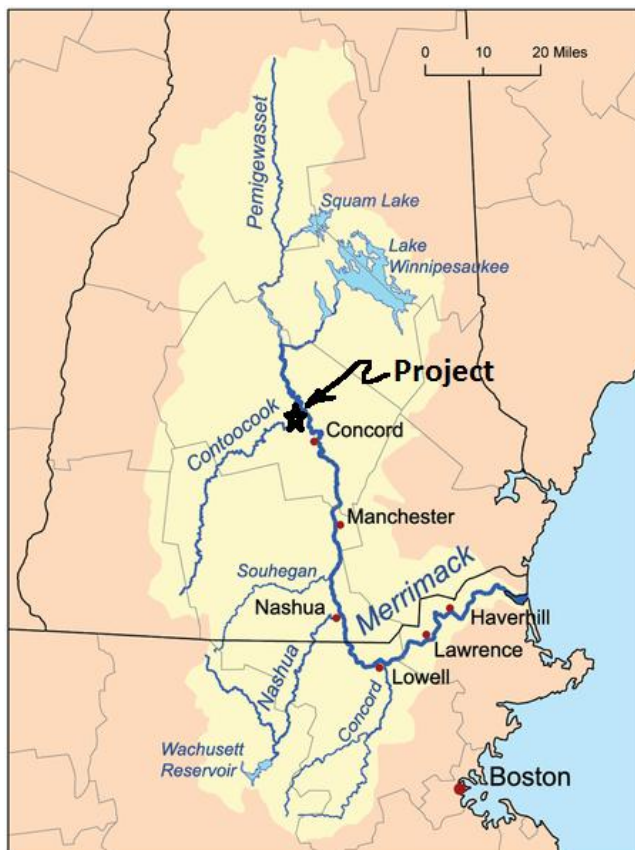


## REVIEW OF APPLICATION FOR CERTIFICATION OF ROLFE CANAL HYDROELECTRIC PROJECT

This report provides review findings and recommendations related to the application submitted to the Low Impact Hydropower Institute (LIHI) on November 19, 2012 by Briar Hydro Associates (Applicant) for Low Impact Hydropower Certification of the Rolfe Canal Project (the Project).

### I. PROJECT'S GEOGRAPHIC LOCATION

The Rolfe Canal Project is located on the Contoocook River in the north end of the city of Concord, New Hampshire. The Contoocook River is a major tributary of the Merrimack River. From the Contoocook River confluence, the Merrimack River flows south to Massachusetts where it turns northeastward to empty into the Atlantic Ocean at Newburyport, travelling a total distance of 101 miles from where the Contoocook enters. The Project dam is 2.1 miles upstream of the mouth of the Contoocook. The Contoocook has a total river length of 71 miles and drains 766 square miles of land.



Two other federally regulated hydroelectric dams are located on the Contoocook downstream of the Project dam: the Penacook Upper Falls Hydroelectric Project (FERC Project No. 6689) and the Penacook Lower Falls Hydroelectric Project (FERC Project No. 3342).<sup>1</sup> Both are under the same ownership as Rolfe Canal.

**Figure 1. Merrimack River Basin showing Project location.**

<sup>1</sup> The two facilities are LIHI certified as numbers 52 and 64, respectively.



Figure 2. Rolfe Canal Hydroelectric Project and nearby dams.

## II. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

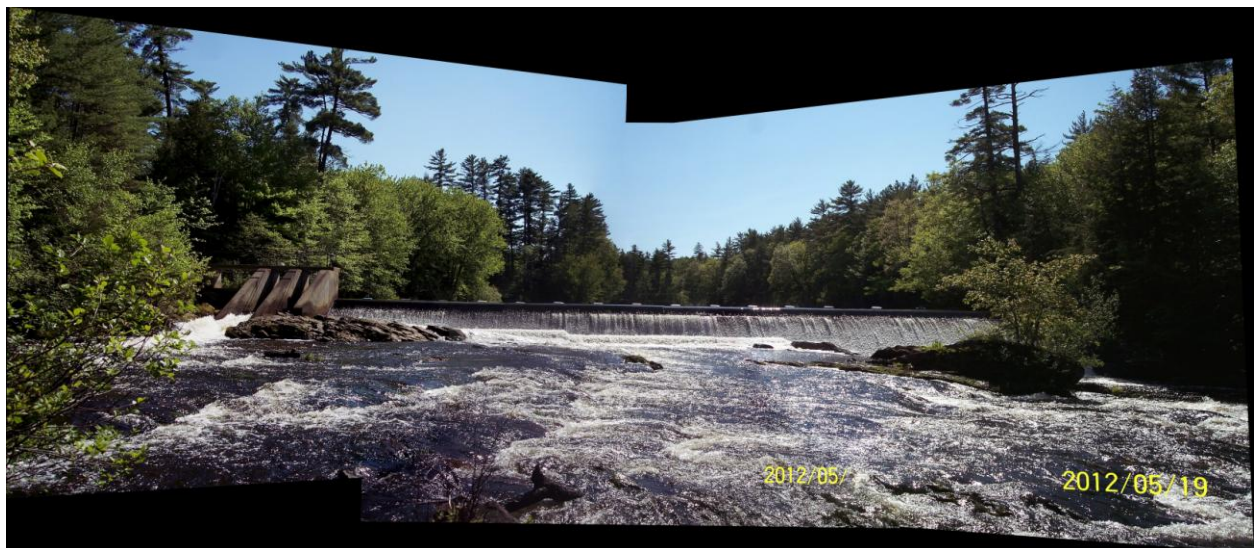


Figure 3. View of York Dam.



As shown in Figure 4, the Project diverts water from an impoundment created by York Dam, a state-owned structure. Rolfe Canal is a headrace channel. Flow into the canal is controlled by an intake structure at the Island Road bridge; the intake structure gate is normally only used during flood conditions or to isolate the canal for maintenance purposes. At the lower end of the canal, the Project headworks are located at the Briar hydro dam where generation flows are conveyed to the powerhouse through a 940-foot-long steel penstock. A channel about 2,400 feet in length is bypassed by the penstock; the reach includes the old Briar Pipe factory dam, which is about 500 downstream of the penstock intake structure. A 1,200-foot-long tailrace channel carries flows back to the main channel of the Contoocook River.



**Figure 4. Project layout.**

Project works consist of: (a) York dam, a 10-foot-high, 300-foot-long granite block dam that creates an impoundment with a surface area estimated at 600 acres at elevation 342.5 feet msl; (b) a 46-foot-long gated concrete power canal intake structure; (c) a 3,100-foot-long, 100-foot-wide, and 9-foot-deep power canal with a surface area of 8 acres; (d) a 17-foot-high, 282-foot-long concrete penstock intake structure carrying 2.0 feet of flashboards set at elevation 342.5 feet; (e) a 940-foot-long, 16-foot-diameter buried steel penstock; (f) a concrete powerhouse containing a single generating unit; (g) a 4.16/34.5 kV 3.8 MVA three-phase transformer with a 50-foot-long 34.5 kV transmission line; and (h) appurtenant facilities.

The station has an installed capacity of 4.285 MW and an average annual generation of 21.6 GWh.

### **III. REGULATORY AND COMPLIANCE STATUS**

On December 5, 1984, the Federal Energy Regulatory Commission (FERC) issued a 40-year license for FERC Project No. 3240, authorizing the construction, operation, and maintenance of the Project. FERC subsequently, on February 28, 1986, authorized a change in the proposed powerhouse location; construction of a new inlet control structure; installation of a single turbine/generator unit, instead of two units as originally licensed; and an increase in the installed generating capacity (4.285 MW instead of 3.350 MW) and hydraulic capacity (2,000 cfs instead of 1,600 cfs). The authorization letter notes that the changes were accepted by the U.S. Fish and Wildlife Service (USFWS), the New Hampshire Department of Fish and Game (NHDFG), and the New Hampshire Water Resources Board, which leases York Dam to the licensee under a February 20, 1986, lease agreement. Construction was completed in 1987.

The license contains special articles addressing minimum flows, anadromous fish passage, and cultural resources protection. When FERC authorized a modification of the project design in 1986, it also noted that the fisheries agencies had stipulated two conditions: 1) that 5 cfs be spilled at the intake control structure (Briar hydro dam) year round to maintain habitat in the channel bypassed by the Project penstock, and 2) that, after consultation with the fisheries agencies, a system of timber weirs be constructed in the bypassed reach of the canal “to optimize the use of the bypass flow to preserve existing habitat.” Although the authorization letter indicated that the license would be amended at a later date (during approval of exhibits A and F) to include these two mitigation measures, there is no record of that having been done. The license also includes an article, Article 33, which obligates the licensee to continue to consult and cooperate with the state and federal resource agencies “for the protection and development of the environmental resources and values of the project area.” The article reserves a right to FERC to modify project works or operation as necessary for protection and enhancement of environmental resources and values.

The New Hampshire Water Supply and Pollution Control Commission, by letter dated February 16, 1983, certified under Section 401 of the federal Clean Water Act a project described as “dredge to increase flow in the Rolfe Canal for a hydroelectric project.” This served FERC’s purposes for the licensing process. The certification is not conditioned.

No compliance issues were revealed in my review of the last ten years of documents in FERC’s eLibrary. The exemptee annually files minimum flow compliance statements with FERC.

### **IV. PUBLIC COMMENTS RECEIVED BY LIHI**

The LIHI application was publicly noticed on December 4, 2012. No comments were received during the notice period, which ended on February 4, 2013.

## V. LIHI CRITERIA REVIEW

Under each of the issue sections that follow, I include a table that contains the related LIHI questionnaire sections and my analysis and conclusions.

***General Conclusions and Recommendations.*** I recommend that the facility be conditionally certified for the standard period of five years, with six recommended conditions to address issues related to conservation flows, flow compliance, fish passage, and protection of threatened and endangered species. The recommended conditions are set forth below. If these conditions are attached to the certification, it is my opinion that the Project will meet all of LIHI's criteria.

Regarding flows, the facility as licensed operates in a run-of-river mode with conservation flows for three channel reaches. The Resource Agency Recommendations predate 1987, and the conservation flows are less than the USFWS summer aquatic base flow. For the purposes of LIHI certification, the resource agencies have recommended an increase in the conservation flow directly below York Dam and field verification of its sufficiency. I am also recommending field verification of the minimum flow currently provided in the penstock-bypassed reach and tailrace. Any LIHI certification should be conditioned on adjustment of flows in these two reaches as necessary to provide appropriate protection of aquatic biota. I am also recommending that a flow management/record-keeping plan be developed in consultation with, and subject to approval by, the resource agencies.

Regarding water quality, the New Hampshire Department of Environmental Services (NHDES) indicates that, based on data provided by the Applicant, the Project is currently meeting water quality standards.

Regarding fish passage, catadromous American eel are present in the basin upstream of the Facility dam and the Applicant currently provides downstream passage at both York Dam and the hydroelectric intake dam but no permanent measures are in place and the current measures have not been reviewed by the resource agencies. Consequently, I recommend that the certification be conditioned to require the Applicant to develop an agreement with the resource agencies for eel passage, with permanent downstream passage measures operational by the 2016 passage season and upstream passage implementation when deemed appropriate by the resource agencies. Anadromous species are not yet present nor is passage likely to be needed within the term of the certification; however, the fish passage condition I am recommending would require the Applicant to notify LIHI should circumstances change, as well as notification of any request for upstream passage of eel.

Regarding listed threatened and endangered species, a state-listed threatened aquatic plant has been identified at the site. Since canal dredging or drawdowns could affect the plant, I am recommending a condition requiring the Applicant to consult with the N.H. Natural Heritage Bureau before any such activities.

Regarding cultural resources, the Project is in an area of 19<sup>th</sup> century mill development; any future activities that may affect historic properties are subject to review by the State Historic Preservation Office (SHPO) under Article 34 of the license.

Regarding other LIHI criteria, the Project does not qualify for extension of the certification term by three years under the watershed protection criteria, and there is no shoreland management plan with which the Applicant must comply. Little in the way of recreational opportunities and access is available on Project lands due to the limited ownership; the Applicant maintains a boat launch near the upper end of the canal. No dam removal has been recommended.

**Issue 1.** While the Project is operated in a run-of-river mode, it is not clear whether FERC considers this to be a regulatory requirement.

**Recommended Condition No. 1.** Briar Hydro Associates shall operate the Project in a run-of-river mode with no utilization of impoundment storage.

**Issue 2.** The minimum flows directly below York Dam and in the reach from the hydroelectric intake to the river main channel are less than the USFWS aquatic base flow and do not appear to have been set based on any instream flow studies. The resource agencies have recommended an increase in the minimum flow below York Dam and field verification of the adjusted flow's sufficiency; the sufficiency of the minimum flow in the other reach should also be field verified.

**Recommended Condition No. 2.** Briar Hydro Associates shall increase the minimum flow released at York Dam to 100 cfs effective upon receipt of this certification. Briar Hydro Associates shall schedule a site visit with the USFWS and NHDFG to enable the resource agencies to observe the 100 cfs flow and the 5 cfs released at the Briar hydro intake and determine whether these flows are appropriately protective of fish. Prior to the site visit, Briar Hydro Associates will provide the resource agencies with the gate setting used to pass the 100 cfs and the 5 cfs and the underlying hydraulic calculations. During the field exercise, the gates shall be adjusted as necessary to attain appropriately protective condition if the resource agencies deem these flows to be inadequate. A report on the results, including documentation of resource-agency concurrence, shall be filed with LIHI within 30 days of the field exercise but no later than September 1, 2013.

**Issue 3.** There is no flow monitoring and record-keeping plan.

**Recommended Condition No. 3.** Briar Hydro Associates shall develop a flow monitoring and record-keeping plan to enable it to demonstrate to FERC and the resource agencies compliance with run-of-river operations and maintenance of the prescribed minimum flows. The plan shall include installation of a staff gage or hydraulic control point marker in an easily accessible portion of the reach directly below York Dam. The plan shall be developed in consultation with the USFWS, NHDES, and NHDFG and shall be subject to approval by the USFWS and NHDES. The plan shall be filed with FERC and LIHI by October 1, 2013.

**Issue 4.** While the Project provides downstream passage for American eel, the method has not been reviewed by the resource agencies, and permanent upstream and downstream passage is a current need.

**Recommended Condition No. 4.** By August 1, 2013, Briar Hydro Associates shall enter into, and provide LIHI with a copy of, an agreement reached between the U.S. Fish and Wildlife Service, the New Hampshire Department of Fish and Game, and Briar Hydro Associates for providing safe, timely, and effective interim and permanent downstream passage and permanent upstream passage for American eel. The agreement shall address 1) measures to be taken to provide

interim downstream passage, which shall be operational by August 15, 2013; 2) the consultative process for design and implementation of permanent downstream passage, which shall be operational by August 1, 2016, subject to a reserved right by the resource agencies to amend that deadline as they deem necessary; and 3) the consultative process and schedule for design and implementation of permanent upstream passage. Briar Hydro Associates shall notify LIHI within two weeks of completion of permanent passage measures. In the event that the U.S. Fish and Wildlife Service or the New Hampshire Department of Fish and Game determine prior to the installation of permanent downstream passage that the initial interim downstream passage measures are not providing safe, timely and effective interim passage for out-migrating eels, Briar Hydro Associates shall implement other reasonable interim measures as requested by these agencies.

**Issue 5.** There are no provisions currently for upstream and downstream passage of anadromous fish. Passage for anadromous fish is not a present need, but may be in the future depending on success of passage at the Merrimack River mainstem dams.

**Recommended Condition No. 5.** During the term of this certification, should a resource agency request implementation of upstream and/or downstream passage at the Facility for anadromous fish, Briar Hydro Associates shall so notify LIHI within 14 days and provide LIHI with a copy of the request and its response.

**Issue 6.** The long-leaved pondweed, a State-listed threatened plant, has been identified at the Project site, and dredging or drawdowns in the canal may affect the plant. The N.H. Natural Heritage Bureau should be consulted before any activities are undertaken that may place the plant at risk.

**Recommended Condition No. 6.** Briar Hydro Associates shall consult with, and, if necessary, obtain approval from, the N.H. Natural Heritage Bureau for any activities that may have an adverse effect on long-leaved pondweed. Such activities shall be included in the annual reports filed with LIHI.

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### A. Flows

The Contoocook River drains an area of 776 square miles at the dam site. The Project operates<sup>2</sup> in a run-of-river mode over a range of flows up to 2,052 cfs while maintaining a conservation flow of 50 cfs in the river main channel directly below York Dam, 5 cfs in the penstock-bypassed reach, and 285 cfs (0.37 cfs/sq. mile, or csm) below the confluence of the tailrace and the main channel. The minimum flows of 50 and 285 cfs are prescribed under Article 32, which also requires a minimum flow of 400 cfs at York Dam for two months in the spring after upstream fish passage facilities are constructed and operational. The 5 cfs minimum bypass flow was added when the project design was modified in 1986. The minimum flows are less than the USFWS summer aquatic base flow of 0.5 csm as prescribed in the Interim Regional Policy for New England Streams Flow Recommendations (1981).

NHDES, by letter dated June 8, 2012, requested certain information to enable it to reach a conclusion as to whether the Project complies with New Hampshire water quality standards, specifically with regard to 1) impact on ambient water quality criteria (dissolved oxygen, total phosphorus, and chlorophyll-a); 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. By letter dated December 31, 2012 to LIHI, NHDES provided its conclusion that the river immediately upstream and downstream of the Project appears to be meeting water quality standards. This conclusion is predicated on:

1. Operation in a run-of-river mode with no artificial impoundment drawdowns;
2. An increase in the minimum flow directly downstream of York Dam from the current 50 cfs to 100 cfs<sup>3</sup>;
3. The 100 cfs minimum flow being field validated by the USFWS for “acceptable habitat conditions”;
4. Reservation of a right to increase the minimum flow above 100 cfs as necessary to achieve acceptable habitat conditions; and
5. Installation of a staff gage or hydraulic control point marker in an easily accessible portion of the bypass reach for compliance monitoring.

Consistent with NHDES’s assumptions and in order to assure compliance with the LIHI flow criteria, I recommend that LIHI certification be subject to Recommended Condition #1 (run-of-river operation), Recommended Condition #2 (the 100 cfs minimum flow below York Dam with field verification), and Recommended Condition #3 (staff gage). Since the Project is not required under the license to have a flow compliance plan, Recommended Condition #3 requires such a plan, which would include the staff gage as well as details on how conservation flows are provided and what records are to be maintained to demonstrate compliance; the Applicant concurs (Applicant response to Intake Review, November 19, 2012).

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<sup>2</sup> The plant is unmanned but monitored on a 24/7 basis.

<sup>3</sup> The USFWS had observed the 50 cfs during an August 28, 2012 field trip and determined that the flow was insufficient for habitat support.



USFWS and NHDFG staff are unfamiliar with the penstock-bypassed reach and could not verify the sufficiency of the 5 cfs minimum flow to support habitat in the penstock bypass and downstream through the tailrace. (email from John Warner, USFWS, February 4, 2013, *see* Appendix, and personal conversation with Carol Henderson, NHDFG, February 8, 2013) In an email to John Warner dated November 14, 2012, the Applicant refers to it as being released “for aesthetic purposes” (supplemental information filing of January 29, 2013). Consequently, I am recommending that LIHI also condition certification on verification of the flow as being appropriately protective of aquatic habitat (included in Recommended Condition #2 as drafted). Presumably the field work can be done at the same time that the flows are observed below York Dam.

LIHI Questionnaire: Flows	
<b>A.1</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The Resource Agency Recommendations (U.S. Fish and Wildlife Service) pre-date 1987.  <b>N/A = Go to A.2</b></p>
<b>A.2</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The minimum flows do not meet Aquatic Base Flow standards.  <b>No = Go to A.3</b></p>
<b>A.3</b>	<p><b>If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> As discussed above, NHDES has stipulated conditions under which the Project would comply with NH water quality standards, including flows.  <b>YES (so long as Recommended Conditions #1-3 are attached to the certification) = PASS</b></p>

**B. Water Quality**

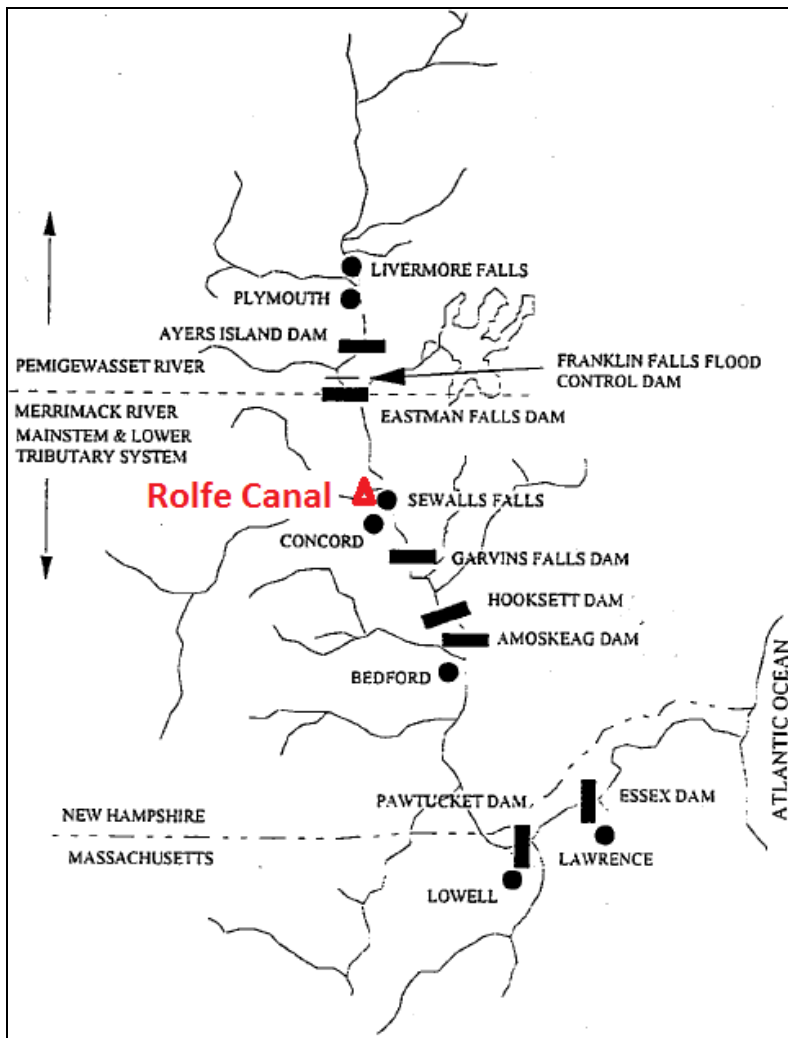
To support its LIHI application, the Applicant performed water quality sampling during August/September 2012 in accordance with a NHDES sampling protocols in order to demonstrate compliance with state water quality standards. Additional sampling was also completed by NHDES between June and August 2012. NHDES, in its letter of December 31, 2012, indicates that the Project appears to be compliant with the State standards for dissolved oxygen, phosphorus and chlorophyll-a.

According to NHDES’s 2010 303(d) list, the Penacook Upper Falls impoundment (Assessment Unit NHIMP700030507-06) is currently listed as a Category 5 impaired water for Aquatic Life support due to pH. This includes the reach below York Dam and the Project tailrace. The Project impoundment (Assessment Unit NHIMP700030507-09) is not listed as impaired, but is a Category 3 water, which are those waters for which there is insufficient information upon which to base a determination of designated-use support. Based on the Applicant’s data and its own data, NHDES intends to re-categorize the impoundment and downstream reach as Category 2, full support for Aquatic Life and Primary Contact Recreation, in the 2014 assessment unless additional data is collected that demonstrates otherwise.

LIHI Questionnaire: Water Quality	
<b>B.1</b>	<p><b>Is the Facility either:</b>  <b>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>  <b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The Project does not have a water quality certification issued after 1986. NHDES analyzed the Project’s impact on water quality and concluded that the current operation is compliant.  <b>YES to (b) = Go to B.2</b></p>
<b>B.2</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> Although the reach below the Project is listed as impaired by pH, the Project would not be a contributing source. The impoundment is not listed. NHDES expects to categorize both reaches as in full support for 2014.  <b>YES = Go to B.3</b></p>
<b>B.3</b>	<p><b>If the answer to question B.2 is yes, has there been a determination that the Facility does not cause, or contribute to, the violation?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> NHDES finds that the Facility complies with water quality standards and, therefore, does not contribute to the pH impairment.</p>

### C. Fish Passage and Protection

According to *Strategic Plan & Status Review, Anadromous Fish Restoration Plan, Merrimack River* (Technical Committee for Anadromous Fishery Management of the Merrimack River Basin and Advisors to the Technical Committee, October 16, 1997), anadromous fish, including Atlantic salmon, American shad, and river herrings (alewives and blueback herring), populated the Merrimack River basin historically. Salmon were present in most of the major tributaries, including the Contoocook River, although the Pemigewasset River watershed in the upper Merrimack basin served as the principal salmon spawning and rearing area. Shad and river herrings likely occurred upstream as far as the Winnepesaukee River watershed. In 1847, the Essex Dam in Lawrence, Massachusetts was constructed at River Mile 30, blocking anadromous fish access to critical upstream habitat. Atlantic salmon became extirpated, while shad and river herring maintained diminished populations by using available habitat downstream of Essex Dam.



**Figure 5. Major dams on the Merrimack and Pemigewasset rivers. (*Strategic Plan & Status Review, Anadromous Fish Restoration Plan, Merrimack River* (1997))**

Article 30 of the FERC license provided for the construction of fish passage facilities at the

Project after consultation with the USFWS and NHDFG. Both upstream and downstream fish passage facilities were required within one year after completion of fish passage facilities at the Garvins Falls Dam, the Hooksett Dam, the Amoskeag Dam, and the Pawtucket Dam. At the time the license was issued, a fish lift had already been installed at Essex Dam (1982), and facilities are now in place at the Pawtucket and Amoskeag dams as well. The license required the Project, after consultation with the New Hampshire Fish and Game Department and the U.S. Fish and Wildlife Service, to file functional design drawings with the Commission no later than July 1, 1988.

On September 25, 1986, the FERC amended Article 30, requiring functional design drawings be filed within two years after the annual passage of 15,000 adult American shad at the Garvins Falls Project (FERC No. 1893), or through the fish facilities of the proposed Sewalls Falls Project (FERC No. 7216) if constructed, but in no case later than July 1, 2004, and installation of fish passage facilities within 5 years of the same triggering event. The Sewalls Falls Project has not been constructed and is no longer licensed.

The USFWS fishway prescription (December 20, 2006) that applies to the PSNH dams on the Merrimack River mainstem requires operational anadromous upstream passage at Hooksett Dam within three years after annual passage of either 9,500 shad or 22,500 river herring at Amoskeag Dam, and at Garvins Dam within after annual passage of either 9,800 shad or 23,200 river herring at Hooksett Dam (unless the Hooksett passage facility is built without a fish counting facility, in which case the trigger will be either 19,300 shad or 45,800 river herring at Amoskeag.

The trigger conditions for construction of upstream passage at Hooksett Dam have not yet occurred. According to the latest annual report to FERC from PSNH (November 28, 2012), although an estimated 21,396 shad and 8,992 herring were lifted at Lawrence Dam during the 2012 fish passage season, only a small number of herring and no shad were observed at Hooksett. Consequently, the earliest that the Rolfe Canal Project will be required to install its facilities is 2020.

There are no systematic population surveys for catadromous American eel in the Contoocook basin; however, according to John Magee, a NHDFG fisheries biologist, eel were found in 2001 in Clement Pond (Hopkinton), which is upstream of the Facility, and are present in other Merrimack River tributaries to the north and south. The Applicant indicates that downstream passage for American eel is currently provided via the 50 cfs gate release at York Dam and a bypass pipe at the facility headworks. The passage measures for eel have not been reviewed by the resource agencies, and the measures may not include impingement/entrainment protection. There are ongoing efforts by state and federal agencies to protect and enhance the depleted coastwise stock of American eel. Eel are present in the upper Merrimack basin and likely continue to be present in the Contoocook basin, although I was unable to verify this. PSNH is working on upstream eel passage measures at Garvins Falls Dam, and the need for permanent passage at the Contoocook dams is expected soon.

In order to assure compliance with the LIHI fish passage criteria, I recommend that LIHI certification be subject to Recommended Condition #4, which provides for preparation of a plan and schedule for interim and permanent downstream eel passage and permanent upstream eel



passage, and Recommended Condition#5, which addresses upstream and/or downstream passage of anadromous fish if triggered by an agency request.

LIHI Questionnaire: Fish Passage and Protection	
<b>C.1</b>	<p><b>Is the Facility in Compliance with <i>Mandatory Fish Passage Prescriptions</i> for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> A prescription is in place for anadromous fish but has not been triggered to date due to the status of passage at mainstem Merrimack River dams downstream of the Facility. The prescription was established in 1986, so this criterion does not apply. There is no prescription for catadromous fish (American eel).  <b>N/A = Go to C.2</b></p>
<b>C.2</b>	<p><b>Are there historic records of anadromous and/or catadromous fish movement through the Facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> Upstream passage of anadromous fish is currently in place upstream to Hooksett Dam on the Merrimack River; Hooksett Dam blocks passage up to the Contoocook River. American eel, a catadromous species, is believed to persist in the watershed upstream of the Project dam and measures are being taken at the Merrimack mainstem dams to improve upstream and downstream passage.  <b>Yes with respect to anadromous fish = Go to C.2.a</b>  <b>No with respect to catadromous fish = Go to C.3</b></p>
<b>C.2.a</b>	<p><b>If the fish are extinct or extirpated from the Facility area or downstream reach, has the Applicant demonstrated that the extinction or extirpation was not due in whole or part to the Facility?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> Several mainstem dams are located downstream of the Project dam. It is unlikely that this particular dam played a role in extirpation of anadromous fish.  <b>Yes with respect to anadromous fish = Go to C.2.b</b></p>
<b>C.2.b</b>	<p><b>If a Resource Agency Recommended adoption of upstream and/or downstream fish passage measures at a specific future date, or when a triggering event occurs (such as completion of passage through a downstream obstruction or the completion of a specified process), has the Facility owner/operator made a legally enforceable commitment to provide such passage?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The triggering conditions for implementing upstream and downstream passage for anadromous fish are established in the federal license.  <b>Yes with respect to anadromous fish (so long as Recommended Conditions #5 is attached to the certification) = Go to C.5</b></p>

<p><b>C.3</b></p>	<p><b>If, since December 31, 1986:</b></p> <p>a) <b>Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in C2a above), and</b></p> <p>b) <b>The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,</b></p> <p>c) <b>Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?</b></p> <hr/> <p><i>Reviewer Analysis/Conclusions:</i> The agencies could prescribe catadromous fish passage under Standard Article 15 of the license but have not done so to date. None of the three C.3.c factors apply to this Facility.  <b>N/A for catadromous fish = Go to C.4</b></p>
<p><b>C.4</b></p>	<p><b>If C3 was not applicable:</b></p> <p>a) <b>are upstream and downstream fish passage survival rates for anadromous and catadromous fish at the dam each documented at greater than 95% over 80% of the run using a generally accepted monitoring methodology? OR</b></p> <p>b) <b>If the Facility is unable to meet the fish passage standards in 4.a, has the Applicant either i) demonstrated, and obtained a letter from the U.S. Fish and Wildlife Service or National Marine Fisheries Service confirming that demonstration, that the upstream and downstream fish passage measures (if any) at the Facility are appropriately protective of the fishery resource, or ii) committed to the provision of fish passage measures in the future and obtained a letter from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service indicating that passage measures are not currently warranted?</b></p> <hr/> <p><i>Reviewer Analysis/Conclusions:</i>      The Applicant has not attempted to demonstrate effective eel passage, but has agreed to provide both upstream and downstream eel passage as a condition of LIHI certification (email of Applicant to USFWS, November 14, 2012).  <b>YES to (b) for catadromous fish (so long as Recommended Conditions #4 is attached to the certification) = Go to C.5</b></p>
<p><b>C.5</b></p>	<p><b>Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of Riverine fish?</b></p> <hr/> <p><i>Reviewer Analysis/Conclusions:</i> There are no prescriptions for riverine fish.  <b>N/A = Go to C.6</b></p>

<b>C.6</b>	<b>Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?</b>
	<i>Reviewer Analysis/Conclusions:</i> There are no Resource Agency Recommendations for entrainment protection measures. Interim and permanent downstream passage measures for eel will address entrainment of outmigrants. <b>N/A = PASS</b>

**D. Watershed Protection**

The Applicant does not own any of the land abutting the York Dam impoundment, the bypassed reach of the Contoocook River, the shoreline of the inlet canal, or the shoreline of the tailrace channel. The dam is leased from the State of New Hampshire. No protected buffer zones have been created along the riverine impoundment through a settlement agreement or the federal exemption. Further, there is no shoreland protection plan.

LIHI Questionnaire: Watershed Protection	
<b>D.1</b>	<b>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?</b>
	<i>Reviewer Analysis/Conclusions:</i> There are no buffer zones at this project. <b>NO = Go to D.2</b>
<b>D.2</b>	<b>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?</b>
	<i>Reviewer Analysis/Conclusions:</i> There is no watershed enhancement fund. The facility does not qualify for an extension of the LIHI certification term by three years. <b>NO = Go to D.3</b>
<b>D.3</b>	<b>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).</b>
	<i>Reviewer Analysis/Conclusions:</i> There is no settlement agreement. <b>NO = Go to D.4</b>
<b>D.4</b>	<b>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?</b>
	<i>Reviewer Analysis/Conclusions:</i> There are neither recommendations nor a shorelands management plan related to the Facility. <b>N/A = PASS</b>

*E. Threatened and Endangered Species Protection*

The Applicant provided a consultation memorandum dated May 23, 2012 from the New Hampshire Natural Heritage Bureau indicating that two state-listed species are present at the Project, wood turtle (species of concern) and long-leaved pondweed (threatened).<sup>4</sup> Noted threats to the pondweed include water level changes and pollution; specimens were found near York Dam and near the Briar hydroelectric dam, but the date of survey is unrecorded. The federal list for New Hampshire<sup>5</sup> includes the endangered Karner Blue Butterfly as present in Concord using a habitat type of pine barrens with wild blue lupine; *if* present near the river, it would be outside of the limited project boundary. Although the Applicant solicited input from both the federal and state agencies as to whether the Project poses any risk to these species, it received no response.

Since the pondweed has been found in the vicinity of the canal, a drawdown or dredging of the canal could imperil the plant. Consequently, I recommend that the certification, if granted, be conditioned on consultation with the New Hampshire Natural Heritage Bureau prior to any such activities (Recommended Condition #6).

Efforts by state and federal agencies to protect and enhance the depleted coastwise stock of American eel are ongoing. The USFWS is currently reviewing eel status for possible protection under the Endangered Species Act. The Applicant has agreed, as discussed under Fish Passage above, to accommodate upstream and downstream eel migration.

LIHI Questionnaire: Threatened and Endangered Species Protection	
<b>E.1</b>	<p><b>Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> A State listed threatened plant species has been found in the Facility area. A federally listed butterfly is in the region but uses terrestrial pine barrens habitat.  <b>Yes = Go to E.2</b></p>
<b>E.2</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> There is no recovery plan.  <b>N/A = Go to E.3</b></p>
<b>E.3</b>	<p><b>If the Facility has received authorization to incidentally <i>Take</i> a listed species through: (i) Having a relevant agency complete consultation</b></p>

<sup>4</sup> Listed species for New Hampshire are available at:  
[http://www.wildlife.state.nh.us/Wildlife/Nongame/endangered\\_list.htm](http://www.wildlife.state.nh.us/Wildlife/Nongame/endangered_list.htm)  
 The turtle was found on the lawn a Briar Pipe Apartments (the former mill) in 2006.

<sup>5</sup> <http://www.fws.gov/newengland/pdfs/NH%20species%20by%20town.pdf>



	<p><b>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 authorization pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authorization?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The Facility does not have authorization to take the State-listed aquatic plant.  <b>N/A = Go to E.5</b></p>
<b>E.5</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> It is reasonable to conclude that the normal Facility operations in a run-of-river mode would not imperil any of the listed species; however, drawdowns or canal dredge could.  <b>YES (so long as Recommended Conditions #6 is attached to the certification)= PASS</b></p>

**F. Cultural Resource Protection**

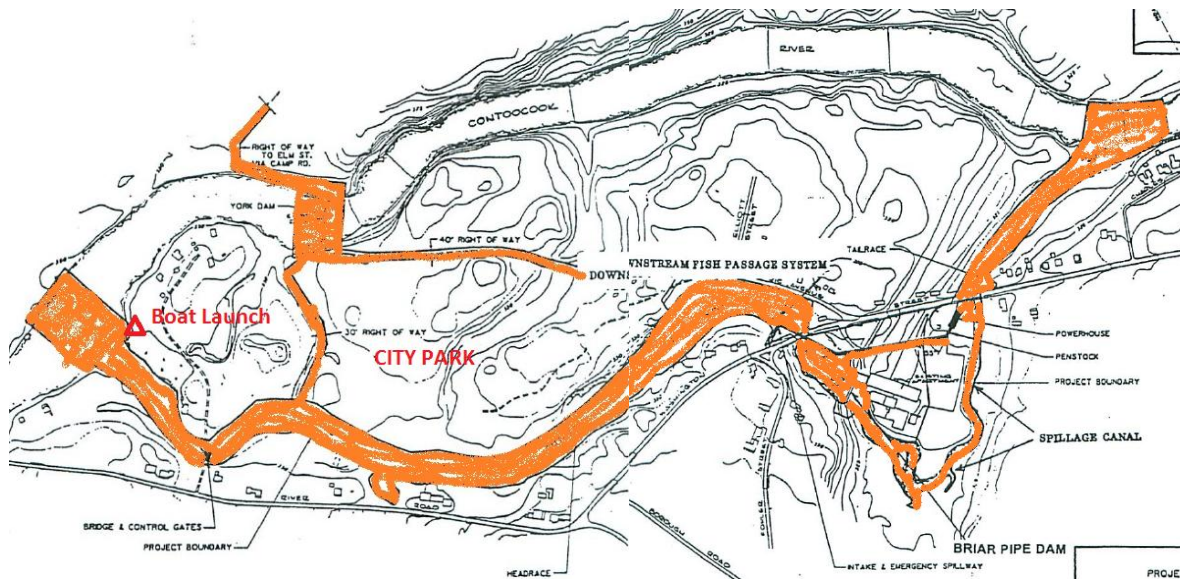
The Applicant submitted a Request for Project Review to the New Hampshire Division of Historical Resources on May 21, 2012. The Division responded on May 29, 2012 that there is no potential to cause effects (because there were no disturbance activities proposed) but that surveys would be necessary for future modifications. The Bureau noted that an archaeological site is located downstream (perhaps the old mill building and dam) and that the dam (probably York Dam) may be eligible for the National Register of Historic Places.

Article 34 of the license requires, prior to any future construction, consultation with the State Historic Preservation Office. The Applicant indicates that it is in compliance with this article and that no future construction is planned.

<b>LIHI Questionnaire: Cultural Resource Protection</b>	
<b>F.1</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> No conflicts were identified in the record. Future construction is subject to Article 34 consultation of the SHPO.  <b>YES = PASS</b></p>

### G. Recreation

The Project provides limited recreational opportunities due to insufficient shorelands ownership (see Figure 6 showing the Project lands). According to the application, the City of Concord owns a large tract of forested land that is located immediately downstream of the intake to the Rolfe Canal and between the Contocook River and the canal. Although the City has identified this land as a potential location for a park, no formal development has yet occurred, and the area is primarily used for hiking and serves as access for angling.



**Figure 6. Project lands as licensed (FERC Exhibit G).**

Prior to Project development, the City of Concord maintained a boat launch on the riverbank at the canal inlet. The license at p. 3 indicated that the Applicant would protect the City's existing boat launch during Project construction and operation; however, unsafe currents were identified during a FERC inspection in 1990 and an order issued requiring the licensee to relocate the boat launch. FERC subsequently issued an order on January 22, 1993 approving a redesign with the launch remaining in the original location but with a breakwater to create a slack-water area for safe launching. The order requires the completion of a study within nine months to determine the maximum safe velocity for use of the launch with gating off of the launch when velocities exceed the safe level. FERC approved the boat launch operation plan by letter order dated June 24, 1993.



**Figure 7. Boat launch at canal inlet (view looking upriver with canal entrance on left).**

The license does not require development of a recreation plan.

During the licensing process, the USFWS recommended that the Applicant provide access across project lands for angling opportunities, especially as related to increased pressure once salmon and shad are restored. The Applicant does not consider its limited ownership conducive to such use. Standard Article 18 of the license requires free public access for public outdoor recreation, including hunting and fishing, except where such use would conflict with project operations or present a risk to public safety.

LIHI Questionnaire: Recreation	
<b>G.1</b>	<p><b>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?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The license contains no specific requirements; however, the Applicant is in compliance with a subsequent order related to the boat launch at the canal inlet.</p> <p><b>Yes = Go to G.3</b></p>
<b>G.3</b>	<p><b>Does the Facility allow access to the reservoir and downstream reaches without fees or charges?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> The Applicant does have shorelands ownership in those areas. The Applicant does not bar access, except where a risk to project works or public safety exists, or charge fees.</p> <p><b>YES = PASS</b></p>

*H. Facilities Recommended for Removal*

The record does not indicate an interest on the part of resource agencies in removing the dam.

LIHI Questionnaire: Facilities Recommended for Removal	
<b>H.1</b>	<p><b>Is there a Resource Agency Recommendation for removal of the dam associated with the Facility?</b></p> <p><i>Reviewer Analysis/Conclusions:</i> No.</p> <p><b>NO = PASS</b></p>



## **APPENDIX**

### **Contents**

Correspondence.....	A-1 to A-15
Contacts .....	A-16

**From:** Warner, John [mailto:john\_warner@fws.gov]  
**Sent:** Wednesday, February 13, 2013 7:24 AM  
**To:** Jeffrey Cueto  
**Subject:** Fwd: Rolfe Canal Hydro

Jeff - followup info on eels at Rolfe Canal - Clement Pond is upstream of Rolfe and the dam on Conottocook Center - (FERC project :Hopkinton Hydro)

----- Forwarded message -----

From: **Gries, Gabriel** <[Gabe.Gries@wildlife.nh.gov](mailto:Gabe.Gries@wildlife.nh.gov)>  
Date: Mon, Feb 11, 2013 at 11:06 AM  
Subject: RE: Rolfe Canal Hydro  
To: John A Magee <[john.a.magee@wildlife.nh.gov](mailto:john.a.magee@wildlife.nh.gov)>, "Warner, John" <[john\\_warner@fws.gov](mailto:john_warner@fws.gov)>  
Cc: "Carpenter, Matthew" <[Matthew.Carpenter@wildlife.nh.gov](mailto:Matthew.Carpenter@wildlife.nh.gov)>, "Nugent, Benjamin" <[Benjamin.Nugent@wildlife.nh.gov](mailto:Benjamin.Nugent@wildlife.nh.gov)>

I would defer to the database you guys have in Concord, but I think it is pretty safe to assume that they are in the watershed and should be provided with up and downstream passage as opportunities present themselves.

Gabe

Gabe Gries <{{}}>  
Fisheries Biologist II  
Warmwater Project Leader  
New Hampshire Fish & Game Department  
Region 4  
15 Ash Brook Court  
Keene, NH 03431  
Phone: 603-352-9669  
Fax: 603-352-8798  
Email: [gabe.gries@wildlife.nh.gov](mailto:gabe.gries@wildlife.nh.gov)

NH Fish and Game...*connecting you to life outdoors*  
[www.wildnh.com](http://www.wildnh.com), [www.facebook.com/nhfishandgame](http://www.facebook.com/nhfishandgame)

**Did you know?** New Hampshire Fish and Game is a self-supporting agency, funded mainly by hunting and fishing license fees, federal grants and donations.

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**From:** John A Magee  
**Sent:** Monday, February 11, 2013 10:33 AM  
**To:** Warner, John  
**Cc:** Carpenter, Matthew; Nugent, Benjamin; Gabe Gries ([Gabriel.Gries@wildlife.nh.gov](mailto:Gabriel.Gries@wildlife.nh.gov))  
**Subject:** RE: Rolfe Canal Hydro



**From:** Warner, John [mailto:john\_warner@fws.gov]  
**Sent:** Monday, February 04, 2013 1:59 PM  
**To:** Jeffrey Cueto  
**Cc:** Carol Henderson  
**Subject:** Re: Rolfe Canal Hydro

Jeff - I have done a quick read

I am not sure about the bypass/briar pipe section so can't say much there. I assume DES has required some DO and Temp monitoring there but have no idea what it creates for habitat. I am OK with the min flow of 100 in the bypass reach below York dam with some verification as indicated. I am not sure about the river reach DS from the tailrace confluence with the bypass, or their operation regime. I don't think there's a lot of freeboard for pulsing, but assume they do that. But I also don't think there's a lot of free-flowing stream DS of the confluence given the proximity of Penacook Upper Falls Project.

On eel passage - I question whether they have any eel passage measures in place - They may have 1" clear spaced racks (cannot recall) but we know that would not be effective and I doubt they have a bypass gate open Aug - Nov. I am comfortable with the provision as you outlined it for DS eel passage. There is no upstream eel passage there, but with increased spill, I'd think we'd likely want to look at upstream eel passage measures at York Dam, or an assessment of how eels pass now or both. I am awaiting info I have asked around about on eel presence upstream, and PSNH is still working out eel passage measures at Garvins Falls. So I think that the upstream eel passage measures here could be staged like the DS passage provision you drafted...

That's my quick response.... need more time that I don't have to be any more specific -- thanks for checking with us - jw

On Mon, Feb 4, 2013 at 11:40 AM, Jeffrey Cueto <[ompompanoo@aol.com](mailto:ompompanoo@aol.com)> wrote:

Carol and John – I know both of you are probably busy, but if I could hear back by the end of this week I'd sure appreciate it. If you'd prefer, I could give you a call.

By the way, one question I should have asked is whether the 285 cfs minimum flow below the project is appropriately protective without the facility actually operating in a strictly run-of-river mode.

Thanks.

Jeff

**From:** Jeffrey Cueto [mailto:[ompompanoo@aol.com](mailto:ompompanoo@aol.com)]  
**Sent:** Thursday, January 31, 2013 12:25 PM  
**To:** 'Warner, John'; 'Carol Henderson'  
**Subject:** Rolfe Canal Hydro

Hi, Carol and John – I was asked to review Briar Hydro Associates’ application for LIHI certification of the Rolfe Canal Hydro Project and would appreciate your input on the conservation flows and fish passage.

**Flows:** As I understand it there is aquatic habitat that needs flow protection in three distinct reaches—1) below the confluence of the project tailrace and the main channel of the Contoocook River; 2) the river mainstem below York Dam to the project tailrace; and 3) in the off-river channel from the old Briar Pipe dam downstream back to the Contoocook River (essentially the penstock bypass and hydrostation tailrace reach). Since this is a pre-1987 project, I must determine that conservation flows either meet FWS ABF standards or that the flow conditions are *appropriately protective* of fish, wildlife, and water quality. I do not believe that the minimum flows at this project meet the ABF standard.

**Reach 1.** With respect to the below-project reach, the project as licensed must maintain a minimum flow of 285 cfs at the confluence of the river and the project tailrace. While the project is operated run-of-river, I do not believe there is a requirement for instantaneous run-of-river.

**Reach 2.** With respect to the reach directly below York Dam, the license requires a minimum flow of 50 cfs; however, Steve Hickey provided an email from John indicating agreement with an interim flow of 100 cfs at York Dam, subject to potential adjustment based on further field review.

**Reach 3.** For the “canal” reach, the original license did not require a minimum flow. On February 28, 1986, FERC (Corso) authorized certain changes to the project design, at the same time noting that the license would be amended at a later date to incorporate a minimum flow of 5 cfs for the canal and installation of a timber-weir system, after consultation with FWS and NHDFG, “...to optimize the use of the bypass flow to preserve existing habitat.” I understand from Steve Hickey that there is a single timber weir at the end of the bypassed reach and that it needs frequent maintenance.

Please let me know if you consider these flows to be *appropriately protective* and whether you recommend any special conditions related to flow in order to qualify for LIHI certification. My initial thoughts are that a certification could require true r-o-r operation; the 100 cfs below York Dam, with field verification; and a flow management/compliance plan.

**Fish Passage:** The applicant indicates that downstream eel passage is currently provided. So I assume eels are present in the Contoocook watershed. The circumstances appear to be similar to the recently certified Franklin Falls project, for which we required a timetable for permanent downstream eel passage and notification of any resource agency request for upstream passage



(catadromous or anadromous). Please let me know if you agree and, if so, whether essentially the same special passage condition makes sense:

By August 1, 2013, Briar Hydro Associates shall enter into, and provide LIHI with a copy of, an agreement reached between the U.S. Fish and Wildlife Service, the New Hampshire Department of Fish and Game, and Briar Hydro Associates for providing both interim and permanent safe, timely, and effective downstream passage for American eel, including a description of the planned passage and protection measures and the implementation schedule for design, installation, and operations. Said permanent facilities shall be in place and operational by August 1, 2016, and Hydro Realty Corporation shall notify LIHI within two weeks of completion. In the interim, effective immediately, Briar Hydro Associates shall institute interim downstream passage which shall consist of nightly shutdowns (dusk to dawn) during rainy nights from August 15 to November 15. Briar Hydro Associates shall keep a log during this period, showing precipitation and generation information, and provide it to the U.S. Fish and Wildlife Service and the New Hampshire Department of Fish and Game by December 31 annually until permanent measures are in place. This interim passage provision shall be included in the aforementioned agreement. In the event that the U.S. Fish and Wildlife Service or the New Hampshire Department of Fish and Game determine prior to the installation of permanent downstream passage that the above-described interim downstream passage measure is not providing safe, timely and effective interim passage for out-migrating eels, Briar Hydro Associates shall implement other reasonable interim measures as requested by these agencies. During the term of this certification, should a resource agency request implementation of upstream passage at the Facility, Briar Hydro Associates shall so notify LIHI within 14 days and provide LIHI with a copy of the request and its response.

Documentation/comments relative to eel presence and overall status of upstream passage would be appreciated for the purposes of the report.

Thanks in advance for your help.

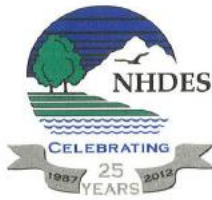
Jeff

><{{{ }> **Jeffrey R. Cueto, P.E.**

><{{{ }> (802) 223-5175

><{{{ }> [ompompanoo@aol.com](mailto:ompompanoo@aol.com)





The State of New Hampshire  
**Department of Environmental Services**

**Thomas S. Burack, Commissioner**

*Celebrating 25 Years of Protecting  
New Hampshire's Environment*



December 31, 2012

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

RE: Water Quality Status of the Contoocook River for Low Impact Hydropower Institute Certification of the Rolfe Canal Hydroelectric Project (FERC No. 3240), Contoocook River

Dear Fred:

Briar Hydro Associates (BHA) has applied for Low Impact Hydropower Certification from the Low Impact Hydropower Institute (LIHI) for the Rolfe Canal Hydroelectric Project (FERC No. 3240) on the Contoocook River in Penacook, NH. We understand that to receive LIHI certification, you require 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. On June 8, 2012, DES sent BHA a letter stating what would be needed to determine if the Contoocook River in the vicinity of the Rolfe Canal hydroelectric project was or was not attaining water quality 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 and thresholds;
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 BHA in response to our letter of June 8, 2012 and, our conclusions as to whether or not the Rolfe Canal Hydroelectric Project is causing or contributing to New Hampshire surface water quality standard violations.

With regards to water quality, BHA collected water quality data for dissolved oxygen, water temperature, total phosphorus, chlorophyll-a, and discharge. Monitoring locations in the bypass reach (03F-CTC) and in the downstream section of the river (03C-CTC) were monitored continuously for a minimum 10 day period in August/September 2012 for water temperature and dissolved oxygen using multi-parameter dataloggers. DES specified that the multi-parameter continuous water quality data should be collected under critical low flow/higher water temperature conditions. The continuous water quality data submitted by BHA was collected when the Contoocook River was flowing below 3 x 7Q10 conditions of 108 cfs and daily average water temperature exceeded 23° F, which meet the conditions set by DES. BHA has stated that during the collection of the continuous water quality data the Rolfe Canal Hydroelectric Project was operating under normal operating procedures. Instantaneous measurements were taken for water temperature and dissolved oxygen in the impoundment (03K-CTC). In addition, between June and

[www.des.nh.gov](http://www.des.nh.gov)

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August 2012, ten samples from stations 03K-CTC and 03C-CTC were collected and tested by the DES laboratory for total phosphorus and chlorophyll-a.

DES has assessed the water quality data collected in 2012, 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 or thresholds for dissolved oxygen, phosphorus and chlorophyll-a. In the June 8, 2012 letter DES provided the assessment status for the parameters of concern for the reaches of the Contoocook River upstream and downstream of the Rolfe Canal 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)<sup>1</sup>. 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 2014. Please note that the assessment status listed in Table 1 could change if water quality criteria or thresholds change and/or if additional data collected between now and the 2014 report indicate water quality violations. For example, data collected at lower flows and/or higher temperatures might result in a different assessment.

**Table 1. Assessment Status for Water Quality Monitoring Parameters - Rolfe Canal Hydroelectric Project**

Assessment Unit	Location	Parameter	Designated Use	Assessment Status based upon summer 2011 sampling
NHIMP700030507-09	Rolfe Canal 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 <sup>A</sup>
		Total Phosphorus	Aquatic Life	Indeterminate <sup>A</sup>
Water Temperature	Aquatic Life	No numeric criteria <sup>C</sup>		
NHIMP700030507-06	Downstream of Rolfe Canal Hydroelectric Dam - Bypass Reach	Dissolved Oxygen (mg/L)	Aquatic Life	Fully Supporting
		Dissolved Oxygen (% Saturation)	Aquatic Life	Fully Supporting
		Water Temperature	Aquatic Life	No numeric criteria <sup>C</sup>
NHIMP700030507-06	Downstream of Rolfe Canal Hydroelectric Dam Bypass Reach - Downstream of Powerhouse	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 <sup>B</sup>
		Water Temperature	Aquatic Life	No numeric criteria <sup>C</sup>

<sup>1</sup> 2012 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>.

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<sup>A</sup> DES does have numeric water quality thresholds 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 threshold comparison. The aquatic life designated use nutrient and chlorophyll-a thresholds are depicted below with the median values for each parameter for the data collected at station 03K-CTC in assessment unit NHIMP700030507-09 and station 03C-CTC in assessment unit NHIMP700030507-06 during the summer of 2012.

	TP (ug/L)	Chl-a (ug/L)
Median 03K-CTC (2012)	21	3.47
Median 03C-CTC (2012)	18	2.37
Oligotrophic	< 8	< 3.3
Mesotrophic	≤ 12	≤ 5
Eutrophic	≤ 28	≤ 11

<sup>B</sup> 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."

<sup>C</sup> 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.

BHA provided DES with a detailed description of the infrastructure of the facility. Project works consist of:

- a previously existing reservoir with negligible storage capacity with a surface area of 5 acres and a normal surface elevation of 349 feet
- the York Dam, a 10 foot high, 130 foot long granite block dam;
- a 4000 foot bypass reach below the York Dam
- a gated concrete canal intake structure leading to a 7,000 foot long, 75 foot wide and 9 foot deep power canal;
- a 650 foot bypass reach below the old Briar Pipe factory dam;
- a 130 foot long concrete penstock intake structure;
- a 900 foot long, 14 foot diameter steel penstock;
- a concrete powerhouse containing a single generating unit with an installed nameplate capacity of 4,285 kw;
- a 100 foot long 4.16KV interconnecting power line
- a 350 foot long, 47 foot wide tailrace and;
- appurtenant facilities.

In December of 2012 BHA provided DES with information regarding minimum flows and pond fluctuations at the Rolfe Canal Hydroelectric Project. BHA confirmed that the facility is operated as a run of river project and that the project does not draw down the impoundment or store water for purposes of power generation. Any pond level fluctuations are solely the result of natural conditions in the Contoocook River and inflow equals outflow at all times.

On August 18, 2012 staff from the U.S. Fish and Wildlife Service (USFWS) did a site inspection of the project to determine if flows were adequate in the bypass reaches. Based on observations during the site visit the USFWS is requiring BHA to increase flows in the bypass reach. BHA has agreed to these terms and has provided DES with written documentation of their consent to these terms. BHA has agreed to release a minimum flow of 100 cfs into the bypass reach downstream of the York Dam. The minimum flow release will be passed through the gate currently used for downstream eel passage and then over the dam. BHA understands that the USFWS will conduct field inspections to confirm that the 100 cfs flow achieves the acceptable habitat conditions desired by this increase flow requirement. BHA also understands that the USFWS and the New Hampshire Fish and Game Department (NHFG) reserve the right to increase this minimum flow requirement if field observations indicate such a need. Once a final flow requirement is determined, BHA will install a staff gage or hydraulic control point marker in an easily accessible portion of the bypass reach to permit verification of compliance with the mandated



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minimum flow. BHA will continue to release the required 5cfs per their FERC license in the tailrace of the old Briar Pipe Factory.

Regarding the issue of fish passage, DES was provided with documentation from BHA and Carol Henderson of NHFG indicating that they concur with the recommendations of John Warner of USFWS regarding upstream and downstream fish passage. For the purposes of LIHI certification BHA concurs with implementing fish passage measures for American eel when prescribed by USFWS and agree to undertake such consultations, design development, and construction in a timely manner after notification of such necessity by the USFWS.

In summary, based on the current and agreed up changes to the operation of the facility, current water quality standards, the water quality data collected in 2012 and information provided to DES by BHA, it appears the Contoocook River immediately upstream and downstream of the Rolfe Canal Hydroelectric Project is attaining water quality standards at this time. As previously noted, however, this assessment could change in the future should a change in water quality criteria or thresholds and/or new data indicate water quality violations. It could also change if the NHFG and/or USFWS conclude in the future that the project is not in compliance with upstream or downstream fish passage requirements or minimum bypass flow requirements.

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

Sincerely,



Ted Walsh, Surface Water Monitoring Coordinator  
NH DES Watershed Management Bureau

Cc (via email): Steve Hickey, Essex Hydro Associates, LLC  
Carol Henderson, NHFG  
John Magee, NHFG  
John Warner, USFWS  
Pat Mcilvaine, LIHI

**From:** Stephen Hickey [mailto:[sjh@essexhydro.com](mailto:sjh@essexhydro.com)]  
**Sent:** Monday, February 04, 2013 10:52 AM  
**To:** Jeffrey Cueto  
**Subject:** Re: Rolfe project description

Jeff,

You are correct regarding downstream passage for eel in the project area. We have not seen any eel and do not believe that there are any in this stretch of the river but any in the area are passed as you described.

Steve

On 2/3/2013 12:43 PM, Jeffrey Cueto wrote:  
Thanks, Steve. That helps clarify things, especially with respect to the water surface elevations in the canal and the river.

By the way, you had provided in the intake review response a project boundary map (Appendix I.12.2) with the project boundary shown in yellow. If I understand the Exhibit B boundary map correctly, the boundary encompasses a much smaller area, mostly the channels, the penstock/powerhouse, and some rights of way on the island.

Regarding eels, you stated before that passage is provided through the gates in the penstock intake structure and in York dam. So I assumed that downstream eel passage was already being provided. Is that not correct?

Jeff

**From:** Stephen Hickey [mailto:[sjh@essexhydro.com](mailto:sjh@essexhydro.com)]  
**Sent:** Friday, February 01, 2013 6:28 PM  
**To:** Jeffrey Cueto  
**Subject:** Re: Rolfe project description

Jeff,

I apologize for the confusion. I've reviewed our records and the project description that I provided to you and would like to provide the following history and updates to clear up any confusion:

As I now understand, an application was submitted to the FERC in 1984 for the Rolfe project. The design that was included in that filing proved to be uneconomic. That is the basis of the project description that I originally sent to you.

Subsequently, an alternate design was developed and submitted to the FERC in 1986

that lead to FERC issuing a letter in 1986 (the Corso letter) that stated a license amendment would not be necessary to modify the design. The major change was to relocate the powerhouse and use a penstock. The project subsequently was built in accordance with that revised design. In 1989 revised exhibits A, F and G were submitted to the FERC that showed the final as built design of the project. On October 12, 1989 the FERC issued an order approving revised exhibits A, F and G and amending the license to reflect the as built condition.

I am enclosing that order and the revised exhibits.

I've made some changes to the project description (see below). I hope the changes will more clearly describe the project configuration. Paragraph g has been changed to specifically refer to the reach bypassed by the penstock. Paragraph e has been changed to state that the "generation dam" should be described as a "reinforced concrete penstock intake structure". Paragraph g is modified to state that the "power canal" contains a surface area of 8-acres. The normal surface elevation in the canal and at the penstock intake structure should be 342.5 feet NGVD. As long as the river flow is less than 2152 cfs, the hydraulic capacity of the turbine plus the 50 cfs bypass flow (to be increased to 100cfs if LIHI certification is forthcoming), the elevation of the river reservoir and the canal are essentially the same at low flows. There is some elevation divergence between the York Dam and the Penstock Intake Structure at higher river flows, but there is not a drop of 11.5 feet in the power canal. I have added a paragraph and lettered the paragraphs to describe the canal intake structure that is located at the upstream end of the power canal. I have attached a map of the project area labeled according to the project description to help you better understand the physical layout of the project.

Revised Project Description:

Project works consist of: (a) a 300-foot-long, 10-foot-high diversion dam (York Dam); (b) a reservoir with negligible storage, a surface area of 600-acres, and normal surface elevation of 342.5 feet NGVD; (c) a 46-foot-long gated concrete power canal intake structure (d) a 3,500 foot-long, 100-foot-wide, and 9-foot deep power canal with a surface area of 8-acres; (e) a 17-foot-high, 282-foot-long reinforced concrete penstock intake structure with a normal water surface elevation of 342.5 NGVD; (f) a roughly 950-foot-long buried penstock; (g) a roughly 2,100-foot-long bypass reach in which is located the Briar Pipe Dam; (h) a powerhouse containing one generating unit with a total installed capacity of 4,300 kW; (i) a 4.16/34.5 kV 3.8 MVA three-phase transformer with approximately a 50-foot-long 34.5 kV transmission line; and (i) appurtenant facilities.

With those changes made, here are responses to your questions.

1. The original description which referred to two reservoirs does refer to the river reservoir and the power canal. As explained above, there is not a drop of 11.5 feet between the river elevation, the canal intake structure and or the penstock intake structure. The elevation in the river and at the canal intake structure are always essentially the same at 342.5 feet NGVD. The elevation at the penstock intake structure is the same as the river and the canal intake structure at low flows and may see a drop of about 2-3 feet at maximum turbine output.

2. The 7,000 feet does refer to the total length from the beginning of the power canal to the point the tailrace returns to the river. The power canal is roughly 3,500-feet from the beginning of the canal to the penstock intake structure. The canal intake structure is located about 500 feet from the point the power canal begins.

3. The Briar Pipe dam is located in the reach bypassed by the penstock and is the unused dam adjacent to the factory building (now an apartment building). The Briar Pipe dam is approximately 300 feet downstream of the penstock intake structure. It forms a negligible impoundment area.

4. The referenced bypass is the penstock bypass reach. In changing the project description I have modified the length to eliminate the tailrace distance.

5. Yes, these are for the penstock bypassed reach.

6. As I indicated before, the Canal Intake structure is normally open and is not used to regulate water flow to the canal. Its primary purpose, other than in flood conditions, is to isolate the canal during certain maintenance operations. At flows in excess of the turbine capacity plus the two bypass flows, 50(100?) cfs plus 5 cfs the river elevation increases as necessary to pass excess flow over the York dam.

With regard to eel passage, the position that we have taken with our other plants is to commit to work with the agencies on a voluntary basis to support any Federal or State eel restoration program. We are unaware of any state or federal eel restoration programs in the Merrimack River watershed. We have never been required to commit to a date certain for installation of fish passage facilities if there is no action taken regarding downstream hydro facilities. You can refer to the commitment we made with our Messalonskee projects. In that instance, those projects were located on a river reach open to the sea. Hopefully this is responsive to your comment.

Again, I apologize for the confusion. I hope these changes respond to your questions.

Please feel free to contact me over the weekend at 857-205-1001 if you have any questions or need any further clarification.

Thank you,

Steve

On 1/31/2013 10:42 AM, Jeffrey Cueto wrote:

Steve – I'm trying to understand the new project works description you provided:

Project works consist of: (a) a 300-foot-long, 10-foot-high diversion dam (York Dam); (b) a reservoir with negligible storage, a surface area of 50-acres, and normal water surface elevation of 346.0 feet NGVD; (c) a 7,000-foot-long, 75-foot-wide, and 9-foot deep power canal; (d) a roughly 950-foot-long buried penstock; (e) a roughly 4,000-foot-long bypass reach; (f) a 130-foot-long, 17-foot-high granite block generation dam (Briar-Hydro Dam); (g) a reservoir with surface area of 3-acres with negligible storage, and a normal water surface elevation of 334.5 feet NGVD; (h) a powerhouse containing one generating unit with a total installed capacity of 4,300 kW; (i) 100-foot-long, 4.16-kV generator leads; (j) the 4.16/34.5 kV 3.8 MVA three-phase transformer; (k) the 650-foot-long, 34.5-kV transmission line; and (l) appurtenant facilities.

Please clarify the following:

1. Under (b) and (g), you describe two reservoirs. I take it that one is the river reservoir upstream of York Dam and the other is the "power canal," and there is a drop of  $346 - 334.5 = 11.5$  feet at the canal intake structure. Sound right?
2. The 7,000 feet must be the total length from the intake structure, down the canal, through the penstock bypass, and down the tailrace back to the river. The "canal" (intake structure to Briar hydro dam) looks like around 3,000 feet.
3. The Briar pipe dam is the unused dam that is next to where the factory used to be. The Briar hydro dam is about 500 feet upstream of that dam.
4. The 4,000-foot "bypass" is the penstock bypass plus the tailrace.
5. The timber weir and 5 cfs bypass flow are for the penstock-bypassed reach(?) I think the answer is Yes given your response:
  1. There is one wooden weir at the end of the bypass canal where the bypass re-enters the powerhouse tailrace. This weir has been replaced a number of times over the last twenty years.





## CONTACTS

Entity	Authorized Representatives	Contact Information
Briar Hydro Associates (Applicant)	Stephen Hickey	Essex Power Services, Inc. 55 Union Street, 4th Floor Boston, MA 02108 Telephone: (617) 367-0032 Email: <a href="mailto:sjh@essexhydro.com">sjh@essexhydro.com</a>
United States Fish and Wildlife Service	John P. Warner Assistant Supervisor	U.S. Fish and Wildlife Service, New England Field Office Conservation Planning Assistance and Endangered Species 70 Commercial Street, Suite 300 Concord, NH 03301 Telephone: (603) 223-2541 - ext.15 Email: <a href="mailto:John.Warner@fws.gov">John.Warner@fws.gov</a>
	Tom Chapman Supervisor, Threatened and Endangered Species Review	U.S. Fish and Wildlife Service New England Field Office 70 Commercial Street, Suite 300 Concord, NH 03301 Telephone: (603) 223-2541 Email: <a href="mailto:tom_chapman@fws.gov">tom_chapman@fws.gov</a>
NH Department of Environmental Services	Ted Walsh Surface Water Monitoring Coordinator	NHDES, Watershed Management Bureau 29 Hazen Drive, P.O. Box 95 Concord, New Hampshire 03301-0095 Telephone: (603) 271-2083 Email: <a href="mailto:Ted.Walsh@des.nh.gov">Ted.Walsh@des.nh.gov</a>
New Hampshire Water Resources Board	Delbert F. Downing Chairman	37 Pleasant Street Concord, NH 03301
New Hampshire Department of Fish and Game	Carol Henderson Fish & Wildlife Ecologist	New Hampshire Department of Fish and Game 11 Hazen Drive Concord, NH 03301 Telephone: (603) 271-3511 Email: <a href="mailto:Carol.Henderson@wildlife.nh.gov">Carol.Henderson@wildlife.nh.gov</a>
	Kim Tuttle Certified Wildlife Biologist	New Hampshire Fish and Game Department 11 Hazen Drive Concord, NH 03301 Telephone: (603) 271-6544 Email: <a href="mailto:Kim.Tuttle@wildlife.nh.gov">Kim.Tuttle@wildlife.nh.gov</a>
NH Natural Heritage Bureau DRED NH Division of Forests and Lands	Melissa Coppola	172 Pembroke Road Concord, NH 03302-1856 Tel: (603) 271-6488 Email: <a href="mailto:Melissa.Coppola@dred.state.nh.us">Melissa.Coppola@dred.state.nh.us</a>
NH State Historical Preservation Office	Nadine Peterson Preservation Planner	New Hampshire Division of Historical Resources 19 Pillsbury Street Concord, NH 03301 Telephone: (603) 271-6628 Email: <a href="mailto:Nadine.Peterson@dcr.nh.gov">Nadine.Peterson@dcr.nh.gov</a>
National Park Service Rivers and Special Studies Branch	Kevin Mendik	Telephone: (617) 223-5299 Email: <a href="mailto:kevin_mendik@nps.gov">kevin_mendik@nps.gov</a>