



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

March 1, 2013

RE: Study Requests for FERC Hydroelectric Projects P-1889 Turners Falls and P-2485 Northfield Mt.

Dear Secretary Bose,

The Massachusetts Department of Environmental Protection (the Department) is the state resource agency responsible for issuing Section 401 Water Quality Certificates. The Department has reviewed the Preliminary Application Document (PAD) for the Turners Falls (P-1889) and Northfield Mountain (P-2485) Hydroelectric Projects prepared by FirstLight Power Resources and appreciates this opportunity to comment on this PAD and to request additional studies.

The Department has two comments to offer:

1. The MassDEP relies on the recommendations by the Massachusetts Division of Fisheries and Wildlife (the Division) regarding requirements needed to support the Connecticut River's designation as a habitat for fish, other aquatic life, and wildlife including for their reproduction, migration, growth and other critical functions. The Department concurs with the recommendations made by the Division to the Federal Energy Regulatory Commission.
2. The PAD needs to reference the Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound prepared by the New York State Department of Environmental Conservation and the Connecticut Department of Environmental Protection (December 2000). Nutrients associated with sediment transport contribute to low dissolved oxygen in Long Island Sound.

The Department requests two studies be conducted:

1. Sediment Transport Study. Results of the sediment transport study request should provide information sufficient to enable staff to understand current and proposed effects of water level fluctuations and the relation to sediment transport in the Connecticut River. Staff should be able to identify techniques that could be used to mitigate the effects of project operations or other mitigation techniques that could be developed to reduce sediment transport within the impoundment and downriver.
2. Water Quality Study. Results of water quality testing will provide a more complete understanding of the seasonal conditions occurring in this section of the river, useful from both a Water Quality Standards and fisheries perspective.

Thank you for this opportunity to comment.

Sincerely,

Robert Kubit, P.E.

FirstLight Study Request: Northfield Mountain/Turners Falls Operations Impact on Sediment Transport

Goals and Objectives

The goals of the study are twofold: (1) Assess management measures available to minimize sediment transport through the Turners Falls Canal and from the Upper Reservoir at Northfield Mountain during and after maintenance drawdowns; and (2) Conduct a focused investigation of bank instability in the Turners Falls Pool (“TFP”) where given a causative relationship between the presence of fine grained soils susceptible to instability by anthropogenic fluctuation of pore water, and observed pool surface elevation changes from power generation unstable banks/slopes exist. The results of the study should provide information sufficient to enable staff to understand current and proposed effects on water level fluctuations, both natural and anthropogenic, and to identify sites where biostabilization techniques or other measures may be beneficial to water quality. The purpose of the study will be to focus attention and resources on that fraction of the banks within the Turners Falls Pool (TFP) which are scientifically established to be susceptible to repeated soil wetting and drying.

The specific objectives of the bank instability study are as follows:

- a. Accurately map and scientifically describe that portion of the TFP where active or recent “bank” “erosion” is occurring (maybe as much as 18% of the “banks” in the Pool)---all terms should be precisely defined in any such study, and linked to jurisdictional definitions whenever possible;
- b. Note any of the areas of active or recent “bank” “erosion” that have been the locus of prior bank stabilization and identify the method of stabilization implemented at that locus;
- c. Within the mapped areas of active or recent “bank” “erosion”, establish and designate fixed, recoverable transects;
- d. Analyze soils (classification, structure, parent materials, texture, hydric regime, position on landscape, chemistry, and most importantly engineering dynamics such as susceptibility to slope failure) at each transect;
- e. Along these same transects, collect cross-section data related to bathymetry and riverine hydrology, most especially as they relate to jurisdiction and water level fluctuation. MassDEP will want to know the precise elevation of the Ordinary High Water Mark, “normal pool elevation”, “maximum pool elevation”, “minimum pool elevation”, maximum and minimum daily range elevations, and perhaps other critical elevations, such as 10- and 100-year floodplain elevations. MassDEP will also need to understand subsurface hydrology at each transect, but above OHWM, in order to account for groundwater influences on soil slumping;
- f. Once the initial data is collected and organized, MassDEP will want a soil scientist, perhaps one with a strong engineering background, to rank data points at each transect as to relative susceptibility to bank failure due to repeated wetting and drying. Soil science analyses e.g. “Plasticity Index” and “Erosion Factors”, would help guide direction of bank stabilization efforts;
- g. Map land use practices that are directly observationally linked to “bank” “erosion” directly beneath and/or proximate to them, and target these areas for employment of best management practices;
- h. Superimpose on the 18% of the Pool which comprises the “study area” a “sensitive receptors” overlay, which will map in detail the position of bank-nesting bird species, rare

- species occurrences, “vegetated shallows”, and other sensitive and agreed to factors that might need to be eliminated as sites for biostabilization, in favor of less sensitive sites.
- i. Transects will then need to be periodically revisited and data recollected, for use in determining progression of relative “erosion” at each, the effectiveness of biostabilization at transects where this technique has been employed, and potential differences in soil profiles at different transects to withstand repeated, daily wetting and drying.
 - j. Determine through accurate, repeatable, scientifically based mapping what fraction of the “banks” of the TFP are susceptible to or experiencing erosion due to repeated wetting and drying of the soil column. In the process, eliminate all other “banks” within the TFP from further study in regards this issue, including areas in which bedrock predominates; soils/substrates are presently stable; or where hardscape stabilization has already been installed.

Resource Management Goals

The Proposed Massachusetts Year 2012 Integrated List of Waters shows the segment from the VT/NH state line to the Turners Falls dam (MA34-01 & MA34-02) as impaired and considered a “Water Requiring a TMDL” due to “Other flow regime alterations”, “Alteration in stream-side or littoral vegetative covers” and “PCB in Fish Tissue”. In addition, the segment below the Turners Falls dam to the confluence with the Deerfield River (MA34-03) is also shown as impaired by these causes as well as total suspended solids.

In order to meet the objectives of the federal Clean Water Act, the Massachusetts Department of Environmental Protection (“MassDEP”) adopted the Massachusetts Surface Water Quality Standards, 314 CMR 4.00. The Standards classify each body of water; designate the most sensitive uses to be enhanced, maintained and protected for each class; prescribe minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges into waters of the Commonwealth.

MassDEP has designated the Connecticut River as a Class B river for its entire length in Massachusetts, 314 CMR 4.06(5). Class B rivers are assigned the designated uses of habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation, 314 CMR 4.05(3)(b). Class B waters must also have consistently good aesthetic value and meet minimum criteria for numerous water quality indicators to achieve compliance with the standards set forth in the regulations. The anti-degradation provisions of 314 CMR 4.04 require protection of all existing and designated uses of water bodies, and maintenance of the level of water quality needed to protect those uses.

The requested studies will assist MassDEP in issuing a Water Quality Certification that complies with the State and Federal Clean Water Acts.

Public Interest

The requestor is a state natural resource agency.

Existing Information

The Pre-Application Document (“PAD”) provides a summary of the numerous studies that have been conducted to characterize stream bank conditions of the Turners Falls Impoundment, to understand the causes of erosion, and to identify the most appropriate approaches for bank stabilization.

The *Erosion Control Plan for the Turners Falls Pool of the Connecticut River* (Simons & Associates, Inc. dated June 15, 1999) was completed in order to comply with license articles 19 and 20, and contained a list of 20 priority stream bank stabilization project sites. By the end of the current license, FirstLight believes work at all sites will have been completed, although some require further repair work. The Erosion Control Plan (ECP) approach should be revised to identify and target those sites where facility operation can be directly linked to bank/slope instability on fine grained soils susceptible to repeated pore saturation/dewatering; and has resulted in potential degradation to the “Aquatic Ecosystem” of the TFP in discrete locations, the long-term results of which have not been analyzed. The next Full River Reconnaissance (FRR) is scheduled in 2013 and a proposed QAPP has been submitted to the MassDEP for comment. The Full River Reconnaissance scheduled for 2013 should be conducted using a MassDEP approved QAPP. MassDEP anticipates that the QAPP will specify establishing recoverable transects and standardizing the way the physical features of the LUWW-Bank-Riverfront Area is characterized, and identification of OHW elevation. MassDEP anticipates working with stakeholders to address specific needs and to ensure that all subsequent observations and evaluations are based upon scientifically reproducible geomorphologic criteria that has been established and is free from potential observer bias or prejudice. In this manner all parties will be able to contrast and compare the same data and make more meaningful assessments.

Nexus to Project Operations and Effects

Repetitive water level fluctuations and flow alterations caused by hydroelectric peaking operations are suspected to be a significant contributor to shoreline erosion. The more focused investigation requested above will enable MassDEP to condition future operation of the facility by issuance of a Section 401 Water Quality Certificate toward protecting the designated uses of the river that are most directly impacted by facility power generation; and specific land use activities in close proximity to the banks/slope without allowance for an adequate riparian buffer.

Methodology Consistent with Accepted Practice

MassDEP requests that FirstLight:

- Provide data on the daily water level fluctuation changes from the past five years from stations listed in the PAD, and estimate weekly/daily fluctuations within TFP assuming proposed operations and hydraulic conditions.
- Implement, as outlined in the pending MassDEP approved Quality Assurance Project Plan for the 2013 Full River Reconnaissance, a focused investigation approach in the pool of those remaining sites that are undergoing erosion, sites having fine grained lacustrine derived soils/parent materials below OHW, sites likely to have slope instability and subsequent erosion due to saturation and dewatering of pore pressure, and sites that experience daily and weekly cycles of changes in elevation of pool water resulting from the Turners Falls Dam, Northfield Mountain or both. The actual daily and weekly river elevation changes, especially those directly related to only power generation, and the corresponding response observed in the soils/slope should be observed.

- Make a comprehensive review of all sites stabilized in the pool to date, with a scope toward comparing pre-stabilization work at previously stabilized sites to comparable site conditions identified in the paragraph above at sites continuing to undergo erosion. Identify the most appropriate techniques for bank stabilization for sites continuing to undergo erosion, given the existing and proposed hydraulic conditions and success of prior stabilization projects at sites with similar conditions, as well as the environmental conditions and associated permitting requirements at each site.
- Evaluate strategies to manage the release of accumulated sediment through Northfield Mountain Project works during upper reservoir drawdown or dewatering activities. FirstLight's evaluation should include the feasibility of the installation of a physical barrier across the bottom of the intake channel designed to prevent the migration of sediment during future drawdowns of the upper reservoir.
- Evaluate practical strategies to manage and minimize sediment released through spillway gates and the log sluice located near the bottom of the forebay adjacent to the Cabot Powerhouse during canal dewatering activities.
- Based upon the information obtained through the bank instability study, propose a list of locations for bank stabilization projects within the TFP, together with a proposed method of stabilization for each identified location and all impediments to the proposed work at each location.

Level of Effort/Cost, and Why Alternative Studies will not Suffice

Numerous erosion studies have already been conducted, however, those studies are insufficient to allow MassDEP to fulfill its statutory obligations. The various studies lack sufficient scope, data and/or quality controls to allow MassDEP to rely on them as they exist or to support an expansion of the scope as a cost effective approach. . This proposed focused approach will enable the stakeholder to reach the stated goals and objectives more efficiently and in a more cost effective manner for FirstLight.

FirstLight Study Request: Water Quality Monitoring

Goals and Objectives

Determine the current water quality of the Connecticut River within the Project area. The results of the study should provide information sufficient to enable staff to understand water quality conditions at the project. The study plan should be developed in consultation with the U.S. Fish and Wildlife Service (FWS) and the Massachusetts Department of Environmental Protection (MADEP).

The specific objectives of this study are as follows:

- Characterize water quality in the Turners Falls impoundment, bypass reach, canal and below the confluence of the bypass reach and canal discharge.
- Evaluate the potential effects of project operation on water quality parameters such as temperature and dissolved oxygen in conjunction with various other water uses.
- Determine the level of contamination in sediment impeded by the Turners Falls dam.
- Collect dissolved oxygen and temperature data during the spring through fall period and under various hydropower operating conditions at the Northfield Mountain Project.

Resource Management Goals

In order to meet the objectives of the federal Clean Water Act, MADEP adopted the Massachusetts Surface Water Quality Standards, 314 CMR 4.00. The Standards classify each body of water; designate the most sensitive uses to be enhanced, maintained and protected for each class; prescribe minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges into waters of the Commonwealth.

MADEP has designated the Connecticut River as a Class B river for its entire length in Massachusetts, 314 CMR 4.06(5). Class B rivers are assigned the designated uses of habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation, 314 CMR 4.05(3)(b). Class B waters must also have consistently good aesthetic value and meet minimum criteria for numerous water quality indicators to achieve compliance with the standards set forth in the regulations. The anti-degradation provisions of 314CMR4.04 require protection of all existing and designated uses of water bodies, and maintenance of the level of water quality needed to protect those uses.

Public Interest

The requestor is a state natural resource agency.

Existing Information

The PAD provides a summary of existing water quality data. While a number of monitoring efforts have taken place and include sample sites within the project boundary, none of those studies were designed to comprehensively investigate whether all relevant project areas currently meet Class B standards: The Massachusetts DEP's Connecticut River watershed assessment monitoring occurred in 2003, only had two stations located within the project area (both upstream of the Turners Falls dam) and only collected five to six samples from late April to early October; the Connecticut River Watershed Council's volunteer monitoring program only had one sample site within the project area (at Barton's Cove in the Turners

Falls headpond) and while those data are more recent, only three samples were collected in 2007 and only six samples in 2008 (over the course of three to four months each year); and the U.S. Geological Survey's long-term water quality monitoring station located downstream of the Cabot Station tailrace only collects information roughly once per month (and no dissolved oxygen data are provided).

No directed, site-specific surveys have been conducted to determine whether waters within the Project area meet State standards. This information gap needs to be filled so that resource agencies can evaluate properly the potential impact of project operations on water quality.

Nexus to Project Operations and Effects

The project creates a 20-mile-long impoundment where there would naturally be a free-flowing river. It currently operates in a peaking mode, with allowable headpond fluctuations of up to 9 feet, with proposals to continue as such. Portions of the headpond are nearly 100 feet-deep. There is a 2.7 mile-long reach of river bypassed by the Turners Falls power canal with only a nominal seasonal release required (equal to 0.05 cfs). The below-project flow requirement is equal to 0.20 cfm (1,433 cfs). Water quality can be affected by the operating mode of a hydropower project. Impoundments can stratify, resulting in a near-hypoxic hypolimnion. If the project intake draws off of these deep waters then it could cause low dissolved oxygen levels downstream from the project discharge.

The MADEP requests that the applicant conduct a water quality survey of the impoundment, bypass reach and tailrace reach in order to determine whether state water quality standards are being met under all currently-licensed operating conditions (i.e., during periods of generation and non-generation). Results of the survey would be used, in conjunction with other studies requested herein, to determine an appropriate below-Project flow prescription, bypass reach flow(s), and to recommend an appropriate water level management protocol for the headpond (e.g., limiting impoundment fluctuations to protect water quality).

Operation of upstream hydroelectric projects as well as the Turners Falls Project and Northfield Mountain Project may impact water quality through the use of water for hydropower generation.

Methodology Consistent with Accepted Practice

Turners Falls: Water temperature and DO measurements should be collected from a minimum of six locations: upstream in the impoundment (Route 10 bridge), at a deep location within the impoundment, in the forebay near the intake, in the bypass reach, in the canal near Cabot Station and downstream of the confluence of the Cabot Station discharge and the bypass reach but upstream of the confluence with the Deerfield River. In order to ensure that data are collected during a time of important biological thresholds and anticipated "worst case" conditions for dissolved oxygen (low flow, high temperature, antecedent of any significant rainfall event), we recommend deploying continuous data loggers at all six locations, with biweekly vertical profiles taken at the deep impoundment location from April 1 through November 15. Results should include date, time of sampling, sunrise time, GPS location, generation status (estimated flow through canal and bypass reach), precipitation data, water temperature, DO concentration and percent saturation. In addition, impoundment sediment adjacent to the Turners Falls dam should be analyzed for metals and polychlorinated biphenyls.

A proposed water quality sampling plan is to be submitted to MADEP for approval prior to sampling. A section on quality assurance and quality control must be included.

If river flow and temperature conditions are representative of an “average” or “low” water year, then one year of data collection should be sufficient to perform the study. If conditions are not representative (i.e., a “wet” or cool year) then a second year of data collection may be necessary.

Northfield Mountain: The water quality study will include monthly dissolved oxygen and temperature profiles within the Northfield Mountain Upper Reservoir. It is anticipated that the study will be conducted from approximately June 15 through September 30.

Level of Effort/Cost, and Why Alternative Studies will not suffice

Cost would depend on the specific methodology chosen. If continuous data loggers are installed at all six locations and biweekly vertical profiles taken at the deep impoundment location from April 1 through November 15 then the estimated cost of the water quality study is moderate. It is expected to take two technicians approximately one day to deploy the loggers, twelve days to collect the vertical profiles, one day to remove the loggers, one day to download the data, and five days to write the report.

In the PAD, the applicant proposes to assess the effects of the Turners Falls and NFMPS project operations on dissolved oxygen and temperature by continuously monitoring DO and temperature at locations within the project areas and gathering vertical profiles within the TF impoundment and NFMPS upper reservoir.