

REVIEW OF APPLICATION
OF THE WEST DUDLEY HYDROELECTRIC FACILITY LIHI #76
FOR CERTIFICATION
BY THE LOW IMPACT HYDROPOWER INSTITUTE

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I. INTRODUCTION

The West Dudley Hydroelectric Project (“the Project”) is located on the Quinebaug River in the town of Dudley, Massachusetts (Figure 1). The Project is owned and operated by West Dudley Hydro, LLC (the Applicant) a Massachusetts limited liability company. The Project has a nameplate capacity of 310 kW. It was first granted LIHI certification in 2010 and was recertified in 2015. The 2015 Certification expired on April 7, 2020. The Applicant submitted their recertification materials in February 2020. On April 8, 2020 the Applicant was granted an extension of their Certificate to August 31, 2020. On August 17, 2020 the Applicant was granted a second certification extension until November 30, 2020.

On October 31, 2019, LIHI notified the applicant of upcoming expiration of the Low Impact Hydropower Institute certification for the Facility. The notification included an explanation of procedures to apply for an additional term of certification under the 2nd Edition LIHI Handbook, including the new 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?

If the answer to any question is “Yes,” the Application must proceed through a second phase, which consists of a more thorough review of the application using the LIHI criteria in effect at the time of the recertification application. The letter noted that because the new Handbook involves changed criteria standards and a new process, all projects scheduled to renew in 2017 and beyond will be an automatic ‘YES.’ Therefore, all certificates applying for renewal since 2017 are be required to proceed through both Phase one and Phase two of the recertification application reviews.

The 2015 LIHI Certificate #76 included one condition shown below. The Applicant has demonstrated compliance with Condition 1 with their annual status report findings. LIHI waived the requirement to submit annual shutdown logs in 2017.

Condition No. 1.

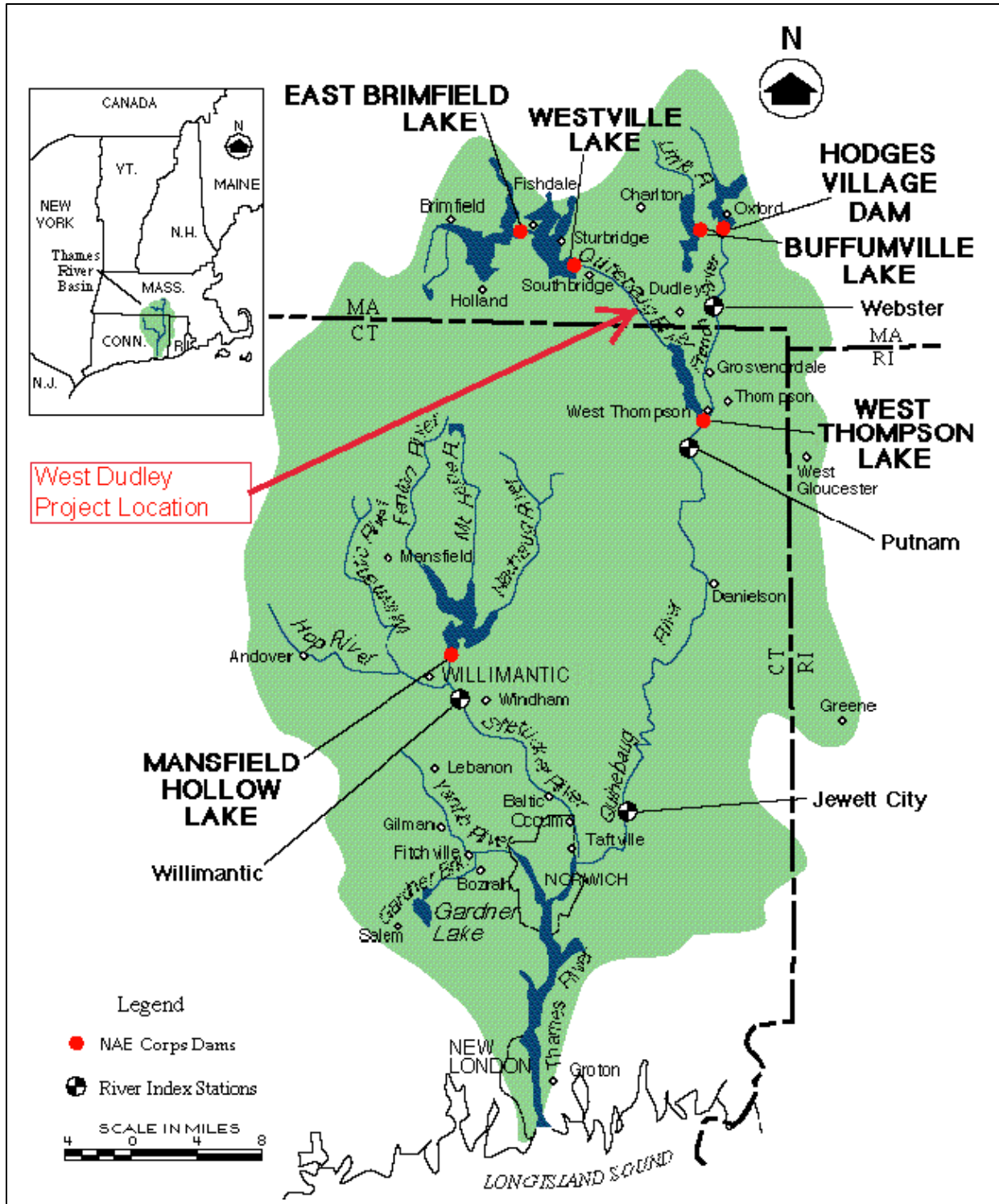
The Owner shall continue to provide interim safe, timely, and effective downstream passage for American eel on an annual basis during the period August 15 through November 15. The Owner shall cease generating from dusk to dawn during that period whenever either of the following occurs: 1) a rain event of 0.25 inch or more in a 24-hour period, or 2) a 50% increase in flow over the previous three-day average flow (e.g., if a substantial water release occurs from an upstream reservoir). The generation shutdowns shall continue for 72 hours (i.e., three nights).

The Owner shall keep a log during this period, showing hourly precipitation and generation information, and provide it to LIHI, the U.S. Fish and Wildlife Service and the Massachusetts Division of Fisheries and Wildlife by December 31 annually until permanent measures are in place.

In the event that either the U.S. Fish and Wildlife Service or the Massachusetts Division of Fisheries and Wildlife determine that the above-described interim downstream passage measure is not providing safe, timely and effective passage for out-migrating eels, the Owner shall implement other reasonable interim measures as requested by these agencies. The Owner may also propose alternative eel passage measures for consideration if such measures have a strong technical and scientific basis. During the term of this certification, should a resource agency request implementation of permanent downstream passage or upstream passage at the Facility, the Owner shall notify LIHI within 14 days of that request and provide LIHI with a copy of the request and the Owner's response.

II. PROJECT'S GEOGRAPHIC LOCATION

The Project is located on the Quinebaug River just north of the Connecticut and Massachusetts state line, see Figure 1. The Quinebaug River is a major tributary of the Shetucket River, which combines the Yantic River in Norwich, Connecticut to form the Thames River 15 miles upstream of Long Island Sound in New London, Connecticut.



III. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

Construction of the Quinebaug River Pond Dam (also called the Rhode Island Cardboard Company Dam) was completed in 1919. Project works then consisted of the dam, including existing flashboards two feet in height, and a brick and masonry powerhouse containing three turbine generators with a total installed capacity of 310 kW (Figure 2). The brick-and-masonry powerhouse (Figure 3) contains three turbine generators. Unit 1 consists of a modified Medsker brand turbine with a belt-driven induction motor. It is a fixed-blade Kaplan style that develops 95 kW of power. Unit 2 is also a modified Medsker brand turbine with a belt-driven induction motor. It is a fixed-blade Kaplan style which develops 120 kW of power. Unit 3 is a Flygt brand submersible unit with a direct-coupled planetary gearbox and induction generator. The powerhouse is flanked by two spillway sections, 55 feet and 114 feet in length and 17 feet high on average. The spillways carry flashboards four feet in height, raising the headpond elevation to 381.8 feet msl (top of boards). The tailwater elevation is 369 feet msl, providing a gross head of 13 feet. The headpond has a surface area of 31 acres. It is an adjustable blade Kaplan style with output of 95 kW. The total water flow through the project at full operation is approximately 500 cfs. The Project contains an upstream reservoir and downstream tailrace, but no bypass reach.

The Applicant stated that, to the best of its knowledge and belief, since the project's inception, no change had been made to increase the impoundment elevation or to alter the capacity or hydraulic discharge of the project's turbines. The maximum gross head is demonstrably less than 13 feet.



Figure 2. Project Features



Figure 3. Powerhouse

IV. ZONES OF EFFECT

The Project consists of two Zones of Effect, 1-Impoundment and 2- Downstream. There is no bypass reach.



Figure 4. Zones of Effect

Table 1 exhibits the Alternative Standards selected by each Zone of Effect (ZOE). The application demonstrated an appropriate Standard selection for each Zone and Criteria.

Table 1-LIHI Standards by Criterion

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

V. REGULATORY AND COMPLIANCE STATUS

The West Dudley Power Company filed a notice of exemption from licensing of a small hydroelectric project, known as West Dudley, Project No. 7254, on May 2, 1983. No agency comments were received in opposition to the exemption and on June 10, 1983 the Federal Energy Regulatory Commission (“FERC”) issued an exemption to the West Dudley Power Company authorizing the operation and maintenance of the West Dudley hydroelectric project, No 7254 (see original application files on LIHI website). A&D Hydro, Inc. purchased the West Dudley project from The West Dudley Power Company in the early 1990’s. On January 21, 1994 A&D Hydro, Inc. filed an Application for Amendment of Exemption with the FERC to request that paragraph (4)(i) of the Notice of Exemption for the project number 7254-MA be amended to reflect the fact that: (1) the existing flashboards were and are 4 feet in height (not 2 feet), (2) the impoundment surface elevation was and is 381.8 feet NGVD, and (3) the minimum (i.e. low flow) tail water elevation is 369 feet NGVD. The FERC e-library was searched for evidence of FERC proceedings regarding compliance. The FERC eLibrary did not present any evidence of Project non-compliance. The LIHI compliance records further demonstrate the project has remained in compliance based on their annual report filings.

VI. PUBLIC COMMENTS RECEIVED OR SOLICITED BY LIHI

A 60-day public notice was announced on August 12, 2020 which concluded on October 10, 2020. No comments were received on the recommendation for LIHI to recertify the Project. No additional outreach was made to regulatory agencies nor project stakeholders as the application presented sufficient evidence in meeting the LIHI recertification standards without additional information.

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 A-1, Not Applicable / De Minimis Effect for both ZOE's. To meet this Standard, the Applicant must demonstrate there is no bypass reach, the system functions as a run-of-river, and for the Impoundment Zone explain the water management (reservoir fluctuation potential) and how the fish and wildlife habitat within the zone are evaluated and managed.

The Project is operated in an instantaneous run-of-river mode, with no bypass reach. There is no measurable impoundment storage and a continuous minimum flow of 76 cfs or the inflow to the impoundment, whichever is less, is maintained for the protection and enhancement of aquatic resources in the Quinebaug River. The minimum flow was developed based on the New England summertime aquatic base flow of 0.5 cfs per square mile according to a 1983 letter from US Fish and Wildlife Service (FWS) provided in Appendix 1-1 of the Project's 2010 LIHI application. Impoundment elevation and minimum flows are electronically monitored. During any needed refill after an approved maintenance drawdown, 90% of inflow is passed downstream and the headpond is refilled using the remaining 10% of inflow until the normal impoundment elevation is achieved.

As a condition of the initial LIHI certification (2010), a flow monitoring plan was developed and implemented in 2012. FWS, the Massachusetts Division of Fisheries and Wildlife (MDFW) and the Massachusetts Department of Environmental Protection (MDEP) approved the plan. Based on the FERC elibrary review, no flow deviations have been reported during the current LIHI certification term.

Based on the review of the application and supporting documentation, the Project continues to satisfy the Ecological Flow 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.

The Applicant selected Standard 3, Site Specific Monitoring Studies for both ZOE's. To meet this Standard the Applicant must demonstrate If facility is located on a Water Quality Limited river reach, provide a link to the state's most recent impaired waters list and indicate the page(s) therein that apply to facility waters. If possible, the Applicant should provide an agency letter stating that the facility is not a cause of such limitation. In addition, recent water quality data should be provided from the facility or from other sources in the vicinity of the facility (e.g., data collected from the state, watershed associations, or others who collected data under generally accepted sampling protocols and quality assurance procedures) with a demonstration of how the Project satisfies current applicable water quality standards including designated uses; or the Applicant can

provide a letter from the appropriate state or other regulatory agency accepting the data.

The Applicant met this standard through the demonstration that the Quinebaug River is designated as a Class B warm water in the Project vicinity. Class B waters are suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. The 2016 303(d) Impaired Waters list (page 199) includes the Quinebaug River in the project vicinity in Category 5 – Waters requiring a Total Maximum Daily Load (TMDL). Per the application the impairments upstream of the dam include E coli, fecal coliform, other unspecified nutrients, dissolved oxygen, and physical alteration of habitat due to substrate embeddedness and undercut banks. The Southbridge MA wastewater treatment plant discharges to the river upstream of the Project. The only listed impairment downstream of the dam is for fecal coliform.

Water quality monitoring was conducted in 2011 and 2012 as a condition of LIHI certification at that time. In 2013, MDEP provided an email indicating that “After review of the submitted water quality data collected during the 2012 field season, the MA Department of Environmental Protection believes the West Dudley Hydroelectric Project (FERC # 7254) does not cause or contribute to violations of Massachusetts state water quality standards. Flow conditions during 2012 were sufficiently representative of low flow conditions.” Since the data are relatively recent, and the impairments upstream are still present and Project operations have not changed, it was not necessary to establish if the MA Department of Environmental Protection still considers the Project as not contributing.

Based on the review of the application and supporting documentation, the Project continues to satisfy 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 populations in areas affected by the facility.

The Applicant selected Standard 1, Not Applicable / De Minimis Effect for the Impoundment ZOE which requires the Applicant to demonstrate why the facility does not present a barrier to upstream fish passage. Impoundment zones by default qualify (with the rare exception) for this standard as once above a dam there is no further facility-related barrier to upstream fish movement. No evidence is therefore required by the Applicant to demonstrate meeting this Standard.

The Applicant selected Standard 2, Agency Recommendation, for the Downstream ZOE which requires the Applicant to demonstrate the proceeding and source, date, and specifics of the agency recommendation applied, explain the scientific or technical basis for the agency recommendation, including methods and data used, and/or 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 sufficient evidence for this Standard by demonstrating the FERC proceedings to date have not required passage. The FERC exemption includes a reservation of authority to prescribe fishways upon agency recommendations in the future. To date no agency has exercised that authority.

There are no anadromous fish species present as there are several dams below the Project that present barriers. American eel is present in the Quinebaug River upstream and downstream of the Project, so eels appear able to pass upstream on their own. Downstream dams including Putnam and Cargill Falls have installed upstream eel

ways, but restoration is not yet targeted in the Massachusetts portion of the river and there are no agency recommendations for upstream passage at the Project.

Based on the review of the application and supporting documentation, the Project continues to satisfy the Upstream Fish Passage criterion.

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 populations in the areas affected by the facility.

The Applicant selected Standard 2, Agency Recommendation, for the Impoundment ZOE which requires the Applicant to demonstrate a proceeding and source, date, and specifics of the agency recommendation applied, explain the scientific or technical basis for the agency recommendation, including methods and data used, and/or 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 sufficient evidence for this Standard by demonstrating the interim downstream eel passage and protection as requested by agencies during the 2015 LIHI recertification is achieved by shutting down operations and spilling inflow at night from August 15 through November 15 whenever a rain event of 0.25 inch or more occurs in a 24-hour period, or whenever there is a 50% increase in inflow over the previous three-day average flow. The generation shutdowns continue for three nights and logs of shutdowns are kept during these periods. As required by the LIHI Certification, the Applicant maintains a logbook of precipitation events as well as generation records which are stored at the Project powerhouse and can be made available for review by the agencies upon their request. The Applicant further demonstrated their commitment to these interim downstream passage measures until permanent passage is in place or alterations to the interim plan are requested by the agencies.

To move from interim to permanent measures, the Applicant has committed to permanently replace the existing 2" racks with ¾" clear spaced racks and to reduce turbine output during eel outmigration (August 15 – November 15) to ensure approach velocities <1.5 fps., or unless otherwise directed. In addition, the Applicant proposes to close the floodgate used to provide minimum flow and instead remove stoplogs in the bay immediately adjacent to the powerhouse to release at least 3% of max turbine capacity (or 20-25 cfs, whichever is greater). These new protection provisions are scheduled to be in place on or before August 1, 2021.

The Applicant selected Standard 1, Not Applicable / De Minimis Effect for the Downstream ZOE which requires the Applicant to demonstrate why the facility does not present a barrier to downstream fish passage. Downstream zones by default qualify (with the rare exception) for this standard as once below a dam there is no further facility-related barrier to downstream fish movement.

Based on the review of the application and supporting documentation, the Project continues to satisfy the Downstream Fish Passage criterion. Since the voluntary proposal to install permanent downstream eel passage is planned to be completed during the next LIHI term, a condition is recommended to notify LIHI of completion of the work and acceptance by resource agencies.

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 1, Not Applicable / De Minimis Effect for both ZOE's which requires the Applicant to demonstrate there are no lands with significant ecological value associated with the facility and/or to document that there have been no Shoreline Management Plans or similar protection requirements for the facility.

The Applicant provided sufficient evidence for this Standard by demonstrating the Project area is comprised of industrial, residential and undeveloped lands. There is no requirement in the FERC exemption for a shoreline management plan or similar plans. Since the Project has no storage there is little to no shoreline fluctuation impacts due to reservoir fluctuation. The application further demonstrates there has been minimal colonization of exposed shorelines by emergent plants within the 200-foot boundary area due to the commercial and residential landscape.

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

F. Threatened and Endangered Species Protection

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

The Applicant selected Standard 1, Not Applicable / De Minimis Effect for both ZOE's which requires the Applicant to demonstrate there are no listed species in the facility area or affected riverine zones downstream, if listed species are known to have existed in the facility area in the past but are not currently present, the facility was not the cause of the extirpation of such species, or if the facility is making significant efforts to reintroduce an extirpated species, describe the actions that are being taken.

The Applicant provided sufficient evidence for this Standard by demonstrating their search of the USFWS IPaC online data tool that showed the potential for the Northern long-eared bat (Threatened status) may be present in the project vicinity, but the Project itself does not provide suitable habitat. In addition, the Applicant provided evidence from the Massachusetts Oliver online mapping tool that potential state-listed species are located outside of the Project boundary (physical footprint of the Project lands established under the FERC license). In review of habitat, the Applicant included the Dudley town report which placed the state-threatened large-bracted tick-trefoil, (*Desmodium cuspidatum*) and shining wedgrass, (*Sphenopholis nitida*) potentially on the shoreline near the impoundment. Per the Applicant's evidence there is no apparent habitat for any of these species that are upland species under the Project's influence .

In consideration of aquatic species, two freshwater mussel species are species of unlisted special concern, creeper (*Strophitus undulatus*) and triangle floater (*Alasmidonta undulata*). The Applicant established that given run-of-river operations, the Project is unlikely to impact these species, if they are present. While the Applicant did not establish why there would be an unlikely mussel impact our research determined that the run-of-river operations would not expose the mussels to conditions that would be likely to result in an impact. Operations that pose a threat to mussels include peaking operations through impoundment raising and lowering

and by rapid discharge changes from low to high into the downstream reach. Mussels cannot move quickly to avoid rapid changes in water levels. The Project does not operate in this matter.

Based on the review of the application and supporting documentation, the Project continues to satisfy the Threatened and Endangered Species Protection criterion.

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 Standard 1, Not Applicable / De Minimis Effect for both ZOE's which requires the Applicant to demonstrate there are no cultural or historic resources located on facility lands that can be affected by construction or operations of the facility and/or to document that facility construction and operation have not in the past, nor currently adversely affect any cultural or historic resources that are present on facility lands.

The Applicant provided sufficient evidence for this Standard by demonstrating that the powerhouse was constructed in 1983 and the Massachusetts State Historic Preservation Office (SHPO) indicated that Project construction would not adversely affect any cultural or historic resources. In addition, in 2011 as part of the original LIHI certification application, the SHPO again stated that given no new construction, demolition or other modifications, the Project would not affect such resources, if any exist. The FERC exemption has no requirements related to cultural or historic resources and no Project-related structures are listed on the National Register of Historic Places. The only change to the Project was the addition of hydraulic spill gates in the summer of 2017. These were simply upgrades to the stop logs that were installed in 1983 and of no historic relevance. There have been no changes to the original dam or structure which was originally constructed in 1919.

Based on the review of the application and supporting documentation, the Project continues to satisfy the Cultural and Historic Resources 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 Standard 3, Assured Accessibility for both ZOE's which requires the Applicant to demonstrate in lieu of existing recommendations and plans for recreational uses, the facility's current and future commitment to accommodate reasonable requests from recreation.

The Applicant provided sufficient evidence for this Standard by demonstrating that there are no Project-related recreation facilities but there are non-Project facilities including an impoundment boat launch, canoe take-out, portage and put-in. Minimal hiking and boating occur in the Project area. The Applicant allows access to the reservoir and downstream reaches of the Project

Based on the review of the application and supporting documentation, the Project continues to satisfy the Recreational Resources criterion.

VIII. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on this review, the LIHI Project #76, West Dudley Hydro, LLC meets the LIHI criteria for recertification as a Low Impact Hydropower facility and a new 5-year term is recommended with the following condition.

Condition 1: The facility Owner will continue to voluntarily provide interim downstream eel passage until such time as the voluntary permanent downstream passage measures are implemented. The facility Owner shall provide LIHI with an annual update on the schedule for permanent passage implementation and, upon completion, shall provide evidence that the installation is functional and acceptable to resource agencies.