



# Indian Orchard Project (FERC No. 10678)

*Reviewer's Report of an  
Application for Certification to the  
Low Impact Hydropower Institute  
from Essential Power, LLC*

**Michael J. Sale  
M. J. Sale & Associates  
12/2/2013**

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## **REVIEW OF APPLICATION FOR CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE INDIAN ORCHARD PROJECT**

*Prepared by:*  
Michael J. Sale  
December 2, 2013

### **1. INTRODUCTION**

This report reviews the original application received by the Low Impact Hydropower Institute (LIHI) for Low Impact Hydropower Certification of the Indian Orchard Hydroelectric Project (Indian Orchard, or Project). This application was submitted by William P. Short III on behalf of the project owner, Essential Power LLC (Essential Power, or Applicant), on August 31, 2012. The Intake Review of this application was requested in January 2012 and was completed in June 2013 by Michael J. Sale, with findings of no significant shortcomings. The complete application was received July 14, 2013.

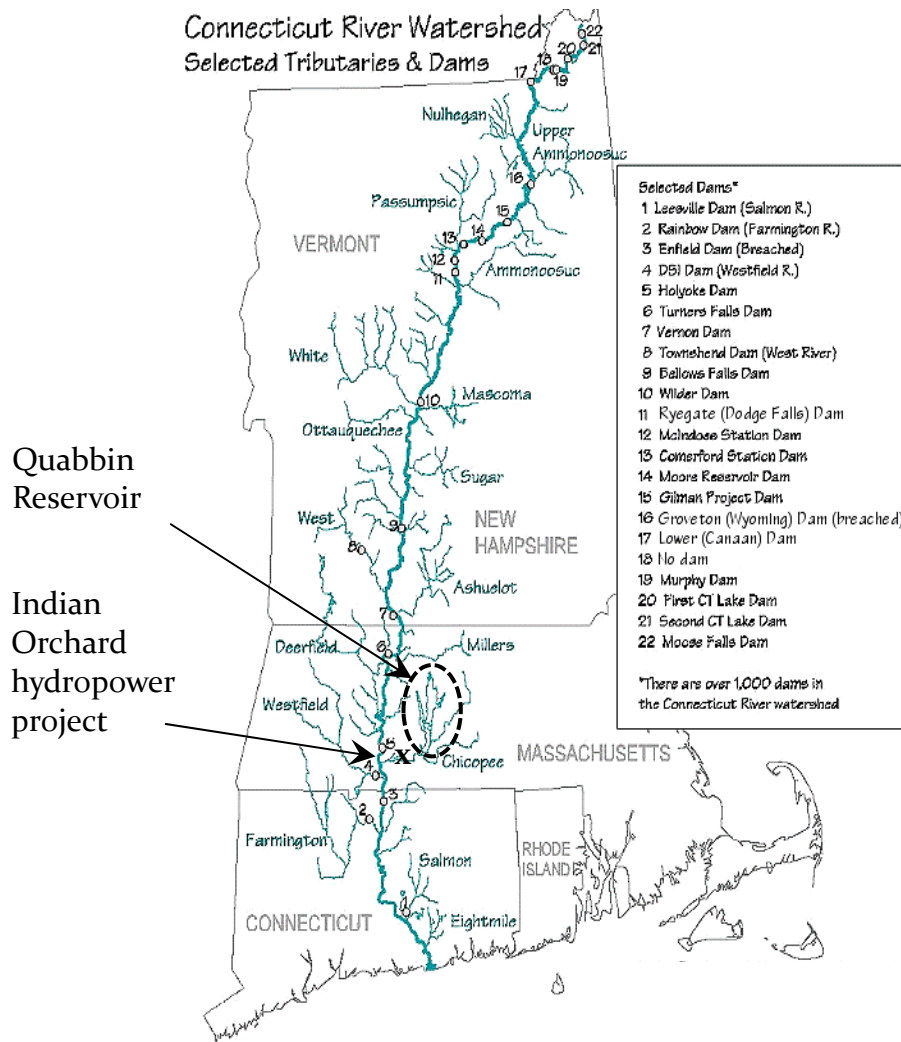
The Indian Orchard hydropower project (FERC Project No. 10678) is a small, 3.70-MW, non-conduit facility that was exempted from licensing by order of the Federal Energy Regulatory Commission on September 11, 1992. It is located on the Chicopee River in western Massachusetts (Figure 1). The FERC exemption was amended on December 29, 1999, and again on November 8, 2001 (Section 4). It has been in compliance with its FERC requirements since 1992. The annual average generation of the facility is estimated at 12,700 MWh; in the last annual reporting period from October 2012 to September 2013, the annual generation was 8,098 MWh.

Until the late 1990s, the project was owned by Western Massachusetts Electric Company (WMEC). It was then sold to Consolidated Edison Energy, Inc. (CEEI), an affiliate of Consolidated Edison Company of New York, Inc. In 2008, the Project was sold to its current owner, Essential Power.

### **2. PROJECT LOCATION**

The project is located between the Town of Ludlow and City of Springfield in Hampden County, Massachusetts, on the Chicopee River about eight miles upstream of the confluence of the Chicopee and Connecticut rivers (Figure 1). The Project dam crosses the municipal line between Ludlow and Springfield. The powerhouse is located in Springfield. The impoundment extends in a northeasterly direction, bordering Ludlow and Springfield.

The Chicopee River watershed is the largest tributary basin of the Connecticut River. The Chicopee River basin drains approximately 722 square miles and is comprised of three major watersheds -- the Swift River, Ware River, and Quaboag River. In addition to its size, the Chicopee is also notable in that it has a relatively high gradient, dropping 260 feet in 18 miles and making it a prime location for hydropower development. The river basin is highly developed for water resources and



**Figure 1. Location of the Indian Orchard hydropower project, in the Connecticut River basin in central Massachusetts.**

relatively highly impacted by municipal and industrial development, especially in the lower basin around the Indian Orchard project.

The Chicopee basin is dominated by Quabbin Reservoir, a manmade reservoir that serves as one of the major water supplies for metropolitan Boston. The Massachusetts Water Resources Agency (MWRA) that owns and operates Quabbin Reservoir, diverts nearly all of the water from the upper Swift River watershed and diverts for eight months of year nearly all of the water from the uppermost portion of the Ware River watershed. Out-of-basin diversions from the upper Chicopee basin are then transferred through aqueducts to the metropolitan Boston area. Total out-of-basin diversions from the upper basin are up to 230 mgd or 356 cfs.

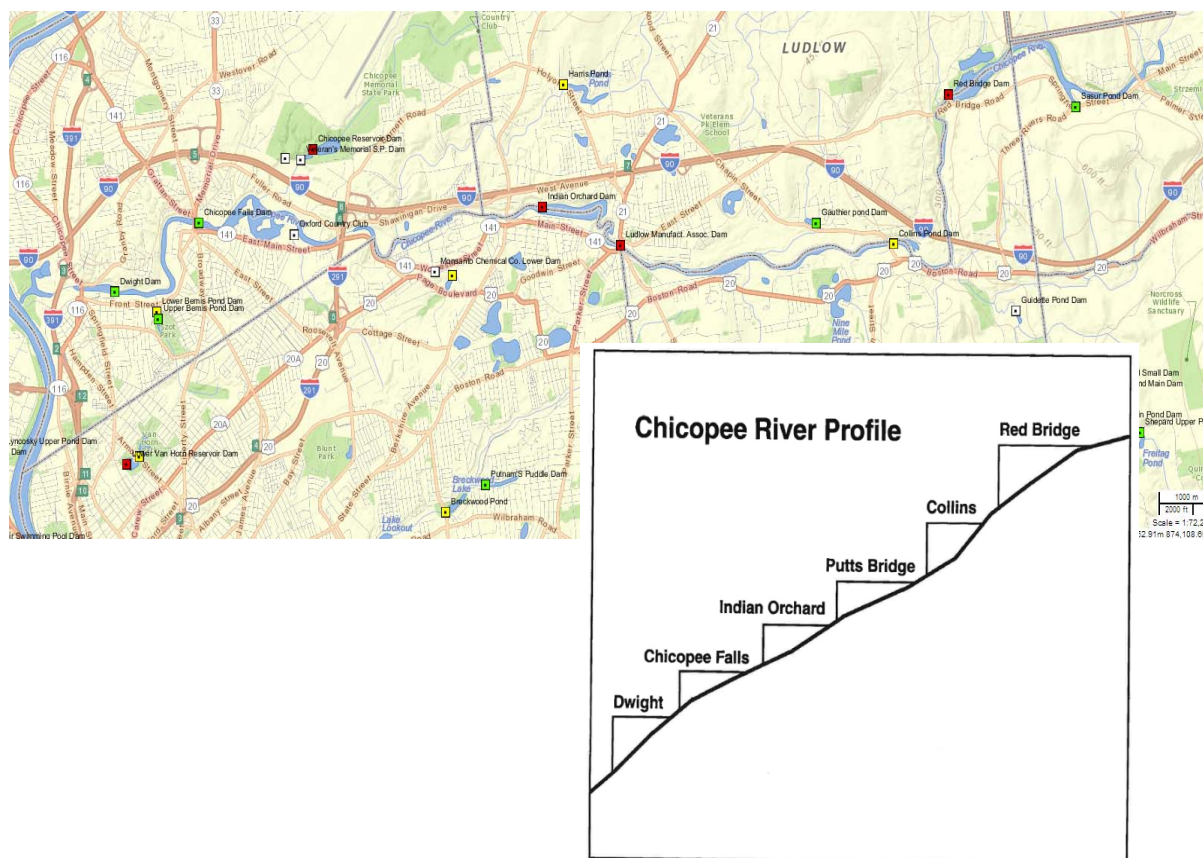
There are six hydropower projects in the Chicopee River between the Connecticut River and the Chicopee's origin near Palmer, MA, where the Swift, Ware, and Quaboag rivers join (Figure 2a and b). Two of the projects, the Dwight Station project (FERC Project No. 10675) and the Chicopee Falls

Dam (FERC Project No. 6522) are downstream of Indian Orchard. The other three projects, Putts Bridge, Collins, and Red Bridge, are upstream of Indian Orchard. All three of those upstream projects have been previously certified by LIHI. The Collins project is owned and operated by an affiliate of Swift River Company. Chicopee Falls is owned by Chicopee Municipal Light District and has been operated by an affiliate of Swift River Company since April 2013. Dwight, Indian Orchard, Putts Bridge, and Red Bridge are all owned and operated by Essential Power.

The upstream watershed area at the Indian Orchard dam is 687 square miles. There are no significant tributaries that enter the Chicopee between the Connecticut River and Red Bridge.

### 3. PROJECT DESCRIPTION

The Indian Orchard hydropower project was constructed at an existing masonry, cut-stone dam that has been in place before 1885 (cover photo). The powerhouse is at the end of a 1,300-ft-long diversion canal that bypasses approximately 1,600 feet of the main Chicopee River channel below the dam (Figure 3).



**Figure 2. Hydropower projects on the Chicopee River, between the Connecticut River on the west and Palmer, MA, on the east (the site labeled Ludlow Manufact. Assoc. Dam here is the location of the Putts Bridge project).**





**Figure 3. Aerial photograph of the Indian River hydropower project on the Chicopee River, Massachusetts (Source: Google Earth).**

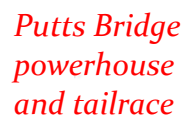
### **3.1 Major Project Works**

The major project works include a cut-stone dam with a crest elevation of 159.4 feet (NGVD), topped with 1.6-foot flashboards, an impoundment, a canal headgate house, a power canal, an intake structure for two operating penstocks, a powerhouse with two operating generating units, a tailrace channel (125.25 feet NGVD) and appurtenant facilities.

The dam crosses the Chicopee River in a roughly north-to-south direction, and is a masonry, gravity structure with a timber deck approximately 402-foot long by 28-foot high. The deck elevation is El. 159.4, topped with 1.6 foot flashboards to create an impoundment elevation of 161.0 feet. The gross head on the project, including flashboards, is 35.7 ft.

At normal pond elevation, the Indian Orchard Project impoundment extends approximately 4,200 feet upstream of the dam, almost to the tailwater of the Putts Bridge project. At normal pond level, the maximum surface area is approximately 74 acres at El. 161.0 feet. While the maximum useable storage of the reservoir is 70 acre-feet, the used storage capacity is just 35 acre-feet (top 0.5 of reservoir). While the allowed daily drawdown is 0.5 foot during the spring and 1.0 foot for the balance of the year (except during energy audits and system emergencies when this limit may be exceeded), the current operating practice is to limit year-round drawdown to six inches.

The canal headgate structure is a brick structure on a concrete foundation, housing the seven intake gates that control the flow from the impoundment to the power canal. Early 2000s plans for the installation of a bar rack and/or a trash boom at the canal gatehouse were discussed but not implemented. A review of the FERC record shows that there is no requirement that the Project have such installations. The seven head gates are all of steel construction, 8.4 feet high by 9.4 feet wide. Each gate is equipped with rack and pinion hoists. The gate hoists are motor-driven by seven 3-hp, 60-cycle, 220/440V, 1730 rpm motors. A minimum flow discharge pipe was installed just downstream of the canal gatehouse. This minimum flow outlet structure is to be replaced with a new structure by the end of 2013.



The power canal extends from the headgates to the penstock intake structure. The canal is approximately 1,300 feet long by 76 feet wide at the gatehouse, narrowing to 52 wide at the penstock intake. The inner sidewalls are constructed of cut-granite, and earthen embankments create the outer walls. The canal has a cobble floor. An 88-foot long canal is on the north wall of the canal, adjacent to the headgate house. The spillway has a crest elevation of 160.9 feet.

Two operable and two inoperable steel penstocks lead underground from the intake structure to the powerhouse. The two inoperable penstocks were taken out of service in 1970 and are now plugged with concrete. The penstock for the operational Unit No. 3 is 190 feet long and 11 feet in diameter. The penstock for operational Unit No. 4 is 160 feet long and 16 feet in diameter.

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The powerhouse measures approximately 190.5 feet by 50 feet in plan, with bays for the discontinued Units No. 1 and No. 2 at the easterly end, and operating Units No. 3 and No. 4 at the westerly end of the structure.

The two operating units have capacities of 1.5 MW and 2.2 MW. A new runner assembly and a new turbine nameplate was installed by CEEI for Unit No. 3 in 2001. Unit No. 3 has a maximum hydraulic capacity is 625 cfs, while Unit No. 4 has a maximum hydraulic capacity is 900 cfs. The minimum operating limit of the smaller unit is approximately 300 cfs. These turbines discharge through two tailrace bays directly to the Chicopee River.

The powerhouse's 5.5 KV generator bus is connected to two 3 MVA transformers located adjacent to the powerhouse. These transformers convert the 5.5 KV, 2-phase, 4-wire system in the generating station to 13.8 KV, 3-phase, 3-wire system for connection to the 13.8 KV bus in WMECO Orchard substation.

The dam creates an average 10.8-foot deep, 74-acre impoundment that is 4,200 foot long, with a normal surface elevation of 161.0 feet USGS datum, normal tailwater elevation of 125.3 feet and average gross head of 35.7 feet.

In response to questions raised in a December 3, 2012 e-mail by the U.S Fish and Wildlife Service (FWS), a telephone conference call was held between Essential Power staff and representatives of FWS and Massachusetts Department of Fisheries and Wildlife (MDFW) on January 14, 2013. Among other points discussed, Essential Power announced that it would rebuild the Indian Orchard minimum flow discharge outlet. Final approvals and design plans have now been completed and construction is underway, with an anticipated completion date at the end of December 2013.

### **3.2 Mode of Operation**

When inflows to the Indian Orchard impoundment are greater than around 500 cfs (minimum flow plus minimum generating capacity on the smaller turbine), Indian Orchard is operated in a limited pond-and-release mode, utilizing the useable storage capacity (35 acre-feet) afforded by a 0.5 foot drawdown year round. The station is operated automatically by float controls. The operating mode of the Indian Orchard project does not change during dry, mean or high water years. As flows vary at the Project, the number of turbines operating and the duration of operation changes, increasing and decreasing the amount of generation realized.

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The current FERC exemption requires a continuous minimum flow release of 247 cfs, or inflow if less, at the project dam to the bypass reach (this based on a FWS-stipulated condition). The exemption also limits pond drawdowns to six inches below the top of the flashboards from April to June and one foot for the remainder of the year. The amount of minimum flow and drawdown from the top of the flashboards at Indian Orchard Project have been impacted by changes made to operations at the Putts Bridge Project. During a June 22, 1999 meeting, FWS requested evidence that operation of the Putts Bridge Project does not impact the minimum flow release at the downstream Indian Orchard Project. In response to FWS concerns, CEEI filed on December 6, 1999, calculation tables on pond fluctuations permitted by the exemptions. Based on the results, it



appears that the pond level control at the Indian Orchard Project should be set at 6 inches during the spring period. This measure would provide sufficient storage to permit the continuous discharge of the minimum flow at the Indian Orchard Project. Therefore, CEEI indicated in a December 6, 1999 letter, that it plans to operate the upgraded units within the head pond restrictions such that the total outflow from the Putts Bridge Project (i.e., the turbine discharge plus the 25 cfs minimum flow) is adequate to maintain the 247 cfs minimum flow requirement at the Indian Orchard Project. It is important to note that because of the 300 cfs minimum hydraulic capacity of the smaller Indian Orchard turbine, generation at Indian Orchard generally cannot begin until river discharge is 500 cfs or more.

On January 27, 2000, FWS requested evidence that the reduced flow to the bypass reach at Putts Bridge would not also create unacceptable water quality at Putts Bridge. To that end, FWS required that a water quality study be performed in order to verify that a flow of 25 cfs will protect water quality in the bypass reach. FWS also conditioned its approval on the study taking place during the summer. On June 7, 2000, after incorporating comments from FWS, MDFW and Massachusetts Department of Environmental Protection (MDEP), CEEI released its Putts Bridge Bypass Water Quality Study Plan. Over a sixty-day period (between July 7 and September 6, 2000), the water was sampled at three points downstream of the dam. Data collected during the water quality monitoring plan indicated that D.O. concentrations and water temperatures in the Putts Bridge bypass reach exceeded MDEP Class B water quality standards. As such, it was concluded that the minimum flows at Putts Bridge, as released by the electronically operated skimmer gate at the dam, are sufficient for maintaining adequate water quality in the Putts Bridge bypass reach. In addition, since then CEEI operates the Indian Orchard Project with a year round drawdown of 6 inches from the top of the flashboards and with a minimum flow of 247 cfs or inflow, if less.

The Project and the other Essential Power dams on the Chicopee River have little to no control over their inflows. In addition, the MWRA diverts up to 350 cfs from the upper basin through aqueducts to the metropolitan Boston area. In summary, the Indian Orchard project is operated in a limited pond-and-release mode for the protection of water quality, aquatic resources, and aesthetic values in the Chicopee River. Although the Project is allowed a one-foot drawdown for the non-spring periods of the year, the Project now operates year-round with a six-inch drawdown. This operation may be temporarily modified, if required, by operating emergencies beyond the control of Essential Power, or for short periods while performing energy audits.

## **4. REGULATORY STATUS**

### **4.1 FERC License**

The Indian Orchard project was issued an exemption from FERC licensing on September 11, 1992, when WMEC was the project owner. The FWS and the state fish and wildlife agency, Massachusetts Department of Fisheries and Wildlife (MDFW), participated fully in the exemption process at that time and have continued to do so in more recent amendment proceedings and subsequent studies. At the time of the exemption, the project owner committed to install a 430-kW minimum flow turbine-generator unit at the Indian Orchard project, but this addition was never completed. The project exemption has been amended twice since its issuance, once in December 1999 and again in November 2001. The first amendment issued when CEEI was the owner, dropped plans for the minimum flow turbine-generator for economic reasons.

The FWS issued mandatory terms and conditions on the Indian Orchard FERC exemption on July 31, 1992, including minimum flow requirements to the bypassed reach, at the foot of the dam. During the processing of a previous LIHI application for the Red Bridge project, it was discovered that the project owner had not completed the "Minimum Flow and Impoundment Fluctuation Monitoring Plan" that was required in the original exemption. The current owner, Essential Power, has since corrected that shortcoming. On February 20, 2012, Essential Power, with the concurrence of FWS, MDEP and MDFW, filed a "Minimum Flow and Impoundment Fluctuation Monitoring Plan" for the project with FERC. On August 3, 2012, FERC issued an order accepting that plan, including the agency comments on it.

#### **4.2 Water Quality Certification**

There is no state 401 Water Quality Certification that has been issued for this project. Some water quality studies have been conducted at the project. The most recent of these was in 2000 (above).

#### **4.3 Compliance Issues**

There have been some compliance issues noted at this project over the term of the FERC exemption, but most if not all have been dismissed or otherwise dealt with by FERC. FERC has noted these and directed the owner to be sure to comply with the requirements and timeframes set forth in the exemptions for the Chicopee River projects.

### **5. PUBLIC COMMENTS RECEIVED**

Two agency comments were received during the public comment period (Appendix B), but no other public comments. Both Caleb Slater of MDFW and Bob Kubet of MDEP expressed their opposition to LIHI certification based on their position that the project is not "low impact." However, neither of these letters contained agency recommendations as defined by LIHI's Handbook (i.e., pursuant to a proceeding). Rather, they are position statements that are in opposition to current LIHI certification policies, stating that only run-of-river operations should be eligible for low impact certification.

The FWS has also been active in commenting on all parts of the proceedings for Indian Orchard. Those comments are also included in Appendix B.

### **6. CONSISTENCY WITH LIHI CRITERIA AND ISSUES IDENTIFIED**

Despite the fact that this project has changed ownership several times since it received a FERC exemption, the application for LIHI certification and the agency communications are relatively well developed. This section summarizes the record for LIHI certification.

#### **6.1 Summary of the Reviewer's Findings**

Criterion A – Flows. Agency recommendations for environmental flow requirements have been well established in the FERC proceedings for this project, including the exemption, two subsequent amendments, and related studies, the most recent of which was a Minimum Flow and

Impoundment Fluctuation Monitoring plan that was approved by FERC in August 2012 after full review, comment, and approval from the agencies. There is a minimum instantaneous flow requirement of 247 cfs that was established by the FWS during the original FERC exemption proceeding in 1992. This minimum flow was set to be consistent with the FWS's Aquatic Base Flow criteria and the median unregulated August stream flows in the basin. Releases from the project are further constrained by limitations on impoundment fluctuations, which have been reduced to a six-inch fluctuation over a small active power pool (approximately 35 acre-ft). Therefore, the application passes on Standard A.1.

Despite the flow conditions that have been incorporated in the FERC exemption, the interactions among the multiple hydropower projects along the Chicopee remain controversial – see for example, the LIHI conditions on Putts Bridge and Red Bridge. Therefore a condition is recommended for the Indian Orchard certification that would encourage the applicant to promote better understanding of the flow conditions in the river and to continue efforts to find agreement on the best operational coordination.

Criterion B – Water Quality. There is no 401 Water Quality Certificate for the Indian Orchard project. The existing water quality at the Indian Orchard Project is classified by the MDEP as a Class B, warmwater fishery. The facility area and reach downstream of the project are currently identified by the US EPA as not meeting the water quality standards pursuant to Section 303(d) of the CWA, due to high coliform and pathogen concentrations. While pathogens are present in the Chicopee River, their appearance in the Chicopee River just immediately above or below the Indian Orchard Project is neither caused by nor contributed to by Indian Orchard Project (MDEP letter of Oct. 12, 2012). Thus, the application passes LIHI Standard B.2.

Although the most recent communication from MDEP on water quality, dated October 13, 2012, stated that the project did not cause or contribute to the fecal coliform problems, that letter also stated that not all uses could be assessed at this time due to lack of data. The potential for adverse hydromodification was noted. The condition recommended above for Flows should address this issue of lack of data.

Criterion C – Fish Passage and Protection. There are no active fish passage requirements at the Indian Orchard project. The original terms and conditions set for this project by FWS on July 31, 1992, contained a requirement that the owner construct, operate, maintain and monitor upstream and downstream fish passage facilities when prescribed by FWS and/or MDFW (i.e., reserved authority). Currently there are no active migratory fish management efforts within the Chicopee River watershed. The Indian Orchard Project is the second-most upstream of Essential Power's Chicopee projects. While it is likely that the lower dams will need fish passage facilities in the near future, it likely will be a number of years before passage will be required at Indian Orchard. Therefore, the project is in compliance with respect to fish passage.

Criterion D – Watershed Protection. There are no buffer zones, watershed enhancement funds, or related settlement agreements at Indian Orchard. There also is no shoreline management plan required by the FERC exemption. State and federal agencies who could potentially require shoreline management have been contacted by the application, but all have refused to set any regulatory requirements related to shoreline or land management at the project unless new construction activities are initiated. The FERC exemption includes requirements for agency consultation in such a case. Therefore, the project passes on this criterion but does not qualify for an extended certification term beyond the normal five years.

**Criterion E – Threatened and Endangered Species Protection.** The FWS and MDFW each stated in 2012 letters that there are no known state or federal listed populations of endangered, threatened or rare vegetative, fish or wildlife species occur in the project area, and none were discovered during any field survey. Therefore, the project passes this criterion.

**Criterion F – Cultural Resources.** The Facility is in compliance with all requirements regarding cultural resource protection, mitigation or enhancement that are included in its FERC license exemption. In the original exemption proceeding, FERC found that the Facility would have no effect on any structure, site, building, district, or object listed in or eligible for listing in the National Register of Historic Places. The FERC exemption order contains articles that will require the project owner to consult with the State Historic Preservation Officer and gain FERC approval prior to any future activities that may affect historic facilities in the area. Therefore, the project passes this criterion.

**Criterion G – Recreation.** The FERC exemption for the project requires that the owner construct and operate a public parking facility, trail, boat ramp and picnic area at Indian Leap and otherwise allow access to project waters. The land originally provided for this purpose was transferred to the City of Springfield by one of the previous project owners in 2006. Springfield City Park and Recreation Department continues to maintain this access point (Figure 5). A FERC inspection report in September 2010 and a follow-up letter in 2011 highlighted the fact that the project owner is still obligated to ensure recreational access is maintained. The project is currently in compliance with its FERC requirements, and it allows access to the reservoirs and downstream reaches without fees or charges. Therefore, the project passes this criterion.

**Criterion H – Dam Removal.** No state or federal agencies have recommended that dam at the Indian Orchard be removed. Therefore, the project passes this criterion.



**Figure 5. Photo of small boat access to the Indian Orchard Impoundment on the south shore of the Chicopee River.**

## **6.2 Recommendations of the Reviewer**

Based on my review of information submitted by the applicant, the additional documentation noted herein, the public comments submitted in writing or other communications with resource agencies and other entities, I find that the project conforms with current LIHI criteria. I recommend that the Indian Orchard project be conditionally certified, with a certification term of five years. One condition should be placed on the certification to address the continuing controversial issues of flow regulation in the Chicopee River.

The Chicopee River between the Red Bridge and Dwight projects is a cascade of small dams and impoundments that are linked through their use of common river flows for hydropower generation. Water available to these hydropower projects is highly modified by out-of-basin transfers from the upper watershed. Previous LIHI certifications in this river (Red Bridge and Putts Bridge projects) have also identified flow management challenges that extend downstream and include the Indian Orchard project.

Essential Power is the owner of four of the six hydropower projects on the river. Three of the Essential Power projects are now LIHI certified. Based on the available records from the LIHI applications received to date, it appears that lack of data and lack of common understanding of the dynamics of the river and projects are the biggest reasons for continuing controversy. Essential Power has been proactive in holding informational meetings with the owner of the Collins project in the past and in trying to work with the resource agencies to resolve differences – this is commendable. Unfortunately, misunderstanding persists. Therefore, the following condition is recommended to encourage progress toward better river management on the Chicopee. The applicant has had a chance to review this proposed condition and does not object:

**Condition A.** The Indian Orchard project owner, Essential Power LLC, will convene an annual workshop on Chicopee River Hydropower Operations designed to promote better understanding of regulated flows and impoundment fluctuations on the river, and to identify operational flow enhancements that can benefit the dual goals of clean, renewable energy and environmental protection. This workshop will be a forum for sharing annual operational data from all the projects on the river. The first such workshop will happen no later than June 2014, scheduled at a time when all the Chicopee hydropower owners and the applicable resource agencies can attend (i.e., FWS, MDFW and MDEP). A summary report describing the outcomes for this workshop will be provided to LIHI and workshop participants. If the workshop is deemed a success, it will be repeated annually. If it is less than successful, Essential Power may petition LIHI to discontinue it. LIHI staff will be available to assist with this workshop, if desired by the river stakeholders.



## 7. DETAILED CRITERIA EVALUATION

### 7.1 Flows

<b>LIHI Goal:</b> The Flows Criterion ensures that healthy flows for fish, wildlife and water quality are provided downstream of the project and in all bypassed reaches, including, where appropriate, seasonal flow fluctuations characteristic of a natural system.	
<b>A.1</b>	<p><i>Is the Facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?</i></p> <p><b>Reviewer Analysis:</b> The Resource Agency Recommendations adopted in the FERC exemption proceeding are clear, and the applicant is in compliance with them. The FWS recommendation is for an Aquatic Base Flow standard for the minimum flow in the bypassed reach plus limits on water levels in the Indian River Impoundment. The most recent Minimum Flow and Impoundment Fluctuation Study approved in 2012 by FERC and the agencies will strengthen this compliance. However, disagreement about the regulated flow regime in the river and how hydro project operations affect it over the full length of the Chicopee seems to persist. Therefore, a condition should be added to the LIHI Certification to encourage the applicant to be proactive in promoting better understanding and improvements in flow management throughout the Chicopee R.</p> <p><b>Conclusion:</b> Pass A.1, go to the Water Quality Criterion.</p>
<b>A.2</b>	<p><i>If there is no flow condition recommended by any Resource Agency for the Facility, or if the recommendation was issued prior to January 1, 1987, is the Facility in Compliance with a flow release schedule, both below the tailrace and in all bypassed reaches, that at a minimum meets Aquatic Base Flow standards or "good" habitat flow standards calculated using the Montana-Tennant method?</i></p> <p><b>Reviewer Analysis and Conclusion:</b> N/A.</p>
<b>A.3</b>	<p><i>If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?</i></p> <p><b>Reviewer Analysis and Conclusion:</b> N/A.</p>

### 7.2 Water Quality

<b>LIHI Goal:</b> The Water Quality Criterion ensures that water quality in the river is protected.	
<b>B.1</b>	<p><i>Is the Facility either:</i></p> <p><i>a) In Compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the Facility after December 31, 1986? Or</i></p> <p><i>b) In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?</i></p> <p><b>Reviewer Analysis:</b> There is no 401 Certification for this project, so it cannot pass on B.1(a). Water quality studies done in the area have shown fecal coliform and pathogen</p>

	<p>concentrations above standards. Other water quality sampling for dissolved oxygen has been done without showing any violations, but those data are more than a decade old. It is uncertain whether the project is in compliance with the hydromodification standards to protect aquatic life, but there are no quantitative water quality standards for that (?). Since the project is in compliance with the FWS Aquatic Base Flow standard, plus upstream, out of basin diversions are a much greater impact on flow regimes, it is hard to see how the project is the cause of hydromodification impacts.</p> <p><b>Conclusion:</b> YES, Pass B.1(b); Go to B.2</p>
<b>B.2</b>	<p><i>Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?</i></p> <p><b>Reviewer Analysis:</b> The entire river segment in Massachusetts is 303(d) listed for fecal coliform and pathogens, and it is been designated as in need of a TMDL study.</p> <p><b>Conclusion:</b> YES; Go to B.3</p>
<b>B.3</b>	<p><i>If the answer to question B.2 is yes, has there been a determination that the Facility does not cause, or contribute to, the violation?</i></p> <p><b>Reviewer Analysis:</b> MDEP stated in an Oct. 31, 2012, letter that the Project is not the cause of the coliform/pathogen problems that are the reason for the 303(d) listing. However, MDEP also identified the project as on an "Alert Status" for potential impacts of hydromodification related to the project.</p> <p><b>Conclusion:</b> YES; Pass on B.3; Go to Fish Passage Criterion.</p>

### 7.3 Fish Passage and Protection

<p><b>LIHI Goal:</b> The Fish Passage and Protection Criterion ensures that, where necessary, the Facility provides effective fish passage for Riverine, anadromous and catadromous fish, and protects fish from entrainment.</p>	
<b>C.1</b>	<p><i>Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?</i></p> <p><b>Reviewer Analysis:</b> No fish passage prescriptions exist at this time, but FWS has reserved its authority under the FERC exemption to make such a prescription in the future if restoration efforts underway now are successful.</p> <p><b>Finding:</b> N/A; go to C.2</p>
<b>C.2</b>	<p><i>Are there historic records of anadromous and/or catadromous fish movement through the Facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?</i></p> <p><b>Reviewer Analysis:</b> No historical records were found of migratory fish in the project vicinity.</p> <p><b>Finding:</b> NO; Go to C.3</p>
<b>C.3</b>	<p><i>If, since December 31, 1986:</i></p> <p>a) Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish</p>

	<p>Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in C2a above), and</p> <p>b) The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,</p> <p>c) Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?</p> <p><b>Reviewer Analysis:</b> The agencies have had an opportunity to prescribe fish passage under the FERC exemption process but have not done so to date. None of the three C.3.c factors apply to this Facility.</p> <p><b>Conclusion:</b> N/A; Go to C.4</p>
C.4	<p>If C3 was not applicable:</p> <p>a) are upstream and downstream fish passage survival rates for anadromous and catadromous fish at the dam each documented at greater than 95% over 80% of the run using a generally accepted monitoring methodology? OR</p> <p>b) If the Facility is unable to meet the fish passage standards in 4.a, has the Applicant either i) demonstrated, and obtained a letter from the U.S. Fish and Wildlife Service or National Marine Fisheries Service confirming that demonstration, that the upstream and downstream fish passage measures (if any) at the Facility are appropriately protective of the fishery resource, or ii) committed to the provision of fish passage measures in the future and obtained a letter from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service indicating that passage measures are not currently warranted?</p> <p><b>Reviewer Analysis:</b> The applicant is obligated under its FERC exemption to comply with any future requirements for fish passage, and FWS has provided a letter saying there are not currently warranted (see Appendix A).</p> <p><b>Finding:</b> YES; Go to C.5</p>
C.5	<p>Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of Riverine fish?</p> <p><b>Reviewer Analysis:</b> There are no prescriptions for riverine fish at Indian Orchard at this time, but mandatory conditioning authority has been reserved under the FERC exemption for FWS and MDFW.</p> <p><b>Finding:</b> N/A; Go to C.6</p>
C.6	<p>Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?</p> <p><b>Reviewer Analysis:</b> No Resource Agency Recommendations for entrainment protection measures have been made for riverine, anadromous, or catadromous fish, although there was a chance for this during the original exemption proceeding and more recent amendments. The agencies have reserved their authority to set mandatory conditions for migratory fish under the FERC exemption.</p> <p><b>Finding:</b> N/A; PASS and go to the Watershed Protection Criterion.</p>

**7.4 Watershed Protection**

<b>LIHI Goal:</b> The Watershed Protection criterion is designed to ensure that land resources are being protected within and around the facility boundary. The term of certification is extended from five to eight years for projects that have either a shoreline buffer zone or a watershed enhancement fund.	
<b>D.1</b>	<i>Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the high water mark in an average water year around 50 - 100% of the impoundment, and for all of the undeveloped shoreline?</i>
	<b>Reviewer Analysis:</b> There are no buffer zones at this project. <b>Conclusion:</b> NO, failure to pass D.1; Go to D.2
<b>D.2</b>	<i>Has the facility owner/operator established an approved watershed enhancement fund that:</i> <i>a) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1.,and</i> <i>b) has the agreement of appropriate stakeholders and state and federal resource agencies?</i>
	<b>Reviewer Analysis/Conclusions:</b> There is no watershed enhancement fund at Indian Orchard. <b>Conclusion:</b> NO, failure to pass D.2 and no qualification for extension of the certification term; Go to D.3
<b>D.3</b>	<i>Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreline buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation).</i>
	<b>Reviewer Analysis:</b> There is no settlement agreement. <b>Conclusion:</b> NO, failure to pass D.3; Go to D.4
<b>D.4</b>	<i>Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreline management plan regarding protection, mitigation or enhancement of shoreline surrounding the project?</i>
	<b>Reviewer Analysis:</b> There are no recommendations or requirements for a shoreline management plan related to Indian Orchard. FERC did not require this in the exemption. Although they were contacted, no state or federal agency was willing to take responsibility for watershed protection unless the owner conducted ground disturbance activities. The FERC exemption does require that if land-disturbing or land-clearing activities are undertaken, the project owner must first notify FERC, develop a plan in coordination with the Soil Conservation Service and MDFW, and gain approval from FERC before activities can begin. The owner accepts this requirement. <b>Conclusion:</b> N/A; pass D.4 and Go to Threatened/Endangered Species Criterion.

### 7.5 Threatened and Endangered Species Protection

<b>LIHI Goal:</b> The Threatened and Endangered Species Protection Criterion is designed to ensure that the Facility does not negatively impact state or federal threatened or endangered species.	
<b>E.1</b>	<p><i>Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?</i></p> <p><b>Reviewer Analysis:</b> There are no records of state or federally listed T&amp;E species in the Facility area at this time.</p> <p><b>Conclusion:</b> NO; PASS on E.1; go to Cultural Resource Criterion.</p>

### 7.6 Cultural Resources

<b>LIHI Goal:</b> The Cultural Resource Protection Criterion is designed to ensure that the Facility does not inappropriately impact Cultural Resources.	
<b>F.1</b>	<p><i>If FERC-regulated, is the Facility in Compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?</i></p> <p><b>Reviewer Analysis:</b> No conflicts were identified in the record.</p> <p><b>Finding:</b> YES; PASS and go to Recreation Criterion.</p>

### 7.7 Recreation

<b>LIHI Goal:</b> The Recreation Criterion is designed to ensure that the Facility provides access to the waters and accommodates recreational activities.	
<b>G.1</b>	<p><i>If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?</i></p> <p><b>Reviewer Analysis:</b> There is neither a recreation plan nor facilities provided or required.</p> <p><b>Finding:</b> YES; Go to G.3</p>
<b>G.3</b>	<p><i>Does the Facility allow access to the reservoir and downstream reaches without fees or charges?</i></p> <p><b>Reviewer Analysis:</b> Access is provided without charge within the limited Project boundaries.</p> <p><b>Finding:</b> YES; PASS and go to Dam Removal Criterion.</p>



**7.8 Dam Removal**

**LIHI Goal:** The Dam Removal Criterion is designed to ensure that the Facility is not certified if a Resource Agency has recommended that a dam associated with the Facility should be removed.

**H.1** *Is there a Resource Agency Recommendation for removal of the dam associated with the Facility?*

**Reviewer Analysis:** There is no evidence that any agencies have requested that Indian Orchard dam be removed.

**Conclusion:** NO, pass H.1 and pass on all LIHI criteria.

**APPENDIX A**  
**COMMUNICATIONS WITH KEY RESOURCE AGENCIES**



Commonwealth of Massachusetts

# Division of Fisheries & Wildlife

Wayne F. MacCallum, Director

September 16, 2013

Dana Hall  
Deputy Director, Low Impact Hydropower Institute

RE: Indian Orchard (FERC No. P-10678)

Dear Ms. Hall:

The Department of Fish and Game ("DFG") hereby submits the following comments on the Low Impact Hydropower Institute's ("LIHI") Pending Application for the proposed LIHI certification of Essential Power, LLC's ("EP") Indian Orchard Project. The project is located on the Chicopee River in Ludlow, and Springfield, Massachusetts.

DFG is submitting these comments to LIHI in order to fulfill the requirements of the Massachusetts Department of Energy Resources ("DOER") Renewable Energy Portfolio Standard Regulations (225 CMR 14.00; "RPS I" and 225 CMR 15.00; "RPS II"). The RPS I and RPS II regulations were promulgated by DOER on January 1, 2009 and require that any hydroelectric project wishing to qualify as either a RPS I or RPS II generator first obtain LIHI certification. These regulations also require all relevant regulatory agencies to comment on the pending LIHI application.

The Department does not support EP's application for LIHI Certification of the Indian Orchard Hydroelectric Project for the reasons outlined below.

## PROJECT

The project includes a dam with a crest elevation of 159.4' (NGVD), a canal headgate house, a power canal, two operating penstocks, a powerhouse with two generating units, a tailrace channel (normal tailrace elevations 125.25) and appurtenant facilities. The project creates a bypass reach approximately 1,600 feet long.

At normal pond elevation, the Indian Orchard Project impoundment extends approximately 4,200 feet upstream of the dam with a maximum surface area is approximately 74 acres at El. 161'. The permitted daily drawdown is six inches in the spring and one foot the rest of the year.

The Indian Orchard project is situated upstream of two other hydroelectric facilities located on the Chicopee River and downstream of three other dams on the Chicopee as well as other dams on the Ware, Swift and Quaboag Rivers.

## FISH AND WILDLIFE RESOURCES

The Chicopee River is the largest drainage basin in Massachusetts (721 square miles). The River is formed where its three tributaries, the Swift, the Ware, and the Quaboag, meet in Palmer, MA. The Swift River's three branches were impounded in 1938 to form the Quabbin Reservoir. The upper section of the Ware River is also seasonally diverted into the Quabbin Reservoir. Operation of the Quabbin Reservoir has led to significant flow alteration in the Chicopee River.

The fish of the Chicopee River include microhabitat generalists species such as chain pickerel, bluegill, golden shiner, largemouth bass and smallmouth bass; fluvial species such as white sucker, common shiner;

[www.mass.gov/masswildlife](http://www.mass.gov/masswildlife)

Division of Fisheries and Wildlife  
100 Hartwell Street, Suite 230, West Boylston, MA 01583 (508) 389-6300 Fax (508) 389-7890  
An Agency of the Department of Fish and Game

and tessellated darter. The only migratory fish found upstream of the first dam on the system (Dwight dam) is the American eel. Anadromous fish such as American shad, Blueback herring and sea lamprey are present downstream of the Dwight dam. The 2009 publication "Development of Target Fish Community models for Massachusetts Mainstem Rivers" determined that fish species expected to be abundant in the Chicopee river (fallfish, common shiner, blacknose dace, white sucker, and longnose dace) are at low abundance or absent from existing fish survey data.

## IMPACTS AND MITIGATION

### FLOWS

#### Run-of-river Operation

The project does not operate as a run-of-river project. The project operates in a "limited pond and release mode" which raises and lowers the impoundment by up to one foot on a daily basis. This mode of operation also results in unnatural flow variations in the Chicopee River downstream of the project.

#### Bypass reach

The project's FERC license guarantees that a minimum flow of 237cfs or inflow is released into the project's 1,300 foot long bypass reach. This flow was recommended in 1989 by the USFWS. The flow is the estimated median August flow and represents 0.35 cfs/m (cfs per square mile of drainage area). This flow is not representative of a natural flow regime and not appropriate as a year round flow requirement.

### FISH PASSAGE

The project has no fish passage requirements.

### COMMENTS

The Department does not support EP's application for LIHI Certification of the Indian Orchard Project. This project, with its daily peaking operations and impoundment fluctuations, contributes to changes to the nature of the Chicopee River and cannot be described as "Low Impact".

Likewise, providing only a minimum flow of 237cfs in a the 1,300 foot long bypass reach section of the Chicopee River cannot be described as "Low Impact". Using summer flows for a year round prescription subjects fish and wildlife resources to year round low flow conditions and does not reflect the current state of knowledge for instream flow requirements.

The Department opposes LIHI certification of this project until such time as this project is operated in a significantly more environmentally sensitive manner.

Thank you for this opportunity to comment.

Sincerely,



Caleb Slater, Ph.D.  
Anadromous Fish Project Leader



**Mike Sale**

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**From:** Kubit, Robert (DEP) <robert.kubit@state.ma.us>  
**Sent:** Thursday, September 19, 2013 1:52 PM  
**To:** 'mjsale@lowimpacthydro.org'  
**Subject:** Indian Orchard Hydroelectric Project Comments

Dear Mr. Sale,

The Massachusetts Department of Environmental Protection is the agency that issues 401 Water Quality Certifications for FERC licensed projects in the state. The FERC exemption for this project was issued prior to the requirement for state issued 401's.

LIHI criteria from the LIHI Handbook, Part IV states:

*"1. Flows: The Flows Criterion is designed to ensure that the river has healthy flows for fish, wildlife and water quality, including seasonal flow fluctuations where appropriate. For instream flows, a certified facility must comply with recent resource agency recommendations for flows. If there were no qualifying resource agency recommendations, the applicant can meet one of two alternative standards: (1) meet the flow levels required using the Aquatic Base Flow methodology or the "good" habitat flow level under the Montana-Tennant methodology; or (2) present a letter from a resource agency prepared for the application confirming the flows at the facility are adequately protective of fish, wildlife, and water quality."*

The Indian Orchard Hydroelectric Project has a permitted daily drawdown is 0.5 foot during the spring and 1 foot for the balance of the year (except during energy audits and system emergencies when this limit may be exceeded), the actual year-round drawdown is six inches.

The Department of Environmental Protection's criteria for an applicant to be considered low impact is to have hydroelectric projects operate in an instantaneous run-of-river mode with inflows equal to outflows and maintain a stable pond level within a narrow band. We concur with comments made by the Massachusetts Division of Fisheries & Wildlife.

Since the FERC issues exemptions in perpetuity, we view the financial incentive to obtain LIHI certification and subsequent RPS I or RPS II generator designation a prime opportunity for operators to voluntarily operate in a more environmentally sensitive manner than allowed under their FERC license.

Accordingly, the Department does not support the application for LIHI certification at this time.

Robert Kubit, P.E.  
MassDEP  
Division of Watershed Management  
627 Main Street  
Worcester MA 01608  
Telephone: (508) 767-2854  
Email: [robert.kubit@state.ma.us](mailto:robert.kubit@state.ma.us)  
Fax: (508) 791-4131

From: Grader, Melissa  
To: w.shortiii@verizon.net  
Subject: LIHI certification for the Indian Orchard Project; FERC No. 10678  
Date: Monday, December 03, 2012 4:57:30 PM

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Dear Mr. Short,

This responds to your various requests for information necessary for Essential Power to complete its application for Low Impact Hydropower Institute (LIHI) Certification. We have reviewed the project file and filings contained on the FERC Online database, and offer the following:

1. Threatened and Endangered Species

According to the FWS/New England Field Office's online database (<http://www.fws.gov/newengland/EndangeredSpec-Consultation.htm>), there are no federally listed T&E species known to occur in the project area.

2. Minimum Flow

The Indian Orchard Project is required to release a continuous flow of 247 cfs (or inflow, if less) to the 1,000 foot-long bypass reach. The bypass flow is provided via two deep drain gates located off of the canal immediately below the headgate structure.

In reviewing the project file, we found correspondence dated June 14, 1994 from then-owner Northeast Utilities, notifying FERC that the correct elevation to the top of the flashboards was 161.308 feet, versus 161.0 feet.

We found two instances of potential violations of the bypass flow requirement. In November of 1997 and May of 1998 then-owner Northeast Utilities contacted FERC/New York Regional Office staff to report problems maintaining the required bypass flow. After investigating both incidences, the FERC determined that the deficient flow releases would not be considered violations of the project's exemption. In both cases, the flow deficiencies were caused by debris clogging the low level drain gates.

When Consolidated Edison Electric Massachusetts, Inc. (CEEMI) purchased the projects from Northeast Utilities, they submitted an application to FERC to amend the project exemption to increase capacity by replacing the runners on one of the two turbines. In the application for that amendment, CEEMI also proposed to investigate the installation of a bar rack or trash boom to prevent large debris from plugging the project's minimum flow drain gates. In FERC's Order amending the exemption (December 29, 1999) they noted this proposal, but did not require it as part of the amendment (because FERC considered it a maintenance activity).

As part of that amendment proceeding, the FWS submitted modified terms and conditions for the Indian Orchard Project (on January 27, 2000). One of those T&Cs was a requirement to submit a plan to monitor impoundment level and bypass flow releases at the project. Kleinschmidt Associates prepared a draft Minimum Flow and Impoundment Fluctuation Monitoring Plan for all four of CEEMI's Chicopee River projects (including Indian Orchard) in October of 2001. The FWS provided comments on that plan by letter dated November 6, 2001. That letter contained a number of issues/concerns that the Service recommended be addressed in the final plan. CEEMI never submitted a revised plan for our review and approval.



As part of the LIHI consultation process for the Red Bridge Project, the FWS provided comments to you that identified this outstanding compliance issue. In response, then-owner North American Energy Alliance (NAEA) provided us with a new draft flow monitoring plan for review (in December of 2011). We provided feedback, and NAEA revised the plan to address our comments/concerns. That plan was then submitted to FERC, who approved it by order dated August 3, 2012.

While the FWS did provide feedback on the flow plan that FERC approved, the comprehensive file review we just completed as part of this LIHI consultation raises two concerns that Essential Power should address: (1) is the correct top-of-boards elevation 161.0 feet or 161.308 feet? If it is the latter, then the flow plan should be amended accordingly; and (2) was a rack or trash boom ever installed to keep debris from clogging the drain gates? If not, how does Essential Power propose to manage the project to prevent debris from clogging the drain gates?

Lastly, as with Red Bridge, we request that Essential Power provide verification (through empirical data collection) that the release mechanism is providing the required flow to the bypass reach.

### 3. Fish Passage

The original terms and conditions set for this project by the Service on July 31, 1992 contained a requirement that the Exemptee construct, operate, maintain and monitor upstream and downstream fish passage facilities when prescribed by the Service and/or the Massachusetts Division of Fisheries and Wildlife. Currently there are no active migratory fish management efforts within the Chicopee River watershed. The Indian Orchard Project is the second-most upstream of Essential Power's Chicopee projects. While it is likely that the lower dams will need fish passage facilities in the near future, it likely will be a number of years before passage will be required at Indian Orchard. Therefore, the project appears to be in compliance with respect to fish passage.

### 4. Watershed Protection

The Service did not set any mandatory terms and conditions relative to watershed protection. The Commonwealth of Massachusetts is the appropriate agency to respond to this particular information request.

In developing this response to your request, we identified several information gaps relative to the project facilities. We would appreciate if Essential Power could provide us with the following:

- the type of units at the project, and their minimum and maximum hydraulic capacities;
- trashrack specifications (wetted area and clear spacing);
- as-built plans of the canal gates used to provide the minimum flow.

We hope this has been responsive to your requests. If you have any questions or require further information please feel free to contact me.

Sincerely,  
Melissa Grader