

January 3, 2011

Fred Ayer, Executive Director
Low Impact Hydropower Institute
34 Providence Street
Portland, ME 04103

Subject: Final Application Reviewer Report for the Lower Penacook Falls Hydroelectric Projects

Dear Fred:

Attached please find my final reviewer's report on the application by Briar Hydro Associates for certification of the Penacook Lower Falls Hydroelectric Projects by the Low Impact Hydropower Institute (LIHI). Please contact me with any questions or concerns.

Sincerely,

Jackie Dingfelder

Attachment: as described.

Review of Low Impact Hydropower Institute Application for Low Impact Hydropower Certification: Penacook Lower Falls Hydroelectric Project

Introduction and Overview

This report reviews the application submitted by Briar Hydro Associates ("BHA") (applicant) for Essex Hydro Associates to the Low Impact Hydropower Institute (LIHI) for Low Impact Hydropower Certification for the Penacook Lower Falls Hydroelectric Project (project or facility). This 4,100-kw (installed capacity) project, with an average generation of 18.4 GWh, is located on the Contoocook River in Merrimack County, New Hampshire which is a tributary to the Merrimack River. This project is located downstream of the Penacook Upper Falls project (LIHI Certification #52).

Project and site characteristics. The project is located along the Penacook Lower Falls on the Contoocook River in the Village of Penacook, New Hampshire. The Contoocook River enters the Merrimack River upstream of the fifth mainstream dam. The Village of Penacook is made up of a small portion of the Town of Boscawen and the northern end of the city of Concord. The Penacook Lower Falls hydroelectric project presently is owned and operated by BHA, a New Hampshire limited partnership.

On September 10, 1981 the Federal Energy Regulatory Commission ("FERC") issued an Order Granting Exemption from Licensing of a Small Hydroelectric Project of 5 Megawatts or Less, FERC Project 3342-001, to New Hampshire Hydro Associates ("NHA") authorizing the construction, operation and maintenance of the PLF project. The Exemption specifically limited the project to operating with a maximum surface impoundment of 272 feet m.s.l. and contemplated a net operating head of 28 feet. This development was based upon reconstructing the project based upon the height of the dam that existed in 1981.

During development it was recognized that the project capacity could be increased by raising the impoundment level to with only a minimal effect on resources . The NH Department of Fish and game and the U.S. Fish and Wildlife Service found that the increase in elevation of six feet would inundate 2.9 acres of land, none of which was developed or developable. Construction of the project began in 1982 and on November 17, 1982, NHA relinquished its exemption and received a 40-year license issued by the FERC authorizing the construction operation and maintenance of the PLF project with a maximum surface elevation of 278 feet m.s.l. Construction was completed in 1983 when first power was generated.

Project Description - The project is operated as a run-of-river facility. The estimated average net head is 34 feet. The project is required to maintain a continuous minimum flow of 338 cubic feet per second (ABF .5 cfs) or the inflow to the reservoir, whichever is less. Project works consist of: (a) a reservoir with an 8.4-acre surface area, and a useable storage capacity of 54 acre-feet; (b) a concrete diversion spillway with three 9.5 foot by 10.0 foot high timber gates and seven timber stoplog gates; (c) a concrete gravity auxiliary spillway, 316 feet long and a main concrete spillway, gated, and 106 feet long; (d) a forebay, 70 feet long; (e) a concrete powerhouse containing a single generating unit with an installed capacity of 4,110 kW; (f) a

tailrace excavated in rock, 700 feet long; (g) transmission equipment and electrical facilities consisting of (1) generator leads; (2) one 4.16/34.5 kV, 7.5 MVA step-up transformer; (3) 200 feet of 34.5-kV line and facilities necessary to connect the project to Concord Electric Company's system; and (4) appurtenant facilities. A concrete powerhouse is constructed to bedrock on the same alignment as the centerline of the river profile. The overall length of the powerhouse is 97.5 feet and the width perpendicular to the profile is 35 feet. A 55-foot wide rock filled access area connects the north face of the powerhouse to the north river bank. Upstream and downstream sides of the access area are contained by concrete retaining walls to bedrock. The powerhouse contains one horizontal tube-type 3-meter turbine encased in concrete. The project utilizes a previously existing impoundment and the plant is not staffed, but operation is monitored on a 24/7 basis.

The Upper Penacook Falls, which is located upstream of the Lower Falls, is a 21-foot high, 187-foot long structure with a spillway built on the remains of an existing dam. It consists of a timber stoplog dam, one generating unit (2,800 kW), and appurtenant facilities. The dam is at an elevation of 306 feet MSL and it creates a pool with a surface area of approximately 11.4 acres. The Upper Penacook Falls facility was certified by LIHI in April 2010.

Public comment and agency letters. LIHI did not receive any public comments on this project.

General conclusions. Based on my review, the project design and operations has resulted in a facility that is consistent with LIHI criteria. Initially, there was some concern regarding compliance with water quality standards since this project had not previously received a Clean Water Act 401 certification. A letter dated December 21, 2010, from the NH Department of Environmental Services, confirms that the Lower Penacook Project is currently meeting water quality standards (see Exhibit 1). No other outstanding issues surfaced during the review of this project.

Recommendation. Based on my review of information submitted by the applicant, my review of additional documentation, and my consultations with resource agency staff, I believe the Penacook Lower Falls Hydroelectric Project **MEETS** all of the criteria to be certified and I recommend certification.

Low Impact Certification Criteria

A. *Flows*

- 1) **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?**

NA

If YES, go to B.

If NOT APPLICABLE, go to A2.

If NO, project fails.

- 2) **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?**

YES.

Article 33 of the FERC License requires that the project be operated as a run-of-the river facility and is responsible for maintaining minimum flows of 338 cubic feet per second or the inflow to the reservoir, whichever is less, for the protection and enhancement of the aquatic resources in the Contoocook River.

A letter from the NHDES date December 21, 2010 confirms that the facility is meeting minimum flows and pond fluctuations at the Project.

If YES, go to B

If NO, go to A3.

PASS.

B. Water Quality

- 1) **Is the Facility either:**
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**

- 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?**

YES.

The facility was issued a Section 401 Water Quality Certificate in 1981 (incorporated into the FERC license in 1984), however, since the issuance of this certification was nearly 30 years ago, New Hampshire water quality standards and assessment methods have changed. As part of the LIHI certification process, the Applicant requested a letter of compliance from the New Hampshire Department of Environmental Services (NHDES). Since there was no existing data to support such a finding, the NHDES provided water quality monitoring recommendations designed to determine if water quality standards were being met in the Contoocook River at and near the Penacook Lower Falls facility. Water Quality data was collected in 2010 and submitted to the NHDES for their review.

In a letter dated December 21, 2010, the NHDES confirmed that the Lower Penacook Project is meeting current water quality standards. NHDES stated in the letter that they had assessed the water quality data collected in 2010, and based on that assessment concluded that the water quality in the impoundment and downstream section of the Contoocook River, under the dam's current operating conditions, do not appear to violate existing water quality standards. (The letter is contained in Exhibit 1 at the end of this report).

If YES, go to B2.

If NO, project fails.

- 2) 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?**

If YES, go to B3.

If NO, go to C.

NO.

PASS.

C. Fish Passage and Protection

- 1) 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?**

YES.

Upstream Passage. In 1986, Article 32 of the Project's FERC License was amended to reflect an agreement between fishery agencies regarding the construction of fish passage facilities at main stem dams on the Merrimack River. Penacook is a tributary stream proposed for anadromous fish restoration and that enters the Merrimack River upstream of the fifth main stem dam.

The license was amended to read that the licensee, within 2 years after the annual passage of 15,000 adult American shad through the fish passage facilities at the Garvins Falls Project, or through the fish facilities of the proposed Sewalls Fall Project, if constructed, but in no case later than July 1, 2004, shall file for Commission approval functional design drawings of fish passage facilities for the Lower Penacook Project. One-third of the Sewalls Falls Dam was washed away in April 1984 and never rebuilt. Subsequently, FERC issued an Order Amending article 32 updating the Project's FERC license to reflect an agreement between the Public Service of New Hampshire (PSHN) and the state and federal fishery agencies regarding the construction of fish passage facilities on the Merrimack River.

The Merrimack River Restoration Program mentioned above targets the Contoocook for anadromous fish restoration. As part of this restoration program, two dams downstream of the Penacook Lower Falls facility are required to install upstream fish passage a certain number of years after a target number of American shad pass the first dam. The Applicant has agreed to install upstream fish passage after the second of those dams does the same, which gives it 6 years at least (2015) before upstream passage would be required at the facility.

Conversations with John Warner from USFWS on 12/ 21/2010 confirm that the applicant is in compliance with the above fish passage prescriptions. Currently, the 15,000 threshold for passage of Shad through the Garvins Falls Project has yet to be met.

Downstream Passage. Downstream passage facilities have been fabricated and installed in accordance with USFWS recommendations. Fish pass through the facility via surface entrance passage located in the first full gate opening to the right of the turbine trash racks. The project maintains a 40cfs downstream flow through a pipe located in the gated concrete spillway of the project. USFWS requires that the bypass flow is maintained from May 1 to June 30 of each year. Compliance with the downstream passage requirements has been confirmed via correspondence with NHDFG and USFWS.

In a letter dated March 17, 2010 from BHA to FERC, the applicant states that

"they have been engaged in ongoing, periodic consultations with USFWS and NHDFG concerning the schedule for design and construction of upstream and downstream fish passage facilities for the project. They state that the project is in compliance in regards to downstream passage requirements."

For upstream passage, they state that barring changes to river conditions for fish management plans, the schedule for design and installation of passage will be governed by the construction and function of passage facilities located on the Merrimack River, downstream of its confluence with the Contoocook River, where the BHA projects are sited."

If YES, go to C5.

5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of *Riverine* fish?

NA. None were prescribed.

If YES, go to C6.

If NOT APPLICABLE, go to C6.

If NO, project fails.

6) Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?

NA.

If YES or NOT APPLICABLE, go to D

If NO, project fails.

PASS.

D. Watershed Protection

1) 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

NO.

If YES = Pass, go to E and receive 3 extra years of certification

If NO = go to D2

2) Has the facility owner/operator established an approved watershed enhancement fund that: 1) could achieve within the project's watershed the ecological and recreational equivalent of land protection in D.1., and 2) has the agreement of appropriate stakeholders and state and federal resource agencies?

NO.

If YES = Pass, go to E and receive 3 extra years of certification

If NO = go to D3

- 3) **Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreland buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation)**

NO.

If YES = Pass, go to E

If NO = go to D4

- 4) **Is the facility in compliance with both state and federal resource agencies recommendations in a license approved shoreland management plan regarding protection, mitigation or enhancement of shorelands surrounding the project.**

YES.

There were no specific state or federal requirements pertaining to protection, mitigation or enhancement of shorelands surrounding the project. The Application Reviewer confirmed that they Applicant was in compliance with applicable local watershed protection requirements via a phone conversation with the City of Concord Planner. There is a 250-foot setback overlay district that was adopted after the FERC license was amended for the Penacook Lower Falls Project so these requirements are not included in the FERC amended license.

If YES = Pass, go to E

If No = Fail

PASS.

E. Threatened and Endangered Species Protection

- 1) **Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?**

YES. The NHFG Nongame and Endangered Species program reviewed the Lower Penacook Hydropower project for T&E species. The following species were identified in the NH Natural Heritage Bureau review as occurring in the vicinity of the project: the state

threatened pied-billed grebe, and two species of concern: northern leopard frog and wood turtle.

If YES, go to E2.

If NO, go to F.

- 2) If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?**

NA.

If YES or NOT APPLICABLE, go to E3.

If NO, project fails.

- 3) If the Facility has received authority to incidentally *Take* a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental Take statement; (ii) Obtaining an incidental Take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authority?**

NA.

If YES, go to E4.

If NOT APPLICABLE, go to E5.

If NO, project fails.

- 5) If E.2. and E.3. are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?**

YES.

Consultation with a NH Fish and Game wildlife biologist confirmed that the hydropower facility is unlikely to affect the state listed pied-billed grebe or northern leopard frog as habitat for the species does not appear to be present. The facility may affect wood turtle and other turtle species as turtles may be entrained and drown on submerged grating. However, as wood turtle is not officially listed under RSA 212:A, the NH Endangered Species Conservation Act, as a state threatened or endangered species, there are no records that state

listed species are being impacted at this time. (See correspondence with Kim Tuttle, Wildlife Biologist, at the end of this report).

If YES, go to F.
If NO, project fails.

PASS.

F. Cultural Resource Protection

1) 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?

The FERC license (Article 35) requires the Licensee to consult and cooperate with the New Hampshire State Historic Preservation Officer (SHPO) prior to the commencement of any construction (including that of the Facility itself) to determine the need for archaeological or other surveys. On 2/9/2010, the New Hampshire Division of Historical Resources confirmed in writing that there are no historic properties affected by the project.

If YES, go to G.
If NOT APPLICABLE, go to F.2

PASS.

G. Recreation

1) 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?

YES.

As part of the FERC licensing process, the USFWS recommended that the Applicant provide access to anglers across project lands including a boat-launching ramp below the dam and a small parking area.

The Applicant constructed and currently maintains a parking area and boat launch facility in a cover on the southern shore of the Contoocook River approximately 700 feet downstream of the powerhouse. The boat launch area provides access to the Merrimac River and is used by local fisherman, boaters and local kayak clubs. The Application Reviewer confirmed via telephone conversation with the City of Concord Recreation Planner that the Applicant is in compliance with their FERC requirement for providing and maintaining recreational facilities and access.

If YES, go to G3.

2) Does the Facility allow access to the reservoir and downstream reaches without fees or charges?

YES. The Applicant has obtained easements to maintain access to the boat launch.

If YES, go to H.

If NO, project fails.

PASS.

H. Facilities Recommended for Removal

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

NO.

If NO, facility is low impact.

If YES, the project fails.

PASS.

FACILITY IS LOW IMPACT

RECORD OF CONTACTS

Date of Conversation: 11/15/2010
Application Reviewer: Jackie Dingfelder, Consultant
Person Contacted: Matthew Walsh, City of Concord Planner
Telephone/email: 603-225-8515/mwalsh@concordnh.gov
Areas of Expertise: Planning/Recreation

Mr. Walsh confirmed that Briar Hydro is maintaining the recreational facilities in a satisfactory manner. They have obtained easements to maintain the boat dock and are in compliance with their requirements of their FERC license in regards to maintaining recreational facilities and access.

Date of Conversation: 11/15/2010
Application Reviewer: Jackie Dingfelder, Consultant
Person Contacted: Becky Hebert, City of Concord Planner
Telephone/email: 603-225-8515/bhebert@concordnh.gov
Areas of Expertise: Conservation /Watershed Planning

Ms. Hebert confirmed that the Lower Penacook Falls project is not required to maintain a buffer as part of their FERC license. She did mention that the facility is located within the Shoreland Protection District and any future construction or development activities would have to meet the requirements for this overlay district. She also confirmed that Briar Hydro is in compliance with their FERC license in regards to watershed protection.

Date of Conversation: 11/17/2010
Application Reviewer: Jackie Dingfelder, Consultant
Person Contacted: Sue Cairns, NH Natural Heritage Bureau
Telephone/email: 603-271-2214/scairns@dred.state.nh.us
Areas of Expertise: T and E species

I had a brief phone conversation with Ms. Cairns regarding T&E species and she directed me to Kim Tuttle (see correspondence below).

Date of Conversation: 11/18/2010
Application Reviewer: Jackie Dingfelder, Consultant
Person Contacted: Kim Tuttle, Wildlife Biologist
Telephone/email: 603-271-6544/kim.tuttle@wildlife.nh.gov
Areas of Expertise: NH Nongame and Endangered Species Program

Jackie,

The NHFG Nongame and Endangered Species program has reviewed NHB10-0478 for the Lower Penacook Hydropower project. The following species were identified in the NHB review as occurring in the vicinity of the project: the state threatened pied-billed grebe, and two species of concern: northern leopard frog and wood turtle. The hydropower facility is unlikely to affected the state listed pied-billed grebe or northern leopard frog as habitat for the species does not appear to be present. The facility may affect wood turtle and other turtle species as turtles may be entrained and drown on submerged grating. However, as wood turtle is not officially listed under RSA 212:A, the NH Endangered Species Conservation Act, as a state threatened or endangered species, we have no records that state listed species are being impacted at this time. Please feel free to contact me if you have any further questions regarding this review.

Sincerely,

Kim Tuttle
Wildlife Biologist
NH Fish and Game
Nongame and Endangered Species Program
603-271-6544

Date of Conversation:	11/18/2010
Application Reviewer:	Jackie Dingfelder, Consultant
Person Contacted:	Matthew Carpenter, Wildlife Biologist
Telephone/email:	Matthew.Carpenter@wildlife.nh.gov
Areas of Expertise:	NH Fish and Game

Hi Jackie,
I will defer to John Warner on this question. He is far more familiar with this project than I am. I will support his recommendation. I did notice some out dated information in the attached document. The trigger numbers for fish passage at Amoskeag were changed from 15,000 to 9,500 shad during the last relicensing process. The document also fails to mention the Hooksett Dam, a hydroelectric project between Garvins Falls and Amoskeag. You can find more details on page 3 in the attached draft of our recently revised shad plan.
Matt

Date of Conversation:	12/21/2010
Application Reviewer:	Jackie Dingfelder, Consultant
Person Contacted:	John Warner, USFWS
Telephone/email:	(603) 223-2541 - ext.15/John_Warner@fws.gov
Areas of Expertise:	Hydropower Coordinator

The reviewer spoke to Mr. Warner to confirm that the information stated in the NHDES letter dated 12/10/2010 was accurate. Mr. Warner confirmed that the Lower Penacook is in compliance with their downstream fish passage requirement. He also indicated that they are in compliance on the upstream passage requirements. The trigger for construction of these upstream passage facilities is tied to the passage of 15,000 Shad in the Merrimack River System which has yet to occur. NH Fish and Game and USFWS are scheduled to consult with the applicant again on the upstream fish passage issue no earlier than June 1, 2012.

Date of Conversation: 12/21/2010
Application Reviewer: Jackie Dingfelder, Consultant
Person Contacted: Ted Walsh, NHDES, Watershed Management Bureau
Telephone/email: 603-271-2083/twalsh@es.state.nh.us
Areas of Expertise: Surface Water Monitoring

Attached is a letter with DES's analysis of water quality data collected in regard to Essex Hydro Associates application to the Low Impact Hydropower Institute for certification of the Penacook Lower Falls hydroelectric facility in Penacook, NH.

If you need any further information or assistance with data interpretation please feel free to contact me. The hard copy was mailed this morning.

Ted

Ted Walsh, Surface Water Monitoring Coordinator
NHDES, Watershed Management Bureau
29 Hazen Drive, P.O. Box 95
Concord, New Hampshire 03301-0095
(p) 603-271-2083
(F) 603-271-7894
email: twalsh@des.state.nh.us

Note: The letter referenced above by Ted Walsh begins on the next page, Page 14.

Exhibit 1
**Water Quality Letter from the State of New Hampshire, Department of Environmental
Services**



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES



Thomas S. Burack, Commissioner

December 21, 2010

Fred Ayer, Executive Director
Low Impact Hydropower Institute
34 Providence Street
Portland, Maine 04103

RE: Water Quality Status of Contoocook River for Low Impact Hydropower Institute Certification of
Penacook Lower Falls Hydroelectric Project (FERC No. 3342), Contoocook River

Dear Fred:

As you know, Essex Hydro Associates (EHA) has applied for Low Impact Hydropower Certification from the Low Impact Hydropower Institute (LIHI) for the Penacook Lower Falls Hydroelectric Project (FERC No. 3342) on the Contoocook River in Penacook, NH. We further understand that to receive LIHI certification, you need a statement from the New Hampshire Department of Environmental Services (DES) stating that the project is not causing or contributing to violations of state water quality standards. As you may recall, on August 19, 2010, the New Hampshire Department of Environmental Services (DES) sent EHA a letter stating what would be needed for DES to determine if the Contoocook River in the vicinity of the Penacook Lower Falls hydroelectric project was or was not attaining standards. In specific, the following was stated: "In order for DES to determine if the subject hydroelectric project is causing or contributing to water quality standard violations, additional monitoring and information is needed. In general, data / information is needed to address the following water quality concerns that are typically associated with hydropower projects:

1. Impact on ambient water quality criteria;
2. Impact of pond fluctuations on aquatic habitat;
3. Maintenance of adequate minimum flows to protect downstream aquatic life; and
4. Adequate upstream and downstream fish passage."

The purpose of this letter is to provide you with our assessment of data and information received from EHA in response to our letter of August 19, 2010 and, our conclusions as to whether or not the Penacook Lower Falls hydroelectric project is causing or contributing to New Hampshire surface water quality standard violations.

With regards to water quality, EHA, with the assistance of DES and the Upper Merrimack River Local Advisory Committee, provided data for dissolved oxygen, phosphorus and chlorophyll-a. Monitoring locations in the impoundment (02-CTC) and in the downstream section of the river (01G-CTC) were monitored continuously for a minimum 10 day period in September 2010 for water temperature and dissolved oxygen using multi-parameter dataloggers. At the time of the deployment and retrieval of the dataloggers a vertical profile of dissolved oxygen and water temperature was measured at the station in the impoundment (02-CTC) to determine if thermal stratification was present. The vertical profiles collected at 02-CTC on September 8th and September 22nd indicated that the impoundment was not thermally stratified. In addition, between August 18, 2010 and September 17, 2010, nine samples from each station were collected and tested by the DES laboratory for total phosphorus and chlorophyll-a. Total phosphorus and chlorophyll-a samples were also collected monthly at station 02-CTC from June through August 2010 as part of DES's Ambient River Monitoring Program. The sampling timeframe included periods of higher temperatures and relatively low flows.

DES Web site: www.des.nh.gov

P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire 03302-0095

Telephone: (603) 271-2457 • Fax: (603) 271-7894 • TDD Access: Relay NH 1-800-735-2964

December 21, 2010

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DES has assessed the water quality data collected in 2010, and based on this assessment concludes that the water quality in the impoundment and downstream section of the Contoocook River, under the dam's current operating conditions, do not appear to be violating existing water quality criteria for dissolved oxygen, phosphorus and chlorophyll-a. In the August 19, 2010 letter DES provided the assessment status for the parameters of concern for the reaches of the Contoocook River upstream and downstream of the Penacook Lower Falls Hydroelectric Project. Table 1 provides an update to the current assessment status of the river reaches in question for the parameters collected this summer. Our assessments were based on the methodology described in the DES Consolidated Assessment and Listing Methodology (CALM)¹. This information will be used in the next Section 305(b)/303(d) Water Quality Assessment report which is expected to be issued by DES in early 2012. Please note that the assessment status listed in Table 1 could change if water quality criteria change and/or if additional data collected between now and the 2012 report indicate water quality violations.

Table 1. Assessment Status for Water Quality Monitoring Parameters at the Penacook Lower Falls Dam

Assessment Unit	Location	Parameter	Designated Use	Assessment Status based upon summer 2010 sampling
NHIMP700030507-07	Penacook Lower Falls Dam Impoundment	Dissolved Oxygen (mg/L)	Aquatic Life	Fully Supporting
		Dissolved Oxygen (% Saturation)	Aquatic Life	Fully Supporting
		Chlorophyll-a	Primary Contact Recreation	Fully Supporting
			Aquatic Life	Indeterminate ^A
		Total Phosphorus	Aquatic Life	Indeterminate ^A
		Water Temperature	Aquatic Life	No numeric criteria ^C
NHRIV700030507-10	Downstream of Penacook Lower Falls Dam	Dissolved Oxygen (mg/L)	Aquatic Life	Fully Supporting
		Dissolved Oxygen (% Saturation)	Aquatic Life	Fully Supporting
		Chlorophyll-a	Primary Contact Recreation	Fully Supporting
		Total Phosphorus	Aquatic Life	No numeric criteria ^B
		Water Temperature	Aquatic Life	No numeric criteria ^C

^A DES does have numeric water quality criteria for the aquatic life designated use for total phosphorus and chlorophyll-a in lakes/ponds and impoundments with characteristics similar to lakes/ponds but it can only be applied to waterbodies where the trophic class is known. For waterbodies where the trophic class is known the median total phosphorus and chlorophyll-a value is used to make the criteria comparison. The aquatic life designated use nutrient and chlorophyll-a criteria are depicted below with the median values for each parameter for the data collected at station 02-CTC in assessment unit NHIMP700030507-07 during the summer of 2010.

	TP (ug/L)	Chl-a (ug/L)
Median 02-CTC (2006 – 2010)	17	1.87
Oligotrophic	< 8	< 3.3
Mesotrophic	≤ 12	≤ 5
Eutrophic	≤ 28	≤ 11

¹ 2010 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology. New Hampshire Department of Environmental Services. NHDES-R-WD-10-3. February, 2010. Available at <http://des.nh.gov/organization/divisions/water/wmb/swqa/documents/2010calm.pdf>.

December 21, 2010
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^B DES does not have numeric water quality criteria for nutrients in rivers or streams. The narrative criteria states that "Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring."

^C Although there is currently no numerical water quality criteria for water temperature, NHDES is in the process of collecting biological and water temperature data that will contribute to the development of a procedure for assessing rivers and stream based on water temperature and its corresponding impact to the biological integrity of the waterbody.

On November 23, 2010 EHA provided DES with information regarding minimum flows and pond fluctuations at the Penacook Lower Falls Hydroelectric Project. EHA confirmed that the facility is operated as a fully automated run of river project. The project is licensed to release an outflow equal to an instantaneous minimum of 338 cfs. Due to the operation of the facility as a run of river project, EHA also provided information indicating that any "water level fluctuations have been controlled by natural changes in the river flow and minimum flow requirements have been equal to the lesser of 338 cfs or project inflow."

Regarding the issue of fish passage, DES was provided with documentation from EHA that they have received confirmation of compliance from John Warner of the U.S. Fish and Wildlife Service (USFWS) and Carol Henderson of New Hampshire Fish and Game (NHFG) for downstream fish passage. Regarding upstream fish passage, DES has also received documentation from EHA that barring changes to river conditions or fish management plans, the schedule for design and installation of upstream fish passage infrastructure will be governed by the construction and successful function of upstream fish passage facilities located on the Merrimack River downstream of the confluence with the Contoocook River. NHFG and the USFWS have indicated their concurrence with the current status of upstream fish passage. NHFG and the USFWS are scheduled to again consult with EHA on the upstream fish passage issue no earlier than June 1, 2012.

In summary, based on the current operation of the dam, current water quality standards, the water quality data collected in 2010 and information provided to DES by EHA, it appears the Contoocook River immediately upstream and downstream of the Penacook Lower Falls Hydroelectric Project is not causing or contributing to water quality standard violations at this time. As previously noted, however, please note that this assessment could change in the future should a change in water quality criteria and/or new data indicate water quality violations. It could also change if the NHFG and/or USFWS conclude in the future that upstream or downstream fish passage is not adequate.

Should you have any questions or require additional information please contact me at (603)271-2083 (ted.walsh@des.nh.gov).

Sincerely,



Ted Walsh, Surface Water Monitoring Coordinator
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