REVIEW OF APPLICATION

OF THE HOOKSET HYDROELECTRIC FACILITY

FOR CERTIFICATION

BY THE LOW IMPACT HYDROPOWER INSTITUTE

Prepared by Diane Barr

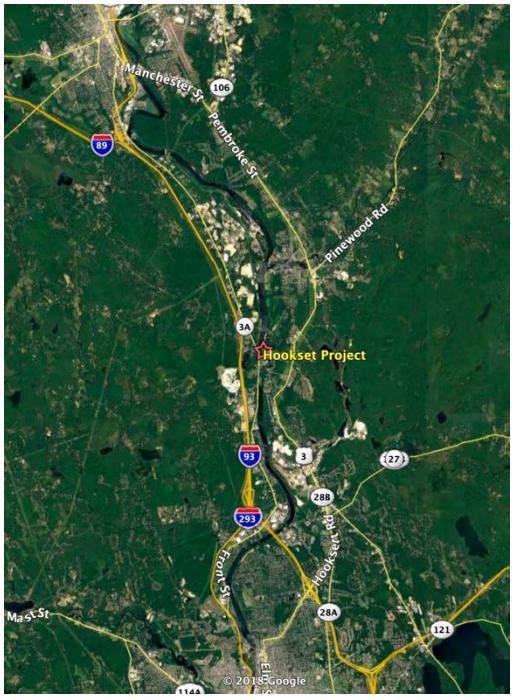
2 August 2019

I. INTRODUCTION

This report reviews the original application submitted by Central Rivers Power, NH (Applicant), on February 28, 2019 to the Low Impact Hydropower Institute (LIHI) for Low Impact Hydropower Certification for the Hooksett Hydroelectric Development (Hooksett or Project), part of the Merrimack River Project that also includes the Garvin Falls and Amoskeag Developments. A LIHI Intake Review was completed April 25, 2019. The Applicant promptly provided supplemental information for review in response to the Intake Review. The Application was posted for public review on May 20, 2019.

Project has a nameplate generation capacity of 1.6 MW and generates approximately 8,020 MWh per year. A Federal Energy Regulatory Commission (FERC) license #1893 was issued for the Merrimack River Project on May 18, 2007, with an expiration date of April 30, 2047. A corresponding modified New Hampshire Water Quality Certification (WQC) was issued on May 10, 2005. The FERC license and WQC both characterize the Project as a run-of-river operation.

Figure 1: Hooksett, NH



II. PROJECT'S GEOGRAPHIC LOCATION

The Project is located on the Merrimack River at river mile 81.1 in Merrimack County, New Hampshire. As shown in Figure 1, the Project is in the town of Hooksett and Bow. Access to the Project is from Interstate Route 93. The coordinates of the Project are 43.099476°, -71.464414°

III. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Merrimack River watershed area is approximately 2,805 square miles (Figure 2). The Hooksett development is located approximately 8 miles upstream of the Amoskeag dam and approximately 5.6 miles downstream of the Garvin Falls dam. The Hooksett reservoir extends approximately 5.5 miles with a surface area of 350 acres. The FERC Project boundary is 5.9 acres, shown in Figure 3. There are four other hydroelectric developments located along the Merrimack River in the Project vicinity, as shown in Figure 4. The Project features include a dam, power canal, substation, powerhouse and downstream fish passage facility. These are shown In Figure 5. The Project is a run-of-the-river facility operated automatically based on available river flow with a 64 cubic feet per second (cfs) minimum flow.

Figure 2: Watershed

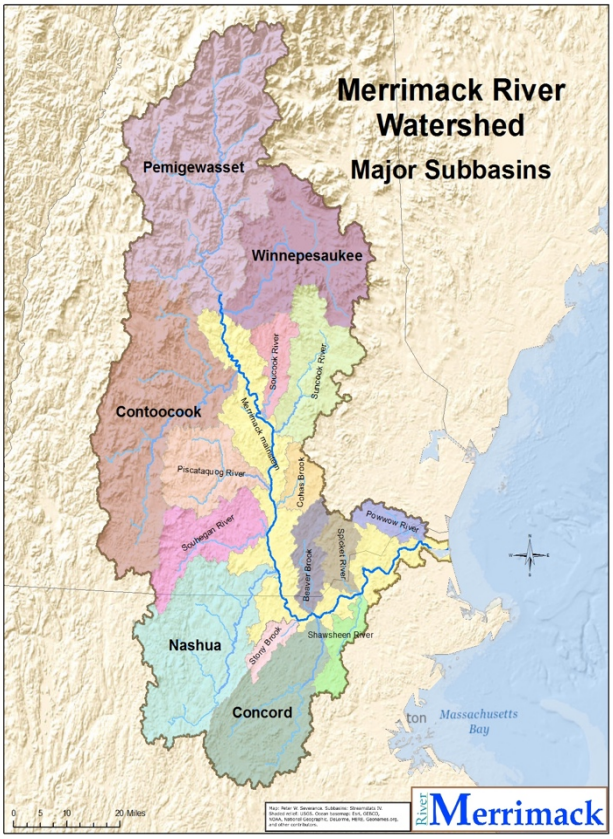


Figure 3: Project Boundary

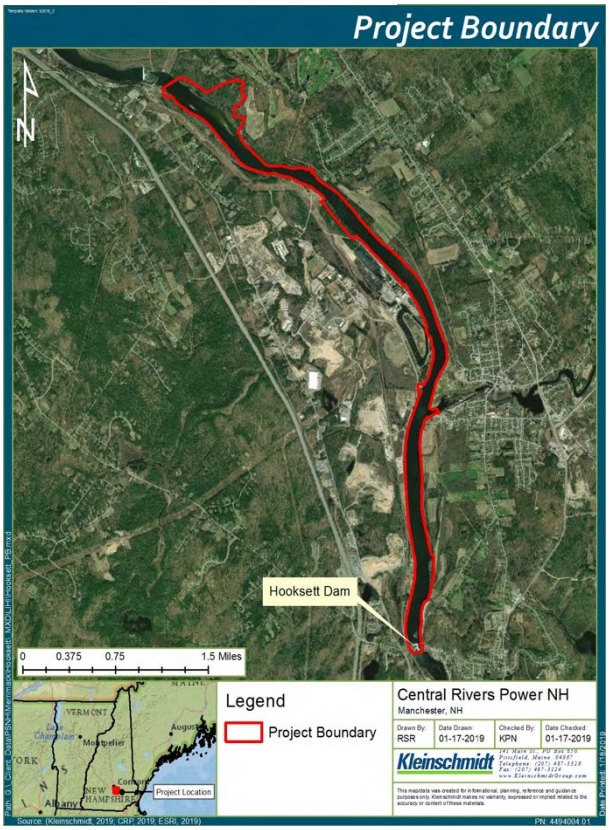


Figure 4: Merrimack River Dams

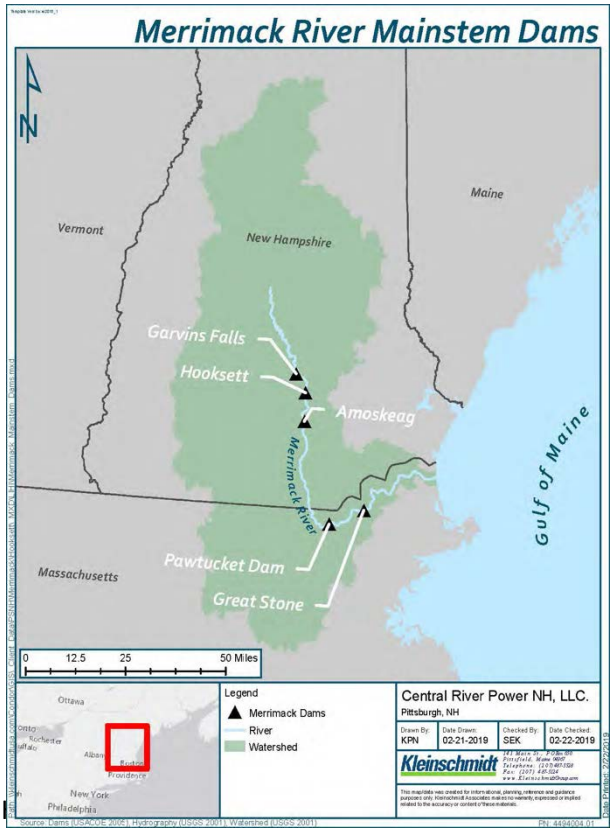


Figure 5: Project Features

The dam has two spillway sections. The 340-foot stone masonry section extends from the west bank of the river, while the remaining 250-foot section is made of concrete. The concrete section runs longitudinally up and down the river near the east bank of the river and forms a canal that extends to the powerhouse, each section topped with 2-foot-high wooden flashboards and a crest at elevation 187 feet (USGS datum). There is a 13-foot-by 20-foot steel Tainter wastegate located between the second spillway section and the powerhouse; a power canal, located at the east of the dam, and the brick powerhouse which is approximately 40 feet long by 45 feet wide. The powerhouse contains a single 2,150 hp I.P. Morris vertical propeller turbine connected to an Allis-Chalmers generator with an installed capacity of 1,600 kW. The Project has an approximate 110-foot long tailrace and a bypassed reach approximately 430 feet long. There is a substation and other appurtenances. In addition, the Fish Passage Gate allows for the necessary flows for the Fish Ladder.

See Figure 5 above and Project photos below.

Photo 1: Masonry and Concrete Spillway

Photo 2: Spillway with minimum flow

Photo 3: Fish Passage Gate

IV. Project Operation

The average annual power production of the Hooksett development is 8,020 MWh (2010-2017) and the total rated capacity of the unit is 1.6 MW. The powerhouse is remotely operated from the Control Center Customized Energy Solutions (CES) located in Philadelphia, Pennsylvania. The unit control is optimized through a SCADA system that allows either manual mode from the station or remote control via CES. The system is programmed to provide a continuous 64 cfs at all times into the bypassed reach for the protection of aquatic life. This is achievable with the maximum hydraulic capacity of the plant of 1,750 cfs at a gross head of 16 feet and an annual monthly average flow of 4,986 cfs.

V. ZONES OF EFFECT

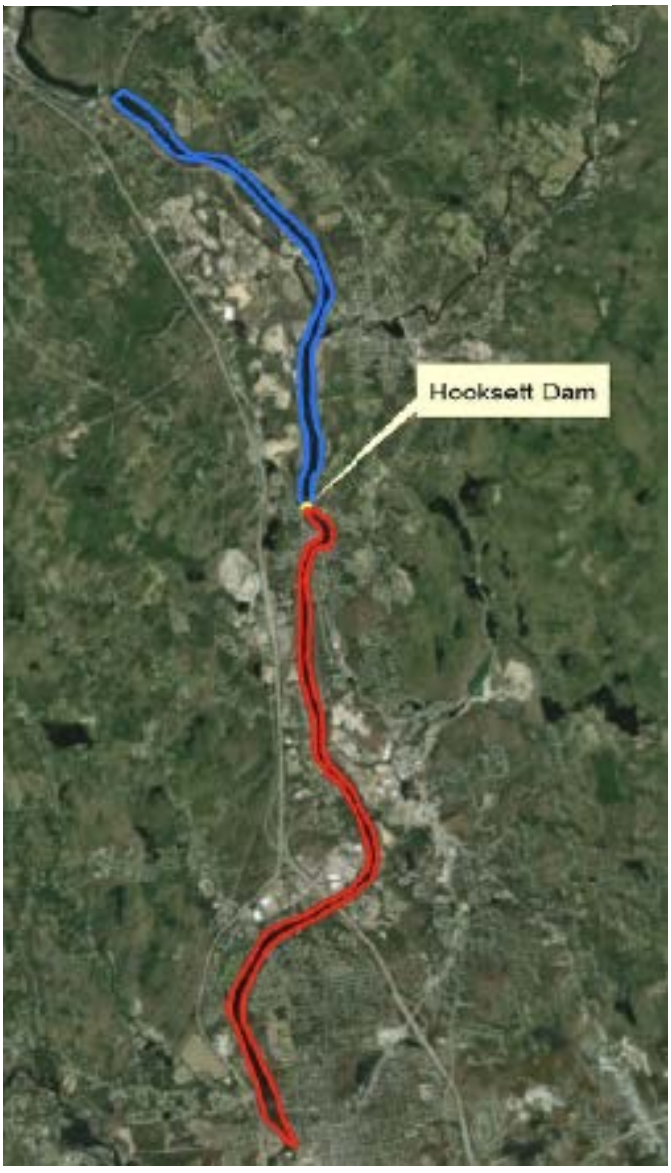
The Project consists of three Zones of Effects (ZOEs), Zone 1: Impoundment, Zone 2: Bypass, and Zone 3: Downstream.

Figure 6: Zones of Effects:

Zone 1: RM 81.1 to RM 86.6. Hooksett dam up to Garvin Falls Development

Zone 2: RM 81.1 to RM 81.2. Hooksett dam downstream approximately 110 feet.

Zone 3: RM 81.1 to RM 73.3. Tailrace end (110 feet downstream of the dam) to Amoskeag Dam



ZONE 1 UPSTREAM STANDARDS SELECTION

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

ZONE 2 BYPASS STANDARDS SELECTION

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

ZONE 3 BYPASS STANDARDS SELECTION

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

V. REGULATORY AND COMPLIANCE STATUS

The Project was issued FERC License #1893 on May 18, 2007 which expires on April 30, 2047. A Clean Water Act (CWA) 401 Water Quality Certificate (WQC) was issued by the New Hampshire Department of Environmental Services (NHDES) for the Project on May 10, 2005. The FERC license is located here in the FERC elibrary and in the LIHI supporting records. The WQC is located in Appendix C of LIHI Application. As part of this review, the FERC e-library was reviewed for the past 10 years. There were no compliance issues or records that depicted the Project different from the information contained in the application.

VI. PUBLIC COMMENTS RECEIVED OR SOLICITED BY LIHI

LIHI solicited public comments on the Application on May 20, 2019. LIHI did not receive any public comments during the 60-day comment period which ended on July 19, 2019. Based on the evidence presented by the Applicant, it was determined that direct outreach to state and federal agencies within the Project's regulatory jurisdiction was not warranted. Therefore, no comments were directly solicited for the application beyond the standard Public Comment period.

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.

The Applicant selected Standard 2 for all three ZOEs:

> ***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)

The Applicant provided sufficient evidence as to their adherence to FERC and NHDES agency requirements for ecological flows. In addition, the Project meets these conditions as a run-of-river facility with the automation controls matching inflow to outflow and the 64 cfs minimum flow through the bypassed reach. The minimum flow level was derived from habitat-based flow demonstration studies conducted for relicensing in consultation with resource agencies.[1] The impoundment is held at a consistent elevation with installed pressure gauges allowing for spill of any flow beyond the generation capacity flow. Under the WQC condition E-7 and license article 405, the Applicant was required to develop an operations plan in coordination with the U.S. Fish and Wildlife Service (FWS), New Hampshire Department of Fish and Game (NHFG), and NHDES. This was submitted to FERC on October 24, 2007 and approved by FERC on December 19, 2007. The Applicant provided sufficient evidence of these filings and approvals with the hyperlinks to the FERC eLibrary.

Based on the review of the application and supporting documentation, the Project satisfies the Ecological Flow Regimes criterion.

[1] FERC Environmental Assessment (EA) https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10937242

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.

The Applicant selected Standard 2 for all three ZOEs:

> ***STANDARD B-2.*** **Agency Recommendation:**
> - If facility is located on a Water Quality Limited river reach, provide an agency letter stating that the facility is not a cause of such limitation.
> - Provide a copy of the most recent Water Quality Certificate, including the date of issuance.
> - Identify any other agency recommendations related to water quality and explain their scientific or technical basis.
> - Describe all compliance activities related to the water quality related agency recommendations for the facility, including on-going monitoring, and how those are integrated into facility operations.

NHDES granted the Licensee a modified WQC for the Project on May 10, 2005 (Appendix C of the Application) after issuance of the original WQC on December 16, 2003. The Merrimack River in the Project area has been classified by New Hampshire as a Class B water. Class B waters are acceptable for fishing, swimming and other recreational purposes, and after treatment, for water supply. The New Hampshire standards for the Merrimack River are:

- Dissolved Oxygen (DO): 75 percent saturation or an instantaneous minimum of 5 mg/l,
- Temperature: not to affect designated uses,
- pH: 6.5-8.0 range, and
- Turbidity: 10 Nephelometric Turbidity Units (NTUs) or less.

The Merrimack River in the Project vicinity is listed by the state as impaired for DO, pH and aluminum with the source listed as unknown.[2] During the FERC licensing, in a 2002 water quality study conducted under extreme low flow conditions, DO of inflow to the upstream Garvin Falls development was below state standards 15% of the time, and at Hooksett, 10% of the time.[3] Prior to relicensing the Garvin Falls development had operated as a peaking or run-of-river facility depending on inflow but it now operates in run-of-river mode. During periods of no generation, DO concentrations displayed a diurnal pattern, varying throughout the day; but when the Project was operating, DO levels in the tailraces increased and stabilized and there was no diurnal fluctuation. NHDES participated in all licensing studies and issued the original and modified WQC. The Applicant reached out the NHDES to obtain verification that continued operations of the Project do not contribute to water quality limitations. No response from NHDES was received from their direct request, nor were comments received during the public comment period. But given that upstream inflow was shown to be DO limited under extreme low flow, and the Project's run-of-river operation it is unlikely that the Hooksett development contributes to that impairment. pH is often naturally low in New Hampshire waters and not likely to be caused by the Project. Upon review of the 401 WQC and the FERC e-library, the Applicant has both chosen the correct Standard and has evidenced their compliance with the Standard.

[2] https://www.des.nh.gov/organization/divisions/water/wmb/swqa/2016/index.htm
[3] FERC EA

Based on the review of the application and supporting documentation the Project satisfies the Water Quality criterion.

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.

The Applicant chose Standard C1 for Zone 1

> ***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.
> - 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.

The application provided sufficient evidence that Zone 1, the impoundment does not impose a barrier for fish passage. There are no barriers to passage in this section of the Project. The dam itself is considered part of Zone 2, the Bypass Reach. The review of the FERC license and the NHDES WQC did not address any conditions for fish passage in Zone 1.

The Applicant chose Standard C-2 for Zone 2 and 3.

> ***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 stringent).
> - 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.

Under license article 406, authority is reserved by the Secretary of the Interior pursuant to Section 18 of the Federal Power Act to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of up and downstream fishways. The anadromous fishery in the Merrimack River includes American shad, alewife, blueback herring, rainbow smelt, and Atlantic salmon. American eel, a catadromous species, also occurs in the Project area.

Per the FERC license, the timing of installation of upstream fish passage at Hooksett is based upon the growth of migratory and riverine fish populations in the Merrimack River. American eels are currently present in the river, and would benefit from the immediate implementation of safe, timely, and effective upstream and downstream eel fishways.

The FERC License directs the licensee to install upstream passage facilities for anadromous fish at the Hooksett dam, within three years after passage of either 9,500 or more American shad or 22,500 or more river herring in any given year at the downstream Amoskeag development. The Applicant, within one year after the trigger number of fish at Amoskeag, must file design drawings and a construction schedule for the fishway with the Service and obtain approval of FWS for any such fish passage design drawings and construction schedule. Upon approval by FWS, the licensee must submit the plan to FERC for approval. In anticipation that agencies would confirm that the trigger number was met during the 2016 river herring migration, the Applicant contracted with Gomez and Sullivan Engineers (GSE) to conduct a Hooksett Upstream Fish Passage Feasibility Study (Appendix B of Application) which was provided to agencies on November 4, 2016. The purpose of this study was to verify that the prescribed Denil fishway is still a cost-effective means for providing upstream passage.

A meeting was held on January 18, 2017 to review the study results and share the initial conceptual designs and a follow-up meeting was held on March 22, 2017 with the FWS fish passage engineer and NOAA hydraulic engineer. On January 19, 2017, FWS wrote a letter to the Applicant stating that the trigger numbers at Amoskeag had been met and upstream fish passage for the Hooksett development was warranted. A meeting was held on January 4, 2018 to review the Hooksett fishway design and cost prepared by GSE, and evidence of the meeting was provided in Appendix E of the Application. The review included assessment of issues related to fish passage efficiency, site access, and operations and maintenance. All parties agreed additional information was necessary to further evaluate the two proposed concepts. A draft Hooksett Upstream Fish Passage data collection plan was sent to the agencies on February 26, 2018 for review and comment. Comments were received from agency engineers via a Technical Memorandum on March 5, 2018 and incorporated into the final data collection plan. The Applicant held an Upstream Fish Passage Engineering Meeting on November 1, 2018 to discuss where the development of the upstream fish passage design concepts stood. The Applicant committed to the Hooksett Fish Passage Schedule(s) on December 5, 2018, which was appended to the annual fish passage status report filed with the Commission on December 19, 2018. The fishway installation schedule is shown below:

Phase	Date
Preliminary Fish Passage Design	July 15 – November 15, 2019
Final Design	November 18 – June 5, 2020
Construction	August 2 – November 19, 2021

On March 1, 2019 a conference was held to the updated Project timeline(s) and status of the 2-Dimensional Modeling of the conceptual designs. No specific changes in schedule were identified. Fishway effectiveness testing will be required once the fishway is operational. With regard to American eel, the agency prescription includes installation of interim and permanent upstream eelways at all three developments. According to the Applicant, no formal upstream eel passageway has been installed at Hooksett because the dam height is minimal (10-20') and there is a nature-like rockway at the spillway located off the tailrace island with natural steps that remain wetted. Eels are able to access the spillway near the island. The current proposal is to ensure that the nature-like fishway being designed for anadromous fish will also pass eels; especially at any low flows during the summer.

Based on the review of the application and supporting documentation the Project conditionally satisfies the Upstream Passage criterion with the requirement that the Applicant provide an annual status update of the construction schedule and any post-construction effectiveness testing results for the upstream passage facility.

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.

The Applicant chose Standard D-2 for Zones 1 and 2.

> ***STANDARD D-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 stringent).
> - 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.

The Applicant provided evidence for downstream fish passage with the Merrimack River Project Upstream and Downstream Fish Passage Plan developed in consultation with the resource agencies and filed with FERC in December 2006. This is included in the WQC condition E-8 (Application Appendix C). The Plan addressed the anadromous fishery in the Merrimack River, which includes American shad, alewife, blueback herring, rainbow smelt, and Atlantic salmon. In addition, the American eel, a catadromous species, also occurs in the Project area. The Fish passage facilities at the development have been installed and consist of a downstream fish bypass gate between the Tainter gate and the powerhouse shown in Photo 3. The fishway is operated on a schedule from April 1 to July 15 and from September 15 to November 15. Downstream passage studies for out migrating silver phase American eel were conducted between 2015 and 2018. Results indicated 90.5% successful passage in 2018 at Hooksett, similar to the prior year results of 92% based on smaller sample sizes (draft report provided by the Applicant). Additional downstream passage effectiveness testing is planned for 2019 and 2020.

The Applicant chose Standard D1, Not Applicable / De Minimis Effect for the Zone 3, Downstream.

> ***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).
> - 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.

The Applicant provided sufficient evidence that there are no barriers to downstream fish passage in Zone 3, downstream zone.

Based on the review of the application and supporting documentation the Project conditionally satisfies the Downstream Passage criterion with the requirement that the Applicant provide the 2019 and 2020 results of downstream eel passage effectiveness testing results.

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.

The Applicant selected Standard E-2 -Agency Recommendation all three ZOEs. In addition, the Applicant selected Standard PLUS.

> ***STANDARD E-2. Agency Recommendation:***
>
> - Provide copies or links to any agency recommendations or management plans that are in effect related to protection, mitigation, or enhancement of shoreline surrounding the facility (e.g., Shoreline Management Plans).
> - Provide documentation that indicates the facility is in full compliance with any agency recommendations or management plans that are in effect.

The Project boundary extends to the normal high-water mark of the impoundment. There is virtually no buffer between project waters and adjacent lands which are developed and include residential, commercial and industrial areas. There is a small area of forested land at the upper end of the impoundment.

However, the FERC License Article 407 requires a Shoreline Management Plan (SMP) which encompasses the entire Merrimack River Project boundary from the upper limit of the Garvin Falls impoundment downstream to the island complex adjacent to the Amoskeag tailwater, which includes all ZOEs of the Hookset development. The plan was developed in coordination with the recreation plan (Article 408) and historic properties management plan (Article 409). In addition, the SMP includes measures to protect the bald eagle and its habitat within the Project boundary. The plan was developed in consultation with FWS, NHFG, and NHDES.

The plan was submitted on May 18, 2009 and modified and approved by FERC on August 16, 2010. The SMP contained several reporting requirement intervals dependent on eagle nesting status. A provision of the SMP was to conduct annual monitoring of bald eagle nesting and roosting locations within the Project boundary. Due to the recovery of bald eagles at the local, state and national level, the Applicant consulted with state and federal agencies and requested that FERC modify the SMP to suspend annual bald eagle monitoring, which was approved by FERC on February 6, 2019. Despite the removal of the annual monitoring from the SMP, the Applicant maintains case-by-case review of proposed shoreline uses and will not allow any uses which have the potential to adversely affect bald eagles or their habitat. Should a proposed use be located in a bald eagle habitat area, the FWS, NHFG, and the Audubon Society are appropriately consulted by the Applicant, to determine if the proposed timing or type of shoreline use has potential to adversely affect eagles and what measures may be necessary.

Based on the review of the application and supporting documentation, the Project satisfies the Shoreline and Watershed Protection criterion.

The Applicant also selected the PLUS Standard for all Zones.

> ***STANDARD E-PLUS.*** **Bonus Activities*:***
>
> - Provide documentation that the facility has a formal conservation plan protecting a buffer zone of 50% or more of the undeveloped shoreline that the facility owns around its reservoirs and river corridors.
> - In lieu of a formal conservation plan, provide documentation that the facility has established a watershed enhancement fund for ecological land management that will achieve the equivalent land protection value of an ecologically effective buffer zone of 50% or more around the undeveloped shoreline.

The Applicant provided additional evidence of the SMP implementation to include a database and website of the shoreline classifications under the SMP. In addition, the Applicant conducts field surveys approximately every six years to determine if there are any unpermitted uses within the SMP area. The approximate 70-acre shoreline area encompassing all three developments includes approximately 60 acres for the benefit of bald eagles. No formal conservation plan protecting those areas was provided to meet the PLUS Standard, nor evidence of a watershed enhancement fund. In lieu of such conservation instruments, the SMP requires any permit application to determine first, if proposed activities within the Project boundary are within active eagle nesting and/or roosting areas and to assess the proposed timing of construction and the type of shoreline use to determine if the proposed activity or shoreline use is appropriate and in keeping with its Bald Eagle Habitat Protection Plan. The Applicant will not allow any uses which have the potential to have an adverse effect on Bald eagles or their habitat. Should a proposed use be located in a Bald eagle habitat area, the Applicant will ensure that FWS, NHFG, and the Audubon Society are appropriately consulted, to determine if the proposed timing or type of shoreline use has potential to adversely affect eagles and what measures may be necessary.

It should also be noted that the shoreline is subject to the NH Shoreland Water Quality Protection Act (SWQPA). Enacted in 1991, the SWQPA establishes minimum standards for the subdivision, use and development of shorelands adjacent to the State's public water bodies[4]. The Act has been modified several times since its enactment, and one of those changes was to include shoreline buffer zones, where vegetation removal is limited, and protection of the shoreline of rivers through enhanced oversight methods. All land within 250 feet of the high-water mark is defined as protected shoreland with restricted uses, including a 50-foot waterfront buffer and a 150-foot natural woodland buffer required to be maintained.

To qualify for the Plus Standard, the Project must have a formal conservation plan protecting a buffer of 50% or more around the undeveloped reservoir shoreline or along its riverine zones for purposes of conservation; or have a watershed enhancement fund that achieves the equivalent land protection value of a buffer zone of 50%

[4] For more information on the SWQPA, including its history and modifications, see the following link: https://www.des.nh.gov/organization/divisions/water/wetlands/cspa/categories/overview.htm

or more. LIHI's PLUS certification is designed to reward applicants for "making substantial investments in the environment around their facilities." Compliance with the SMP and state law do not rise to the level of the PLUS Standard. Therefore, I am recommending against PLUS certification for this Project.

F. Threatened and Endangered Species Protection

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

The Applicant selected Standard F-2, Finding of No Negative Effects for all three Zones.

> ***STANDARD F-2. Finding of No Negative Effects:***
> - Identify all listed species in the facility area based on current data from the appropriate state and federal natural resource management agencies.
>
> Provide documentation that there is no demonstrable negative effect of the facility on any listed species in the area from an appropriate natural resource management agency or provide documentation that habitat for the species does not exist within the ZOE or is not impacted by facility operations.

At the time of FERC relicensing, the bald eagle was listed as federally threatened on the Endangered Species list under the Endangered Species Act (ESA), and was known to be present at the Project and to use Project waters and lands for perching, foraging, and winter roosting. The FERC license required protection of five areas of bald eagle habitat, in addition to the Applicant's proposed area at the Garvin Falls development, be included in the Project and protected under the SMP discussed above. The Garvin Falls area is a 200-foot-wide buffer extending along about 2.9 miles of shoreline. The other areas are of varying sizes, but they also include lands extending up to 200 feet from the shoreline. At Hooksett, one area of about 13 acres in the impoundment contains known eagle perching and foraging habitat.

In addition, the application identified potential ESA listed plant species. The Applicant contacted the New Hampshire Natural Heritage Bureau (NHB) to confirm the presence of state-listed species. On January 29, 2019 the NHB confirmed the current or historical presence of three rare but unlisted species and a rare natural community within the Project area (Appendix E of the application). As a run-of-river project, it is unlikely that the Project would affect these species and community, as noted by NHB in that consultation. In addition, the FWS Species List was reviewed on February 4, 2019, (Appendix D of the application) and included the Northern long-eared bat (*Myotis septentrionalis*) and the small whorled pogonia (*Isotria medeoloides*) that may occur in the Project Area. The Applicant stated that it is unlikely that the Northern long eared bat would use the Project area for breeding and hibernating due to the urbanized nature of lands surrounding the Project. However, the species could use the area for feeding and transit. According to the application material, the small whorled pogonia occurs on upland sites in mixed-deciduous or mixed deciduous/coniferous forests that are generally in second- or third-growth successional stages. The application discussion concludes that because the Project is located in a lake/riverine area it is very unlikely that the species would occur at the Project.

<u>Based on the review of the application and supporting documentation, the Project satisfies the Threatened and Endangered Species Protection criterion.</u>

G. Cultural and Historic Resource 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.

The Applicant selected Criterion G2 – Approved Plan for all three zones.

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

A cultural and historic reconnaissance survey was conducted during relicensing and identified seven historic archaeological sites at the Hooksett development. In addition, 11 shoreline locations were considered to be sensitive for intact prehistoric archaeological resources and another 14 locations with more than low potential for intact historic archaeological resources. The Hooksett development facilities (powerhouse, dam, spillway, and Tainter gate structure) are also eligible for listing on the National Register of Historic Places (FERC EA).

The Applicant provided evidence from the FERC license of a Programmatic Agreement among the Federal Energy Regulatory Commission and the New Hampshire State Historic Preservation Officer (SHPO) for Managing Historic Properties, executed on May 16, 2006, including but not limited to the Historic Properties Management Plan (HPMP) for the Project which ensures that sites are monitored, and ground-disturbing activities are conducted in consultation with the SHPO. The HPMP was submitted on May 19, 2008 and approved by FERC on January 27, 2009. The Applicant also provided evidence of annual HPMP filings.

Based on the review of the application and supporting documentation and given run-of-river operations that minimize erosion, the Project satisfies the Cultural and Historic Resource 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.

The Applicant selected Criterion H2 – Agency Recommendation for all three zones.

> ***STANDARD H-2. Agency Recommendation:***
>
> - Document any comprehensive resource agency recommendations and enforceable recreation plan that is in place for recreational access or accommodations.
> - Document that the facility is in compliance with all such recommendations and plans.

Recreational facilities at the Hooksett development are limited to a canoe portage takeout at the dam. There is no formal portage route since boaters can use Merrimack Street along the river and put in

below the dam via a public non-Project boat launch. Additional recreational facilities are provided at the Garvin Falls and Amoskeag developments. The Applicant provided sufficient evidence with FERC License Article 408, a Recreation Management Plan (RMP) for the Merrimack River Project as a whole. This plan was submitted, and FERC approved the RMP on June 9, 2008. The plan was prepared in consultation with the NHFG, NHDES, Appalachian Mountain Club, American Whitewater, New England FLOW, the New Hampshire Rivers Council, and the Concerned Citizens of BOW. No FERC Environmental and Recreation Inspection Report was found on the FERC elibrary.

Based on the review of the application and supporting documentation, and given the limited recreational opportunities at the development, the Project satisfies the Recreational Resources criterion.

VIII. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on this review, the Hookset Project meets the LIHI criteria for certification as a Low Impact Hydropower facility and a five (5)-year term with one condition:

- **Condition 1:** The Facility Owner shall provide status updates to LIHI in annual compliance submittals on a) the upstream fish passage consultation and construction schedule; and b) on downstream eel passage effectiveness studies. The annual status update shall include all agency consultation records and concurrence on the final fish passage measures and effectiveness. LIHI reserves the right to modify certification based on passage effectiveness results.