REVIEW OF APPLICATION FOR LIHI CERTIFICATION
OF THE
HANOVER POND DAM HYDROELECTRIC PROJECT

FERC Project No. 14550
Quinnipiac River, Meriden Connecticut

October 25, 2019
Maryalice Fischer, Certification Program Director

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FINAL REVIEW OF APPLICATION FOR LIHI CERTIFICATION OF THE HANOVER POND DAM HYDROELECTRIC PROJECT

This report provides final review findings and recommendations related to the certification application submitted to the Low Impact Hydropower Institute (LIHI) by Hanover Pond Hydro, LLC, a subsidiary of New England Hydropower Company, LLC (Applicant) for certification of the Hanover Pond Dam Hydroelectric Project (Project). The final certification application was filed on August 12, 2019 and is subject to review under the current 2nd edition LIHI Handbook (Revision 2.03, December 20, 2018).

I. INTRODUCTION

The Hanover Pond Dam Project is a 0.22 MW Project located on the Quinnipiac River in the City of Meriden in New Haven County, Connecticut. The Project is authorized under Federal Energy Regulatory Commission (FERC) exemption No. P-14550 issued May 19, 2016.

The Project was built on an existing dam first constructed in 1855 to provide power to the Meriden Cutlery Company but had not been used to power machinery since the late 1920s. The dam is owned by the City of Meriden and the pond is maintained by the City for recreational purposes. It was completely rebuilt in 2005 at which time upstream fish passage was also installed. The Project started operation in 2017 and is the first facility in the US to employ the Archimedes Screw Turbine technology (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 (Figure 1).

Figure 1. Archimedes Screw Turbine

II. PROJECT LOCATION AND SITE CHARACTERISTICS

The Project is located in the south-central portion of Connecticut. The Quinnipiac River is the fourth largest river in Connecticut. It is approximately 46 miles long with its origin in Dead Wood Swamp in Farmington and New Britain, and its discharge into Long Island Sound at New Haven Harbor about 22.5 miles downstream of the Project. Two former dams located upstream, the Clarks Brothers and Carpenter's dams were both removed. Downstream of the Project are the breached Britannia Spoon dam and intact Wallace dam owned by the Town of Wallingford at river mile 16.6 (Figure 2). The watershed area at the Project is 95 square miles. Average annual flows at the Project are 185 cubic feet per second (cfs), ranging from 94 cfs in summer months to 297 cfs during the spring freshet.

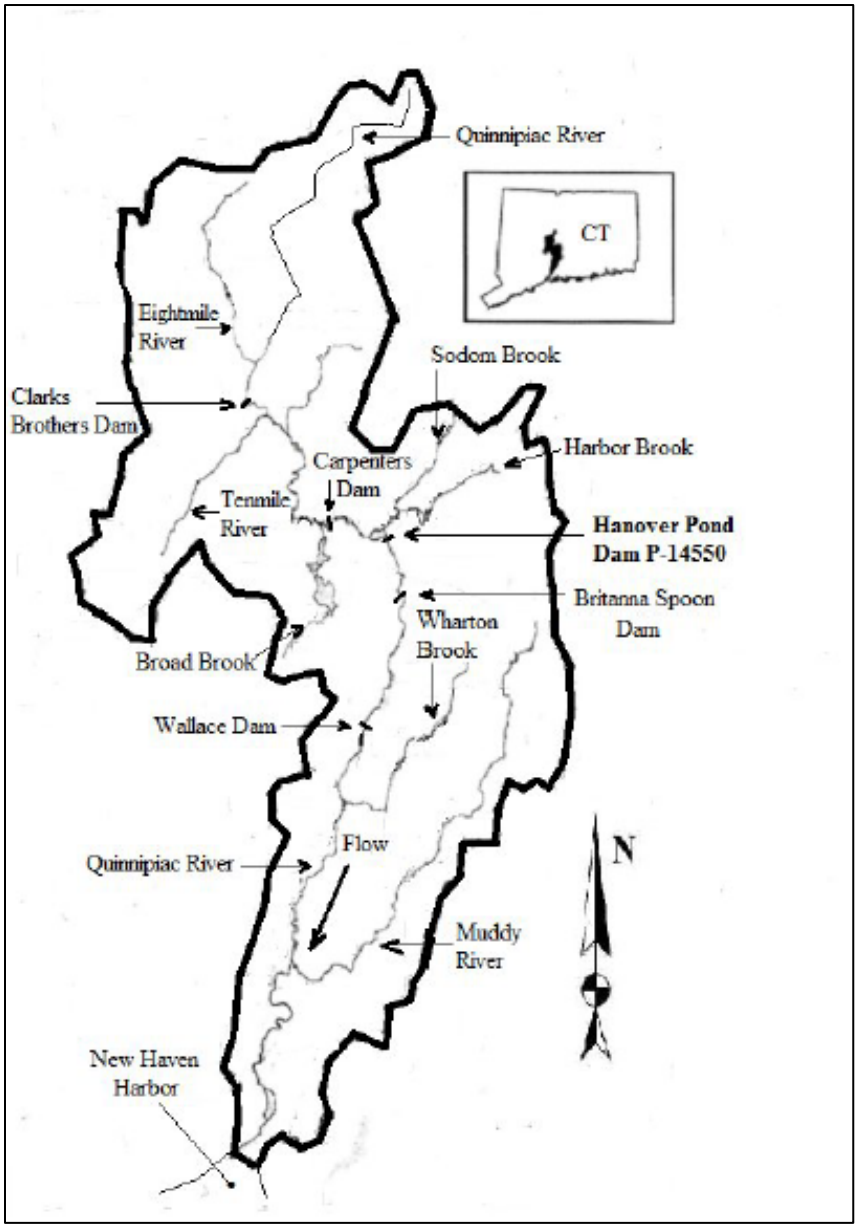

Figure 2. Project Location (source: FERC EA)

The area inside the FERC boundary includes the Hanover Pond, approximately 71 acres with a volume of 1,800 acre-feet. In addition, the Project includes approximately 0.9 acres and encompasses the access road, intake area, powerhouse and tailrace, and canoe portage route. These lands are leased to the Applicant from the City of Meriden.

The Project consists of a 12-foot-wide, 8-foot-wide intake structure, a 78-foot-long buried penstock, the AST which is 46.5 feet long and 11.65 feet in diameter 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 located adjacent to the existing upstream fishway installed by the City of Meriden when the dam was reconstructed in 2005. The dam is 25 feet high and 397 feet long which consists of a 150-foot-long earthen embankment and a 247-foot-long concrete spillway with five sections at varying elevations including a 6-foot-long low-flow notch section which provides minimum flows from the impoundment into the 65-foot-long bypassed reach.

The Project operates in a run-of-river mode and water levels do not change as a result of operations. Minimum flows pass over the low-flow notch in the dam and seasonally through the existing fishway. The intake of water to the AST is controlled by a hydraulically powered sluice gate. The AST has a capacity of 0.22 MW and generates 900 MWh annually. Its minimum hydraulic capacity is 10 cfs and a maximum hydraulic capacity of 194 cfs. Key features of the Project are identified in Figure 3.

Figure 3. Hanover Pond Dam Key Features

III. REGULATORY AND COMPLIANCE STATUS

The FERC exemption[1] and Environmental Assessment (EA)[2] were issued on May 19, 2016. The Water Quality Certificate (WQC)[3] was issued by the Connecticut Department of Energy and Environmental Protection (CTDEEP) on April 15, 2016. In addition to standard and Project-specific exemption articles, Requirements in the exemption include those from the WQC and from US Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) under Section 30(c) of the Federal Power Act. Table 1 summarizes requirements for plans and studies. Additional requirements related to the LIHI Criteria are discussed in Section VII below.

Table 1. Study and Plan Implementation Requirements

Condition	Requirement to develop and implement plans for:
WQC 3	Erosion, sediment, and spill control
FWS 2, NMFS 3, WQC 4	Fish passage channel modifications
FWS 5, WQC 6, 7	Water quality monitoring
FWS 6, WQC 8	Operation and maintenance monitoring
FWS 7a, WQC 9a	Freshwater mussel survey
FWS 8a, NMFS 5a, WQC 10a	Fish ladder utilization
FWS 8c, WQC 10c	Sluice gate evaluation
FWS 8d, NMFS 5b, WQC 10d	Archimedes screw turbine injury and mortality assessment
FWS 8e, NMFS 5c, WQC 10c	Eel trapping
FWS 10	Invasive species monitoring and control

V. PUBLIC COMMENTS RECEIVED OR SOLICITED BY LIHI

The application was publicly noticed on August 13, 2019 and notice of the application was forwarded to resource agency and stakeholder representatives listed in the application. An email response was received from Mariana Cardenas Trief of the Connecticut Green Bank supporting LIHI certification and indicating that the organization had no specific comments (Appendix A).

No other public comments were received by LIHI during the 60-day comment period which ended on October 12, 2019. The reviewer reached out to CTDEEP for confirmation of downstream fish passage matters (Appendix A). The reviewer also conducted a site visit on May 14, 2019 which confirmed various aspects of the facility and operations.

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

[2] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14251754

[3] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14206230

VI. ZONES OF EFFECT

The Applicant delineated the Project into two Zones of Effect (ZoEs): Zone 1 is the impoundment and Zone 2 is the downstream reach below the dam that includes the 65-foot-long bypassed reach, the 15-foot-long tailrace and the area where the tailrace rejoins the river. The Applicant selected the standards shown in the tables below. The reviewer agrees that the selected standards are appropriate.

Zone of Effect # 1: Impoundment

Criterion		*Alternative Standards*				
		1	*2*	*3*	*4*	*Plus*
A	Ecological Flow Regimes	*X*				
B	Water Quality			*X*		
C	Upstream Fish Passage	*X*				
D	Downstream Fish Passage	*X*				*X*
E	Watershed and Shoreline Protection	*X*				
F	Threatened and Endangered Species Protection	*X*				
G	Cultural and Historic Resources Protection	*X*				
H	Recreational Resources			*X*		*X*

Zone of Effect # 2: Downstream Reach

Criterion		*Alternative Standards*				
		1	*2*	*3*	*4*	*Plus*
A	Ecological Flow Regimes		*X*			
B	Water Quality			*X*		
C	Upstream Fish Passage		*X*			
D	Downstream Fish Passage	*X*				*X*
E	Watershed and Shoreline Protection	*X*				
F	Threatened and Endangered Species Protection	*X*				
G	Cultural and Historic Resources Protection	*X*				
H	Recreational Resources			*X*		*X*

VII. DETAILED CRITERIA REVIEW

A: Ecological Flow Regimes

Goal: *The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.*

Assessment of Criterion: The Applicant selected Standard A-1, Not Applicable/De Minimis Effect for the impoundment and Standard A-2, Agency Recommendation for the downstream reach. Impoundments can typically qualify for A-1 since this criterion is focused primarily on riverine reaches, and with no impoundment storage, Standard A-1 is appropriate.

Discussion: The Project is operated in run-of-river mode, with inflow matching outflow. Flow is managed in accordance with the Flow Monitoring Plan[4] and is controlled by a hydraulically powered sluice gate. This system continuously monitors head pond water level via a gage upstream of the intake, and automatically adjusts the height of the sluice gate to maintain a pre-set river level.

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 CTDEEP annually stocks Hanover Pond with trout for recreational fishing.

Monitoring of operations 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). 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.

The FERC exemption, WQC, FWS and NMFS all require a minimum flow of 30 cfs or inflow if less to pass over the low-flow spillway and seasonally through the fishway, and such that the downstream fish passage channel is wetted to a depth of two feet. These amounts were based on modeling conducted by the Applicant which indicated that 30 cfs would maintain adequate zones of passage for fish with 2 feet of depth and provide 12-15 cfs through the low-flow notch (about 8 inches of water) and allow for 6-9 cfs through the fish ladder. 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. The flow regime is depicted in Figure 4 below.

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

The exemption allows for temporary modification of operations in emergencies or if planned, with pre-approval of resource agencies. Impoundment refill after maintenance or emergency drawdowns must release 90% of inflow and refill the impoundment with the remaining 10% of inflow until the normal impoundment elevation and run-of-river operations are restored, unless pre-approved by FWS and CTDEEP. FERC must be notified of operational modifications within 10 days of each event.

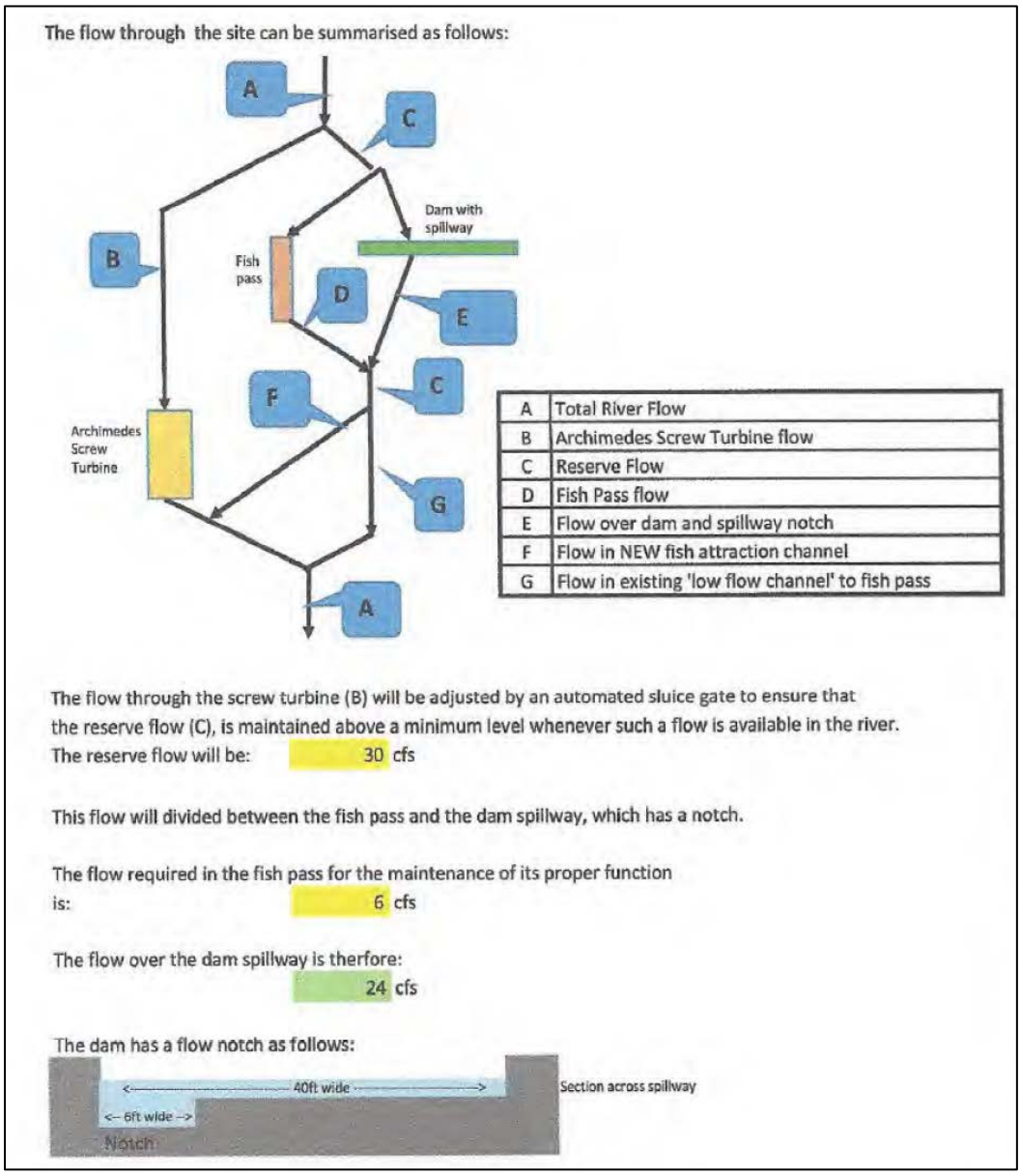

Figure 4. Flow Management and Routing

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project is in compliance with flow requirements and operates to protect aquatic habitat, and therefore satisfies the ecological flow regimes criterion.

B: Water Quality

Goal: *Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions*.

Assessment of Criterion: The Applicant selected Standard B-3, Site-Specific Studies in both ZoEs to pass the water quality criterion.

Discussion: CTDEEP classifies the Quinnipiac River in the project area as "Class B". Class B waters are designated to be used for fish and wildlife habitat, agricultural and industrial supply and other uses such as navigation. Class B waters must have a minimum dissolved oxygen (DO) standard of 5 milligrams per liter (mg/l) at all times and cannot have temperature changes from natural conditions that would impair existing or designated uses, and in no case exceed 85^0 F, nor raise the temperature of surface water more than 4^0 F.

The 2016 State of Connecticut Integrated Water Quality Report[5] lists the Project impoundment and downstream reach as non-supporting of aquatic habitat or recreation. The causes of impairment include *e coli* bacteria, nutrient/eutrophication, Polychlorinated Biphenyls (PCBs) and sedimentation/siltation. The report states Hanover Pond is also impaired for fish consumption. Potential contamination sources include stormwater, industrial discharges, municipal discharges, landfills, illicit discharges, remediation sites, groundwater impacts.

The WQC includes conditions requiring pre- and post-construction water quality monitoring in accordance with the approved water quality monitoring plan.[6] Pre-construction monitoring occurred in 2014 -2016 and post-construction monitoring occurred in 2017-2019 and will continue in 2020. All monitoring was conducted during summer low flow periods. Results indicated that DO and temperature meet state standards. Readings did not vary appreciably between upstream and downstream locations, nor did pre- and post-construction results indicate that the Project affects water quality in the river.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project does not appear to adversely impact water quality and therefore satisfies the water quality criterion, with a condition requiring submittal of the 2019 and 2020 water quality reports when they become available for confirmation of continued compliance with water quality standards.

C: Upstream Fish Passage

Goal: *The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy, sustainable fish and wildlife resources in areas affected by the facility.*

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

[6] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14644128

Assessment of Criterion: The Applicant selected Standard C-1, Not Applicable/De Minimis Effect in the impoundment and Standard C-2, Agency Recommendation in the downstream reach to pass the upstream fish passage criterion.

Discussion: Impoundments typically qualify for C-1 since once upstream of a dam there is no Project-related barrier to further passage. In addition, the removal of the two upstream dams in 2016 and the removal in 2019 of an old water line that also created a barrier[7] has opened up 16 miles of additional habitat for fish upstream of Hanover Pond.

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. Migratory species in the Project area include American eel, sea lamprey, alewife and blueback herring (collectively river herring), and American shad. Restoration of these species as well as gizzard shad is a high priority for CTDEEP.[8]

A Denil style fish ladder was constructed in 2005 by the City of Meriden when the dam was rebuilt. It is operated by CTDEEP. The ladder was designed to pass several species targeted for restoration including American shad, river herring and sea lamprey. In early 2017 the Applicant constructed a boulder fish passage channel (see Figure 3) that leads from the tailrace entrance to an existing channel, and to the fish ladder entrance. The new channel is intended to minimize false attraction flows and create a preferential pathway to guide fish to the fish ladder.

Under the exemption and resource agency conditions, the Applicant is required to monitor and report on fishway utilization to determine if the Project has any impact on the migration of species or the use of the fishway. The fishway had not been monitored by CTDEEP prior to construction of the hydro facility. Baseline data was collected for one year prior to construction and river herring, sea lamprey, gizzard shad, and American eels were observed along with some resident species including white sucker which were tagged as part of the study. Monitoring consists of a custom-built fish crowder, underwater camera and SalmonSoft video software which records and processes data on fish exiting the fishway into Hanover Pond. Three years of post-construction monitoring is required, and the first-year study occurred in 2017 along with white sucker tagging. The study was postponed in 2018 due to a station outage for turbine repairs that occurred during the migration season. Monitoring was conducted in 2019 but results are not publicly available at this time, and the final year of monitoring will occur in 2020. Results to date indicate that there is no appreciable change in fishway utilization although the

[7] https://www.ctenvironment.org/2019/04/22/press-release-16-miles-of-upper-quinnipiac-river-flow-free-third-barrier-removed/

[8] http://www.ct.gov/deep/lib/deep/water/watershed_management/wm_plans/quinnipiac/quinnipiac_river_finalwbp.pdf

number and species of fish recorded in both 2016 and 2018 were less than in 2017, the first post-construction season. No American shad were observed.

The Applicant was also required to install, operate, and monitor use of an upstream eel trap at the base of the tailrace. Eels had been observed by CTDEEP prior to Project construction in the existing fishway and at the downstream Wallace dam. The study term includes up to four post-construction years.

The trap system is composed of a 6-inch PVC pipe extending from a trench below the AST up to the top of a holding tank. The pipe is filled with "bio barrels", small perforated plastic tubes to provide a substrate for climbing, and a water pump which provides attraction flow. The discharge from the holding tank is fed back into the pipe to provide additional attraction (Figure 5). Eels are collected in the trap, manually counted, and manually transported to Hanover Pond.

Figure 5. Eel Trap

Results from 2017 and 2018 indicate that eels effectively use the trap although lower numbers were collected in 2018 than in 2017, in keeping with reduced numbers of eels observed along the Atlantic seaboard in 2018. [9]

[9] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15107120

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project is in compliance with agency recommendations and therefore satisfies the upstream fish passage criterion. However, a condition is recommended to ensure that the results of upstream passage studies conducted in 2019 and 2020 continue to confirm that upstream passage measures are effective.

D: Downstream Fish Passage

Goal: *The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. All migratory species can successfully complete their life cycles and to maintain healthy, sustainable fish and wildlife resources in the areas affected by the Facility.*

Assessment of Criterion: The Applicant selected Standard D-1, Not Applicable/De Minimis Effect in both ZoEs to pass the downstream fish passage and protection criterion. The Applicant also selected the PLUS standard in both ZoEs.

Discussion: In addition to the migratory species listed above, the Quinnipiac River supports a variety of fish species including small and largemouth bass, common and white sucker, yellow and white perch, common shiner, chain pickerel, common carp, blacknose dace, and brook, brown and rainbow trout. CTDEEP stocks the river with the three trout species to support a put-and-take fishery.[10]

The low-flow notch in the spillway provides a zone of downstream passage and was designed to concentrate flows during the low-flow season into one area and to direct spill into a plunge pool with a minimum 2-foot water depth.

According to the application, 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 water) in an upward manner for various purposes. Fish hatcheries have employed this technology to transfer fish from tanks to trucks 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

[10] Op. Cit., footnote 2

simultaneously where appropriate. Attachment D of the application includes links to additional information on ASTs.

To allow migratory fish to use the AST for downstream passage, a trash rack with 9-inch clear spacing was installed on the intake. Studies from other projects listed in the FERC EA suggested that fish passage survival through an AST is nearly 100% with little, if any, and only non-fatal injury. Under the exemption and resource agency conditions, the Applicant was required to conduct an injury and mortality assessment for up to a total of four years beginning in 2017 after construction. Alewives and American shad 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.[11] The study was postponed in 2018 due to the station outage during the migration season. The study was repeated in 2019 and may be repeated again in 2020 and 2021 per agency conditions. Results from the 2019 study are not publicly available at this time. Email correspondence from CTDEEP (see Appendix A) indicates that 2019 study results, in particular for American shad were inconclusive in that while fish passed the AST safely, shad may not be able to locate the entrance to the AST for purposes of passage.

The Applicant was also required to conduct a similar study on adult American eels which was completed in 2018.[12] Balloon-tagged eels were released into the top of the AST and recovered in the tailrace. Results indicated 100% immediate and 48-hour survival of eels with no observable injury, showing that the AST functions as an effective downstream passage facility for that species.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project conditionally satisfies the downstream fish passage criterion. A condition is recommended to ensure that additional downstream passage study results and/or additional mitigation measures are implemented in consultation with resource agencies to confirm effective downstream passage at the Project.

Use of the AST for downstream passage at the Project is the first application in the US and can be considered an advanced, innovative technology in this country. Therefore, the Project should be awarded the PLUS Standard for downstream passage, pending the outcome of the remaining downstream passage studies, agency consultation and possible additional mitigation related to downstream passage effectiveness.

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

[12] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15185281

E: Shoreline and Watershed Protection

Goal: *The facility has demonstrated that sufficient action has been taken to protect, mitigate or enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.*

Assessment of Criterion: The Applicant selected Standard E-1, Not Applicable/De Minimis Effect in both ZoEs to pass the shoreline and watershed protection criterion.

Discussion: The Project is located on the south side of Hanover Pond in the southwestern section of the City of Meriden. In both ZoEs, the lands occupied and utilized by the Project 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 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.

The upland portion of the site is largely mowed grass with some shrubs and a few trees. The northern edge of the site bordering Hanover Pond contains a narrow wetlands fringe along the shore. The shoreline on the upstream side of the powerhouse is armored with riprap and a concrete wing wall to protect against erosion. Downstream of the powerhouse the river bank is also armored with riprap. There are no lands with significant ecological value at the Project.

The Project is not required to have a shoreline management plan although an erosion and sediment control plan was developed for the construction phase in accordance with the exemption and WQC conditions. The Applicant also prepared an invasive species control plan in accordance with the exemption and FWS conditions.[13] The purpose of the plan is to limit the post-construction distribution and spread of invasive plant species in the area immediately surrounding the powerhouse and access road. The plan includes initial mapping of existing invasive species, monitoring and reporting on the status of them, and implementation of control measures as needed to control them. Species of concern that were present at pre-construction included oriental bittersweet (*Celastrus orbiculatus)* and common reed (*Phragmites australis*). The initial survey was to be conducted in 2018 but was postponed due to repair work being conducted at that time. The survey was conducted on June 10, 2019 but results are not yet publicly available.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project has little to no impact on the shoreline and therefore satisfies the shoreland and watershed protection criterion.

[13] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14510038

F: Threatened and Endangered Species

Goal: *The facility does not negatively impact federal or state listed species.*

Assessment of Criterion Passage: The Applicant selected Standard F-1, Not Applicable/De Minimis Effect in both ZoEs to pass the threatened and endangered species criterion.

Discussion: The only federally listed species with potential to occur in the Project vicinity is the threatened Northern long-eared bat (*Myotis septentrionalis*) which was listed subsequent to the Applicant's inquiry of FWS in 2013. General habitat characteristics for this species includes mines and caves (over-wintering) and forested habitats (summer). There are no mines or caves nor any reported roost trees within the Project vicinity.[14] The Applicant reports that they conduct regular vegetation removal; however, this does not typically include removal of trees. Normal maintenance consists of mowing and cutting back brush and other low growing vegetation There are no designated critical habitats for bats, and it is extremely unlikely that the species is present within the Project's small footprint and urban location.

The Applicant requested species information from CTDEEP in 2015 and again in 2016. CTDEEP stated the eastern box turtle (*Terrapene carolina carolina*) and wood turtle (*Glyptemys insculpta*) are both categorized as Species of Special Concern and could be found within the site. The review confirmed that the status of these two species has not changed. CTDEEP also stated there had been an historic observation of squarrose sedge (*Carex squarrosa*) in the Project area as well. Construction-related mitigation measures were proposed for the turtle species based on suggestions from the agency and no further action was required for the sedge.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project is unlikely to affect listed species and therefore satisfies the threatened and endangered species protection criterion.

G: Cultural and Historic Resources Protection

Goal: *The Facility does not unnecessarily impact cultural or historic resources that are associated with the facility's lands and waters, including resources important to local indigenous populations, such as Native Americans.*

Assessment of Criterion: The Applicant selected Standard G-1, Not Applicable/De Minimis Effect in both ZoEs to pass the cultural and historic resources protection criterion.

Discussion: 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 Project site. All buildings associated with the factory, which closed in the 1920s, were demolished in the

[14] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14176330

1930s. The only known portions of the factory complex on the site were the original timber crib dam (now demolished and fully rebuilt by the City of Meriden) and a former north-south oriented water intake canal that once traversed the western portion of the site (abandoned and filled sometime between 1934 and 1951). No Project-related 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 site.

The CT State Historic Preservation Officer indicated no impacts would result to cultural or historic resources as a result of Project construction or operation. There is no cultural resource management plan required for the Project.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project does not impact cultural or historic resources and therefore satisfies the cultural and historic resources protection criterion.

H: Recreational Resources

Goal: *The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.*

Assessment of Criterion Passage: The Applicant selected Standard H-3, Assured Accessibility and Use in both ZoEs to pass the recreational resources criterion. The Applicant also selected the PLUS standard in both ZoEs.

Discussion: Hanover Pond and the dam are owned and managed by the City of Meriden. The City allows recreational activities such as fishing and boating with two boat access points in the impoundment. The hydro facility's construction and operation has not impacted those activities.

Prior to construction, most recreational boaters portaged around the 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 hydro facility the Applicant provided improved gravel put-in and take-out locations with signage, and the more formal landings are located safely away from the Project's intake and outflow which are marked with public warning signs. The Facility itself is fenced for safety and a boater boom is installed upstream of the dam. The site also has landscaped, grassy grounds surrounding it.

There is no recreation management plan required for the Project and no requirements for recreational facilities. Allowing for safer, more permanent and well-marked access to portage around the dam was a voluntary measure not required in the exemption nor recommended by resource agencies.

Based on the application, supporting documentation, and FERC elibrary documents, this review finds that the Project satisfies the recreational resources criterion. The PLUS Standard requires that the Applicant document any new public recreational opportunities that have been created on facility lands or waters beyond those required by agencies, and that such new recreational opportunities did not create unmitigated impacts to other resources. Improvements made by the Applicant to the existing informal portage route are laudable and no doubt provide better access and egress at the dam; however, this review finds that these improvements do not constitute new opportunities created and therefore do not rise to the level of the PLUS Standard.

VIII. CERTIFICATION RECOMMENDATION

This review included evaluation of the application and additional information provided, a review of the FERC elibrary, a review of other publicly available information, and a site visit. Based on this evaluation, the Hanover Pond Dam Project meets the goals and standards of the LIHI Criteria. In addition, the following conditions are proposed:

- **Condition 1:** The facility Owner shall provide copies of the final 2019 and 2020 water quality monitoring reports in annual compliance submittals to LIHI in the compliance year after each study's results become available. All agency and FERC correspondence and/or approvals of the results shall also be provided.

- **Condition 2:** The facility Owner shall provide copies of the upcoming upstream and downstream passage study reports in annual compliance submittals to LIHI in the compliance year after each study's results become available. All agency and FERC correspondence and/or approvals of the results shall also be provided. The Owner shall consult with resource agencies on any modifications and/or additional mitigation needed to ensure that downstream passage is effective. The Owner shall submit a plan and schedule of approved measures to LIHI. LIHI reserves the right to modify this certification as necessary to assure that its downstream fish passage standards are being met.

- **Condition 3 (optional):** If at any time prior to six months before the expiration of the Certification term, Condition 2 is deemed satisfied, LIHI will determine whether or not to award a PLUS standard for downstream passage and extend the Certificate term for three additional years.

APPENDIX A

From: Mariana C. Trief
To: mfischer@lowimpacthydro.org
Subject: RE: Pending Application: Certification of Hanover Pond Dam Project, CT
Date: Wednesday, August 14, 2019 11:12:01 AM
Attachments: image001.png

Maryalice,

Thank you for your note. The Green Bank is supportive of New England Hydropower Company's certification application and we have no public comments.

Best,
Mariana

Mariana Cardenas Trief
Consultant Clean Energy Finance
Connecticut Green Bank

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CONNECTICUT GREEN BANK

From: mfischer@lowimpacthydro.org <mfischer@lowimpacthydro.org>
Sent: Wednesday, August 14, 2019 8:03 AM
To: Mariana C. Trief <Mariana.C.Trief@ctgreenbank.com>
Subject: FW: Pending Application: Certification of Hanover Pond Dam Project, CT

Good morning,

You may have already received the notice below if you are on the Low Impact Hydropower Institute (www.lowimpacthydro.org) email list. However, you were also identified as an agency or stakeholder contact on the LIHI certification application recently submitted by New England Hydropower Company for the Hanover Pond Dam Hydroelectric Project located on the Quinnipiac River in Meriden CT. I may be in contact with you if I have questions about the project or need to clarify any aspects of the LIHI application. You may also provide public comments directly to LIHI as indicated below.

More information about the project and its application can be found in the link below. If you would like to receive additional notices about this project or other hydroelectric projects in your region applying for LIHI certification, please sign up for our mailing list at https://lowimpacthydro.org/join-our-list/.

Best regards,
Maryalice Fischer

From: Gephard, Steve
To: "mfischer@lowimpacthydro.org"
Subject: RE: Question on Hanover Pond Dam
Date: Tuesday, September 24, 2019 3:54:06 PM

Hi Maryalice,

We collaborated with NEHC on the studies. We passed alewife, shad, and eels down the Screw and found no evidence of injury and feel pretty good about it. Here is a summary of where we stand on this project:

1. Upstream passage, shad and other targeted species- good
2. Upstream passage, American Eel- good
3. Downstream passage, American Eel- good
4. Downstream passage, shad and other targeted species- incomplete.
   They have shown that the Screw doesn't harm the fish. However, it is not clear that shad will ever reach the Screw. The plans we approved showed an open air penstock (power race) leading from the headpond to the Screw. But when they built it, they covered it. Shad do not like shadows or submerged orifices and we have great concern that the fish may not enter the penstock and reach the Screw. We have had them do a tagging study to confirm that shad can safely pass downstream. They completed one year of the study and I have not seen the results but I think the results are inconclusive. Until which time we can confirm that the project is providing safe, timely, and effective downstream passage for shad, we cannot endorse LIHI certification.

Steve

Stephen Gephard
Supervising Fisheries Biologist
Diadromous Fisheries *and* Habitat Conservation and Enhancement programs
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Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

www.ct.gov/deep

From: mfischer@lowimpacthydro.org [mailto:mfischer@lowimpacthydro.org]
Sent: Thursday, September 19, 2019 4:51 PM
To: Gephard, Steve <Steve.Gephard@ct.gov>
Subject: Question on Hanover Pond Dam

Hi Steve,
I'm reviewing the LIHI application for the Hanover Pond dam on the Quinnipiac River. I know that you have been heavily involved in that project. As you know, the owner completed studies on downstream passage through the Archimedes screw turbine for anadromous species and American eel. I could not find in the FERC record any comment from CTDEEP on those studies. Would you care to characterize CTDEEP's view of those studies and more generally, use of the screw for safe and effective downstream passage?
Thank you,

Maryalice Fischer
Certification Program Director
Low Impact Hydropower Institute
mfischer@lowimpacthydro.org
603-664-5097 office (best option)
603-931-9119 cell