

GLENDALÉ HYDROELECTRIC PROJECT

LIHI APPLICATION

ATTACHMENT 18

NEW GENERATION

144 FERC ¶ 62,017
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Littleville Power Company, Inc.

Project No. 2801-033

ORDER APPROVING REVISED TRASH RACK DESIGN

(July 9, 2013)

1. On June 17, 2013, Littleville Power Company, Inc., licensee for the Glendale Hydroelectric Project, filed revised plans for the minimum flow unit trash rack design, pursuant to license article 403 of the Commission's Order Issuing Subsequent License¹ and condition 21 of the Water Quality Certificate (WQC), issued by the Massachusetts Department of Environmental Protection (DEP).² The licensee's original trash rack design was approved by the Commission on May 12, 2011.³ The Glendale Hydroelectric Project is located on the Housatonic River in the Town of Stockbridge, Berkshire County, Massachusetts.

BACKGROUND

2. Article 403 of the license requires the licensee to file, at least 90 days before the start of any land-clearing or land-disturbing activities at the project site associated with installation of the minimum flow turbine-generator, for Federal Energy Regulatory Commission (Commission) approval, detailed design drawings of the trash racks to be installed at the intake for the minimum flow turbine unit and a schedule to construct and install the trash racks. The filing shall include, but not be limited to: (1) specifications of the size of the openings between the trash rack bars not to exceed 1 inch; (2) the maximum intake approach velocity not to exceed 2 feet per second (fps); and (3) a description of the methods and a schedule for installing the trash racks.

¹ 128 FERC ¶ 62,123 (August 19, 2009).

² The WQC was issued on July 8, 2009, and made part of the license by ordering paragraph D.

³ 135 FERC ¶ 62,137.

3. The licensee is required to prepare the aforementioned drawings and schedule after consultation with the DEP, Massachusetts Department of Fisheries and Wildlife (DFW), and the U.S. Fish and Wildlife Service (FWS). The licensee is also required to include with the drawings and schedule documentation of consultation, copies of comments and recommendations on the drawings and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the licensee's facilities.

LICENSEE'S PLAN

4. The revised trash rack structure proposed by the licensee would be installed in a newly constructed intake opening in the existing concrete power canal wall. The trash rack would consist of a single 8 feet 2 $\frac{3}{4}$ inches wide, by 14 feet 6 inches high panel positioned in the newly constructed canal wall intake opening. The trash rack frame would extend from the top of the power canal concrete wall to the bottom of the canal intake opening at a 12:1 slope. The sides of the trash rack structure would be contained within concrete side walls of the new intake to prevent fish from passing behind the trash racks. The licensee states that, based on the gross area of the racks, the approach velocity one foot in front of the trash racks is calculated to be 1.2 fps, which is less than the 2.0 fps requirement and the velocity through the trash rack bars is calculated to be 1.6 fps.

5. The licensee states that the design details for installing the new minimum flow unit are presently being finalized. The licensee proposes to de-water the power canal and construct the new canal intake. There would be no change to the licensee's plans to construct the powerhouse in the dry (behind a cofferdam). In addition no impoundment drawdown would be necessary. The licensee expects that construction will commence in summer 2013, with unit commissioning scheduled for December 2013. The licensee proposes to fabricate the trash rack panel off site and installed it when the intake opening is completed.

AGENCY CONSULTATION

6. The licensee provided the draft plan to the agencies on June 7, 2013. The DEP and DFW provided approval of the plan in letters dated June 10, 2013. The FWS approved the plan in an email dated June 12, 2013.

DISCUSSION

7. In accordance with the article 403 requirements, the licensee's plan states that the trash racks will not have opening in excess of one inch, and the calculated approach velocity will not exceed 2 fps. The licensee's submitted, pursuant to article 302 of the license, copies of its plans, specifications, and supporting design documents to the Commission's New York Regional Engineer and the Commission, on July 19 2011. The licensee's plans were approved by letter dated October 21, 2011. On June 27, 2013, the

licensee filed its revised plans, specifications, and supporting design documents to the Commission's New York Regional Engineer and the Commission. The licensee's plan addresses the requirements of license article 403 and WQC condition 21 for trash racks at the minimum flow unit and should be approved.

The Director orders:

(A) The revised trash rack plan for the minimum flow unit filed on June 17, 2013, by Littleville Power Company, Inc., licensee for the Glendale Hydroelectric Project, is approved.

(B) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 8251 (2006), and the Commission's regulations at 18 C.F.R. § 385.713 (2013). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Steve Hocking
Chief, Environmental Resources Branch
Division of Hydropower Administration
and Compliance



Green Power

Enel Green Power North America, Inc.

One Tech Drive, Suite 220
Andover, Massachusetts USA 01810
T 978 681 1900 F 978 681 7727

LITTLEVILLE POWER COMPANY, INC.
A SUBSIDIARY OF ENEL GREEN POWER NORTH AMERICA, INC.

Via eFiling

June 17, 2013

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

Re: Glendale Hydroelectric Project (FERC No. 2801-033);
License Article 403 – Revised Intake and Trashrack Design.
Expedited Review Requested

Dear Secretary Bose:

On May 12, 2011 the Commission approved the trashrack design proposed by Littleville Power Company, Inc. (LPC) for the new minimum flow unit at the Glendale Hydroelectric Project (FERC No. 2801), pursuant to Article 403 of the project's Subsequent License.¹ As approved, the minimum flow unit would draw water from the project impoundment through two abandoned waste gates located between the dam and the main intake canal. LPC selected this design because it would maximize the operational flexibility of the project by allowing the minimum flow unit to operate independently of the project's main units, when the power canal to the main units is dewatered. However, the waste gates are heavily silted in by PCB-contaminated river sediments, such that reactivating these gates for the minimum flow unit would require dredging and disposal of over 1,000 cubic yards of contaminated sediments at substantial cost. Because the construction bids for this project far exceeded LPC's budget, LPC temporarily shelved construction of the minimum flow unit to explore options for reducing the construction costs.

To avoid the expense of dredging and disposal and to eliminate the need for a cofferdam in the impoundment, LPC has developed an alternative intake configuration in which the minimum flow unit would draw water from the main power canal, instead of through the waste gates. While this configuration would reduce the operational flexibility of the project, the savings in construction costs and time would be more in line with the project's overall financial goals. All other aspects of the powerhouse design as presently approved by the Regional Engineer would remain unchanged.

¹ 135 FERC ¶ 62,137

Pursuant to the terms of license article 403, LPC is submitting its revised minimum flow unit trashracks for the canal intake. LPC respectfully requests expedited review of this submittal due to construction timing concerns. Article 403 requires that the submittal include: (1) specifications of the size of the openings between the trash rack bars not to exceed 1 inch; (2) the maximum intake approach velocity not to exceed 2 feet per second; and (3) a description of the methods and a schedule for installing the trash racks. As required, the attached trashrack plans were prepared in consultation with the resource agencies.

Trashrack Design and Bar Spacing

The attached three drawings show the overall layout of the modified intake design and the construction details of the proposed trashrack. Water will be drawn from the canal into the minimum flow unit's forebay via a 8'-4" wide by 8'-9" deep (at normal pond elevation of 810.9 ft NGVD) opening in the concrete canal wall, controlled by a 7 ft by 7 ft slide gate (Drawing No. 3). A new trashrack structure will be mounted within the opening, consisting of a single 8'-2 $\frac{3}{4}$ " wide by 14'-6" tall panel with 76 bars 3" by 5/16" each with 1-inch clear spacing (Drawing No. 12). The trash rack panel will extend from the top of the concrete canal wall to the bottom of the canal opening at a 12:1 slope (Drawing No. 11), and will have an effective submerged depth of 8'-9". The sides of the rack structure will be contained within the concrete sidewalls of the canal opening, thereby preventing fish from passing behind the trash racks.

Approach Velocity

Trashrack approach and through-flow velocity calculations are provided in Note 6 at the right side of Drawing 12. Based on the gross area of the submerged portion of the racks, the approach velocity 1 ft in front of the trash racks is calculated to be 1.2 ft/s, well within the 2.0 ft/s maximum approach velocity requirement. Furthermore, the calculated velocity through the net open area of the submerged racks is 1.6 ft/s, also within the 2.0 ft/s requirement.

Construction Schedule and Method

LPC is presently finalizing the engineering details for new intake design. On October 21, 2011 FERC's Regional Engineer granted construction approval for the original powerhouse and intake design. LPC also previously obtained all other necessary local, state and federal permit approvals for the construction activities at the dam. LPC expects to submit the engineering details of the new intake design to the Regional Engineer for a revised construction approval shortly. As LPC reported by letter dated October 25, 2011, the new turbine-generator unit has been purchased and received. Pending the Regional Engineer's revised approval, on-site construction is anticipated to commence in July, 2013 with unit commissioning scheduled to occur by December 31, 2013.²

Construction of the canal intake and installation of the trashracks will be accomplished "in the dry" with the canal dewatered. An impoundment drawdown will not be necessary to facilitate any construction activities. The trashrack panel will likely be

² LPC understands that construction must be completed by November 1, 2013 under Article 301. LPC will separately request an extension of time to complete construction from the Commission.

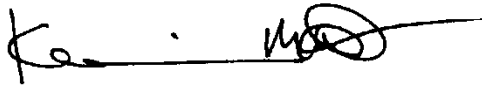
fabricated off-site and installed when the concrete work for the canal opening is complete. There will be no change to the construction of the new powerhouse downstream of the gatehouse structure, which will be conducted "in the dry" behind a cofferdam.

Agency Consultation

Pursuant to the consultation requirements under Article 403, LPC submitted a draft of this plan to the MDEP, the MDFW and the USFWS for their review and comment. All three agencies approved the proposed changes to the trashrack design and location. Copies of all comments received are attached.

Thank you for your review of this revised trash rack design. Please do not hesitate to contact me at (978) 681-1900, extension 809 if you have any questions concerning this submittal.

Sincerely,
Littleville Power Company, Inc.

A handwritten signature in black ink, appearing to read "Kevin M. Webb", with a long horizontal line extending to the right.

Kevin M. Webb
Environmental Affairs Coordinator

cc: R. Bartlett, LPC

Attachments:

- 3 drawings (CEII)
- Agency approval letters

Attachment A

Trashrack Design Drawings

The trashrack design drawings contain Critical Energy Infrastructure Information and have been removed from the publicly-available portion of this submittal, in accordance with the Commission's CEII guidelines.

Attachment B

Agency Approvals



MassWildlife

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

Wayne F. MacCallum, *Director*

June 10, 2013

Kevin M. Webb
Hydro Licensing Manager
Enel Green Power North America, Inc.
One Tech Drive, Suite 220
Andover, Massachusetts USA 01810

RE: Glendale Hydroelectric Project (FERC No. 2801)
Minimum Flow Unit Installation – Revised Intake and Trashrack Design.

Dear Kevin,

The Massachusetts Division of Fisheries and Wildlife (Division) is the agency responsible for the protection and management of the fish and wildlife resources of the Commonwealth. As such we monitor operations at hydroelectric projects within the Commonwealth. The Division has the following comments on the "Revised Intake and Trashrack Design" for the Glendale Hydroelectric project (FERC No. 2801) issued on June 7, 2013.

Proposal

The project owner has proposed to change the location of the intake for the new minimum flow unit at the Glendale dam from old waste gates that would draw water from the project impoundment to a new gate that would draw water from the project's power canal. All other aspects of the minimum flow unit design would remain unchanged. The proposed gate will be protected by a trash rack with 1" clear space with an approach velocity calculated at less than 2 feet per second.

Comments

The Division finds the proposed new gate and trashrack acceptable.

Thank you for this opportunity to comment,

Caleb Slater, Ph.D.

www.mass.gov/masswildlife



Department of Environmental Protection

Central Regional Office • 627 Main Street, Worcester MA 01608 • 508-792-7650

DEVAL L. PATRICK
Governor

RICHARD K. SULLIVAN JR.
Secretary

KENNETH L. KIMMELL
Commissioner

Kevin M. Webb
Littleville Power Company, Inc.
One Tech Drive, Suite 220
Andover, Massachusetts USA 01810

June 10, 2013

Re: Glendale Hydroelectric Project (FERC No. 2801-MA)
Minimum Flow Unit Installation – Revised Intake and Trashrack Design

Dear Mr. Webb,

The MA Department of Environmental Protection (the Department) is the agency that issues 401 Water Quality Certificates on behalf of the Commonwealth for hydroelectric projects. To accomplish this, the Department relies on the recommendations provided by the MA Division of Fish & Wildlife regarding aquatic life habitat and fisheries issues. Accordingly, the Department concurs with the recommendations to be developed by the MA Division of Fish & Wildlife for the revised intake and trashrack design.

If I can be of any further assistance, please contact me at 508-767-2854.

Sincerely,

Robert Kubit, P.E.

From: [Grader, Melissa](#)
To: [Webb, Kevin \(EGP North America\)](#)
Cc: [Caleb Slater \(Caleb.Slater@state.ma.us\)](#); [Kubit, Robert \(DEP\)](#); [Bartlett, Randal \(EGP North America\)](#)
Subject: Re: Glendale Project - revised trashrack design
Date: Wednesday, June 12, 2013 1:04:05 PM

Hi Kevin,

The FWS has reviewed Enel's request to change the location of the minimum flow turbine at the Glendale Project. Based on the information you provided, the Service has no objection to moving the location of the minimum flow intake from the spillway to the upper end of the power canal. The trashracks at the intake to the new unit will have 1 inch clear spacing and an approach velocity less than 2 fps, in conformance with Service design criteria to minimize impingement and entrainment of fishes. The location of the new powerhouse (and therefore, of the minimum flow release discharge point) would remain unchanged.

Thank you for this opportunity to comment.

Regards,
Melissa

Melissa Grader
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service - New England Field Office
103 East Plumtree Road
Sunderland, MA 01375
413-548-8002 x124
melissa_grader@fws.gov

~~~~~  
"But now's the time to look and look again at what you see,  
Is that the way it ought to stay?" That's the Way by Led Zeppelin

On Fri, Jun 7, 2013 at 3:15 PM, Webb, Kevin (EGP North America)  
<[Kevin.Webb@enel.com](mailto:Kevin.Webb@enel.com)> wrote:

Following up on my recent phone conversations with each of you, please find attached a letter formally asking for review of our revised trashrack design for the Glendale minimum flow unit. As we will also need to submit this to FERC for approval, I would great appreciate it if you could give this a review as soon as possible.

Thanks again and please don't hesitate to contact me if you have any questions.

**Kevin M. Webb**

Hydro Licensing Manager



**Green Power**

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**LITTLEVILLE POWER COMPANY, INC.**  
A SUBSIDIARY OF ENEL GREEN POWER NORTH AMERICA, INC.

**Via eFiling**

October 25, 2011

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

Re: Glendale Hydroelectric Project (FERC No. 2801-027);  
License Article 301 - Start of Construction.

Dear Secretary Bose:

On August 19, 2009 the Commission issued a Subsequent License to Littleville Power Company, Inc. (LPC) for the Glendale Hydroelectric Project.<sup>1</sup> The Subsequent License authorizes the Licensee to install a new turbine-generator unit at the project dam to capture energy from minimum flows released to the bypass reach. Article 301 of requires that construction of the new minimum flow unit begin by November 1, 2011, two years from the effective date of the Subsequent License.

The Licensee submits the following documentation to the Commission demonstrating that it has started construction of the minimum flow unit pursuant to Article 301:

- On December 3, 2010 LPC's parent company Enel North America, Inc. issued a Purchase Order to The James Leffel & Co. to supply the turbine-generator unit (Attachment A). Fabrication of the unit was recently completed, and delivery is expected by October 31, 2011.
- On May 11, 2011 LPC's representatives hand-delivered the required pre-construction documents to the Regional Engineer for review and approval, pursuant to Article 303 (Attachment B). Authorization to proceed with on-site construction was issued by the Regional Engineer on October 21, 2011 (Attachment C).

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<sup>1</sup> 128 FERC ¶ 62,123

Glendale Project (FERC No. 2801-MA)  
License Article 301 - Start of Construction.

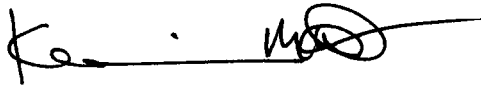
October 25, 2011  
Page 2

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- LPC has obtained all other federal, state and local permits necessary for the construction of the minimum flow unit powerhouse at the dam. Evidence of the issuance of these permits can be provided to the Commission upon request.

LPC expects that on-site construction activities will commence shortly.

We thank the Commission and its staff for its assistance in implementing this important project improvement. Please do not hesitate to contact me at (978) 681-1900, extension 809 if you have any questions concerning this information.

Sincerely,  
**Littleville Power Company, Inc.**

A handwritten signature in black ink, appearing to read 'Kevin M. Webb', with a long horizontal line extending to the right.

Kevin M. Webb  
Environmental Affairs Coordinator

cc: Gerald L. Cross, P.E., FERC-NYRO  
S. Michaud, LPC  
J. Dollard, LPC

**Purchase Order: 4550011537**

Date: 12/03/2010

**Ship to:**

GLENDAL  
ROUTE 183, 22 GLENDAL ROAD  
STOCKBRIDGE , 01262 , MA

**Invoice to be sent to:**

Enel North America, inc  
One Tech Drive, Suite 220  
Andover, MA 01810  
Phone: 978-681-1900  
Fax: 978-681-7727

**Vendor:**

Company  
THE JAMES LEFFEL & CO.  
1978 COMMERCE CIRCLE  
45504 SPRINGFIELD, OH  
USA  
VAT ID No.: US31-1297200

Telephone 937-322-0116

**OBJECT**

| Item  | Code | Description           | Un | Quantity | Price | Amount | Curr. | Delivery   | Plant | St. Loc. |
|-------|------|-----------------------|----|----------|-------|--------|-------|------------|-------|----------|
| 00010 |      | Turbine and generator | AU | 1        |       |        | USD   | 12/01/2010 | F002  |          |
| Text  |      |                       |    |          |       |        |       |            |       |          |

**Total amount without TVA:** USD

Company  
(Seal & Signature)

Vendor Acceptance  
(Seal & Signature)

Other Condition:



**LITTLEVILLE POWER COMPANY, INC.**  
A SUBSIDIARY OF ENEL GREEN POWER NORTH AMERICA, INC.

**Green Power**

Enel Green Power North America, Inc.

One Tech Drive, Suite 220  
Andover, Massachusetts USA 01810  
T 978 681 1900 F 978 681 7727

**Via Hand Delivery**

May 11, 2011

Gerald L. Cross, P.E.  
Regional Engineer  
Federal Energy Regulatory Commission  
19 West 34th Street, Suite 400  
New York, NY 10001

Re: Glendale Hydroelectric Project (FERC No. 2801-MA);  
Pre-Construction Documents for Minimum Flow Turbine Installation.

Dear Mr. Cross:

On August 19, 2009, Littleville Power Company Inc. (LPC) was issued a Subsequent License by the Federal Energy Regulatory Commission for the continued operation of the Glendale Hydroelectric Project.<sup>1</sup> The Glendale Project is located on the Housatonic River in Stockbridge, Berkshire County, Massachusetts. The new FERC license authorizes LPC to install a new turbine-generator unit at the project dam to recapture the energy potential of the 90 cfs minimum flow released to the bypass reach.

Pursuant to license article 303, please find attached the Contract Plans and Specifications and related documents for your review and approval. These include the following:

- Contract Plans and Specifications;
- Construction drawings;
- Quality Control and Inspection Program (QCIP);
- Temporary Construction Emergency Action Plan (TCEAP);
- Soil Erosion and Sediment Control Plan – included on the Cover Sheet and Sheets 1 and 2 of the attached construction drawings.

Our cofferdam construction drawings will be submitted to your office for review and approval pursuant to license article 302, once the plans are developed in conjunction with our selected construction contractor. In addition, pursuant to license article 403 the proposed trashrack design was submitted to the Secretary of the Commission on March 21, 2011, following agency review and approval of the plans. We are currently awaiting FERC's approval of the proposed design.

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<sup>1</sup> 128 FERC ¶ 62,123

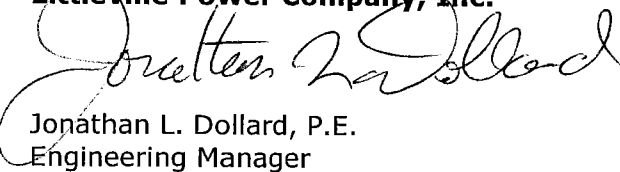


Glendale Project (FERC No. 2801-MA)  
Pre-Construction Documents for Minimum Flow Turbine Installation

May 11, 2011  
Page 2

Thank you for your expedited review of these documents. If you have any questions concerning this project, please do not hesitate to contact me at (978) 681-1900, extension 810, or Kevin Webb, Environmental Affairs Coordinator, at extension 809.

Sincerely,  
**Littleville Power Company, Inc.**



Jonathan L. Dollard, P.E.  
Engineering Manager

cc: Secretary, FERC  
Director, Division of Dam Safety and Inspections  
K. Webb, LPC

**FEDERAL ENERGY REGULATORY COMMISSION**  
**Office of Energy Projects**  
**Division of Dam Safety and Inspections – New York Regional Office**  
**19 West 34<sup>th</sup> Street, Suite 400**  
**New York, NY 10001**

Telephone No. (212) 273-5900

Fax No. (212) 631-8124

**In reply refer to:**

**P-2801-MA Glendale**  
**NATDAM # - MA00021**

**Minimum Flow Unit**  
**Construction Authorization**

**October 21, 2011**

**Mr. Jonathan L. Dollard, P.E.**  
**Engineer Manager**  
**One Tech Drive, suite 220**  
**Andover, MA 01810**

Dear Mr. Dollard:

In accordance with Article 303 of the Subsequent License issued on August 19, 2009 that authorized the new 165 kW Minimum Flow turbine-generator to be installed at the Glendale Hydro Project; you have filed the following documents on May 11, 2011:

- Construction Drawings and Specifications
- Quality Control and Inspection Program (QCIP)
- Temporary Construction Emergency Action Plan (TCEAP)
- Soil Erosion and Sediment Control Plan which was included on the Cover sheet and sheets No. 1 & 2 of the construction drawings.

By letter dated July 18, 2011 you submitted revised Construction Drawings, Specifications and the Design Report which supersede previous versions. The design report and the revised project Construction Drawings were requested during our meeting held on May 12, 2011 in NY Regional office.

After review, we have the following comments regarding the present submittals:

1. The filing satisfies the requirements of Article 303 "Construction Plan and Specifications" from the License issued by the Commission on August 19, 2009.

***Critical Energy Infrastructure Information***  
***-Do Not Release-***

2. As discussed during the August 25, 2011 conference call, shear forces from the south retaining wall must be accommodated at the existing gate structure.

We reviewed the Article 303 submittals and did not find any significant errors or discrepancies that would affect the integrity of the project structures or the ability of the project works to perform their intended functions.

Based on the Commission's Order "Approving Trashrack Design" issued on May 12, 2011, and our review of Article 303 submittals you may proceed with the minimum flow unit on Glendale Project construction. This is a conditional authorization to commence construction, pending the submittal of your contractor's cofferdam design, cofferdam drawings, and a letter from you approving the cofferdam design and drawings. These documents must be submitted at least two weeks prior to the start of construction. Additionally, you must obtain all necessary federal, state and local permits prior to the commencement of construction.

If during the design and construction process, the plans and specifications are revised, it is your responsibility to assure these changes are properly coordinated between the design engineer, the QCIP manager, FERC and yourself. Also, if any changes are made that require a change in the operation of the project it is your responsibility to assure these changes are properly coordinated with FERC. You are reminded that no changes to operation of the project can be made to the project until it is authorized by FERC.

Please note that within 45 days of completion of construction you are to submit to this office a letter with the following certifications (notarized in accordance with 18CFR Part 12, Paragraph 12.13 of the Commission's Regulations):

- A certification by the Design Engineer that the project was constructed in accordance with the design intent.
- A certification by the Quality Control Manager that the results of the inspection and testing program results in a conclusion that the project was constructed in accordance with the plans and specifications.
- A certification from the Licensee that the construction fulfills the design intent and was constructed in accordance with the plans and specifications reviewed by FERC.

Within 30 days following completion of construction, you must submit a final construction report using the enclosed outline for Licensee construction reports.

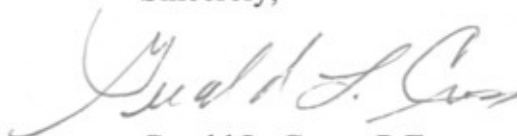
*Project No. 2801-MA*

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Additionally, Article 304 of your License requires that within 90 days of completion of construction you shall file for Commission approval, with a copy to this office, revised exhibit A, F & G drawings as applicable.

Your cooperation is appreciated. If you have any question concerning the above matter please call Mr. Chung Yao Hsu of this office at (212) 273-5914.

Sincerely,

A handwritten signature in dark ink, appearing to read "Gerald L. Cross". The signature is fluid and cursive, with a large initial "G" and a long, sweeping underline.

Gerald L. Cross, P.E.  
Regional Engineer

***{ EXCERPTS FROM }***

ENVIRONMENTAL ASSESSMENT  
FOR  
SUBSEQUENT HYDROPOWER LICENSE

Glendale Project

FERC Project No. 2801-027

Massachusetts

Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Licensing  
888 First Street, NE  
Washington, D.C. 20426

March 2009

[Portions discussing the new generating unit are highlighted]

## **2.0 PROPOSED ACTION AND ALTERNATIVES**

### **2.1 NO ACTION ALTERNATIVE**

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative as the baseline environmental condition for comparison with other alternatives.

#### **2.1.1 Existing Project Facilities**

The existing Glendale Project consists of: (1) a 250-foot-long, 30-foot-high concrete gravity dam with a 182-foot-long spillway and a gatehouse containing two manually-operated 10 by 10-foot-square intake gates and two 8-by 8-foot-square waste gates; (2) a 23-acre reservoir with a normal water surface elevation of 810.9 feet National Geodetic Vertical Datum (NGVD); (3) a 1,500-foot-long, 40-foot-wide intake canal; (4) a forebay structure containing two manually-operated headgates (with trash racks with 1-inch clear bar spacing) and one hydraulically-operated canal waste gate; (5) a 250-foot-long, 12-foot-diameter steel penstock; (6) a powerhouse with four turbine generating units with a combined installed capacity of 1,140 kW; (7) a 300-foot-long tailrace channel; (8) a step-up transformer and 83-foot-long, 13.8-kilovolt transmission line; and (9) appurtenant facilities. The Housatonic River reach that is bypassed by the project (measured from the gatehouse to the tailrace channel) is about 2,500 feet long.

The project boundary encloses all the project facilities described above.

#### **2.1.2 Project Safety**

The project has been operating for over 29 years under the current license which was effective November 1, 1979. During this time, Commission staff have conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. As part of the relicensing process, Commission staff will evaluate the continued adequacy of the proposed project facilities under a subsequent license. Special articles will be included in any license issued, as appropriate. Commission staff will continue to inspect the project during the subsequent license term to assure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

#### **2.1.3 Existing Project Operation**

Littleville Power currently operates the project in a run-of-river mode using

automatic pond level control (PLC). The powerhouse contains four identical vertical semi-Kaplan turbine/generator units with a total maximum hydraulic capacity of approximately 400 cubic feet per second (cfs), or 100 cfs for each turbine, and a minimum hydraulic capacity of approximately 55 cfs for each turbine. Water discharged through the turbines enters the project tailrace and flows approximately 300 feet before reentering the Housatonic River. All inflow in excess of the project's generating capacity is passed over the dam.

When about 2.5 inches of spill occurs over the dam, the PLC unit is programmed to start one unit beginning at 55 percent gate and then gradually increasing to 80 percent gate. If the level of spill exceeds 2.5 inches with one unit operating, the PLC is programmed to start additional units sequentially as flows become available while maintaining the 10-cfs minimum flow.

Since 2001, in an effort to reduce river level fluctuations observed downstream of the Glendale Project at the U.S. Geological Survey (USGS) gaging station in Great Barrington, Massachusetts, Littleville Power has voluntarily ceased all generation when inflow is below 200 cfs and, when possible, has refrained from taking each turbine unit off line until after it is operating at its minimum hydraulic capacity (55 cfs). The result of this ramping mode of operation is that downstream fluctuations (caused by the time delay that occurs between the decreased flows from the powerhouse when a unit is taken off line and increased spillage at the dam) are minimized or eliminated.

Littleville Power estimates that the project's total average annual generation is 5,000 MWh.

## **2.1.4 Existing Environmental Measures**

Under the current license, Littleville Power is required to operate the project in a run-of-river mode, and provide a continuous minimum flow of 10 cfs or inflow from the dam to protect aquatic resources in the Housatonic River (Article 25). The flow to the bypassed reach is currently passed over the length of the spillway crest, or alternatively, through a 6-foot-wide by 10-inch-deep notch in the spillway crest.

No designated recreation facilities exist at the project.

## **2.2 APPLICANT'S PROPOSAL**

### **2.2.1 Proposed Project Facilities**

Littleville Power proposes to install a new 165-kW minimum flow turbine generating unit, including new trash racks with 1-inch clear spacing, in one of the waste gate slots located at the gatehouse adjacent to the project dam.

### **2.2.3 Proposed Project Operation**

Littleville Power proposes to continue run-of-river operation with minimal impoundment fluctuations and turbine unit ramping.

### **2.2.4 Proposed Environmental Measures**

#### **Aquatic Resources and Operations**

To enhance aquatic habitat and protect fish, Littleville Power proposes to:

- continually release 90 cfs or inflow into the bypassed reach. The 90 cfs would be released through the new 165-kW minimum flow turbine generating unit at the dam into the bypassed reach
- install trash racks with 1-inch spacing at the minimum flow unit intake.

#### **Recreation**

To enhance recreation opportunities, Littleville Power proposes to:

- provide a canoe portage around the dam, including a new take-out and put-in and a portage trail using an existing access road; and
- provide formal parking, for the public at the bypassed reach, adjacent to the proposed put-in.

### **2.2.5 Modifications to Applicant's Proposal – Mandatory Conditions**

The following mandatory conditions have been provided and are evaluated as part of the applicant's proposal.

#### **Section 18 Prescription**

Interior requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

## **2.3 STAFF ALTERNATIVE**

Under the staff alternative, the project would include all of Littleville Power's proposed measures plus the following measures: (1) release (downstream of the project) 90 percent of inflow during impoundment refilling following any maintenance and emergency drawdowns; (2) an operation compliance monitoring plan; (3) an erosion and sedimentation control plan; (4) an invasive species control plan; (5) a recreation plan for



flow in the bypassed reach with a new turbine generator unit (discussed below). To address downstream flow fluctuations, Littleville Power states that it would continue to operate the main turbine units, when possible, such that a unit's output is reduced to its minimum hydraulic capacity before being taken offline ensuring that the magnitude of downstream fluctuations is minimized.

Interior and Massachusetts DFW recommend under section 10(j) that the project be operated in a run-of-river mode such that inflow to the project equals outflow from the project on an instantaneous basis, and fluctuations of the impoundment water level are minimized.

### *Staff Analysis*

Fish species that inhabit and spawn in near-shore areas of project impoundments can be susceptible to stranding as well as egg desiccation from project-related fluctuating water levels.

Operating in a run-of-river mode and limiting impoundment fluctuations as proposed by Littleville Power would continue to reduce the chances of fish stranding and disruption of spawning. Maintaining relatively stable impoundment levels within the control of the Glendale Project (up to flows of about 490 cfs) would continue to benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for feeding, spawning, and cover. Erosion of shoreline areas and resultant turbidity as well as sediment mobilization (including any contaminated sediments) would also continue to be minimized when the impoundment is held relatively stable. In addition, by not storing water, impoundment water would be less likely to increase in temperature or decrease in DO content.

Fluctuating water levels downstream of hydro projects can cause fish stranding, egg desiccation, and effects to invertebrate populations. We discuss below Littleville Power's proposal to provide a minimum flow to the bypassed reach to protect and enhance water quality and aquatic habitats. Downstream of the confluence of the bypassed reach and the project tailrace channel, run-of-river operation along with Littleville Power's ramping of turbine units prior to taking a unit offline would ensure that any fluctuations occurring in the Housatonic River due to project operation are kept to a minimum.

### Water quality effects due to operation of minimum flow turbine

Littleville Power proposes to install a 165-kW turbine generator unit within an existing waste gate slot adjacent to the dam. Because the proposed unit would draw water from the deeper portions of the impoundment, water released from the unit could be low in DO and affect water quality conditions in the bypassed reach.

Interior and Massachusetts DFW state that the likelihood of DO depletion is low given the frequent amount of project spills and the proximity of the minimum flow unit's discharge location to a riffle which would facilitate reaeration.

#### *Staff Analysis*

We agree with the agencies' assessment. Water quality profile information from a single sampling day during August 2006 indicated that the impoundment was well oxygenated throughout the water column and not thermally stratified. Because this sample was taken during a typical summer month, if stratification was going to take place we would have expected it to be evident at this time. Therefore, it is likely that operation of the minimum flow unit would not result in the release of poorly oxygenated water during most years. In the event that low DO conditions do set up in deeper portions of the impoundment, spill flows and aeration due to the minimum flow release could ameliorate the low DO conditions in the bypassed reach. Spill flows would occur in the bypassed reach about 30 to 75 percent of the time on a monthly basis, and riffle habitat represents nearly 40 percent of the total habitat in the bypassed reach. Therefore, any potential for the minimum flow unit to release oxygen-depleted water from the deeper strata of the impoundment would likely be offset by increased turbulence and aeration caused by the higher minimum flows and frequent spill flows.

#### Flow continuation following impoundment drawdown

Hydro project impoundments may need to be drawn down periodically due to scheduled and unscheduled maintenance as well as emergencies beyond the control of the operator. The refill of an impoundment following a drawdown can disrupt flows downstream of a project and affect water quality and aquatic habitat. Littleville Power does not propose a refill protocol following impoundment drawdowns.

Interior and Massachusetts DFW recommend under section 10(j) that Littleville Power use 10 percent of the inflow to the project to refill the project impoundment after dam maintenance or emergency drawdowns and release 90 percent of inflow downstream of the project impoundment for the protection of aquatic resources.

#### *Staff Analysis*

Maintaining flow in the bypassed reach and below the project during project maintenance activities is important for the protection of aquatic biota. While most fish successfully move to deeper areas when flow decreases, many macroinvertebrates are not as mobile. Additionally, with lower flows, both fish and macroinvertebrates are more likely to be preyed on or stressed by increased water temperatures and decreased DO levels, especially in the summer. Releasing 90 percent of the project impoundment's

and dust control measures.

In a letter filed January 3, 2008, Massachusetts DFW states that if a drawdown of the impoundment is needed to complete the turbine installation, the lowered water levels may affect wildlife, including state-listed mussels.

### *Staff Analysis*

The installation of the new turbine generator unit could cause some short-term effects on habitat within the impoundment and downstream in the bypassed reach resulting from erosion and sedimentation. However, because the installation activities would not require an impoundment drawdown, we would not expect much of an effect on aquatic habitats within the impoundment or downstream in the bypassed reach. Nevertheless, implementing specific measures to control erosion and sedimentation during construction activities would help ensure that aquatic habitats are protected. These measures would also protect habitat during construction of the proposed recreation facilities, discussed in section 3.3.4.

### Fish entrainment and impingement

Currently, there are no upstream fish passage facilities at the project and any downstream passage occurs via spillage or turbine passage. The existing trash racks with 1-inch clear spacing and approach velocities of 2 feet per second or less provide some level of protection to fishes susceptible to entrainment and turbine-induced mortality through the project's main turbine intakes. Littleville Power proposes to use similar trashracks with 1-inch clear bar spacing to protect fishes from entrainment and turbine-induced mortality at the proposed minimum flow turbine unit. The trashracks at the minimum flow unit would also be of sufficient dimensions to ensure approach velocities of 2 feet per second or less.

Interior and Massachusetts DFW recommend under section 10(j) that full depth, 1-inch clear trash racks with velocities less than or equal to 2 feet per second be installed at the project's main and minimum flow units.

### *Staff Analysis*

Fish that reside in the project impoundment could be susceptible to impingement on the trash rack or entrainment through the project's turbine units when the project is operating. For any fish entrained through the turbines, a certain number may be killed due to turbine-induced mortality.

The existing trash rack at the intake to the main turbine units already meets Interior's and Massachusetts DFW's recommendation for 1-inch clear bar spacing and

approach velocities of 2 feet per second or less. Littleville Power's proposal to install trash racks with similar requirements at the proposed minimum flow turbine unit intake would provide a similar level of protection.

Trash racks with 1-inch clear bar spacing would prevent all but the smaller fish from passing through the intake structures. Based on the results of studies conducted by Lawler et al. (1991), 1-inch clear spacing would generally not allow passage of smallmouth bass or brown trout greater than 9 inches in total length,<sup>6</sup> thus preventing most adult resident bass and stocked trout from entering the project turbines. Littleville Power presented similar results for data obtained from Smith (1985) for a variety of fish species found in the project vicinity. Littleville Power's analysis showed that for seven of the nine species analyzed (including smallmouth bass and brown trout), fish with total lengths greater than 8 inches would be excluded by the trash racks. In addition, the turbulence generated by the trash racks may create a behavioral deterrent to reduce entrainment of the smaller individuals that would otherwise be able to fit through the racks.

Littleville Power provided the results of a literature review of mortality rates for various groups of fishes obtained from studies conducted at other projects with Kaplan or propeller-type turbines.<sup>7</sup> While no projects were identified that had the exact turbine configuration as the Glendale Project, turbine survival at the three most similar projects was 81 percent or greater (range 81 to 98 percent) for the fish species and sizes tested and survival estimates for fish smaller than 8 inches were 86 percent or greater (range 86 to 98 percent). Kleinschmidt (2003) reported an average mortality rate of 13.7 percent based on the results of 14 turbine mortality studies conducted on Kaplan/propeller-type turbines which corroborate the results of Littleville Power's analysis.

In addition to entrainment effects, fish can become impinged on the bars of a trash rack if they are not able to overcome the approach velocity. As stated above, the average approach velocity in front of the existing project intake is 2 feet per second or less and a similar maximum approach velocity is predicted for the proposed minimum flow turbine intake. To escape the influence of a trash rack, fish are capable of swimming at a burst speed, which is defined as a short, intense swimming effort generally sustainable for about 1 second or less (Bell, 1991). Beamish (1978) reports that most fish can burst at a speed equal to about 10 times their body length in centimeters per second.

To analyze whether or not impingement of gamefish on the trash racks would

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<sup>6</sup> Total length is defined as the distance from the furthest forward protruding portion of a fish's head to the tip of the furthest protruding tail fin ray.

<sup>7</sup> Four identical vertical Kaplan turbine units are used to generate power at the Glendale Project.

occur at the project, we used the results of Beamish (1978) and coupled them with our calculation of the smallest gamefish that would be excluded by the 1-inch clear-spaced trash rack. The burst speed for a 9-inch bass or trout is about 7.5 feet per second. Therefore, a 9-inch smallmouth bass or brown trout would be expected to easily escape the 2-foot-per-second intake velocities at the project and avoid becoming impinged on the trash rack. Bell (1991) also reported sustained swimming speeds of nearly 4 feet per second for white sucker, which is another commonly occurring species in the Housatonic River and likely to occur in the impoundment. Therefore, white sucker should also be able to avoid impingement on the project trash rack.

In summary, the existing 1-inch-spaced trashracks at the project's main turbine intake would protect most of the adult gamefish residing within the impoundment from being entrained into the turbines and being subjected to potential turbine-induced mortality. Based on the swimming speeds of fishes residing in the project impoundment and the existing approach velocities in front of the intakes, most fishes would be able to avoid impingement. Installing trashracks with similar 1-inch clear spacing and approach velocities at the intakes for the proposed minimum flow turbine unit would provide an equal level of protection. Although smaller fishes would still be susceptible to entrainment and some level of turbine mortality, by acting as a behavioral barrier, the trashracks may guide many of them away from the intakes and prevent them from entering the turbine units. Last, nothing in the record for this project suggests that entrainment and turbine mortality are having an adverse effect on fish populations in the project area.

### **Cumulative Effects**

During the scoping process, water quality was identified as a resource that may be cumulatively affected by the proposed operation of the Glendale Project in combination with the Willow Mill Hydroelectric Project located upstream and municipal, industrial and urban land use and other non-point sources of pollution in the basin.

As discussed above, run-of-river operation would minimize the effect of the project on DO concentrations and water temperatures under most conditions. Erosion of shoreline areas and resultant turbidity as well as sediment mobilization (including any contaminated sediments) would also continue to be minimized when the impoundment is held relatively stable. The use of cofferdams and implementing soil erosion control measures during the installation of the proposed minimum flow unit would minimize any effects on water quality within the impoundment and the Housatonic River downstream of the dam due to erosion and sedimentation. The potential for the minimum flow unit to release oxygen-depleted water from the deeper strata of the impoundment would be offset by increased turbulence and aeration within the bypassed reach caused by the higher minimum flows. Also, increased flow would minimize pockets of standing water and thus reduce the likelihood of any temperature increases in the bypassed reach and