

In Connecticut, this terrestrial turtle inhabits a variety of habitats, including woodlands, field edges, thickets, marshes, bogs, and stream banks. Typically, however, box turtles are found in well-drained forest bottomlands and open deciduous forests. They will use wetland areas at various times during the season. During the hottest part of a summer day, they will wander to find springs and seepages where they can burrow into the moist soil. Activity is restricted to mornings and evenings during summer, with little to no nighttime activity, except for egg-



laying females. Box turtles have a limited home range where they spend their entire life, ranging from 0.5 to 10 acres (usually less than 2 acres).

Box turtles are omnivorous and will feed on a variety of food items, including earthworms, slugs, snails, insects, frogs, toads, small snakes, carrion, leaves, grass, berries, fruits, and fungi.

Life History

From October to April, box turtles hibernate by burrowing into loose soil, decaying vegetation, and mud. They tend to hibernate in woodlands, on the edge of woodlands, and sometimes near closed canopy wetlands in the forest. Box turtles may return to the same place to hibernate year after year. As soon as they come out of hibernation, box turtles begin feeding and searching for mates.

The breeding season begins in April and may continue through fall. Box turtles usually do not breed until they are about 10 years old. This late maturity is a result of their long lifespan, which can range up to 50 to even over 100 years of age. The females do not have to mate every year to lay eggs as they can store sperm for up

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION . WILDLIFE DIVISION

to 4 years. In mid-May to late June, the females will travel from a few feet to more than a mile within their home range to find a location to dig a nest and lay their eggs. The 3 to 8 eggs are covered with dirt and left to be warmed by the sun. During this vulnerable time, skunks, foxes, snakes, crows, and raccoons often raid nests. Sometimes, entire nests are destroyed. If the eggs survive, they will hatch in late summer to early fall (about 2 months after being laid). If they hatch in the fall, the young turtles may spend the winter in the nest and come out the following spring.

As soon as the young turtles hatch, they are on their own and receive no care from the adults. This is a dangerous time for young box turtles because they do not develop the hinge for closing into their shell until they are about 4 to 5 years old. Until then, they cannot entirely retreat into their shells. Raccoons, skunks, foxes, dogs, and some birds will prey on young turtles.

Conservation Concerns

The eastern box turtle was once common throughout the state, mostly in the central Connecticut lowlands. However, its distribution is now spotty, although where found, turtles may be locally abundant. Because of the population decline in Connecticut, the box turtle was added to the state's List of Endangered, Threatened, and Special Concern Species when it was revised in 1998. It is currently listed as a species of special concern. The box turtle also is protected from international trade by the 1994 CITES treaty. It is of conservation concern in all the states where it occurs at its northeastern range limit, which includes southern New England and southeastern New York.

Many states have laws that protect box turtles and prohibit their collection. In Connecticut, eastern box turtles **cannot** be collected from the wild (DEP regulations 26-66-14A). Another regulation (DEP regulations 26-55-3D) "grandfathers" those who have a **box turtle collected before 1998**. This regulation limits possession to a single turtle collected before 1998. These regulations provide some protection for the turtles, but not enough to combat some of the even bigger threats these animals face. The main threats in Connecticut (and other states) are loss and fragmentation of habitat due to deforestation and spreading suburban development; vehicle strikes on the busy roads that bisect the landscape; and indiscriminate (and now illegal) collection of individuals for pets.

Loss of habitat is probably the greatest threat to turtles. Some turtles may be killed directly by construction activities, but many more are lost when important habitat areas for shelter, feeding, hibernation, or nesting are destroyed. As remaining habitat is fragmented into smaller pieces, turtle populations can become small and isolated.

Adult box turtles are relatively free from predators due to their unique shells. The shell of a box turtle is extremely hard. However, the shell is not hard enough to survive being run over by a vehicle. Roads bisecting turtle habitat can seriously deplete the local population. Most vehicle fatalities are pregnant females searching for a nest site.

How You Can Help

- Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.
- Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.
- Do not disturb turtles nesting in yards or gardens.
- As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often
 pregnant females and they should be helped on their way and not collected. Without creating a traffic hazard
 or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still
 keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the
 side they are headed. Never relocate a turtle to another area that is far from where you found it.
- Learn more about turtles and their conservation concerns. Spread the word to others on how they can help Connecticut's box turtle population.



State of Connecticut Department of Environmental Protection Bureau of Natural Resources Wildlife Division www.ct.gov/dep



The production of this Endangered and Threatened Species Fact Sheet is made possible by donations to the Connecticut Endangered Species/Wildlife Income Tax Checkoff Fund.

WILDLIFE IN CONNECTICUT

STATE SPECIES OF SPECIAL CONCERN

Wood Turtle

Glyptemys insculpta

Background

Wood turtles may be found throughout Connecticut, but they have become increasingly rare due to their complex habitat needs. Wood turtles also have become more scarce in Fairfield County due to the fragmentation of suitable habitat by urban development.

Range

Wood turtles can be found across the northeastern United States into parts of Canada. They range from Nova Scotia through New England, south into northern Virginia, and west through the Great Lakes region into Minnesota.

Description

The scientific name of the wood turtle, Glyptemys insculpta, refers to the deeply sculptured or chiseled pattern found on the carapace (top shell). This part of the shell is dark brown or black and may have an array of faint yellow lines radiating from the center of each chiseled, pyramid-like segment due to tannins and minerals accumulating between ridges. These segments of the carapace, as well as those of the plastron (bottom shell), are called scutes. The carapace also is keeled, with a noticeable ridge running from front to back. The plastron is vellow with large dark blotches in the outer corners of each scute. The black or dark brown head and upper limbs are contrasted by brighter pigments ranging from red and orange to a pale yellow on the throat and limb undersides. Orange hues are most typical for New England's wood turtles. The hind feet are only slightly webbed, and the tail is long and thick at the base. Adults weigh approximately 1.5 to 2.5 pounds and reach a length of 5 to 9 inches.

1 1 3 m

Habitat and Diet

Wood turtles use aquatic and terrestrial habitats at different times of the year. Their habitats include rivers and large streams, riparian forests (adjacent to rivers), wetlands, hayfields, and other early successional habitats. Terrestrial habitat that is usually within 1,000 feet of a suitable stream or river is most likely used. Preferred stream conditions include moderate flow, sandy or gravelly bottoms, and muddy banks.

Wood turtles are omnivorous and opportunistic. They are not picky eaters and will readily consume slugs, worms, tadpoles, insects, algae, wild fruits, leaves, grass, moss, and carrion.

Life History

From late spring to early fall, wood turtles can be found roaming their aquatic or terrestrial habitats. However, once temperatures drop in autumn, the turtles retreat to rivers and large streams for hibernation. The winter

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is spent underwater, often tucked away below undercut riverbanks within exposed tree roots. Dissolved oxygen is extracted from the water, allowing the turtle to remain submerged entirely until the arrival of spring. Once warmer weather sets in, the turtles will become increasingly more active, eventually leaving the water to begin foraging for food and searching for mates. Travel up or down stream is most likely, as turtles seldom stray very far from their riparian habitats.

Females nest in spring to early summer, depositing anywhere from 4 to 12 eggs into a nest dug out of soft soil, typically in sandy deposits along stream banks or other areas of loose soil. The eggs hatch in late summer or fall and the young turtles may either emerge or remain in the nest for winter hibernation. As soon as the young turtles hatch, they are on their own and receive no care from the adults.

Turtle eggs and hatchlings are heavily preyed upon by a wide variety of predators, ranging from raccoons to birds and snakes. High rates of nest predation and hatchling mortality, paired with the lengthy amount of time it takes for wood turtles to reach sexual maturity, present a challenge to maintaining sustainable populations. Wood turtles live upwards of 40 to 60 years, possibly more.

Conservation Concerns

Loss and fragmentation of habitat are the greatest threats to wood turtles. Many remaining populations in Connecticut are low in numbers and isolated from one another by human-dominated landscapes. Turtles forced to venture farther and farther from appropriate habitat to find mates and nesting sites are more likely to be run over by cars, attacked by predators, or collected by people as pets.

Other sources of mortality include entanglements in litter and debris left behind by people, as well as strikes from mowing equipment used to maintain hayfields and other early successional habitats.

The wood turtle is imperiled throughout a large portion of its range and was placed under international trade regulatory protection through the Convention on International Trade in Endangered Species (CITES) in 1992. Wood turtles also have been included on the International Union for Conservation of Nature's (IUCN) Red List as a vulnerable species since 1996. They are listed as a species of special concern in Connecticut and protected by the Connecticut Endangered Species Act.

How You Can Help

- Conserve riparian habitat. Maintaining a buffer strip of natural vegetation (minimum of 100 feet) along the banks of streams and rivers will protect wood turtle habitat and also help improve the water quality of the stream system. Stream banks that are manicured (cleared of natural shrubby and herbaceous vegetation) or armored by rip rap or stone walls will not be used by wood turtles or most other wildlife species.
- Do not litter. Wood turtles and other wildlife may accidentally ingest or become entangled in garbage and die.
- Leave turtles in the wild. They should never be kept as pets. Whether collected singly or for the pet trade, turtles that are removed from the wild are no longer able to be a reproducing member of a population. Every turtle removed reduces the ability of the population to maintain itself.
- Never release a captive turtle into the wild. It probably would not survive, may not be native to the area, and could introduce diseases to wild populations.
- As you drive, watch out for turtles crossing the road. Turtles found crossing roads in June and July are often pregnant females. They should **not** be collected but can be helped on their way. Without creating a traffic hazard or compromising safety, drivers are encouraged to avoid running over turtles that are crossing roads. Also, still keeping safety precautions in mind, you may elect to pick up turtles from the road and move them onto the side in the direction they are headed. Never relocate a turtle to another area that is far from where you found it.
- Learn more about turtles and their conservation concerns, and educate others.
- If you see a wood turtle, leave it in the wild, take a photograph, record the location where it was seen, and contact the Connecticut Department of Environmental Protection (DEP) Wildlife Division at <u>dep.wildlife@</u> <u>ct.gov</u>, or call 860-424-3011 to report your observation.



State of Connecticut Department of Environmental Protection Bureau of Natural Resources Wildlife Division www.ct.gov/dep Hanover Pond Dam Hydroelectric Project LIHI

Application CT SHPO Finding of No Effect and

THPO Review



You do not need to complete the rest of the form if you have been previously issued a SHPO Project Number. Please attach information to this form and

Print Form



Department of Economic and Community Development



submit

State Historic Preservation Office

One Constitution Plaza | Hartford, CT 06103 | 860.256.2800 | Cultureandtourism.org

| ROJECT | REVIEW | COVER | FORM |
|--------|--------|-------|------|
|--------|--------|-------|------|

| 1. | This information relates to a previ | ously submitted project. |
|----|-------------------------------------|--------------------------|
|----|-------------------------------------|--------------------------|

2. This is a new Project.

If you have checked this box, it is necessary to complete ALL entries on this form .

Project Name Hanover Pond Dam Hydroelectric Project

Project Location 9 Cutlery Ave

Include street number, street name, and or Route Number. If no street address exists give closest intersection.

City or Town Meriden

In addition to the village or hamlet name (if appropriate), the <u>municipality</u> must be included here. County New Haven County

If the undertaking includes multiple addresses, plcase attach a list to this form.

Date of Construction (for existing structures) Dam rebuilt in 2006

PROJECT DESCRIPTION SUMMARY (include full description in attachment):

See Attachment A. Proposed small hydroelectric generating facility to be built alongside existing modern fishway and Hanover Pond Dam, rebuilt in 2006. Run-of-river project will not change water levels in Hanover Pond impoundment.

TYPE OF REVIEW REQUESTED

a. Does this undertaking involve funding or permit approval from a State or Federal Agency?

| X Yes No | | State | Federal |
|---|---|----------|---------|
| Agency Name/Contact FERC/ John Ramer CEFIA/ Patrick O'Neill | Type of Permit/Approval License for <10 MW Exemption State Funding Support | | |
| b. Have you consulted the SHPO and UC or absence of previously identified culture | CONN Dodd Center files to determine the presence ral resources within or adjacent to the project area? | Yes × | No |
| If yes: Was the project site wholly or partially h | ocated within an identified archeologically sensitive area? | | X |
| Does the project site involve or is it subs listing in the CT State or National Regist | tantially contiguous to a property listed or recommended for ers of Historic Places? | | X |
| Does the project involve the rehabilitation building or structure that is 50 years old | n, renovation, relocation, demolition or addition to any or older? | | × |



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PROJECT REVIEW COVER FORM

The Historic Preservation Review Process in Connecticut Cultural Resource Review under the National Historic Preservation Act – Section 106 <u>http://www.achp.gov/106summary.html</u> involves providing technical guidance and professional advice on the potential impact of publicly funded, assisted, licensed or permitted projects on the state's historic, architectural and archaeological resources. This responsibility of the State Historic Preservation Office (SHPO) is discharged in two steps: (1) identification of significant historic, architectural and archaeological resources; and (2) advisory assistance to promote compatibility between new development and preservation of the state's cultural heritage.

Project review is conducted in two stages. First, the SHPO assesses affected properties to determine whether or not they are listed or eligible for listing in the Connecticut State or National Registers of Historic Places. If so, it is deemed "historic" and worthy of protection and the second stage of review is undertaken. The project is reviewed to evaluate its impact on the properties significant materials and character. Where adverse effects are identified, alternatives are explored to avoid, or reduce project impacts; where this is unsuccessful, mitigation measures are developed and formal agreement documents are prepared stipulating these measures. For more information and guidance, please see our website at: http://www.cultureandtourism.org/cct/cwp/view.asp?a=3933&q=293820

ALL PROJECTS SUBMITTED FOR REVIEW MUST INCLUDE THE FOLLOWING MATERIALS*:

PROJECT DESCRIPTION Please attach a full description of the work that will be undertaken as a result of this project. Portions of environmental statements or project applications may be included. The project boundary of the project should be clearly defined**

PROJECT MAP This should include the precise location of the project – preferably a clear color image showing the nearest streets or roadways as well as all portions of the project. Tax maps, Sanborn maps and USGS quadrangle maps are all acceptable, but Bing and Google Earth are also accepted if the information provided is clear and well labeled. The project boundary should be clearly defined on the map and affected legal parcels should be identified.

PHOTOGRAPHS Clear, current images of the property should be submitted. Black and white photocopies will not be accepted. Include images of the areas where the proposed work will take place. May require: exterior elevations, detailed photos of elements to be repaired/replaced (windows, doors, porches, etc.) All photos should be clearly labeled.

| For Existing Structures | Yes | N/A | Com | ments | |
|---|-------|--------------|-----|-------|------|
| Property Card | | | | Dam | |
| For New Construction | Yes | N/A Comments | | ments | |
| Project plans or limits of construction (if available) | X | | | | |
| If project is located in a Historic District include renderings or elevation drawings | | | | | |
| of the proposed structure | | | | | |
| Soils Maps http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm | X | | | | |
| Historic Maps http://magic.lib.uconn.edu/ | | | | | |
| For non-building-related projects (dams, culverts, bridge repair, etc) | Yes | N/S | Com | ments | |
| Property Card | | | | | |
| Soils Map (see above) | | | | | |
| Historic Maps (see above) | | | | | |
| SHPO USE ONLY | Above | Da | e | Below | Date |
| Indicate date of Review and Initials of Reviewer | | | | | |

PROJECT CONTACT

| Name Sarah Faldetta | · | Title Senior Project N | lanager | |
|-------------------------|----------------------|------------------------|-----------|--|
| Firm/Agency New England | d Hydropower Company | LLC | | |
| Address 100 Cummings Co | enter, Suite 438N | | | |
| City Beverly | | State MA | Zip 01915 | |
| Phone | Cell 508-494-624 | 8 Fax | · · · | |
| Email sarah@nehydropow | er.com | | | |

*Note that he SHPO's ability to complete a timely project review depends largely on the quality of the materials submitted.

** Please be sure to include the project name and location on each page of your submission.



Department of Economic and Community Development



State Historic Prescrvation Office

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PROJECT REVIEW COVER FORM

SHPO USE ONLY

| Based on our review of the information provided to the State Historic Preservation Office, it is our opinion that: |
|--|
| No historic properties will be affected by this project. No further review is requested. |
| This project will cause no adverse effects to the following historic properties. No further review is requested: |
| This project will cause no adverse effects to the following historic properties, <u>conditional</u> upon the stipulations included in the attached letter: |
| Additional information is required to complete our review of this project. Please see the attached letter with our requests and recommendations. |
| This project will adversely affect historic properties as it is currently designed or proposed. Please see the attached letter for further details and guidance. |
| Daniel T. Forrest Deputy State Historic Preservation Officer Deputy State Historic Preservation Officer |


Sarah Faldetta <sarah@nehydropower.com>

SMALL-SCALE HANOVER POND DAM HYDROELECTRIC PROJECT -QUINNIPIAC RIVER - CITY OF MERIDEN - NEW HAVEN COUNTY -CONNECTICUT - FERC DOCKET P-14550-000

1 message

Knowles, Kathleen <KKnowles@mptn-nsn.gov> Sat, Oct 4, 2014 at 1:39 PM To: "kimberly.bose@ferc.gov" <kimberly.bose@ferc.gov> Cc: "sarah@nehydropower.com" <sarah@nehydropower.com>, "catherine.labadia@ct.gov" <catherine.labadia@ct.gov>, "Stevens, Sue" <SStevens@mptn-nsn.gov>

Ms. Sarah Faldetta,

Senior Project Manager

New England Hydropower Company, LLC

100 Cummings Place, Suite 436N

Beverly, MA 01915

Re: SMALL-SCALE HANOVER POND DAM HYDROELECTRIC PROJECT

QUINNIPIAC RIVER, CITY OF MERIDEN, NEW HAVEN COUNTY, CT

FERC DOCKET P-14550-000

Based on a review of the information provided regarding the APE, there does not appear to be any impact to potentially significant religious and cultural resources for the Mashantucket Pequot Tribe.

The Mashantucket Pequot Tribe appreciates the opportunity to review and comment on this proposed project.



Knowles

Tribal Historic Preservation Officer

Natural Resources Protection & Regulatory Affairs

Mashantucket Pequot Tribal Nation 550 Trolley Line Blvd., P.O. Box 3202, Mashantucket, CT 06338-3202 Attachment D Additional Resources

Attachment D

Additional Resources

Additional resources in support of AST as hydropower generator and as upstream fish transport: <u>https://www.waterboards.ca.gov/sandiego/water_issues/programs/regulatory/docs/appendices/Appendix_J.pdf</u>

http://fishflowinnovations.nl/en/innovations/

https://www.usbr.gov/mp/TFFIP/red-bluff.html

Fish Studies Europe and UK:

http://www.mannpower-hydro.co.uk/wp-content/uploads/2016/04/Phase-1-archimedean-screw-fishpassage-test-results.pdf

http://www.mannpower-hydro.co.uk/attachments/research/archimedean-screw-fish-passage-testresults-phase-2.pdf

http://www.mannpower-hydro.co.uk/attachments/research/fish-passage-tests-archimedean-screwturbine-phase-3.pdf

http://www.dzivaisudens.lv/pdf/fish-test.pdf

Early Stage Studies in the US:

https://www.energy.gov/sites/prod/files/2017/04/f34/optimized-composite-prototype-archimedesturbine.pdf

https://engineering.usu.edu/news/main-feed/2018/percheron-power