

**Vermont Department of Environmental Conservation***Agency of Natural Resources*

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March 12, 2017

Low Impact Hydropower Institute

PO Box 194

Harrington Park, New Jersey

RE: Essex 19 Hydroelectric Project (FERC No. 2513)  
Comments on Low Impact Hydropower Certification

Dear Ms. Ames,

On December 30, 2016, the Low Impact Hydropower Institute (LIHI) received a complete application from Green Mountain Power Corporation for low impact certification of the Essex 19 Hydroelectric project located on the Winooski River in Essex Junction and Williston, Vermont. Based on its review, the Agency has substantial concerns regarding compliance of the Essex 19 project with LIHI's low impact criteria. The Agency provides comments, herein.

**Background**

The Agency issued a water quality certification for the Essex 19 hydroelectric project on November 8, 1993, which was amended on January 1, 1995. Subsequently, FERC issued a new license for a major project on March 30, 1995. The Agency's LIHI certification review of the project focuses on conditions B, E, and K of the water quality certification issued for the project, specifically evaluating compliance with minimum flows, peaking constraints, and fish passage provisions.

**Flows**

The Applicant has not demonstrated compliance with LIHI's flow criterion. LIHI's flow criterion applicable to this application are:

*“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”*

Condition B of the water quality certification issued for operation of the project specifies seasonal minimum flows that must be maintained in the bypassed reach and below the project. Pursuant to condition B, run-of-river operations (outflow equal to inflow on an instantaneous basis) are required from April 1 to May 15. Condition E of the water quality certification issued for operation of the project establishes constraints on peaking operations based on the low flow for a

given calendar day as measured below the project. Pursuant to Condition E, run-of-river operations are required under specific flow conditions.

Flows at the project are controlled to a large degree by the operation of upstream peaking projects including the Waterbury Hydroelectric Project, Mollys Falls Hydroelectric Project, and Bolton Falls Hydroelectric Project. Due to peaking operations upstream, flow transitions at the project have historically been problematic. While the LIHI application for the project correctly identifies that “Project compliance is enforced with the implementation of the December 8, 1995 FERC Approved Minimum Flow Monitoring Plan”, it does not discuss the modifications to this plan since its original approval.

FERC identified need for modifications in a February 3, 2000 letter that directed GMP to file for Commission approval an operating plan addressing operational problems and deficiencies that occurred in 1999. In response, GMP submitted a proposal to refine the previously approved flow monitoring plan, which identified “procedures to predict inflow and changes in inflow to the Essex 19 impoundment” as an area that may require refinement.<sup>1</sup> FERC approved GMP’s proposed plan, requiring “any necessary revisions to the plan including agency’s comments be filed by December 31, 2000”.<sup>2</sup> On December 28, 2000, GMP submitted a document entitled, Essex 19 Flow Monitoring Plan Refinements, which included the results of ongoing operational and monitoring refinements that were incorporated at the project during the spring, summer, and fall 2000.<sup>3</sup> The refinements include incorporating an estimate of Bolton Falls outflow data in GMP’s SCADA system “to predict inflow to the Essex 19 impoundment during low flow periods and ROR operation” and procedures to “estimate and coordinate discharges at Bolton Falls and Essex 19 under low flow conditions”. FERC approved the refinements to the plan to monitor run-of-river and minimum flow under articles 403 and 404 on February 20, 2001.<sup>4</sup>

As part of its LIHI review, the Agency requested one year of operational records to evaluate the compliance of project operations over a range of flow conditions with certification conditions. The Agency received spreadsheets containing generation, headpond level, and flow at the downstream USGS gauge. Due to the influence of upstream peaking projects, the Agency requested the Bolton Falls outflow data and/or inflow estimates for the Essex 19 project to evaluate compliance with water quality certification conditions B and E when run-of-river operations are required. However, it does not appear that this data is currently being collected or utilized to inform operational decisions at the Essex 19 project. While the Agency acknowledges headpond level can serve as a proxy to quantify differences between inflow and outflow, it not a perfect substitute and its usefulness as a proxy decreases with increasing impoundment size as relatively small changes in water level cause increasingly large changes in downstream flow. Considering the refinements to the flow management plan include provisions to include Bolton Falls outflow in GMP’s SCADA system and estimate inflow into the Essex 19 impoundment, it does not appear that flow at the project is monitored consistent with the approved flow monitoring plan for the project.

While a robust evaluation of compliance with conditions B and E is not possible without inflow estimates, the Agency’s review has identified instances of potential non-compliance that merit further analysis. The Agency compared discharge at the gage below the Waterbury Hydroelectric

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<sup>1</sup> Green Mountain Power. Refinements to Essex 19 Flow Monitoring Plan. June 1, 2000.

<sup>2</sup> Federal Energy Regulatory Commission. Order Amending Flow Release Plan. October 4, 2000.

<sup>3</sup> Green Mountain Power. Essex 19 Flow Monitoring Plan Refinements. December 28, 2000.

<sup>4</sup> Federal Energy Regulatory Commission. Order Modifying and Approving Flow Monitoring Plan Refinements under Articles 403 and 404. February 20, 2001.

Project on the Little River to discharge below the Essex 19 project to evaluate to some degree how upstream peaking operations affects flow at Essex 19. From May 22 – 31, 2015, the low flow for the calendar day below the Essex 19 project was less than 1000 cfs. Pursuant to condition E, the project is to be operated in run-of-river mode under these flow conditions. With the influence of the upstream peaking projects, one would expect flow increases below the project as the pulse of water moves through, but would not expect to see downstream flow curtailment associated with the upstream flow pulse. However, assuming inflow is represented by the period of relatively steady flow between peaks, the hydrograph indicates substantial curtailment of downstream flows (>300 cfs) after a peak passes and before run-of-river operations resumes. These conditions are shown on the hydrograph below in red and represent deviations from run-of-river operations. Such curtailments are likely due to a lag time of the turbines adjust to decreasing inflows, causing a small impoundment draw, and then an overcorrection of the turbines to decreasing headpond level. It is likely that the refinements to the flow management plan, specifically the inclusion of outflow data from Bolton Falls and estimates of inflow to Essex 19 impoundment would help to alleviate this condition. There appear to be two additional deviations from run-of-river operations in the hydrograph below shown in blue. These appear in the operations data provided for Agency review, the former in a headpond draw and the latter in turbine generation, however, the Agency does not have deviations on file to account for these events.

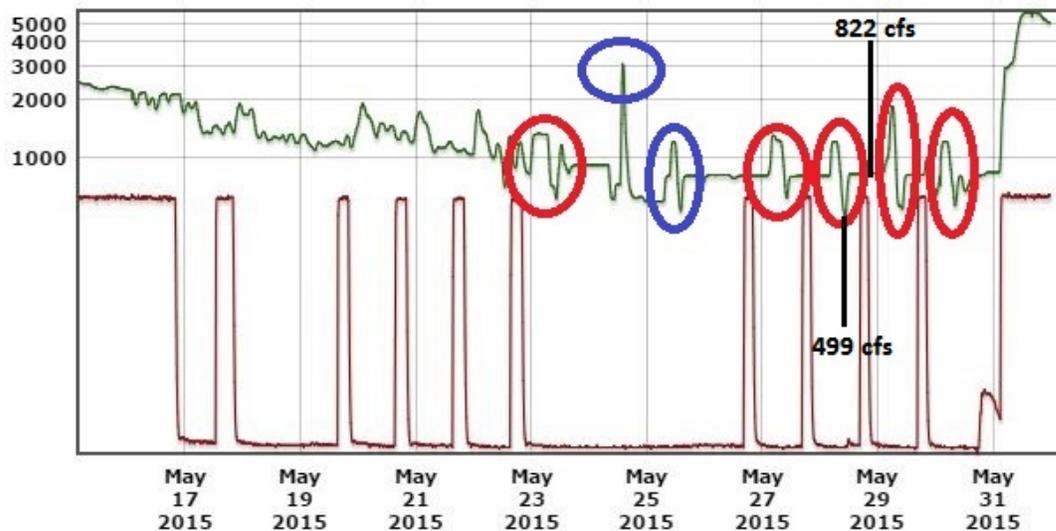


Figure 1. Hydrograph comparing discharge in cubic feet per second from the USGS gage below the Waterbury Hydroelectric Project on the Little River (Red) and the USGS gage below Essex 19 Hydroelectric Project on the Winooski River (green).

## Fish Passage

The Applicant has not demonstrated compliance with LIHI's fish passage criterion. LIHI's fish passage criterion applicable to this application are:

*“Compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986.”*

Condition K of the water quality certification for the Essex 19 project concerns downstream passage and requires GMP to submit a plan for downstream fish passage to the Vermont Department of Fish and Wildlife (VDFW) and provide downstream passage 24 hours per day, from April 1 through June 15 and from September 15 through December 15. The condition requires the inclusion of provisions to minimize entrainment and impingement, and ultimately convey fish safely and effectively downstream of the facility.

Landlocked Atlantic salmon, native to Lake Champlain, were extirpated from the basin approximately 150 years ago. The U.S. Fish and Wildlife Service (USFWS), in partnership with VDFW and New York Department of Environmental Conservation, has been working to restore landlocked Atlantic salmon to Lake Champlain since 1972. Pursuant to a license article, GMP in part, supports a trap and truck program that transports fish returning to the most downstream dam on the Winooski River (Winooski One) above the Essex 19 project to provide fish with access to more than 20 miles of spawning and nursery habitat in the upper river and its tributaries. This program has recently resumed and has been quite successful in recent years with natural reproduction documented upstream and greater numbers returning to the fish lift to move upstream to spawn. These factors reinforce the importance of effective downstream passage at the project to the continued success of the restoration program.

In response to a request to confirm compliance of the Essex 19 project with several license articles in preparation of an application for LIHI certification, USFWS conducted a thorough file review.<sup>5</sup> This review identified information that would be needed to confirm compliance. Following up on this review and to perform a fishway inspection, representatives of USFWS, the VDFW and GMP met at the Essex 19 project on September 23, 2016. After this meeting, the USFWS communicated a list of items to GMP that would need to be addressed to ensure proper operation of the fish bypass system. While there has been progress on a number of items, it is the Agency's understanding that a resolution has not yet been reached, meaning safe and effective passage, and therefore compliance with certification conditions, cannot be confirmed at this time.

### **Recommendation**

As a result of its review, the Agency does not believe that the Essex 19 project has demonstrated compliance with water quality certification conditions, FERC license articles and LIHI criteria at the time of its application for low impact certification. As such, the Agency would recommend that certification of this project as "low impact" be contingent upon demonstrated compliance with the requirements specified above.

If LIHI certifies the Essex 19 project, the Agency would recommend the following conditions be included in any certification issued for the project.

1. GMP shall review the flow monitoring procedures at the Essex 19 project and assess compliance with the approved flow monitoring plan including the refinements identified in GMP's 2000 refinement plan. In consultation with VDEC, GMP shall establish a plan for implementing modifications required under the approved plan, and submit this plan to LIHI within 180 days.
2. GMP shall conduct a review of run-of-river operations at the Essex 19 project and determine if additional modifications are needed to ensure compliance with LIHI criteria. In

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<sup>5</sup> United States Fish and Wildlife Service. Letter to Ms. Katie Sellers, Kleinchmidt. February 5, 2016.

consultation with VDEC, GMP shall establish a plan for implementing any modifications identified, and submit this plan to LIHI within 180 days.

3. GMP shall re-initiate consultation on the downstream bypass facility with Vermont Department of Fish and Wildlife and U.S. Fish and Wildlife Service. GMP shall identify any modifications needed to conform with prior resource agency recommendations and develop a schedule for implementation within 180 days.
4. GMP, in consultation with Vermont Department and Fish and Wildlife and U.S. Fish and Wildlife Service, shall evaluate the performance bypass facility to verify that downstream passage is safe and effective. Results of this evaluation shall be provided to LIHI. If results of this evaluation indicate issues with safety or effectiveness, GMP shall commit to working with the agencies to identify reasonable measures to increase safety and effectiveness and shall document these efforts with an annual report to LIHI.

Thank you for the opportunity to comment.

Sincerely yours,



Eric Davis  
River Ecologist

- c:     Jeff Crocker, VTDEC  
       Bernie Pientka, VTDFW  
       Melissa Grader, USFWS  
       Julianne Rosset, USFWS  
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