

Full Application Review for Low Impact Hydropower Certification of Clement Hydroelectric Facility



Prepared by Peter Drown, Cleantech Analytics LLC

April 23, 2015

Cl **antech**
analytics LLC

I. Executive Summary

This report reviews the Full Original Application for the Clement Hydroelectric Project (“Clement”) located on River Mile 13 of the Winnepesaukee River near Tilton, New Hampshire. Eagle Creek Renewable Energy LLC (“Eagle Creek”) submitted a timely and complete application for Low Impact Certification to the Low Impact Hydropower Institute (“LIHI”) on February 6, 2015. Clement is a 2.4 MW hydroelectric facility and consists of a dam, intake canal, intake, powerhouse, tailrace, transmission and appurtenant structures. The project received a FERC License (Minor) on May 17, 1982 for a smaller design of the project, but this was amended on March 18, 1983 to a Major License under 5 MW (FERC #2966) to accommodate greater power generation capacity. The license expires in May of 2032.

The Winnepesaukee River travels from Lake Winnepesaukee Lake, New Hampshire’s largest lake, to the Merrimack River, for a stretch of roughly 15 miles. The River has five hydroelectric projects along its course, of which Clement is the middle facility, between Lochmere Dam upstream and Steven Falls (pending LIHI certification) downstream, both of which are also owned by Eagle Creek Renewable Energy. Flows for the river are controlled by the Lakeport Facility at Lake Winnepesaukee, with an average flow of 700 CFS. The river is currently used for recreational purposes such as fishing and boating. No threatened or endangered species exist within the project area of Clement, nor are any of the project impact areas designated or proposed “critical habitat.” No compliance issues were noted on the FERC e-library.

The current operator of the facility, Eagle Creek Renewable Energy Management (“ECREM”), has entered into a binding Memorandum of Agreement (“MOA”) with U.S. Fish and Wildlife Service (“USFWS”) to establish a plan and schedule for addressing fish passage and minimum flow requirements at ECREM’s various hydroelectric projects in New Hampshire. This MOA is intended as a critical step to achieving Low Impact Certification, and requires the applicant to take specific steps to support measures by the USFWS to protect aquatic life. Specifically, ECREM plans to implement downstream fish passage enhancements for American Eel and River Herring in 2015, provide a flow monitoring plan to USFWS, and complete upstream fish passage review by 2020. In addition, not included in the MOA, the applicant will provide new water quality samples according to New Hampshire Department of Environmental Services standards. The applicant has informed LIHI they have budgeted for these tasks accordingly, and has agreed to keep LIHI informed throughout this process, and this is included as conditions upon certification.

Recent conversations with resource agencies (Appendix A) have indicated that the applicant has maintained ongoing activities to achieve the outcomes prescribed in the MOA. USFWS has approved new designs for fish screening and surface bypass with the addition of modifications, including modifications to the eel bypass and trapping facility. As this report is being drafted, revised drawings are being prepared for review by USFWS, and construction and installation of these modifications has been moved to 2015. With additional modifications being completed at upstream and downstream facilities, in my opinion the applicant appears to be in compliance with LIHI certification requirements.

II. Recommendation

The proactive approach taken by ECREM to work with resource agencies via a binding MOA to ensure the facility stewards the surrounding environment appears to comply with LIHI's criteria, and makes this facility a strong candidate for certification. After review and consideration of the information provided by applicant, review of the FERC record, and conversations with agencies as noted in the Communications Log (Section VIII), **I believe the Clement Hydroelectric Project meets LIHI criteria for Low Impact Certification, and recommend this project is certified, subject to the following conditions:**

1. Facility owner shall complete the agreed upon water quality sampling in 2015, receive satisfactory determination from New Hampshire Department of Environmental Service that facility does not impact water quality, and provide the results to LIHI by December 31, 2015
2. Facility owner will comply with updated fish passage installation plans in 2015 as specified in the MOA with USFWS, obtain written approval of design by USFWS, and report results to LIHI by December 31, 2015
3. Facility owner will complete minimum flow review in 2015 as prescribed in the MOA with USFWS, obtain written approval by USFWS, and provide results to LIHI by December 31, 2015
4. Facility owner will complete the Operations and Flow Monitoring Plan as required by the MOA, obtain written approval of plan by USFWS, and provide results to LIHI by December 31, 2015

III. Facility Description

The Clement Hydroelectric Project is a 2.4 MW facility located on the Winnepesaukee River in the town of Tilton, Belknap County, in central New Hampshire. The project is located roughly four miles downstream of the 1 MW Lochmere Hydroelectric Project and two and one-half miles upstream of the 2 MW Stevens Mill Hydroelectric Project (currently in the LIHI Certification process.) The Winnepesaukee River is a 10.5 mile river that connects Lake Winnepesaukee, the largest lake in New Hampshire, with the Pemigewasset and Merrimack Rivers in Franklin, New Hampshire. The Winnepesaukee River traditionally supported industrial activity in the towns that line its banks from Lake Winnepesaukee to its confluence with the Merrimack River. The river is located in the Lakes Region of central New Hampshire. The total drainage area of the river is approximately 488 square miles.

Flows on the Winnepesaukee River are highly regulated by releases from the Lakeport Dam located on the outlet of Lake Winnepesaukee, which controls 45% of the watershed. Flows from the Lakeport Dam are directed by the State of New Hampshire to control water levels on the lake and balance recreational, environmental and commercial uses. After exiting the Lakeport Dam, the river enters Opechee Bay and travels through an industrial area in Laconia and ends at Winnisquam Lake, a five-mile long stretch and the fourth-largest lake in New Hampshire, entering the Lochmere Dam at the outlet. The river then passes through Silver Lake before entering through the center of the towns of Tilton and Northfield, where Clement Project is located. The river then descends through a narrow valley to Franklin where the river passes over the Stevens Mills Project (currently pending LIHI Certification) and finally the Franklin Falls Project (LIHI Certificate No. 83) and joins the Pemigewasset River roughly 2,000 feet below the Franklin Falls Dam in the center of Franklin, forming the Merrimack River.

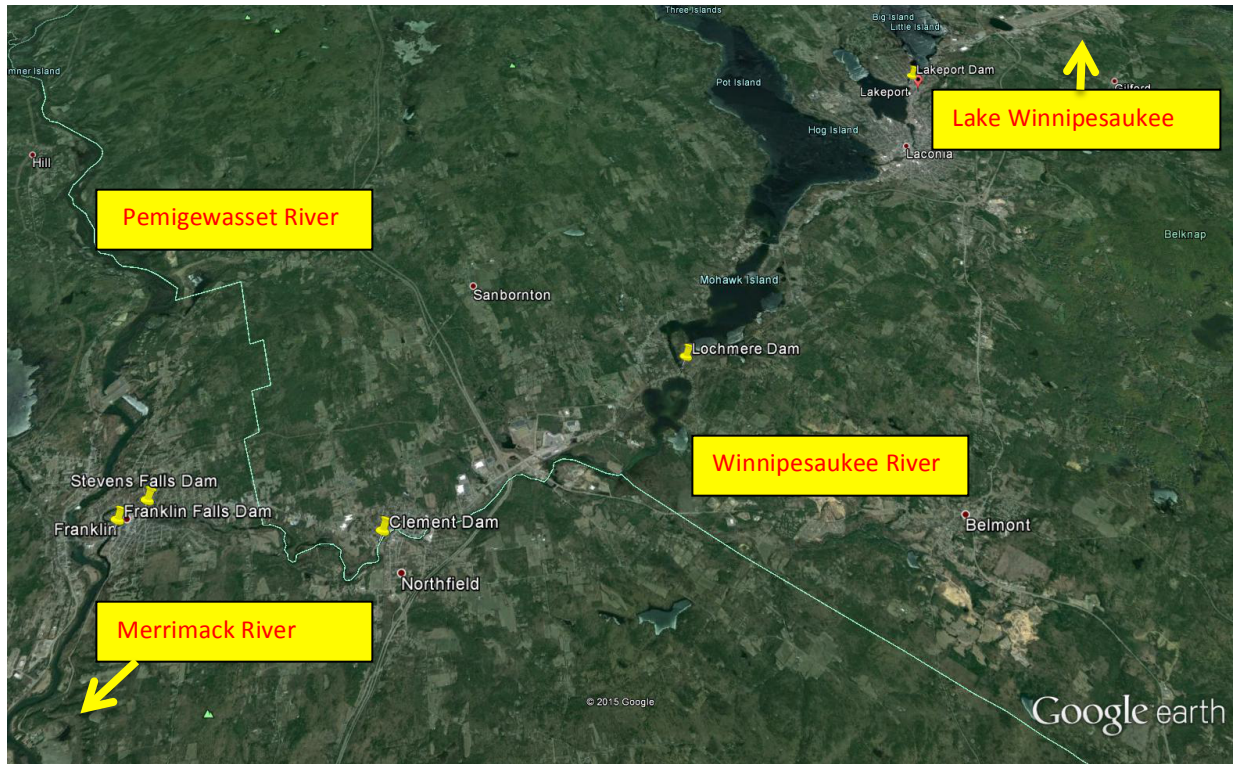


Figure 1 –Hydroelectric Facilities along the course of the Winnepesaukee River



Figure 2 - Aerial View of Clement Hydroelectric Facility Site Layout

The reservoir at Clement has a volume of 27,200 acre-feet and surface area of 31,400 acres. Approximately 1.35 acres are inundated by the facility at an elevation of 420 NGVD. Run-of-river operation is required at the facility, and the applicant has worked with resource agencies to monitor and ensure this mode of operation. Fluctuations in the reservoir are primarily attributable to the flow release schedule from the Winnepesaukee Lake upstream, which is controlled by the State of New Hampshire. The riverbanks immediately upstream of the project in the town of Tilton are industrialized, while the area downstream is more scenic as the river courses from Crescent to the Franklin and Steven Mills Projects. Tilton completed a Riverfront Park in 2006 that offers a boat launch and bathrooms for recreational users.

The total area occupied by non-reservoir facilities at Clement total 5.14 acres. Project works as originally constructed consist if (1) Concrete dam, approximately 120 feet long and 16.5 feet high, having a spillway section surmounted with 3-foot-high flashboards; (2) reservoir having minimal pondage and a normal water surface elevation of 442.4 feet (m.s.l.); (3) an intake structure near the right dam, abutment; (4) steel penstock 275 feet long and 12 feet in diameter, leading to (5) a powerhouse containing a horizontal Kaplan turbine-generator unit having a total rated capacity of 2,400 KW; (6) tailrace returning flow to the Winnepesaukee River approximately 600 feet downstream of the dam; (7) a transmission line, approximately 150 feet long; and (8) appurtenant facilities. Construction in 2015 will include the installation of exclusionary trashracks as required by the MOA between USFWS and ECREM.



Figure 3 – Clement reservoir facing downstream to dam



Figure 4 - Clement Impoundment



Figure 5 – Clement Powerhouse from tailrace



Figure 6 - Clement tailrace facing downstream beyond confluence with bypass reach

IV. Regulatory Status

FERC issues minor license (#2966) to James Katsekas and Zoes J. Dimos for construction and operation of Clement Hydroelectric Project on May 17, 1982. On March 18, 1983, FERC issues amendment changing the status of the project from minor license to major license under 5 MW. The purpose of the amendment was to increase the height of the dam by 11 feet, install new flashboards and appurtenant structures, to accommodate greater power generation capacity at the facility. There was no Water Quality Certificate issued for this facility available on record or according to the applicant. On August 22 1999, the project was purchased by the Algonquin Power Fund, and on June 20 2014, was purchased by the current owner, Eagle Creek Renewable Energy.

No violations of license requirements were discovered during this review process. The most recent regulatory status of the facility is included in the *Fish Passage and Project Operations Memorandum of Agreement* signed between ECREM and the USFWS. This binding agreement is in effect for a term of five years, after which both parties, by mutual agreement, can elect to extend the term for one or more subsequent five-year periods. The purpose of the agreement is to improve fish passage and prevent fish kills at several hydroelectric facilities ECRE recently acquired in New Hampshire, through environmental enhancement measures including providing continuous minimum flows to bypass reaches of the projects, preparing and filing for approval by the Service an Operations and Flow Monitoring Plan, and implementing physical construction of fish passage facilities as required. All activities are coordinated and approved by the Service.

ECREM has confirmed they are following the requirements of the MOA, and are currently preparing the Operations and Flow Monitoring Plan. In addition, they have confirmed that they have budgeted for the 2015 fish passage enhancement work. Appendix A contains the latest recommendations from USFWS in regards to fish passage improvements at the site, which include new designs for fish screening and surface bypass with the addition of modifications, including modifications to the eel bypass and trapping facility.

State resources agencies indicated their approval and concurrence with the plans set forth in the MOA. Glenn Normandeau, Executive Director of the New Hampshire Fish and Game Department noted:

“The Department appreciates the work that has been completed by the USFWS, ECREM and others to reach the actions outlined in the MOA, in order to advance the enhancement and protection of fish and habitat. In addition, the Department agrees that the Low Impact Hydropower Institutes (LIHI) should include a provision acknowledging the applicant’s concurrence with implementing minimum flows and fish passage measures for herring and/or American eel as prescribed in the MOA, and to undertake such consultations, design development and construction in a timely manner.”

Outside of the MOA, the applicant will be conducting additional water quality sampling in 2015 to allow the New Hampshire Department of Environmental Services to make determination if the facility is causing or contributing to violations of water quality standards. This effort was initially conducted in 2013 and no evidence of violations were recorded, although the NHDES indicated the data did not meet the required low flow specifications. NHDES has agreed to work with ECREM in 2015 to conduct additional water quality sampling and arrive at this determination.

V. Detailed Criteria Review and Discussion

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?*

YES – Go to B. The MOA contains the latest guidance relating to flows for the project. The USFWS requires ECREM to 1) provide continuous minimum flows to the bypass reaches of the Project as established in consultation with and approved by the Service in 2015, and 2) file an Operations and Flow Monitoring Plan within 6 months of MOA signing for monitoring run-of-river operation and bypassed reach flow releases from the Project. In addition, the MOA requires a plan for recording data for inspection by the Service and other resource agencies to verify proper operations and minimum flow releases. Although some of the dates have been passed, throughout this review process both the applicant and USFWS have reaffirmed strong commitment to following requirements of MOA, on an updated schedule. The applicant is currently preparing this Plan and has committed to keeping LIHI informed of its progress with USFWS towards meeting the requirements of the MOA. Therefore, in my

opinion this criterion is satisfied with the condition that the applicant continues to follow terms of MOA and copy LIHI on communications with the agencies.

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*

N/A – Go to B.1.b. WQC issued May 18, 1982.

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 - Go to B.2. On August 12, 2013, the New Hampshire Department of Environmental Services (NHDES) sent a letter to Essex Power Services (acting as an agent for ECREM,) with a list of required water quality data and information to determine if the hydroelectric project was causing or contributing to water quality standard violations. The letter included a detailed plan of what data is required and in what river flow conditions that data should be collected.

In 2013, Essex Power Services Inc., as an agent for ECREM, conducted water quality testing as prescribed by the NHDES, collecting data for dissolved oxygen, water temperature, total phosphorous, and chlorophyll-a. The dataloggers deployed under required flow conditions were initially stolen from the site. Applicant redeployed these dataloggers but due to increased releases from Lake Winnepesaukee flows never returned to the low-flow target of 3x7Q10. DES assessed the sampling results and noted that:

“...based on the current and agreed upon changes to the operation of the facility, current water quality standards, the water quality data collected in 2013 and information provided to DES by EHA, it appears the Winnepesaukee River immediately downstream of the Clement Hydroelectric Project is attaining water quality standards under the conditions during which the data was collected under flow conditions that exceeded the target of 3X 7Q10 low flow conditions.” (email from Ted Walsh dated 01/16/15, see Appendix A)

Given that the conditions in which the data was collected exceeded the NHDES low flow target, the applicant has made a commitment to NHDES to re-assess water quality conditions and provide results to both LIHI and NHDES. NHDES has confirmed they will work with applicant in 2015 to support this effort and make a final determination on the project. Therefore, in my opinion the applicant’s efforts have demonstrated compliance with water quality criteria conditional upon receiving final determination that facility does not cause or contribute to water quality impacts in 2015.

It should also be noted that the Winnepesaukee River Basin Program, established to clean up wastewater treatment practices in the Lakes Region in New Hampshire, has resulted in a dramatic improvement in

water quality in the area. According to the New Hampshire Department of Environmental Services, “there are no longer any known municipal discharges into the Winnepesaukee River over its entire length¹.”

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?*

NO – Pass. Winnepesaukee River is not listed on latest (2012) New Hampshire 303(d) list².

C.) Fish Passage and Protection

1. *Are anadromous and/or catadromous fish present in the Facility area or are they known to have been present historically?*

YES – go to C.2. River Herring (anadromous) and American Eel (catadromous) are both present and ECREM has taken actions and continues to undertake new efforts per the MOA to ensure successful passage.

2. *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 – go to C.6. The most recent Fish Passage requirements are contained in the MOA signed with USFWS and ECREM on August 14, 2014, and updated via email as included in Appendix A. These include both operational changes and physical modifications, including:

1. American Eel Provisions³: Exclusionary trashracks at headworks (ECRE will evaluate ¾-inch rack spacing), bypass sluice and plunge pool. To be completed in 2015.
2. River Herring Provisions: Exclusionary trashracks at dam headworks (ECRE will evaluate ¾-inch rack spacing), and angled floating diversion boom ~ 3 foot skirt, bypass sluice and plunge pool. To be completed in 2015.
3. Complete minimum flow review in 2015 (see Flows Criteria A.1)
4. Review upstream fish passage in 2020

The applicant has informed LIHI they have budgeted to fulfill these requirements in 2015. On April 1st, 2015, John Warner from USFWS (Appendix A) indicated approval of proposed designs for screening and surface bypass with some requested modifications. Modifications have been agreed to for eel bypass discharge pipe and plunge pool configuration. Revised drawings are currently being prepared and will be circulated for review.

¹ http://des.nh.gov/organization/divisions/water/wrbb/documents/wrbp_brochure.pdf

² <http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/index.htm>

³ Identified structural passage measures for eels may be replaced by operational shutdowns after analysis of information.

In all of these measures, the applicant will review plans with USFWS and obtain approval upon completion. They have agreed to keep LIHI apprised of the efforts and copy on correspondence with agencies. In the MOA and supporting correspondence with the agencies, ECREM is noted to have a strong track record of cooperating with agencies regarding fish passage and agencies have indicated they have appreciated this effort.

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

YES – go to C.7. The Mandatory Fish Passage Prescriptions prescribed in the MOA cover all fish passage concerns at the facility.

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

YES – Pass. The MOA specifies: “The downstream passage facilities shall consist of measures to protect downstream river herring from impingement and/or entrainment, as well as bypass facilities to assist fish in moving safely past the Projects.” Therefore, in my opinion the provisions of the MOA fulfill this requirement, and the applicant has committed and budgeted to meet this criterion in 2015.

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 average annual high water line for at least 50% of the shoreline, including all of the undeveloped shoreline?*

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 – go to D2

3. *Has the Facility owner/operator established through a settlement agreement with appropriate stakeholders, with 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 – go to D2

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?*

N/A – Pass, go to E. The shoreland immediately surrounding the facility is the historic downtown of Tilton and Northfied, the “gateway” to the Lakes Region of New Hampshire. An urban shopping district has developed upstream of the project, and the historic downtowns are located in the immediate area upstream of the project. Downstream the shoreland becomes more scenic and vegetated. No shoreland management plan is required. Article 19 of license requires Licensee to take “reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution.” No evidence of violations of this Article was discovered in FERC filings. The applicant is bound by MOA to operate the facility in run-of-river mode, reducing the risk of erosion on lands adjacent to the Winnepesaukee River. In addition, they have provided assurance that they will take reasonable measures to prevent erosion on project property and have no ground disturbing activities currently planned. In my opinion, the lack of a license-approved shoreland management plan renders this criterion a “N/A,” and therefore constitutes a “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?*

No – Pass, go to F. The MOA with USFWS states in Section 3.2: “As of July 1, 2014, the Service has determined that, based on the information available as of that date, except for occasional transient individuals, no federally listed or proposed endangered or threatened species under the Service jurisdiction are known to exist in the Project’s impact areas. In addition, no habitat in the Project’s impact areas is currently designated or proposed “critical habitat” in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).”

The applicant also requested review by the New Hampshire Natural Heritage Bureau on July 19, 2013. I resubmitted this request to obtain updated report on March 30, 2015 (see Appendix A.) The Bureau responded: “The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as threatened or endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near the project area.”

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?*

Yes – Pass, go to G. Article 27 of the FERC license requires consultation with the New Hampshire State Historic Preservation Officer (SHPO) prior to construction at the site, primarily for historical and architectural purposes.

On September 9, 2013, a Request for Project Review form was submitted to the New Hampshire Department of Historical Resources (DHR). DHR found the project with “No Potential to Cause Effects,” and noted “This is an unevaluated resource, if in the future plans involve alterations to the facility surveys will be required.” No alterations are currently planned, and no records of violations of this condition were discovered on the FERC e-library.

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, Go to G.3. Boating and fishing occur frequently in the project waters, and Clement maintains open access to all project lands other than the intake and tailrace. See Figure 2 showing upstream and downstream boat ramps and fishing access point. Fishing for trout and smallmouth bass occurs immediately in the upstream and downstream segments of the facility. The river is popular for whitewater kayakers, particularly the more challenging segment downstream of the facility, where the river drops 90 feet per mile. The 2.25 mile section immediately downstream of the Clement facility is classified as “Class I” or and isn’t quite as popular for whitewater kayakers⁴. However, 2.25 miles beyond Clement is the most popular section, with Class III and IV rapids. Each winter there is an “Icicle Paddle” put on by the Merrimack Valley Paddlers in this section of the river. Hiking, biking and jogging is available along the river via the Winnepesaukee River Trail, a five-mile pedestrian/biking trail that links Tilton, Northfield and Franklin and offers many views of the river as well as historic and cultural sites. However, the immediate Tilton area upstream of the Clement facility is more urbanized and industrial. Article 30 provides the applicant authority to ensure any development of the site maintains recreational value at the site, and the facility appears to be in compliance with this requirement. Boat launches and recreational access points are available upstream and downstream of the facility.

- 3. Does the Facility allow access to the reservoir and downstream reaches without fees or charges?*

YES – See G.1. PASS

H.) Facilities Recommended for Removal

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

NO-Pass, Facility is Low Impact

VI. Public Comments

There were no public comments received during the comment period. Consultations with agencies are noted under the respective section in Detailed Criteria Review (Section VI,) and in the Communications Log (Appendix A.)

⁴ <http://www.americanwhitewater.org/content/Article/view/articleid/10244/display/full/>

Appendix A
Supporting Communications Log (Reverse Chronological Order)

Date: 04/10/15

Contact Person: John Warner

Agency: U.S. Fish and Wildlife Service

Title: Assistant Supervisor, Conservation Planning Assistance and Endangered Species

I had a phone call with John Warner from USFWS to discuss Pembroke Project (not Clement), in addition to general comments about MOA process with ECREM. Warner indicated that although many of the dates initially agreed to in the MOA had been passed, he wanted to make sure the LIHI report reflected the ongoing responsibility of applicant to meet the objectives. In general the applicant is responsive and has been accommodating with working with USFWS to achieve the objectives, several of which have changed in scope and schedule since the MOA was signed. They are in agreement that any outstanding requirements must be met, and Warner indicated he has a high trust level with the applicant that the objectives will be met. He did indicate that it would be important for LIHI to have clear requirements to follow terms of MOA, in the unlikely event the project is transferred to a new owner who did not have the history that ECREM does with USFWS. I indicated that the report would have conditions to follow the MOA that must be met for certification, and the project owner would be held responsible for meeting through the annual compliance process with LIHI.

Date: 04/01/15

Contact Person: John Warner

Agency: U.S. Fish and Wildlife Service

Title: Assistant Supervisor, Conservation Planning Assistance and Endangered Species

From: Warner, John [mailto:john_warner@fws.gov]

Sent: Wednesday, April 01, 2015 11:11 AM

To: Bob Gates

Cc: [Excluded]

Subject: Moving Forward on Eagle Creek Fish Passage Projects

Bob - Based on our discussions yesterday regarding fish passage improvements at Eagle Creek's projects, we have agreed to the following:

-- **Mines Falls** -- [Excluded]

- **Lochmere** -- [Excluded]

- **Clement** -- The proposed designs of the screening and surface bypass as depicted in the conceptual drawings, with modifications outlined in our January 30, 2015 letter are acceptable. We discussed and agreed to modifications to the eel bypass discharge pipe and clarification of the plunge pool configuration. Dave Robinson will be preparing revised drawings to depict agreed to changes and circulate those for our review. We concur with the plan to move to construction drawings and installation in 2015.

- **Stevens Mill/Bow Street** -- [Excluded]

For all projects, we request that conceptual design drawings be provided to me and Bryan Sojkowski, and that Bryan also receive proposed construction drawings.

Let us know if there is anything else you need in order to proceed with these projects.

-- JW

John P. Warner
Assistant Supervisor, Conservation Planning Assistance and Endangered Species
New England Field Office, U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 0330-5087
phone: [603-223-2541](tel:603-223-2541), [Ext 15](tel:603-223-2541)
fax: [603-223-0104](tel:603-223-0104)

Date: March 30, 2015
Contact Person: N/A
Agency: New Hampshire Natural Heritage Bureau
Title: N/A



New Hampshire Natural Heritage Bureau

To: Peter Drown
2665 Prosperity Avenue
#320
Fairfax, VA 22031

Date: 3/30/2015

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 3/30/2015

NHB File ID: NHB15-1130

Applicant: not applicable

Location: Tax Map(s)/Lot(s): Tilton, Northfield
Tilton, Northfield

Project Description: Eagle Creek Renewables LLC is applying for Low Impact Hydropower Certification. This datacheck tool is used in the review process for determining impact on any sensitive species in project area.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

This report is valid through 3/29/2016.

Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
PO Box 1856
Concord NH 03302-1856

Date: January 16, 2015
Contact Person: Ted Walsh
Agency: New Hampshire Department of Environmental Services
Title: Surface Water Monitoring Coordinator

Steve Hickey

From: Walsh, Ted
Sent: Friday, January 16, 2015 12:44 PM
To: Steve Hickey
Subject: RE: Clement Dam 2015 WQ testing

Steve,
DES will work with the applicant in 2015 to reassess the water quality and provide guidance to ensure that the data will be useful in making a determination if the project is causing or contributing to water quality standard violations.

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

VRAP and NH Rivers Twitter Feed: https://twitter.com/#!/NHDES_Rivers

From: Steve Hickey [<mailto:sjh@essexhydro.com>]
Sent: Friday, January 16, 2015 12:14 PM
To: Walsh, Ted
Subject: Clement Dam 2015 WQ testing

Ted,

As you are aware, in 2013 Essex Power Services Inc., agent for Eagle Creek Renewable Energy LLC ("the applicant"), owner and operator of the Clement Dam hydroelectric project ("the project") located on the Winnepesaukee river in Tilton, NH conducted water quality testing as required by your sampling plan ("the plan") for the project dated August 12, 2013. The plan is attached for your reference. The water quality sampling was done to confirm the project does not cause or contribute to violations of New Hampshire State water quality standards. This is required in the applicant's application to the Low Impact Hydropower Institute for certification of the project as a low impact facility. Data loggers were originally deployed during flows at or below 3X7Q10 as required by the plan but unfortunately were stolen from the river. New data loggers were deployed but due to environmental conditions in 2013 beyond the applicant's control (i.e. high flows), the sampling did not occur at or below the 3X7Q10 flows required in the plan. Data was collected at higher flows and provided to you for your review. You reviewed the data submitted and confirmed by letter dated November 6, 2014 that the data provided met New Hampshire State Water Quality Standards but was collected under flow conditions in excess of those required.

Please confirm by responding to this email that you will work with the applicant in 2015 to re assess the water quality conditions above and below the Clement Dam hydroelectric project. The applicant will re conduct the sampling as required by your August 12, 2013 sampling plan, or an updated plan if so required and provide the results to you for your review.

Thank you and please feel free to contact me with any questions.

Steve

Stephen Hickey

Date: August 14, 2014
Contact Person: Glenn Normandeau
Agency: New Hampshire Department of Fish and Game
Title: Executive Director



Glenn Normandeau
Executive Director

New Hampshire Fish and Game Department

11 Hazen Drive, Concord, NH 03301-6500
Headquarters: (603) 271-3421
Web site: www.WildNH.com

TDD Access: Relay NH 1-800-735-2964
FAX (603) 271-1438
E-mail: info@wildlife.nh.gov

August 27, 2014

Mr. Stephen Hickey
Essex Power Services, Inc.
Agent for Eagle Creek Renewable Energy
55 Union Street, 4th Floor
Boston, MA 02108

RE: Eagle Creek Renewable Energy Projects – LIHI Certification

Dear Mr. Hickey:

NH Fish and Game concurs with the recommendations and proposed actions, as outlined in the Memorandum of Agreement (MOA) signed by the US Fish and Wildlife Service (USFWS) and Eagle Creek Renewable Management, LLC (ECREM) on August 14th, 2014, regarding several hydroelectric facilities located in New Hampshire. These facilities include Mine Falls (FERC#3442) on the Nashua River, Gregg Falls (FERC# 3180) on the Piscataquog River, Webster-Pembroke (FERC# 3185) on the Suncook River and the Lakeport (FERC#6440), Lochmere (FERC# 3128), Clement (FERC# 2966) and Steven Mills (FERC# 3760) facilities on the Winnepesaukee River.

The Department appreciates the work that has been completed by the USFWS, ECREM and others to reach the actions outlined in the MOA, in order to advance the enhancement and protection of fish and habitat. In addition, the Department agrees that the Low Impact Hydropower Institutes (LIHI) should include a provision acknowledging the applicants concurrence with implementing minimum flows and fish passage measures for herring and/or American eel as prescribed in the MOA, and to undertake such consultations, design development and construction in a timely manner.

If you have any further concerns or questions, please do not hesitate to contact Carol Henderson, Environmental Review Coordinator at carol.b.henderson@wildlife.nh.gov or by phone at 603-271-3511. Thank you.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn Normandeau".

Glenn Normandeau
Executive Director

cc: John Warner, USFWS
Ted Walsh, DES

Appendix B
Memorandum of Agreement between ECREM and USFWS

FISH PASSAGE and PROJECT OPERATIONS

MEMORANDUM OF AGREEMENT

Eagle Creek RE Management and the U.S. Fish and Wildlife Service

1.0 INTRODUCTION

This Memorandum of Agreement (Agreement) is entered between the United States Fish and Wildlife Service (Service) and Eagle Creek RE Management, LLC (ECREM). ECREM is a Delaware limited liability company and is wholly owned by Eagle Creek Renewable Energy, LLC (ECRE). Individually, the above may be referred to as a "Party," collectively "Parties."

1.1 Term of the Agreement

This Agreement will remain in full force and effect for a period of five years from the date of the Agreement. After that time the parties can, by mutual agreement, extend the term of the contract for one or more subsequent five-year periods. Either party may also terminate this Agreement at the end of each five-year term without liability to any other party or any further obligations hereunder.

1.2 Purpose

This Agreement establishes a plan and schedule for addressing fish passage and minimum flow issues at ECREM's hydroelectric projects in New Hampshire that will facilitate receiving certification as a low-impact hydroelectric project by the Low Impact Hydroelectric Institute (LIHI). Upon the execution of the Agreement, the Service will provide a supporting letter for the ECRE application to LIHI within three weeks of signing.

1.3 Agency Appropriations

Nothing in this Agreement shall be construed as obligating the Service to expend in any fiscal year any sum in excess of appropriations made by Congress to state or local legislatures or administratively allocated for the purpose of this Agreement for the fiscal year or to involve the Service in any contract or obligation for the future expenditure of money in excess of such appropriations or allocations.

1.4 Establishes No Precedents

The Parties have entered into the negotiations and discussions leading to this Agreement with the explicit understanding that all discussions relating thereto are privileged, shall not prejudice the position of any Party or entity that took part in such discussions, and are not to be otherwise used in any manner in connection with these or any other proceedings. The Parties understand and agree that this Agreement establishes no principles or precedents with regard to any issue which is not addressed herein or with regard to any Party's participation in future

relicensing proceedings unrelated to the agreements set forth herein and that none of the Parties to this Agreement will cite this as establishing any principles or precedents except with respect to the matters to which the Parties have herein agreed.

1.5 Binding Effect

This Agreement shall be binding on the Parties and on their successors and assigns.

1.6 Multiple Counterparts

This Agreement may be executed in two or more counterparts, each of which is deemed an original but all constitute one and the same instrument.

2.0 BACKGROUND

Various wholly owned subsidiary companies of ECRE have acquired the ownership interests in several of the hydroelectric generation projects located in the State of New Hampshire which were previously owned or leased by Algonquin Power Systems. These projects are Mine Falls Project (FERC No. 3442) on the Nashua River; Gregg Falls Project (FERC No. 3180) on the Piscataquog River; Webster-Pembroke Project (FERC No. 3185) on the Suncook River; and the Lakeport Project (FERC No. 6440), Lochmere Project (FERC No. 3128) and Stevens Mills Project (FERC No. 3760) (which includes both Stevens Mills and Riverbend facilities projects on the Winnepesaukee River [each a "Project" or "Facility" and collectively "Projects" or "Facilities"]). These purchases were consummated on June 29, 2013. ECRE is also in the process of evaluating the acquisition of the Clement Project (FERC No. 2966), also located on the Winnepesaukee River.

The Projects acquired by ECRE have either a License or an Exemption from Licensing issued by the Federal Energy Regulatory Commission (FERC). Those licenses and exemptions include various requirements for Project operations, including bypass flow releases, and for providing fish passage when needed. The Service has identified fish passage needs at many of the subject projects. In addition, in order to address low impact hydropower certification criteria established by LIHI, ECRE needs to consult with the Service on project operations and flow releases in addition to fish passage.

ECREM is the entity within the Eagle Creek group of companies that manages the operations on behalf of and as agent for various project companies owned by ECRE. Since the acquisition of these assets, ECREM has worked in cooperation with the Service and other agencies to improve fish passage and prevent fish kills at several of its hydro projects in New Hampshire and elsewhere.

ECREM leadership has had a long history of cooperation with the Service and other agencies regarding fish passage and is keenly aware of the benefits provided to the public from such enhancements. ECREM seeks to maintain a cooperative relationship with the Service, and therefore is entering into this Agreement in support of the program goals established by the Service and other resource agencies.

3.0 GENERAL AGREEMENTS OF THE PARTIES

3.1 Reopeners

The Parties agree that, except as provided herein, this Agreement is not intended to limit or restrict the ability of any Party to petition FERC pursuant to any reopener condition contained in any license, including any exercise by the Secretary of the Department of the Interior relating to her/his fishway prescription authority under §18 of the Federal Power Act. No such petition, including the exercise of §18 authority, may be filed without the filer's providing at least 60 days written notice of its intention to do so to all the other Parties and, promptly following the giving of notice, consulting with the other Parties regarding the need for and the purpose of the petition. In the event such a petition is filed, the filing Party shall include with its filing documentation of its consultation with the other Parties, a summary of their recommendations and of its response to those recommendations. The filing Party shall also serve a copy of its petition to all other Parties.

The Parties agree that nothing in this Agreement is intended to limit or restrict the ability of any Party to seek an amendment to this Agreement during the effective period of the license or as long as an exempted project is operated. Any Party proposing such an amendment to this Agreement shall provide all Parties with at least 60 days written notice of the proposed amendment using updated addresses as needed. If the amendment would require modification of the license or any other permit, the Licensee shall file all applications to amend any license or permits necessary to effectuate the agreed-upon changes, and the other Parties will support such efforts. An amendment to this Agreement shall be effective only upon the written consent of all Parties to this Agreement.

3.2 Compliance with the Endangered Species Act

As of July 1, 2014, the Service has determined that, based on the information available as of that date, except for occasional transient individuals, no Federally listed or proposed endangered or threatened species under the Service jurisdiction are known to exist in the Projects' impact areas. In addition, no habitat in the Projects' impact areas is currently designated or proposed "critical habitat" in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). Therefore, no further

Endangered Species Act coordination or consultation with the Service is required at this time. Should Project plans change, or if additional information on listed or proposed species or critical habitat becomes available, this determination may be reconsidered.

4.0 ENVIRONMENTAL ENHANCEMENT MEASURES

4.1 Bypass Flows

ECREM shall, for the protection and enhancement of fish and aquatic habitat, provide continuous minimum flows to the bypass reaches of each Project as established in consultation with and approved by the Service, in accordance with the schedule in Appendix A. Once the Service has approved these flow regimes and the LIHI has formally approved Eagle Creek's LIHI application for the subject Facilities, ECREM will implement the agreed upon continuous minimum bypass flows. The flow requirements may be modified in the future as appropriate to address the effective operation of upstream fish passage facilities.

4.2 Flow Monitoring

ECREM shall, within six (6) months from the effective date of the Agreement, prepare and file for approval by the Service, an Operations and Flow Monitoring Plan for monitoring run-of-river operation and bypassed reach flow releases from the Projects. The Plan also should incorporate a description of the refill protocol that will be followed and how run-of-river operation and bypass flow releases will be provided during periods when the head pond is drawn down for dam maintenance. The Plan shall include a description and design of the mechanisms and structures that will be used, including any periodic maintenance and/or calibration necessary to ensure the devices work properly. In addition, a plan for recording data on Project operations to verify proper operations and minimum flow releases, and for maintaining such data for inspection by the Service and other resource agencies, also shall be filed. The operations and flow monitoring plan shall be developed in consultation with, and require approval by the Service.

4.3 Fish Passage

ECREM agrees to implement the activities related to fish passage at the Projects as described in Appendix A of this Agreement. The implementation of these activities will be performed in accordance with the schedule set forth in Appendix A or as mutually agreed upon between ECREM and the Service.

The proposed enhancements will consist of structural changes to provide for upstream passage at the Mines Falls Project, and exclusion and safe and effective downstream passage of river herring and/or American eel or seasonal Project shutdowns of the Project turbines, combined

with a safe egress route, or potentially a combination of both measures at all Projects. For some of the Projects, the fish passage measures have been agreed to, whereas in others, the passage measures have yet to be proposed by ECREM or reviewed by the Service. For these, Appendix A establishes a process timeline to determine the appropriate passage measures.

For all proposed structural fish passage measures, ECREM shall provide the Service with functional design drawings of proposed facilities for its review and approval.

A. Upstream Passage at Mines Falls

ECREM will develop design plans and a construction schedule for the rehabilitation of and improvements to the Mines Falls fish lift system for Service approval and filing with FERC. Appendix A identifies the schedule for submittal of the plans and a proposed construction completion date. The target construction date is April 1, 2015. However, based on the timing of design plan development, time for review and Service approval, and the complexity and extent of necessary construction, that date may need to be adjusted based on mutual agreement between ECREM and the Service.

B. American Eel Silver Eel Passage

In general, the measures to protect adult silver eels during outmigration are either:

- (1) cessation of Project operation from dusk to dawn from August 15 through November 15, annually. Future refinement of the timing and other conditions (such as flow, weather conditions, etc.) that drive the downstream movement may be made by the Service, with concurrence by ECREM, as information on the behavior of migrants at the Projects is obtained. The nightly protocol at some Projects shall include closing or screening the headgates, as agreed upon with ECREM, to prevent eels from becoming trapped in the forebay. A downstream bypass sluice shall be opened to provide a minimum fish bypass flow (needed flows to be determined for each site); or
- (2) operation of a passage and protection system that meets the following criteria:
 - i. a full depth trashrack/screen system with $\frac{3}{4}$ -inch-clear spacing and a desired approach velocity equal to or less than 1.5 feet per

second,¹ in conjunction with a bypass sluice or lower level gate of sufficient size and passing a sufficient flow (to be determined during the designing of the facilities); and

- ii. the downstream passage and protection system shall be designed in consultation with, and require approval by the Service and filed with FERC. The system shall operate annually from August 15 through November 15. Future refinement of the timing and other conditions (such as flow, weather conditions, etc.) that drive the downstream movement may be made by the Service, with concurrence by ECREM, as information on the behavior of migrants at the Projects is obtained.

C. River Herring Downstream Passage

ECREM shall construct, operate and maintain downstream fish bypass passage facilities for adult and juvenile river herring in all years when river herring have been stocked upstream of the Projects. The downstream fish passage measures for downstream river herring passage may be the same as measures implemented for American eels.

The downstream passage facilities shall consist of measures to protect downstream river herring from impingement and/or entrainment, as well as bypass facilities to assist fish in moving safely past the Projects. Final design and construction of the protection system shall occur in consultation with, and require approval by the Service and shall be filed with FERC.

If the downstream bypass facility is deemed ineffective based on evaluations by the Service and ECREM, ECREM shall be required to submit a proposal for amended designs or other measures for approval by the Service within six (6) months of the effectiveness determination.

D. Interim Passage Measures

In the interim periods between execution of the Agreement and the implementation of measures specified in the Agreement and Appendix A, interim passage measures for river herring and American eel will be implemented at the Projects as specified in Appendix A. Interim measures will consist of nighttime shutdowns on the day of and for three consecutive days after a rain event or river flow increase resultant from Lake Management activities by New Hampshire Department of Environmental Services. Initial operational shutdown periods will be from dusk to dawn during the passage season, but the Service and ECREM will cooperatively

¹ Site configuration and Project works of individual Projects may preclude the attainment of this criteria. In that event, the Service will consider a variance to this criteria based on review of the overall Project passage plan.

work together to determine the extent of nighttime shutdowns, taking into account downstream migrant needs and Project operations.

4.4 Fish Passage Facilities Operations and Maintenance Plans

ECREM shall develop and implement a Fish Passage Facilities Operations and Maintenance Plan for each Project with fish passage provisions identified in Appendix A. The plans shall detail how and when the upstream and downstream fishways will be operated and describe routine maintenance activities that will occur both during and outside of the fish passage seasons. The Plan shall be developed in consultation with, and require approval by the Service. The approved Plan shall be in effect prior to the first passage facilities coming on-line, and shall be updated as needed as new passage facilities are placed into service and based on information obtained from operation of the facilities.

4.5 Fish Passage Monitoring and Modifications

ECREM agrees to cooperate with the Service on the evaluation of the effectiveness of the adopted fish passage measures, and agrees to implement reasonable modifications to the passage facilities and their operation in order to provide for safe, timely and effective passage of diadromous fish.

5.0 SUPPORT OF LIHI CERTIFICATION

The Service agrees to support ECREM in its efforts to secure certification from LIHI for the Facilities. In the event that LIHI approval is not achieved for a specific site or sites, ECREM will be relieved of the non-fish passage Agreement obligations as they pertain to the specific site or sites. If ECREM fails to implement the provision of continuous bypass flows and/or fish passage enhancements for a specific site or sites to the satisfaction of the Service, the Service will notify ECREM of such failure, and ECREM will have 60 days to resolve the matter to the satisfaction of the Agencies. If the Service then determines that ECREM has not resolved the matter in question, the Service may terminate this Agreement, upon 10 days' notice to ECREM for the site that has failed to meet the approval of the Agencies. Upon such termination, no Party shall have any further obligation to any other Party with respect to the site in question.

This MOA version used because of
text clarity – signed version
available

The parties hereby indicate their agreement to the terms above:

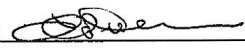
Eagle Creek RE Management, LLC

By: _____

Title: _____


Date: _____

United States Fish and Wildlife Service

By:  _____

Title: Assistant Field Supervisor

Date: 8/14/14

EAGLE CREEK RE, LLC				APPENDIX A	FINAL MOA	USFWS Signature: 	Date: 8/14/14	ECREM Signature:	Date:
FACILITY	IMPLEMENT DOWNSTREAM PASSAGE*	IMPLEMENT UPSTREAM PASSAGE	REVIEW IN 2020	COMPLETE MINIMUM FLOW REVIEW	TARGET SPECIES	PROPOSED ENHANCEMENTS**			
LAKEPORT	2014		REVIEW IN 2020	Adequate Flows Exist	AMERICAN EEL RIVER HERRING	3/4-inch rack overlays w/ eel collection box & discharge pipe to plunge pool. Consult w/ FWS on permanent racks. None Needed.			
LOCHMERE	2015		REVIEW IN 2020	2014	AMERICAN EEL RIVER HERRING	3/4-inch exclusionary trashracks at the canal headworks with open sluice gate at dam and plunge pool. 3/4-inch rack and bypass structure for eels. Additional angled floating diversion boom ~ 3 foot skirt. Secondary Intake trashrack and diversion box and pipe to tailrace. Existing facility to be modified.			
					BYPASS FLOWS	Perform study of habitat and river needs for bypass reach by December 1, 2014.			
CLEMENT	2015		REVIEW IN 2020	2015	AMERICAN EEL RIVER HERRING	Exclusionary trashracks at headworks (ECREM will evaluate 3/4-inch rack spacing), bypass sluice and plunge pool. Exclusionary trashracks at dam headworks (ECREM will evaluate 3/4-inch rack spacing), an angled floating diversion boom ~ 3 foot skirt, bypass sluice and plunge pool.			
RIVERBEND	2015		REVIEW IN 2020	2015	AMERICAN EEL	Evaluate required trashrack length for hydro operations. 3/4-inch exclusionary trashrack overlays or angled racks. Modify trashgate at dam, set flow requirement and provide plunge pool as needed.			
					RIVER HERRING	3/4-inch exclusionary or angled racks. Modify trashgate at dam & set flow requirement. Plunge Pool as needed.			
STEVENS MILLS	2015		REVIEW IN 2020	2014	AMERICAN EEL RIVER HERRING	3/4-inch exclusionary trashracks. 3/4-inch exclusionary trashracks. Angled surface diversion boom.			
						2014 - operate sluice gate at trashracks during outmigration in consult with FWS and NHFGD & review bypass gate, intake velocities & trashracks for permanent passage measure. Modifications to facilities as needed by September 1, 2015.			
PEMBROKE	See Detail		REVIEW IN 2020	2014	RIVER HERRING	Eel downstream passage measures within 48 months of notification by NHFGD and/or USFWS.			
					BYPASS FLOWS	Perform study of habitat and river needs for bypass reach by December 1, 2014.			
GREGG'S FALLS	See Detail		REVIEW IN 2020	2014	RIVER HERRING	Discontinue use of salmon smolt downstream fishway.			
					AMERICAN EEL	Eel Downstream Passage measures within 48 months of notification by NHFGD and/or USFWS.			
					BYPASS FLOWS	Continue Instantaneous Run of River Operations. Set allowable water level fluctuations. Minimum flows from dam not likely needed. Verify adequacy of flows below dam in 2014.			
MINES FALLS	2015		2015	2014	RIVER HERRING	Provide downstream diversion boom either at the canal headworks or at the intake. Provide a plunge pool for downrunning fish if released out of trash sluice. Move or eliminate downstream pipe.			
					AMERICAN EEL	Fish lift drawings to USFWS by 11-1-14. Construction target April 1, 2015, but no later than September 1, 2015.			
	2016				AMERICAN EEL	Downstream eel passage measures will be needed. Review eel downstream passage alternatives with Agencies in 2014.			

* Interim eel passage measures for Lakeport, Lochmere, River Bend and Stevens Mills will consist of nighttime shutdowns from dusk to dawn (or as agreed upon with the USFWS) for three consecutive days after rain event or after increased flows during the eel migration period (August 15 through November 15).

** Identified structural passage measures for eels may be replaced by operational shutdowns after analysis of information. All fish passage facilities and other measures to be designed in consultation with and be approved by the USFWS. Operational shutdowns will be evaluated based on the following criteria: Species, Time of Year, Economics, Weather Conditions.