REVIEW OF APPLICATION FOR LIHI RECERTIFICATION OF THE ICE HOUSE HYDROELECTRIC PROJECT, LIHI #44

FERC Project No. 12769, Exempt
Nashua River
Ayer, MA

September 23, 2019
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FINAL REVIEW OF APPLICATION FOR LIHI RECERTIFICATION OF THE ICE HOUSE HYDROELECTRIC PROJECT, LIHI #44

I. INTRODUCTION

This report summarizes the review findings of the application submitted by Ice House Partners, Inc. (Applicant) to the Low Impact Hydropower Institute (LIHI) for re-certification of the 0.28-megawatt (MW) Ice House Hydroelectric Project (Project, LIHI #44), located on the Nashua River in Ayer, Massachusetts.

The Project operates under a license exemption from the Federal Energy Regulatory Commission (FERC), issued on March 31, 2008 as FERC No. P-12769.[1] The Project began modern operations in 2012 and was originally certified by LIHI prior to commencement of operations in October 2009. It was recertified in August 2014 with an expiration date of August 6, 2019, extended to October 31, 2019. There are no conditions associated with the current Certification.

II. RECERTIFICATION PROCESS AND MATERIAL CHANGE REVIEW

Under the current LIHI Handbook, reviews are a two-phase process starting with a limited review of a completed LIHI application, focused on three questions:

(1) Is there any missing information from the application?
(2) Has there been a material change in the operation of the certified facility since the previous certificate term?
(3) Has there been a change in LIHI criteria since the Certificate was issued?

In accordance with the Recertification Standards, if the only issue is that there is some missing information, a Stage II review may not be required. These standards also state that "material changes" mean non-compliance and/or new or renewed issues of concern that are relevant to LIHI's criteria. If the answer to either question (2) or (3) is “Yes,” a more thorough review of the application using the LIHI criteria in effect at the time of the recertification application, and development of a complete Stage II Report, is required. As a result, all Projects currently applying for renewal must go through a full review unless their most recent certification was completed using the current Handbook.

A review of the initial application, dated May 3, 2019, resulted in a Stage I or Intake Report, dated June 17, 2019. The Stage I review was conducted by Mr. Stephen Byrne and the assessment found there were no “material changes” at the Project and only a little information

[1] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11629992

was missing. The response to the Stage I Report was provided in the form of supplemental information from the Applicant between late June and early July. The final recertification application package was received on July 15, 2019 and posted for public comment on July 19, 2019. The application is subject to review under the current 2nd edition LIHI Handbook (Revision 2.03, December 20, 2018).

This Stage II assessment included in-depth review of the application package, public records in FERC's eLibrary since the last LIHI certification in 2014, other publicly available information, and the annual compliance statements received by LIHI during the past term of Certification.

III. PROJECT LOCATION, AND SITE CHARACTERISTICS

The Ice House Project is located in the towns of Ayer, Shirley and Harvard, in Middlesex and Worcester counties, Massachusetts. The dam is located approximately at river mile (RM) 26.9 on the Nashua River, about 10.6 RM downstream of the confluence of the North and South branches of the river (see Figure 1 below). The Nashua River is a 37.5-mile-long tributary flowing north to the Merrimack River in New Hampshire.

Upstream of Ice House there are a number of dams located in the City of Fitchburg along the North Branch, and the large Wachusett Dam on the South Branch in Clinton, owned and operated by the Massachusetts Water Resources Authority. Downstream about 11 miles from the Project is the Pepperell Dam hydroelectric Project in Pepperell, MA (FERC No. 12721, licensed in 2015) which is owned by Pepperell Hydro Company (subsidiary of Eagle Creek Renewable Energy).

The Ice House property consists of an 11-acre parcel, which is primarily located in the southwest part of Ayer along West Main Street. A small portion of the property extends north into the town of Shirley and west into the town of Harvard. The property includes a modern office building located in the former mill village of Mitchellville which, by the 1890s, contained a half dozen residences and the current building's industrial predecessors. The canal for diverting the flow of the Nashua River on the south bank was built c. 1790 and the dam for impounding the Nashua River and feeding the canal was built in 1909. The powerhouse was constructed of brick in 1909 in the Victorian Eclectic and Panel Brick style. The river is approximately 220' wide at this point and attracted industrialists involved in grist milling, paper making, dye manufacture, power generation and ice making from 1790 to 1967. Over time, the entire infrastructure fell into disrepair. In the 1980s the powerhouse was largely destroyed by fire.

The Applicant, a small family-run private entity, purchased the site in 1999 and restored all aspects of the property, including the dam, powerhouse, and headgate structure, along with building of the new office, the Grady Research Building. The structures were repaired using historically accurate materials and designs and placed back into service. The Project re-commenced operation again in 2012 and operates in a run-of-river mode with a vacuum flume that provides negative gage pressure required for submergence/siphoning of water (see Section VI.A below). The Project generates approximately 1,133 MWh annually.

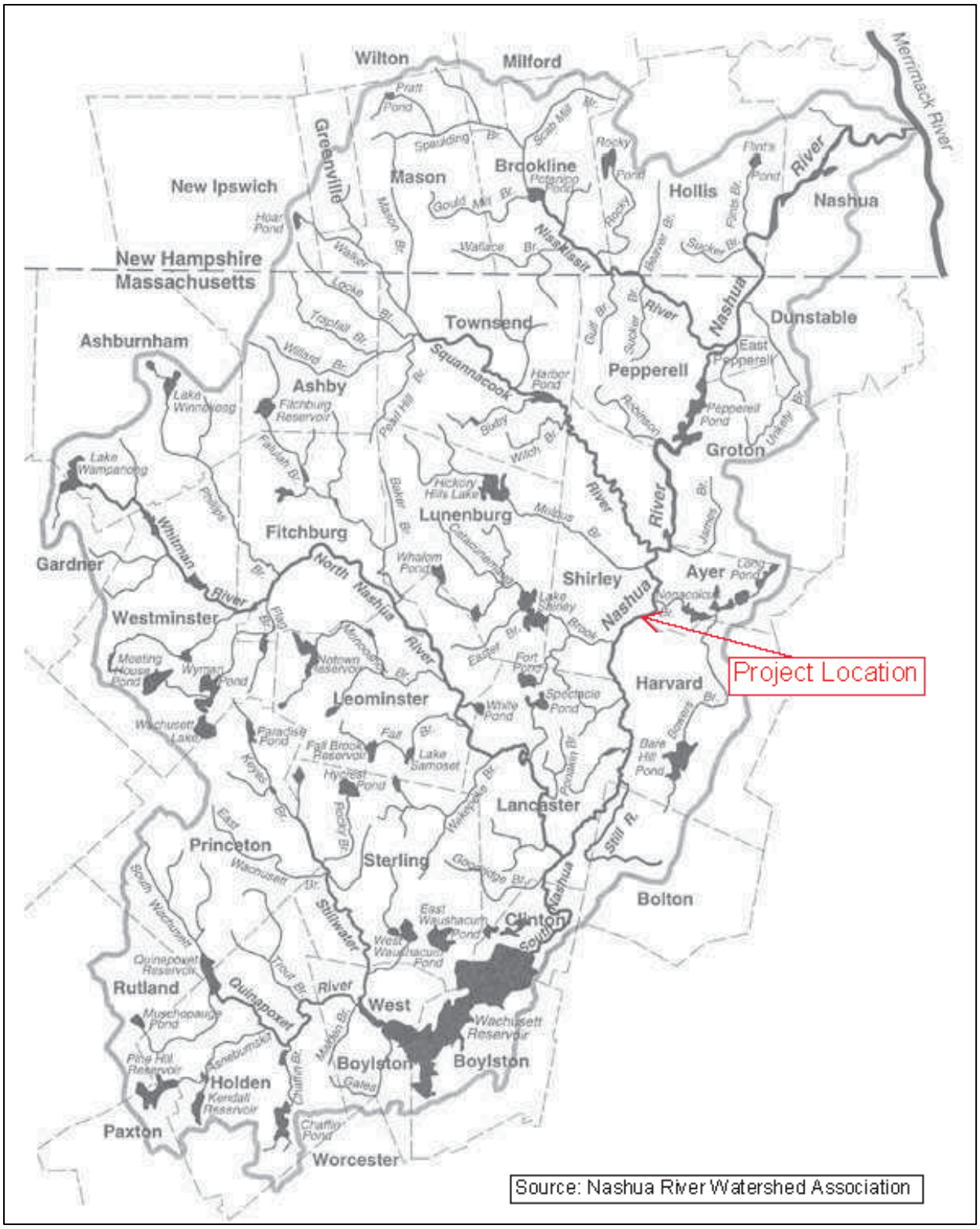

Figure 1. Nashua River Watershed

Project works consist of the 12-foot-high dam which impounds a 137-acre reservoir, and facilities including:

- A 180-foot-long composite masonry, rock-filled timber-crib frame spillway (Figure 2) at 216.6 feet above mean sea level (msl), a low-level let-down gate and 2-foot-high crest weir boards (e.g., flashboards)
- Left and right stone masonry abutments
- A 50-foot-wide, 109-foot-long power canal lined with stone walls (Figure 3)
- A power canal gate inlet structure with 2 inlet gates and trash racks with 2-inch spacing;
- A powerhouse with a siphon turbine pit and two Kaplan vertical axial flow turbines and synchronous generators with a combined capacity of 0.28 MW (Figure 4)
- A tailrace power canal partially lined with stone walls.

Figure 2. Ice House Dam

Figure 3. Canal, Powerhouse, and Grady Research Building in background

Figure 4. Powerhouse Interior

IV. REGULATORY AND COMPLIANCE STATUS

A review of the FERC elibrary found no documents related to the LIHI Criteria since the last recertification in 2014 other than a single FERC acknowledgement on August 19, 2014 of the Applicant's notification to resource agencies and FERC of a planned impoundment drawdown in May of 2014 needed as a result of damage to the eelway as a result of high spring flows. All other documents related to Project safety (e.g., dam safety inspections, emergency action plans).

The Project is also subject to continuing Orders of Conditions issued by the towns of Ayer and Shirley under the Massachusetts wetlands regulations promulgated by the Massachusetts Department of Environmental Protection (MDEP). The Orders include provisions for pre- and post-construction as well as continued operation of the Project. The Ayer Order of Conditions is included in Appendix B of the application. The Shirley Order of Conditions expired in February 2019 and is currently in the process of being renewed. The Notice of Intent to renew is included in Appendix F of the application.

V. PUBLIC COMMENTS RECEIVED BY LIHI

The application was publicly noticed on July 19, 2019. No public comments were received by LIHI during the 60-day comment period which ended on September 19, 2019. Given the limited nature of the Project, completeness of the application, no material changes at the facility, and availability of other public information, the reviewer did not contact resource agencies for input on the application. However, a visit to the site in June of 2019 confirmed various aspects of the facility and operations.

VI. LIHI CRITERIA REVIEW AND RECOMMENDATIONS

The Applicant selected three Zones of Effect (ZOEs) defined as follows (Figure 5):

- ZOE #1: Impoundment Reach, 137 acres and upstream ~6.5 RM to Bolton Flats
- ZOE #2: Bypassed Reach, ~ 300 feet
- ZOE #3: Tailrace, ~ 300 feet

Figure 5. Zones of Effect

The Applicant selected the standards shown in the tables below. Where applicable, reviewer recommendations for alternate standards are shown in **red**.

Table 1. LIHI Standards Selected for Zone of Effect No. 1 - Impoundment

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

Table 2. LIHI Standards Selected for Zone of Effect No. 2 – Bypassed Reach

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

Table 3. LIHI Standards Selected for Zone of Effect No. 3 – Tailrace

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

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 and has demonstrated compliance with Standard A-2, Agency Recommendation in all zones, to pass the Ecological Flow Regimes criterion. This standard requires:

> ***STANDARD A-2. Agency Recommendation:*** The flow regime at the facility was developed in accordance with a science-based agency recommendation.

Discussion: The Project operates in a run-of-river mode in accordance with the FERC and resource agency-approved Run-of-River Maintenance and Monitoring Plan (not publicly available) required under the FERC exemption article 14. The impoundment level is maintained by the inherent vacuum flume design of the powerhouse. The powerhouse will not run when the impoundment level falls below the top of the dam. When river levels fall below the crest of the dam, the vacuum is broken and the powerhouse turbines automatically shut down, allowing the impoundment levels to rise and water to spill over the dam. Impoundment height is measured by both an automatic, remotely accessible gauge and Programmable Logic Controller (PLC) as well as a hard gauge, visible at the dam. The Project is also required to release 90% of inflow during impoundment refilling after annual maintenance drawdowns or in emergencies, so as to maximize water turbulence and aeration and help maintain the river's water quality (FERC Environmental Assessment).[2] The Ayer Order of Conditions also restricts non-emergency drawdowns to the months of July through October to protect rare turtle activity in the spring.

There is a minimum flow requirement of 1 million gallons/day (MGD) or about 1.55 cubic feet per second (cfs) into the bypassed reach to provide adequate aeration levels for aquatic habitat (Ayer Order of Conditions). The flow is typically higher than the minimum and provided by a permanent notch in the crest weir sized to allow sufficient flow at all times. The Applicant conducted a "Bypass Flow Requirements" study from 2012 to 2014 (see LIHI webpage, 2014 recertification files) to characterize aquatic habitat in the bypassed reach, to confirm the flow through the notch, and to determine if the flow requirement was adequate to maintain water quality and support habitat, as required under Massachusetts Division of Fisheries and Wildlife (MDFW) mandatory prescriptions under Section 30(c) of the Federal Power Act, and included in article 2 and Appendix B of the FERC exemption. In a March 27, 2014 email, MDFW confirmed that the Project was meeting its minimum flow obligations and that, based on the study, the flow was adequate. The agency had participated in onsite demonstration flows as part of the bypass study.

Based on the information provided, this review finds that the Project satisfies Criterion A.

[2] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11528507

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 and has demonstrated compliance with Standard B-2, Agency Recommendation to pass the Water Quality criterion. This standard requires:

> ***STANDARD B-2. Agency Recommendation:*** The facility is in compliance with all water quality conditions contained in a recent Water Quality Certification or science-based resource agency recommendation providing reasonable assurance that water quality standards will be met for all waterbodies that are directly affected by the facility. Such recommendations, whether based on a generally applicable water quality standard or one that was developed on a site-specific basis, must include consideration of all water quality components necessary to preserve healthy fish and wildlife populations, human uses and recreation.

Discussion: The Massachusetts Department of Environmental Protection (MDEP) in consultation with MDFW waived State 401 Water Quality Certification in 2007, based on the Project location and the "*inclusion of needed water quality based conditions in the FERC exemption*". The waiver deferred all water quality concerns to state and federal fisheries agencies for determining minimum bypass reach flows. Agency recommendations related to flows and operations to protect water quality are discussed in Section VI.A above.

The Project is located in a portion of the Nashua River that is designated as Class B waters. Class B waters require habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Class B waters should also be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses, and have consistently good aesthetic value.

The Project vicinity (a 14.2 mile river segment, MA81-05) is listed in the Massachusetts 2016 integrated list of waters as being impaired due to: aquatic macroinvertebrate bioassessments, *Escherichia coli*, total phosphorus, and sediment bioassays (acute toxicity freshwater).[3] The cause of the impairments is listed as "unknown", but waste treatment plants are located upstream of the Project and discharge from them accounts for 30% of summertime flow in the river.[4]

The 2007 FERC Environmental Assessment (EA)[5] noted that the Nashua River has a long history of water quality issues which had improved greatly over time. The EA included water quality

[3] See p. 193 of https://www.mass.gov/files/documents/2017/08/zu/16ilwplist.pdf
[4] https://www.nashuariverwatershed.org/5yr_plan/subbasins/nashua_main.htm
[5] Op. cit., footnote 2

monitoring data up to that time from upstream and downstream stations monitored by the Nashua River Watershed Association. Results indicated episodic low dissolved oxygen (DO) and low pH between 1997 and 2007 at a site located about 15 miles upstream from the Project. At a site located about 3 miles downstream, all samples (collected only in 2005 – 2007) met state water quality standards. The Applicant provided LIHI with a letter from the Nashua River Watershed Association that notes continued water quality improvements in the river, and which agreed that the Project is not likely to be the cause of impairments which most likely include the wastewater treatment plants, combined sewer overflows, stormwater runoff, and historical industrial uses of the river (sediment toxicity). FWS also reported that the former Fort Devens Army installation had historical contamination leading to toxic levels of contaminants in fish tissue, and the base was deemed a Superfund site in 1989.[6]

Based on the information provided, the historical nature of water quality issues, and since the Project is a run-of-river facility that is unlikely to alter water quality in the Nashua River, this review finds that the Project satisfies Criterion B.

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.*

Assessment of Criterion: The Applicant selected and has demonstrated compliance with Standard C-1, Not Applicable/De Minimis Effect in the impoundment zone, and Standard C-2, Agency Recommendation in the bypassed reach and tailrace zones to pass the Upstream Fish Passage criterion. Impoundment zones typically qualify for the C-1 Standard since once above a dam there is no further Project-related barrier to continued upstream passage of fish. For the bypassed reach and tailrace zones, Standard C-2 requires:

> ***STANDARD C-2. Agency Recommendation:*** The facility is in compliance with science-based fish passage recommendations issued by appropriate resource agency(ies) for the facility and which may include provisions for appropriate monitoring and effectiveness determinations.

Discussion: Anadromous fish in the Merrimack River Basin include American shad, river herring and Atlantic salmon which have been observed using fish passage facilities on the Merrimack River at Essex Dam (Lawrence Project, LIHI #121), Pawtucket Dam (Lowell Project, LIHI #142) and Amoskeag Dam (just downstream of the Hooksett development, (LIHI #162). A current basin-wide fishery restoration effort focuses on restoring shad and herring, while attempts to restore salmon have been suspended. Anadromous fish access to the Ice House Project is blocked by the downstream Pepperell Dam and no anadromous fish are present at Ice House.

[6] https://www.fws.gov/northeast/mainecontaminants/pdf/NashuaRiver_Study.PDF

American eels are also present in the Merrimack River Basin. Eels have been found in fish surveys in the Nashua River and tributaries, both upstream and downstream of the Ice House Project.

An eel ladder is being constructed at the downstream Pepperell Project and annual monitoring at that Project will be required. At Ice House, an upstream eelway was designed in consultation with MDFW and FWS and approved by FERC (Figure 6). A siphon pipe provides attraction water and keeps the substrate wetted. The eelway was installed in 2010 and inspected by resource agencies on several occasions thereafter. The eelway is hinged so it can be lifted out of water, typically during annual maintenance work in October. It is lowered back into the water after ice-out each spring.

Figure 6. Ice House Upstream Eelway

Upstream anadromous fish passage was not required to be installed at the time of the FERC issued exemption; however, plans for fishways were to be filed with FERC prior to commencement of operations under exemption article 14. That requirement was subsequently vacated by FERC in a 2010 letter[7] based on both MDFW and US Fish and Wildlife Service (FWS) agreement to defer fishway plans until notified that they were needed, in accordance with the agencies' Section 30(c) mandatory prescriptions which reserved authority to require upstream

[7] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12413892

fish passage upon request. MDFW indicated that upstream passage at Ice House would likely be required once passage facilities have been installed at the Pepperell Dam. A review of the FERC docket for Pepperell (FERC No. 12721) shows that upstream anadromous passage at that project will be required no sooner than 2026 although plans must be filed, under a granted extension, by September 2019.[8]

Therefore, based on the information provided, this review finds that the Project satisfies Criterion C.

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 and has demonstrated compliance with Standard D-1, Not Applicable/De Minimis Effect in the tailrace zone, and Standard D-2, Agency Recommendation in the impoundment and bypassed reach to pass the Downstream Fish Passage criterion. Downstream zones typically qualify for the D-1 Standard since once below a dam and bypassed reach there is no further Project-related barrier to continued downstream passage of fish. For the impoundment and bypassed reach zones, Standard D-2 requires:

> ***STANDARD D-2. Agency Recommendation:*** The facility is in compliance with a science-based resource agency recommendation for downstream fish passage or fish protection, which may include provisions for appropriate monitoring and effectiveness determinations.

Discussion: As noted above, there are no anadromous fish species present and resource agencies reserved authority to prescribe fishways in the future. In addition to American eel, the application includes a list of resident fish in the Nashua River provided by MDFW as shown in Table 4.

[8] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15050959

Table 4. Resident Fish Species in the Nashua River

Common Name	Scientific Name
Bluegill	*Lepomis macrochirus*
Blacknose Dace	*Rhinichthys atratulus*
Banded Sunfish	*Enneacanthus obesus*
Chain Pickerel	*Esox niger*
Common Shiner	*Luxilus cornutus*
Fallfish	*Semotilus corporalis*
Golden Shiner	*Notemigonus crysoleucas*
Largemouth Bass	*Micropterus salmoides*
Longnose Dace	*Rhinichthys cataractae*
Pumpkinseed	*Lepomis gibbosus*
Spottail Shiner	*Notropis hudsonius*
Tessellated Darter	*Etheostoma olmstedi*
White Sucker	*Catostomus commersonii*
Yellow Bullhead	*Ameiurus natalis*
Yellow Perch	*Perca flavescens*

The Project intake has trash racks with 2-inch clear spacing such that smaller fish and potentially eel could pass the racks and become entrained in the turbines. However, while not a specifically designed downstream passage, the Project's minimum flow through the spillway notch permits passage downstream of riverine fish and eel. At the downstream Pepperell Project, interim downstream eel passage is required by August 1, 2020 and permanent downstream passage needed within 8 years after juvenile eels are observed moving upstream at that Project. It should be noted that the Project conducted a downstream eel study in 2018 which found only 2 adult eels in 3 ½ months of video observation.[9]

Therefore, based on the information provided, and given that none of the resident species require passage for completion of their lifecycles and given the low number of eels upstream of the Project, this review finds that the Project satisfies Criterion D.

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 and has demonstrated compliance with Standard E-2, Agency Recommendation in all zones to pass the Shoreline and Watershed Protection criterion for the Project. This standard requires:

> ***STANDARD E-2. Agency Recommendations:*** The facility is in compliance with all government agency recommendations in a license or certificate, such as an approved

[9] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15247429

SMP or equivalent for protection, mitigation or enhancement of shoreline surrounding the project.

Discussion: There are lands that are considered to have significant ecological value associated with the Project. The impoundment is part of The Oxbow National Wildlife Refuge. According to FWS, the "*1,697-acre refuge lies along almost eight miles of the Nashua River. Within its boundary is a diverse array of habitats beneficial to wildlife: wetlands, forested uplands, old fields, oxbow ponds, and, of course, the river itself. FWS manages the refuge for a variety of wildlife species, with a special emphasis on migratory waterfowl and birds that are dependent on grass/shrub land habitat.*" [10] The river and the abutting property are under the control and management of the FWS and upstream shoreline management and protection are the responsibility of the Oxbow Refuge Manager. The downstream portion of the property borders the Town of Shirley's property (Walker Rd.) and FWS property on the Ayer side of the river.

The Nashua River from the confluence of the North and South branches to the New Hampshire state border was designated in 2019 under the National Wild and Scenic Rivers System as a "Partnership Wild and Scenic River", along with two tributaries, the Squannacook River and the Nissitissit River. Under this program the National Park Service maintains administrative responsibilities for the designated river but it is managed in partnership with local communities and organizations under a local Stewardship Plan.[11] The designation excludes the area around the Project and two other dams, and grandfathers them as existing "compatible" facilities such that designation does not impact their existing operations. As a result, the designation does not constitute a material change at the Project since the last LIHI Certification.

There is no Shoreline Management Plan (SMP) required for the Project; however, the Project is subject to Massachusetts wetlands regulations in the 200-foot riverfront area. Rules are implemented via general and site-specific Orders of Conditions issued by the towns of Ayer and Shirley that govern the Applicant's activities associated with the shoreline.

Where shoreline activities occur within the Project boundary, they are restricted by the standing Orders of Conditions. Routine vegetation management is limited to mowing, pruning and the like. Any activity that might lower the impoundment in non-emergencies is further requires notification to the town conservation commissions and Massachusetts Natural Heritage and Endangered Species Program (MNHESP), and drawdowns are restricted to July through October, so as to not disturb nesting and other wildlife activity within designated lands. Based on the information provided and evaluation of other publicly available information, this review finds that the Project satisfies Criterion E.

The Applicant also requested the PLUS Standard in the impoundment zone for Shoreline and Watershed Protection. The PLUS Standard requires:

[10] https://www.fws.gov/refuge/Oxbow/about.html
[11] https://www.wildandscenicnashuarivers.org/uploads/8/9/9/1/89911665/nsn_stewardship_plan_7-23-18_final_web.pdf

> ***STANDARD E-PLUS:*** To the extent the facility owner has direct or indirect ownership or control over lands surrounding the facility and its riverine zones, the facility has an approved and legally enforceable shoreline buffer or equivalent watershed land protection plan for ecological land protection of water quality, aesthetics, and low-impact recreation values. The buffer zone must be dedicated for conservation purposes and must also be vegetated similarly to adjacent natural lands. In addition, the buffer zone must include at least 50% of the undeveloped shoreline around the reservoir, or a reservoir shoreline equivalent along its riverine zones. Alternatively, the facility has established a watershed enhancement fund for land management within the facility's watershed that is designed to achieve the ecological and recreational equivalent of land protection that would have been achieved by dedicating an ecologically effective buffer zone around more than 50% the reservoir.

The Applicant reported that they had participated in cooperative efforts to designate the Nashua River in the vicinity of the Project under the Wild and Scenic Rivers program. The Stewardship Plan notes that: "*The owners of the Hollingsworth and Vose Dam, the Ice House Dam, and the Pepperell Dam are important stakeholders. Over the years, they have partnered with member entities of the Study Committee on impactful projects benefitting the ORRVs, such as river-bank restoration and management of aquatic invasives. Their continued partnership will be important to the success of the Stewardship Plan."*[12]

The Applicant's efforts to support the river designation and participate in shoreline projects is laudable, but this review finds that these efforts do not rise to the level of the PLUS standard, and no PLUS standard is recommended.

F: Threatened and Endangered Species

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

Assessment of Criterion Passage: The Applicant selected and has demonstrated compliance with Standard F-2, Finding of No Negative Effects in all zones to pass the Threatened and Endangered Species Protection criterion for the Project. This standard requires:

> ***STANDARD F-2. Finding of No Negative Effect*.** There are listed species in the area, but the facility has been found by an appropriate resource management agency to have no negative effect on them, or habitat for the species does not exist within the project's affected area or is not impacted by facility operations.

Discussion: The Applicant provided a letter and email from FWS (Appendix G of the application) that indicated no federally-listed threatened or endangered species occur in the Project area which would imply that Standard F-1, Not Applicable/De Minimis could be used for

[12] Ibid.

that species. The general range of the Northern long-eared bat which is federally threatened and endangered in Massachusetts includes the Project vicinity. There are no federal critical habitats for the species in the Project area. Further, according to state information there are no hibernacula, roosting trees identified in the Project area.[13] Therefore, it is unlikely that the species would be present at the Project.

The Applicant also provided a May 15, 2019 MNHESP determination that the Project is located within priority habitat for unnamed state-listed species, and that with conditions that continue to restrict impoundment drawdowns and minimum flows, the Project "will not result in an adverse impact" to habitats of state-listed species.

Rare and listed species information in the Project vicinity from 2008 was included in the application; however, some of those species are no longer state-listed. Current species information is readily available only on a town-level basis and was collected from the state database for the towns of Ayer, Shirley and Harvard.

Habitat information was evaluated as part of this application review to help determine which species could be present at the Project (Table 5). Species that were listed in the 2008 data are bolded, assuming they may still be present. Species with habitat types not likely to be found at the Project, and species not observed since 1980 were eliminated. The resulting table includes three bird species, the Blanding's turtle, and six plant species that could be present.

Table 5. State-Listed Species Potentially Present at the Project[14]

Town	Taxonomic Group	Common Name	Scientific Name	MESA Status	Most Recent Observation
Harvard	**Bird**	**King Rail**	**Rallus elegans**	**T**	**2005**
Harvard	Bird	Least Bittern	Ixobrychus exilis	E	2005
Harvard	**Bird**	**Pied-billed Grebe**	**Podilymbus podiceps**	**E**	**1984**
Ayer, Shirley, Harvard	**Reptile**	**Blanding's Turtle**	**Emydoidea blandingii**	**T**	**2011**
Shirley	**Reptile**	**Blanding's Turtle**	**Emydoidea blandingii**	**T**	**2017**
Harvard	**Reptile**	**Blanding's Turtle**	**Emydoidea blandingii**	**T**	**2019**
Ayer	Vascular Plant	American Bittersweet	Celastrus scandens	T	2018
Harvard	**Vascular Plant**	**Cat-tail Sedge**	**Carex typhina**	**T**	**1999**
Harvard	Vascular Plant	Culver's-root	Veronicastrum virginicum	T	1993
Harvard	**Vascular Plant**	**Ovate Spike-sedge**	**Eleocharis ovata**	**E**	**1991**

[13] https://www.mass.gov/service-details/the-northern-long-eared-bat

[14] https://www.mass.gov/service-details/rare-species-by-town-viewer

Town	Taxonomic Group	Common Name	Scientific Name	MESA Status	Most Recent Observation
Harvard	Vascular Plant	Pale Green Orchis	Platanthera flava var. herbiola	T	2009
Harvard	**Vascular Plant**	**Small Bur-reed**	**Sparganium natans**	**E**	**1994**
Ayer	**Vascular Plant**	**Wild Senna**	**Senna hebecarpa**	**E**	**2010**

Most of the lands and waters within the Project FERC boundary are encompassed by the impoundment. The immediate Project area consists of an 11-acre parcel surrounding the Project works and the three Zones of Effect. Other surrounding lands and waters are owned and/or managed by other entities including the town of Shirley, the Commonwealth of Massachusetts, the Devens community, and USFWS, and the Oxbow National Wildlife Refuge. As noted above, Project lands under the control of the Applicant are subject to requirements in the Ayer and Shirley Orders of Conditions and the MNHESP determination. Specifically, the Ayer Order of Conditions restricts non-emergency drawdowns to the months of July through October to protect turtle activity; annual notification of work conducted within 100 feet of wetlands or 200 feet of the river; and consultation with the towns and MNHESP for any non-routine maintenance work or changes in the current operations or maintenance activities. The Order of Conditions, FERC exemption, and MNHESP determination also require the bypassed reach minimum flow to provide adequate oxygen levels, particularly in the summer.

Therefore, based on the information provided and evaluated, this review finds that the Project satisfies Criterion F.

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 and has demonstrated compliance with Standard G-2 in all zones to pass the Cultural and Historic Protection criterion for the Project. This standard requires:

> ***STANDARD G-2. Approved Plan:*** The facility is in compliance with approved state, federal, and recognized tribal plans for protection, enhancement, or mitigation of impacts to cultural or historic resources affected by the facility.

Discussion: The Project is subject to a Historic Properties Management Plan (HPMP) developed as a result of a Memorandum of Agreement executed among the Applicant, FERC and the Massachusetts State Historic Preservation Office in 2008 (Appendix G of the application). The

plan was approved by the SHPO in 2009 and by FERC in 2010. There are no archaeological resources, but Project structures including the powerhouse, the canal and bridge over the canal, and the dam were identified as being historic structures potentially eligible for listing on the National Register of Historic Places, collectively identified as the West Main Street Ice House Industrial Area. The HPMP governs Project operations and maintenance activities, proposed improvements, and public access that could impact historic resources. It includes an annual inspection and consultation with the SHPO if alterations or ground-disturbing activities are planned.

Based on the information provided, this review finds that the Project satisfies Criterion G.

The Applicant also requested the PLUS Standard which requires:

> ***STANDARD G-PLUS:*** The applicant has made a substantial commitment to restoring one or more significant cultural or historical resource in the vicinity beyond what is required in existing plans, such as a Historic Properties Management Plan; or the applicant has created a significant new educational opportunity about cultural or historical resources in the area, and formally commits as a condition of its LIHI Certification that this opportunity will exist for the duration of the LIHI Certification.

Rehabilitation of the powerhouse was undertaken with care toward using historically accurate materials and maintaining important historic architectural elements that were present in the remains of the former powerhouse. The modern Grady Research Building was constructed on the site of the destroyed former mill building. The modern building was designed to be appropriate for the historic period and visitors tend to believe that the building is original to the site. The Applicant preserved remnants of the original circa 1903 turbines and gate works now on public display (Figure 6).

Figure 6. Historic Turbine Display and Grady Research Building

Unique foundation stones with eagle emblems were unearthed during construction that date back to the New Deal and Works Progress Administration (WPA) of the 1930s. They are now on display at the end of the canal bridge (Figure 7).

Figure 7. WPA Foundation Stone Display

The Applicant has presented the history of the site at many community events, including local Lions clubs and area high schools and hosted many groups for various informational and educational tours – from charter school engineering and science classes to international economic development delegates. Most recently, the Applicant conducted a Nashua River Watershed 50th Anniversary historic walking tour titled, "Ice, Innovation & Impoundment – The Ayer Ice House Dam upon Nashua River". The tour explored the history of the Project location upon the Nashua River, including the first bridge to span the river, first dams to harness the power of the falling water, the power canal, post-colonial grist and saw mill, the birth and death of the "Mitchellville" woolen mills, coming of the electric trolley bridge, the innovation of the powerhouse, the founding of the Ice House, the Great Depression WPA bridge, and the wondrous story of the reclamation and rebirth of the historic site, Power Canal, Power House, and Hydro-Electric generation as Ice House Partners Inc./Grady Research.

Based on the information provided and the significant effort and cost to rehabilitate the site with historic sensitivity, this review finds that the Project satisfies the G-PLUS Standard.

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-2, Agency Recommendation in all zones to pass the Recreational Resources criterion for the Project. However, this review finds that Standard H-3, Assured Access is more appropriate. This standard requires:

> ***STANDARD H-3. Assured Accessibility and Use:*** If agency recommendations or an enforceable recreation plan is not in effect, the applicant demonstrates that they have been and formally commits as a condition of its LIHI Certification to continue to be responsive to reasonable requests from recreational interests for public access to lands and waters associated with the facility, , and to appropriate recreational water flows and levels, without fees or charges.

Discussion: The Project is not required to have and does not have a Recreation Management Plan. The FERC exemption requires the Applicant to allow public access where safe to do so. Recreational access to the river for fishing and canoeing is available and free to the public. There is a portage around the dam on the Shirley side. The Nashua River Watershed Association publishes a canoe and kayak guide[15] that alerts the canoeing/fishing public about the presence of the dam and the portage around the dam.

[15] https://www.nashuariverwatershed.org/recreation/paddling/canoe-kayak-guide.html

There is no safe access from the Ayer side due to areas restricted by safety concerns at the Project as well as steep banks on that side. Warning signs and barriers on the river include signage on the bridge abutment upstream of the dam, a warning buoy in the middle of the river upstream of the dam, orange trash booms upstream of the inlet gates andcanal, and large orange warning barrels strung across the river.

Based on the information provided, this review finds that the Project satisfies Criterion H.

VII. CERTIFICATION RECOMMENDATION

This review included evaluation of the application, and supplemental additional information provided in response to Stage I review questions, a review of the FERC elibrary and other publicly available information, and a visit to the site in June of 2019. Based on the evaluation, I recommend that the Project be recertified for a term of eight (8) years which includes an extra three years for meeting the Cultural and Historic Resources Protection PLUS standard. One condition is recommended since the Certificate term overlaps with plans for downstream eel passage at the downstream Pepperell Project, and the extended term could overlap with plans for installation of upstream fish passage plans at the Pepperell Project:

- **Condition 1:** Should the Facility Owner receive notification during the term of this LIHI Certification from either FWS or MDFW that upstream and/or downstream passage for anadromous or catadromous fish is required, the Owner shall forward to LIHI a copy of that notification along with a summary of plans and a schedule to initiate consultation and subsequently implement passage.