REVIEW OF APPLICATION FOR CERTIFICATION OF GREENEVILLE AND TENTH STREET HYDROELECTRIC PROJECT

This report provides review findings and recommendations related to the application submitted to the Low Impact Hydropower Institute (LIHI) on March 1, 2013 by the City of Norwich, Connecticut, Department of Public Utilities (Applicant) for Low Impact Hydropower Certification of the Greeneville and Tenth Street Project (the Project).

I. PROJECT'S GEOGRAPHIC LOCATION

The Greeneville and Tenth Street Project is located on the Shetucket River in the city of Norwich, Connecticut about 1.3 miles upstream of the Thames River and 1.5 miles downstream of the Quinebaug River, a tributary. The dam is the most downstream dam on the Shetucket River. The reach below the dam is subject to tidal influence. At its mouth, the Shetucket River combines with the Yantic River to form the Thames River 15 miles upstream of Long Island Sound in New London, Connecticut. The Thames River basin is the third largest major river basin in Connecticut and includes portions of eastern Connecticut, south-central Massachusetts, and northwestern Rhode Island. The Shetucket River, with a basin area of about 1,270 square miles, drains an estimated 93% of the Thames River watershed.

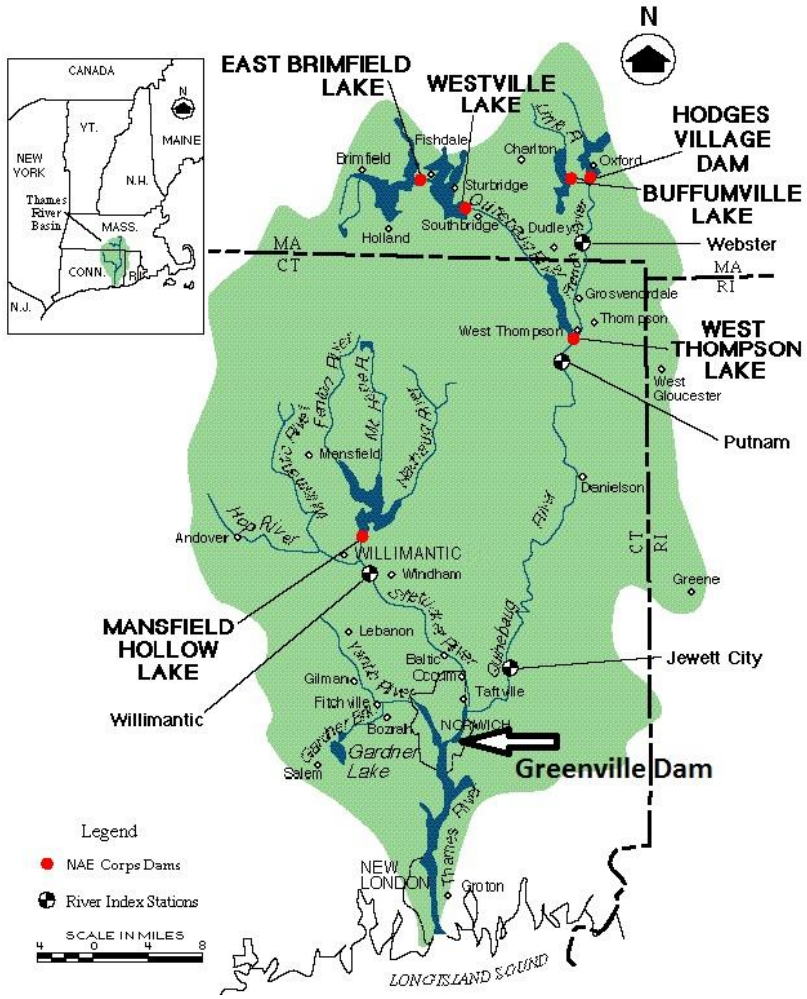

Figure 1. Thames River Basin map showing Project's location.

The Applicant is concurrently filing for LIHI certification of a second facility located at Occum Dam (FERC Project No. 11574), also located on the Shetucket mainstem and about five miles upstream of Greeneville Dam. Intermediate between the two projects is a third dam, Taftville Dam, an unlicensed hydroelectric facility owned and operated by FirstLight Power Resources, which also owns and operates another unlicensed facility, the Tunnel Hydroelectric Project at the mouth of the Quinebaug River as shown in Figure 2 below.

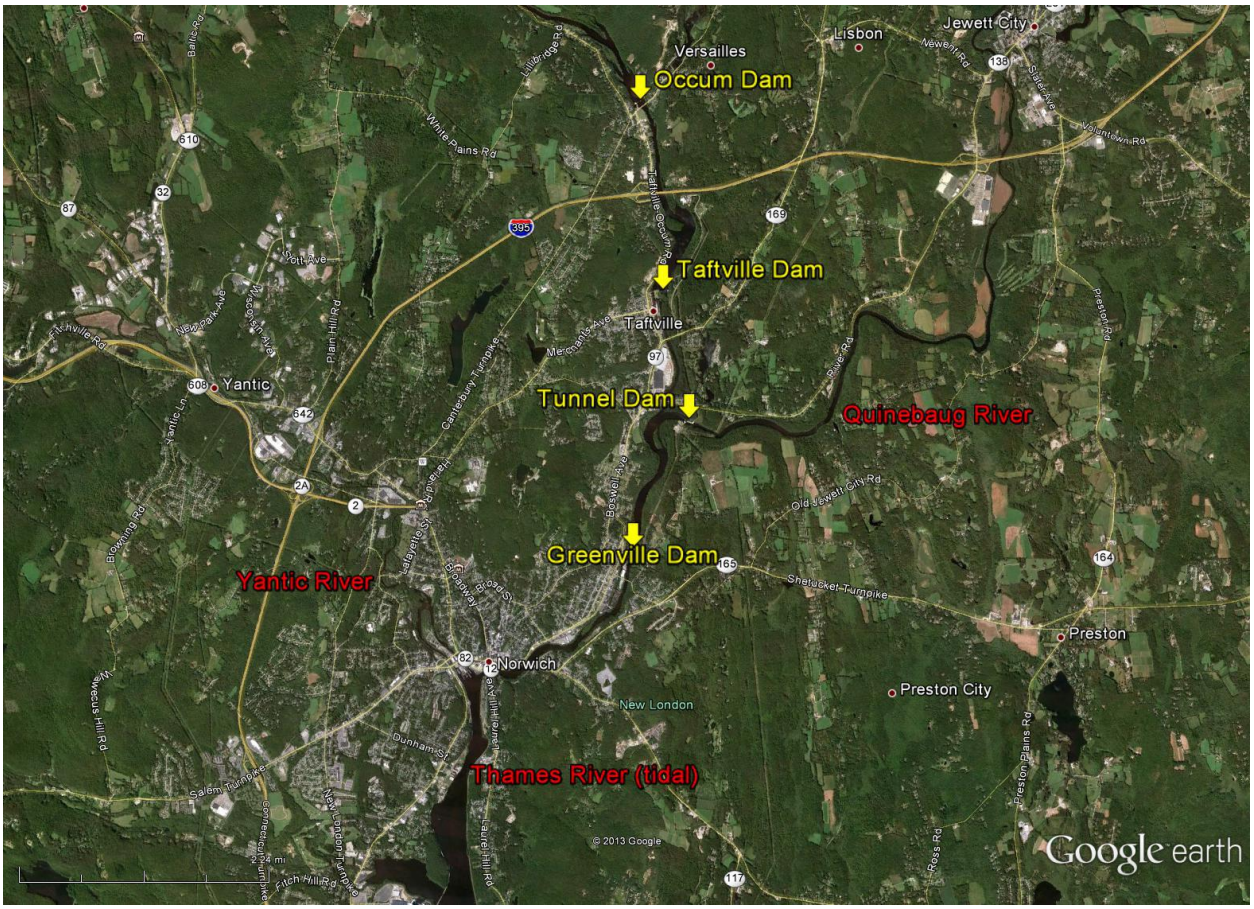

Figure 2. Greeneville Hydroelectric Project dam and nearby dams on Shetucket River.

II. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The Project utilizes a 15-foot-high, 400-foot-long timber crib dam that diverts water into a 3,200-foot-long, 70-foot-wide, and 13-foot-deep power canal with two power stations, the Tenth Street station located about a quarter of the way down the canal and the Greeneville, or Second Street, station at the lower end of the canal. The dam axis is runs approximately east-west, with the Project facilities on the west bank. The dam, with a crest elevation of 21.0 feet NGVD, carries 1.3-foot-high flashboards. The dam creates a riverine impoundment with a surface area of 80 acres and an estimated average depth of three feet; it extends upstream past the Quinebaug river confluence.

Figure 3. View of Greeneville Dam.

The canal gatehouse is separated from the dam by masonry-lined earth fill embankment. The gatehouse has six timber gates, each approximately 11 feet wide by nine feet high. The canal runs parallel to the river. The canal incorporates a side spillway directly downstream of the gatehouse. The side spillway has twelve concrete formed spillway sections, each approximately 7.7 feet wide; its crest is at an elevation of approximately 19 feet NGVD, with an additional two feet of stop logs in each section.

Figure 4. Power canal gatehouse.

Figure 5. Upper end of canal and Tenth Street Station.

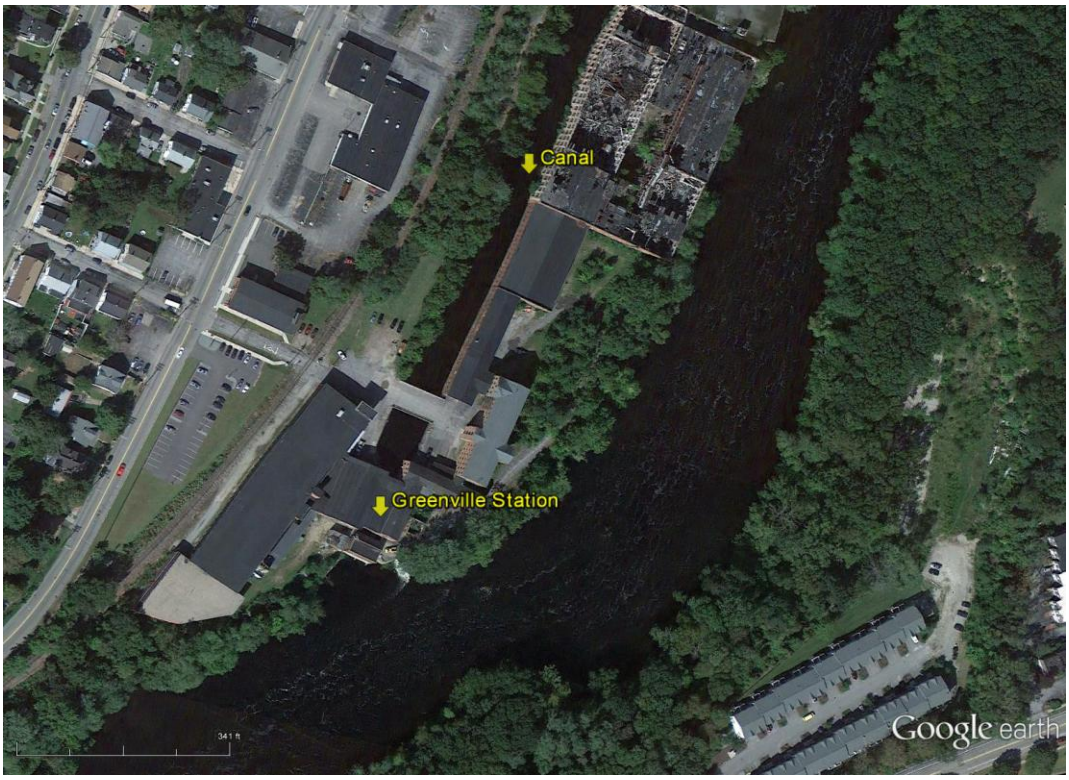

Figure 6. Greeneville (Second Street) Station at lower end of canal.

Figure 7. View down canal from gatehouse showing angled trashrack.

The Tenth Street station houses one 1,400 kW turbine/generator unit. The Greeneville station houses two vertical Francis turbines with a combined output of 800 kW at a normal head of 17 feet and a total hydraulic capacity of 700 cfs. The reported average annual production is 7.6 GWH.

Figure 8. Tenth Street Station (intake side).

Figure 9. Greeneville (Second Street) Station.

III. REGULATORY AND COMPLIANCE STATUS

On March 31, 1993, the Federal Energy Regulatory Commission (FERC) issued a license for FERC Project No. 2441, combining two projects that were previously under separate licenses as the Greeneville Dam Project No. 2441-009 and the Tenth Street Hydro Station Project No. 2508-002. Because the licensee proposed substantial new construction (upstream and downstream fish passage facilities) and changes in operation, FERC established a license term of 50 years (expiration date of January 1, 2044) rather than the standard 30-year term. There were no protests or objections to issuance of a license. American Rivers intervened in the licensing based on the environmental enhancement opportunities that existed. FERC staff completed an environmental assessment (EA) on November 20, 1992, recommending licensure; the EA is appended to the license order.

The license contains special articles addressing run-of-river operation and minimum flows, flow monitoring, fish passage, recreational enhancements and use monitoring, documentation of historic Greeneville Dam in anticipation alterations caused by fishway construction, and cultural resources protection.

The Connecticut Department of Environmental Protection (now the Connecticut Department of Energy and Environmental Protection (CTDEEP)), by letter dated December 16, 1992, conditionally certified the Project under Section 401 of the federal Clean Water Act. The seven conditions address flow management and fish passage, and the license articles are consistent with the certification requirements. The conditions were subsequently clarified in a letter of January 27, 1993 to the Applicant.

The U.S. Fish and Wildlife Service (USFWS) made a Federal Power Act Section 10(j) recommendation that the Tenth Street station operate on a first-on, last-off protocol during the upstream passage season. FERC staff disagreed with this constraint, proposing instead that the need for special operating measures beyond the proposed minimum bypass flow be assessed after license issuance and construction of the upstream fishway. USFWS by letter dated January 27, 1993 concurred with FERC staff's proposal to monitor passage effectiveness.

No significant compliance issues were revealed in my review of the last ten years of documents in FERC's eLibrary.

IV. PUBLIC COMMENTS RECEIVED BY LIHI

The LIHI application was publicly noticed on March 6, 2013. No comments were received during the notice period, which ended on May 6, 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 one recommended condition to address fish passage, specifically American eel passage. The recommended condition is set forth below. If this condition is 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 released into the bypassed reach. The Resource Agency Recommendations are post 1986. Consistent with the license, the Applicant maintains flow compliance records.

Regarding water quality, the Project is subject to a water quality certification issued by CTDEEP after 1986. Further, there is no 303(d) listing for a use impairment for which the Project is a source.

Regarding fish passage, the Project has passage facilities for both anadromous fish (American shad and river herring) and catadromous American eel. Unlike anadromous-fish passage, the eel facilities are not based on a license article or subsequent formal resource-agency prescription. Given that, I recommend a condition requiring the Applicant to continue to cooperate with the resource agencies with respect to assuring effective eel passage.

Regarding listed threatened and endangered species, none have been identified as present in the Facility area.

Regarding cultural resources, the Project is in an historic district and is subject to a Memorandum of Agreement and a Cultural Resources Management Plan for protection of historic resources. Consultation with the State Historic Preservation Office is required for

maintenance and repair activities.

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. The Applicant maintains recreational improvements consistent with the license-approved recreation plan and reviews the adequacy of facilities at six-year intervals. No dam removal has been recommended.

Issue 1. While the Project incorporates upstream and downstream passage for American eel, the measures were installed and are being operated by CTDEEP.
Recommended Condition No. 1. The City of Norwich shall continue to cooperate with CTDEEP and the USFWS on efforts to provide safe, timely, and effective American eel passage at Greeneville Dam. The City shall implement reasonable improvements to passage facilities or operating protocols when requested by the resource agencies. Should the City disagree with an agency request, it shall so notify LIHI within 30 days of the request and provide an explanation for the disagreement. The City shall take over operation of the upstream eel pass if requested to do so by CTDEEP. LIHI may suspend or revoke this certification should it determine that its passage criteria are not being met.

A. Flows

The Shetucket River drains an area of 1,252 square miles at the dam site. The Project operates in an instantaneous run-of-river mode while maintaining a conservation flow of 250 cfs through the bypassed reach starting at the base of the dam. The impoundment level is maintained within two inches of the crest of the flashboards. The minimum flow is normally released from three sources: 1) 100 cfs via notched flashboards; 2) 50 cfs via the downstream fishway sluice; and 3) 100 cfs via the upstream fishway, or from the attraction flow pipes during non-migratory periods. If the flashboards are down, three inches of water is spilled over the dam crest.

According to the Project EA, the minimum bypass flow was established to improve water quality, protect resident fish habitat, and provide zone of passage for anadromous fish. American shad, river herrings (alewife and blueback), and Atlantic salmon were targeted anadromous species for the purposes of the licensing decision. The basis for the 250 cfs minimum flow is not detailed in the EA; however, the EA indicates that it is based on a unit area runoff of 0.2 cfs per square mile of drainage area and that the approach uses the hydrological and geological characteristics of the watershed and has been found effective for water quality and fish protection in similar basins in Connecticut. Further a "minimum flow analysis" in the bypassed reach demonstrated that it would be sufficient for shad, herring, smallmouth bass, brown trout, striped bass, and white perch, as well as meeting zone-of-passage criteria throughout the bypassed reach.

Several license articles pertain to flow management. Article 402 requires instantaneous run-of-river operation, and Article 403 prescribes the 250 cfs, or inflow if less, minimum flow. Under Article 404, the licensee was required to develop for FERC approval a gaging plan to demonstrate compliance with articles 402 and 403 and to provide compliance records to agencies within 30 days of a request. FERC approved the plan by order dated September 19, 1995; the licensee is to report incidences of non-compliance to FERC within 30 days. Under the order, the licensee must check the release structures daily for any blockages and proper gate settings. The order also requires the filing of a report with gate ratings for the fishways for conditions with and without the flashboards in place. The Applicant provided a copy of a FERC environmental inspection report (July 29, 2005) from a May 11, 2005 site visit; the report indicates that no follow up after the inspection was necessary for the three flow management articles. The report states that the Applicant operates this project and the Occum project remotely at a control center that is manned full time, with hourly records manually kept of generation, flows, and headpond and tailwater levels.

LIHI Questionnaire: Flows	
A.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?**
	Reviewer Analysis/Conclusions: The post-1986 license incorporates Resource Agency Recommendations addressing bypass flows and instantaneous run-of-river operation. There are no incidences of non-compliance in the recent record. **YES = PASS**

B. Water Quality

As discussed in Section III above, CTDEEP certified the Project in 1992 as compliant with state water quality standards subject to seven conditions related to flow management and fish passage. I was unable to receive confirmation from CTDEEP that the Facility is in compliance with the water quality certification. Nonetheless, there is no recent record in FERC eLibrary of flow or fish passage violations, and the appended letter of March 8, 2013 from CTDEEP-Inland Fisheries Division does not indicate any compliance issues.

Connecticut's 2012 Integrated Water Quality Report (Final – December 17, 2012) indicates that Greeneville dam is the boundary between two river segments, Segment CT3800-00_01, which extends from the dam downstream to the river's mouth (1.56 miles) and Segment CT3800-00_02, which extends from the dam to a point six miles upstream. The upper segment has not been assessed for use support for Aquatic Life and for Recreation since at least 2006.[1] The lower segment is listed as impaired for recreational use and has not been assessed for Aquatic Life support. The 303(d) listing for the downstream segment relates to bacteriological contamination and is likely attributable to combined sewer overflows and not the Facility.

LIHI Questionnaire: Water Quality	
B.1	**Is the Facility either:** **a) In Compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the Facility after December 31, 1986? Or** **b) In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?**
	Reviewer Analysis/Conclusions: The Project water quality certification was issued after 1986, and the record does not contain incidences of non-compliance. **YES to (a) = Go to B.2**
B.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?**
	Reviewer Analysis/Conclusions: Recreational use in the reach below the Project is listed as impaired by bacteria. The impoundment has not been assessed. **YES = Go to B.3**
B.3	**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?**
	Reviewer Analysis/Conclusions: The Project would not be a contributing source for the impairment.

[1] Email from Eric Thomas, CTDEEP, April 30, 2013, appended.

C. Fish Passage and Protection

Restoration of diadromous fish to the Shetucket River Basin follows *The Plan to Restore Diadromous Fishes to the Shetucket River Watershed* (DEP, Inland Fisheries Division, December 2009). Historically, Atlantic salmon, alewife and blueback herring (collectively, "river herring"), American shad, sea lamprey, American eel, and sea-run trout accessed spawning and nursery habitat in the basin; however, access was eliminated due to the construction of dams in the mid- to late-1800s. Greeneville dam, at the time of licensing, did not have fish passage facilities. The new license includes USFWS Section 18 prescriptions for anadromous fish passage. The Applicant was required to install an upstream Denil fish ladder by April 1, 1996 and add a fish lift when certain target numbers of shad and herring are reached (Article 405); to install downstream passage facilities by April 1, 1996, including an angled trashrack with one inch bar clear spacing and a bypass sluice (Article 406); to evaluate upstream passage effectiveness based on a FERC-approved plan (Article 407); to evaluate downstream passage effectiveness for juvenile fish (Article 408); and to develop a fishways maintenance plan subject to FERC approval (Article 409). By order dated April 12, 1994, FERC removed the requirement to construct a Denil fish ladder based on a proposal to move ahead with construction of fish lift facilities instead; the lift is part of a trap-and-truck operation. The final designs for upstream and downstream passage were approved by order dated October 19, 1994. FERC also approved the effectiveness studies plans by order dated May 7, 1996, and, on September 8, 2000, issued an order approving the effectiveness study report and recommendations for continued passage operation; the order indicates that operation of the facilities started on schedule in 1996.

Figure 10. Interior of fish lift.

Figure 11. Entrance to downstream passage sluice, angled rack to right.

The effectiveness studies resulted in several modifications and refinement of the upstream passage operating schedule. For downstream passage, the entrance was illuminated after the first year of operation, and the sluice pipe flow was increased by 10 cfs (from 50 cfs to 60 cfs) during the passage period to improve passage of spent shad. To address problems with leaf litter at the fish lift, a trash boom was installed. CTDEEP and the USFWS commented that the 250 cfs may be marginal for shad movement through the bypassed reach to the fish lift; consequently, the 2000 order included a condition that provided for further enhancement measures should evidence suggest that the minimum flow is inadequate.[2]

Atlantic salmon is not targeted for restoration at this time.

Upstream passage facilities for American eel have also been installed at the dam as shown in Figure 13. The eelway is operated by CTDEEP. The Applicant has also voluntarily assisted in recent downstream eel passage testing throughout the river system under a study being conducted by the USFWS, the U.S. Geological Survey, and CTDEEP. Outmigration is provided by the downstream bypass sluice, which flows year round. Eel passage is continuing to be evaluated according to an email of April 24, 2013 from the applicant's engineering consultant, Al Nash (appended). Although there is no current interest on CTDEEP's part, the Applicant is willing to assume responsibility for operation of the eel pass should CTDEEP make such a

[2] The 2000 FERC order at p. 5 indicates that the agreed upon criterion for zone of passage was, "a significant portion of the channel width had depths of at least 30 centimeters (12 inches)."

request at some point in the future.

Stephen Gephard, who manages the Diadromous Fish Program for CTDEEP, commented on the LIHI application by letter dated March 8, 2013, copy appended. Mr. Gephard states that the fish lift has been extremely effective in passing shad, with thousands passed each year. Shad are also trucked upstream of Occum Dam due to ineffective passage facilities at Taftville Dam. CTDEEP meets regularly with the Applicant to review passage activities and insure compliance. The tone of the letter suggests that cooperation has been excellent.

Figure 12. Downstream migrant sluice pipe (36-inch diameter).

Figure 13. Eel ladder viewed from fish lift structure.

LIHI Questionnaire: Fish Passage and Protection	
C.1	**Is the Facility in Compliance with *Mandatory Fish Passage Prescriptions* for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?**
	Reviewer Analysis/Conclusions: The 1993 federal license prescribed upstream and downstream passage for anadromous fish; the facilities have been operated since 1996 and pass American shad and river herring. The resource agencies are not currently pursuing restoration of Atlantic salmon. Beyond the license requirements, the Applicant supported CTDEEP's initiative to install an upstream passage facility for American eel, a catadromous species. Effectiveness studies were completed, and the facilities and operations are acceptable to the agencies. **Yes with respect to anadromous fish = Go to C.5** **N/A with respect to catadromous fish = Go to C.2**
C.2	**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)?**
	Reviewer Analysis/Conclusions: American eel continue to move through the Facility area using the existing upstream passage eelway, which is operated by CTDEEP. Eel are passed downstream via the angled trashrack and bypass sluice. **No with respect to catadromous fish = Go to C.3**
C.3	**If, since December 31, 1986:** **a) 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) The Resource Agencies declined to issue a Mandatory Fish Passage Prescription,** **c) 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?**
	Reviewer Analysis/Conclusions: The agencies have not formally prescribed passage for American eel; however, facilities are in place, and the Applicant is fully cooperating. **N/A for catadromous fish = Go to C.4**
C.4	**If C3 was not applicable:** **a) 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) 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?
	Reviewer Analysis/Conclusions: The Applicant has not attempted to demonstrate effective eel passage, but has agreed to cooperate with continued operation of the upstream eel pass by CTDEEP and to pass eel downstream via the existing fish pipe used for anadromous passage. Further, the Applicant has agreed to take over operation of the eel pass if so requested by CTDEEP. **YES to (b) for catadromous fish (so long as Recommended Conditions #1 is attached to the certification) = Go to C.5**
C.5	**Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of *Riverine* fish?**
	Reviewer Analysis/Conclusions: There are no prescriptions for riverine fish. **N/A = Go to C.6**
C.6	**Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?**
	Reviewer Analysis/Conclusions: Downstream passage measures in place divert fish from the canal for passage through a sluice pipe. **YES = PASS**

D. Watershed Protection

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	
D.1	**Is there a buffer zone dedicated for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low-impact recreation) extending 200 feet from the high water mark in an average water year around 50 - 100% of the impoundment, and for all of the undeveloped shoreline?**
	Reviewer Analysis/Conclusions: There are no buffer zones at this project. **NO = Go to D.2**
D.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?**
	Reviewer Analysis/Conclusions: There is no watershed enhancement fund. The facility does not qualify for an extension of the LIHI certification term by three years. **NO = Go to D.3**
D.3	**Has the facility owner/operator established through a settlement agreement with appropriate stakeholders and that has state and federal resource agencies agreement an appropriate shoreland buffer or equivalent watershed land protection plan for conservation purposes (to protect fish and wildlife habitat, water quality, aesthetics and/or low impact recreation).**
	Reviewer Analysis/Conclusions: There is no settlement agreement. **NO = Go to D.4**
D.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?**
	Reviewer Analysis/Conclusions: There are neither recommendations nor a shorelands management plan related to the Facility. **N/A = PASS**

E. Threatened and Endangered Species Protection

There are no federally listed species known to be present in Norwich according to the USFWS website.[3] Connecticut has a fairly extensive list of threatened and endangered species and species of concern for New London County. The list includes shortnose sturgeon (endangered) and Atlantic sturgeon (threatened); however, they are not known to be present in the Shetucket watershed (email from Steve Gephard, CTDEEP, May 2, 2013, appended).

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. An eelway is in place at the dam and is operated by CTDEEP.

LIHI Questionnaire: Threatened and Endangered Species Protection	
E.1	**Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?**
	Reviewer Analysis/Conclusions: No federally or state listed threatened or endangered species have been identified as present in the Facility area. **NO = PASS**

[3] http://www.fws.gov/newengland/pdfs/CT%20species%20by%20town.pdf

F. Cultural Resource Protection

On February 11, 1993, a Memorandum of Agreement (MOA) was executed between FERC, the licensee, the Connecticut State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The MOA requires mitigative measures to protect the historical integrity of the Greeneville dam, a component of the Greeneville Industrial District which is eligible for inclusion in the National Register of Historic Places. Article 412 requires the licensee to implement the MOA, including documentation of the dam as related to fish passage alterations of the structure and development of a Cultural Resources Management Plan (CRMP). The CRMP addresses maintenance and repair activities to assure protection of historic resources over the long term. By order dated August 21, 1997, FERC approved the CRMP as well as the historic documentation of the dam, gatehouse and control gates, canal spillway deck bridge, and the canal.

Article 413 requires the licensee to consult with the State Historic Preservation Office and conduct a cultural resource survey prior to any ground disturbance at the project other than authorized in the license.

LIHI Questionnaire: Cultural Resource Protection	
F.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?**
	Reviewer Analysis/Conclusions: No conflicts were identified in the record. Future construction is subject to consultation with the SHPO under articles 412 and 413. **YES = PASS**

G. Recreation

As part of the licensing, the applicant proposed several recreational improvements, including at trail system for angler access, an access/portage for canoeists and car-top boaters, and a parking area. These facilities are consistent with recommendations made by the USFWS and CTDEEP and were required under Article 410. They have been developed on the east side of the river as shown in Figure 14. FERC also required under Article 411 that the adequacy of recreational facilities be continually evaluated over the term of the license. This is beyond the normal Form 80 filings; the licensee must provide annual use figures by activity, evaluate facilities adequacy; add or expand facilities as necessary, and consult with agencies (CTDEEP and Norwich Planning Department). Reports are to be filed at intervals not greater than six years. The Applicant completed its latest evaluation in 2008 and set its findings to the resource agencies; no responses were received. The Applicant filed a Form 80 with FERC on March 25, 2009, but neglected to include a report of its findings. I brought this to the Applicant's attention. Since its determination was that no recreational enhancements were needed and since none of the agencies challenged that determination, I would regard the failure to file the full report to be a simple administerial oversight of no consequence. The Applicant indicated that it would follow up with FERC to clarify the record.

Recreational access to the west side of the river below the dam is not provided due to safety concerns. Free access is provided to the impoundment and the section between the dam and Eighth Street. Below Eighth Street, the east riverbank is in private ownership.

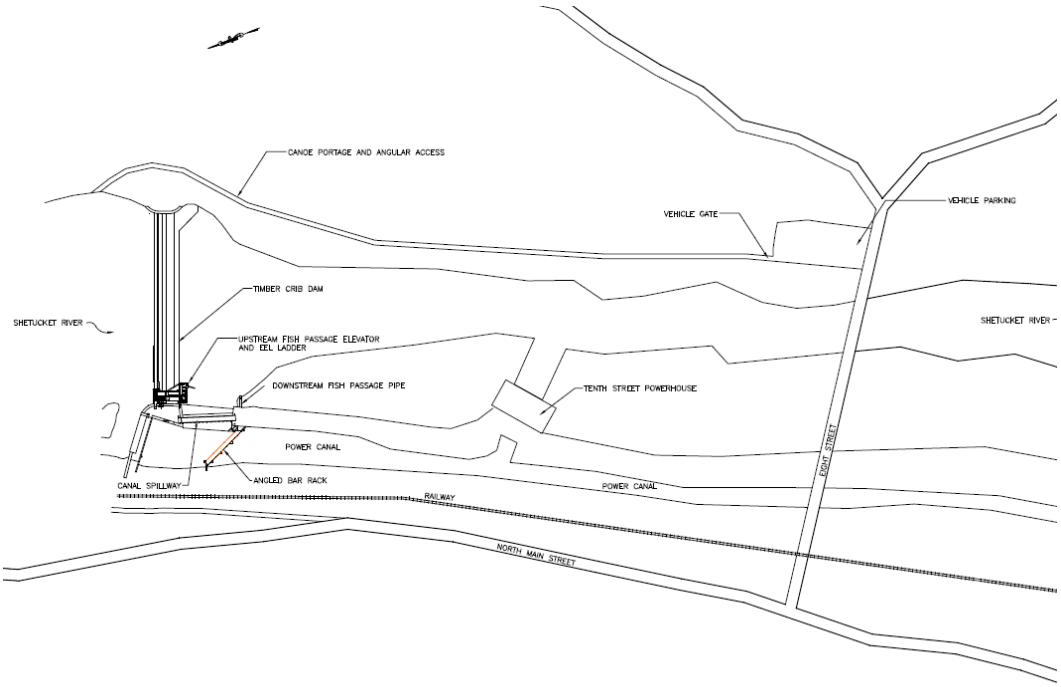

Figure 14. Layout showing recreational parking and access.

Figure 15. Trail and kiosk viewed from parking area.

Figure 16. Angler use off trail below dam.

LIHI Questionnaire: Recreation	
G.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?**
	Reviewer Analysis/Conclusions: The Article 410 recreational improvement were completed, and adequacy of the recreational plan is evaluated on a continuing basis under Article 411. **Yes = Go to G.3**
G.3	**Does the Facility allow access to the reservoir and downstream reaches without fees or charges?**
	Reviewer Analysis/Conclusions: 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. **YES = PASS**

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	
H.1	**Is there a Resource Agency Recommendation for removal of the dam associated with the Facility?**
	Reviewer Analysis/Conclusions: No. **NO = PASS**

APPENDIX

Contents

From: Thomas, Eric [mailto:Eric.Thomas@ct.gov]
Sent: Tuesday, April 30, 2013 3:06 PM
To: 'Jeffrey Cueto'
Cc: Hannon, Robert; Chase, Cheryl; Thomas, Eric
Subject: RE: LIHI application for Greenville Hydro

Hello Jeff,

I have reviewed our Department's statewide water quality assessment reports going back to the 2006 reporting cycle; documents as you know are posted online here. The Shetucket River segment that you are referring to (CT3800_00_02) has not been assessed for either Aquatic Life (Habitat for Fish and other aquatic life and wildlife) or for Recreation use support since at least 2006.

- The Department's current wadeable stream monitoring and assessment methodologies are not favorable for assessing the physical and hydrological features of this particular segment. It has not been practical to monitor the river segment's benthic macroinvertebrate community as our primary indicator of biological integrity.
- Recreational use assessment (covering both "primary" and "secondary" contact) is based on sanitary/safety considerations and aesthetic/practical usability. Sanitary condition is determined from indicator bacteria data provided by DEEP and other sources, along with sanitary surveys where appropriate. There are no designated bathing beach areas in this Shetucket River segment. Furthermore, water quality bacteria sampling is not generally taken when monitoring crews are not on the river collecting data for the aquatic life support use assessment. I don't recall seeing records for other factors recorded for that river segment, such as excessive, non-native aquatic plant species present that would be assessed for impacts to water-based recreational uses.

If I understand your second query, I do not have information on compliance with regulatory matters such as Connecticut's 401 water quality certification program (that would reside in our Department's Inland Water Resources Division). I have copied Cheryl Chase, director of that division, as well as Robert Hannon of our Commissioner's Office of Planning and Program Development, in case they can provide that information to you.

Thank you for forwarding the comments submitted by our Department's Inland Fisheries Division in support of the LIHI designation.

Eric

Eric Thomas
Watershed/NPS Management Program
Planning and Standards Division
Water Protection and Land Reuse Bureau
Connecticut Department of Energy and Environmental Protection
79 Elm Street, Hartford, CT 06106-5127
P: 860.424-3548 | F: 860.424-4055 | E: eric.thomas@ct.gov

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From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Sunday, April 21, 2013 9:46 AM
To: Thomas, Eric
Cc: Golembiewski, Brian
Subject: LIHI application for Greenville Hydro

Hi, Eric. We corresponded previously about Mechanicsville, and I am now working on Greenville Hydro and Occum Hydro. I had a couple questions about Greenville that you may be able to help me with:

1. I looked at the latest WQ assessment report (2012), and it did not appear to include the segment from Greenville dam upstream six miles (CT3800-00_02). I think the prior report had indicated that use support for Aquatic Life and Recreation had not been assessed. Is that still the case?
2. I looked at FERC eLibrary and did not see any reports of non-compliance with the license. Insofar as you know, is the licensee in compliance with your water quality certification?

I'm attaching a copy of a letter we received from Steve Gephard. It looks like the fish passage requirements are being met.
Thanks.
Jeff

><{{{˚> ***Jeffrey R. Cueto, P.E.***
><{{{˚> (802) 223-5175
><{{{˚> ompompanoo@aol.com

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CONNECTICUT DEPARTMENT OF
ENERGY & ENVIRONMENTAL PROTECTION

March 8, 2013

Low Impact Hydropower Institute
P.O. Box 194
Harrington Park, NJ 07640

RE: Greeneville and Occum Hydroelectric Projects- LIHI Certification

To the LIHI,

Both of the referenced projects are FERC-licensed projects on the Shetucket River in Connecticut, operated by the City of Norwich- Norwich Public Utilities (NPU). I supervise the Diadromous Fish Program for the CTDEEP and have been involved NPU projects for over 20 years. As Greeneville underwent relicensing and Occum underwent licensing, I have been involving in those processes, recommending license conditions, reviewing and approving fish passage facility plans and construction, and engaged with NPU as it carried out both required evaluation studies and all fish passage activities. I am very familiar with these projects and am writing a letter to support LIHI certification. The paragraphs below will explain my position.

The license for the Greeneville project required effective upstream fish passage, effective downstream fish passage, an evaluation study, the provision of minimum flows down the bypass reach, and other procedural requirements relative to our agency. All have been achieved on an ongoing basis. The fishlift at Greeneville has proven quite effective and has passed thousands of American shad (principal target species) annually. NPU has allowed our staff to maintain fish counting capability in the counting house so that we may monitor the run. NPU has also allowed us to install and operate an upstream eel pass, which was not required by its mid-1990s license. Our staff meets regularly with NPU to review fish passage activities and ensure compliance with all required activities.

The license for the Occum project also required effective upstream fish passage including an eel pass, effective downstream fish passage, an evaluation study, the provision of minimum flows down the bypass reach, and other procedural requirements relative to our agency. A Denil fishway has been built and operated for seven years. The evaluation study has been hampered by the fact that there is one other dam between Greeneville and Occum that is owned by another party, non-jurisdictional in respect to FERC, and its fishway has not been effective in passing American shad. Therefore, few shad have passed up the Occum fishway (although in 2012, Occum passed all of the seven shad passed at the next downstream fishway). NPU's evaluation study has documented the passage of many non-diadromous species, suggesting that the fishway works well. The study of the downstream fish passage facility show that it passes many young-of-the-year shad. The study has also highlighted trends in fish passage and suggested what could be done to improve fish passage. One obstacle to effective fish passage at Occum

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is the peaking operational mode of the Scotland Dam, the next project upstream. This results in substantial spill and false attraction at the Occum spillway. After accepting the NPU reports, our agency has supported the suspension of further evaluation studies at Occum until which time Scotland is re-licensed and becomes run-of-river. Our staff meets regularly with NPU to review fish passage activities and ensure compliance with all required activities and NPU submits an annual report to FERC which we review and sign off on for accuracy.

NPU has voluntarily begun trucking live shad from its Greeneville Dam Fishlift to spawning habitat upstream of its Occum Dam to compensate for the fact that few shad are passing through its Occum Dam fishway. This is a significant contribution and will accelerate the pace of restoration of shad to the river. We hope that this will be an interim measure as the owner of the second dam/fishway improves passage and more shad reach and pass Occum. NPU has also voluntarily cooperated with the U.S. Fish & Wildlife Service, the U.S. Geological Survey (Conte Anadromous Fish Research Center), and our agency on a cooperative research project that released 60 tagged silver-phase American eels above Occum and studied their migratory path and behavior as the moved downstream past the three hydroelectric dams. It is hoped that the results of this ongoing study will give clues to how best design downstream eel passage facilities at these and other hydroelectric projects.

In summary, I feel that NPU is operating these two projects in a manner that qualifies them for certification by the LIHI and I endorse such certification.

Sincerely,

Stephen Gephard
Supervising Fisheries Biologist
Inland Fisheries Division
steve.gephard@ct.gov

From: Al Nash [mailto:al.nash@renewablepowerconsulting.com]
Sent: Friday, April 26, 2013 8:11 AM
To: 'Jeffrey Cueto'
Cc: 'Mark Greene'
Subject: RE: Greenville

Outmigrating eels currently pass through the downstream fish passage located at the end of the canal's angled bar rack. The passage is open year round for minimum flow releases.

Alfred Nash, P.E.
Renewable Power Consulting, PA
43 Spaulding Road
P.O. Box 195
Palmyra, ME 04965
(207) 992-3926
email: AL.Nash@renewablepowerconsulting.com

From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Friday, April 26, 2013 7:27 AM
To: 'Al Nash'
Cc: 'Mark Greene'
Subject: RE: Greenville

Thanks, Al.
Regarding eels, please clarify how eels pass downstream at the dam during outmigration. I understand that passage is under study, but LIHI normally expects that there is some form of interim passage in place pending completion of permanent passage measures.
Thanks.
Jeff

From: Al Nash [mailto:al.nash@renewablepowerconsulting.com]
Sent: Wednesday, April 24, 2013 9:28 AM
To: 'Jeffrey Cueto'
Cc: 'Mark Greene'
Subject: RE: Greenville

Good morning Jeff. Below are the responses to your questions and attached is the amendment to the application we intend to submit.

1. We'll submit an amendment to the application to include the correct information. Attached is the correct Attachment A for your immediate use.
2. Correct - this section was not assessed for the 2012 report.
3. Various parties were to send letters and I'll make a round of reminder calls. I know Melissa Grader is out straight on the CT river re-licensing and had indicated she may trouble finding time. She has indicated her support verbally but our request was made at a time in which she was mainly focused on the CT river. I'll be meeting with her this Friday so if I cannot reach her earlier I'll find out her status Friday.

4. We noted in the application that NPU has been assisting the USFWS and CTDEEP on monitoring eel movement through the basin. The USFWS is using this study to help establish criteria for all sites (*e.g.* how deep before you need a low outlet passage , rack spacing effectiveness, etc..). Part of the study will determine the effectiveness of NPU's current protection system. In general this is a work in progress as NPU voluntarily works with the resource agencies with results not known until after an additional year of study.
5. The latest report (2009) is attached for you use and will be submitted as an amendment to the application. NPU has not received any comments on the submitted information and has not received any communications indicating a concern or deficiency with the current facilities. Below is the contact information for the CT DEP. This information will be added to the contact list and submitted as an amendment to the application.

Chuck Lee
CT DEP Lakes Program
79 Elm Street
Hartford, CT 06106
860-424-3716
charles.lee@po.state.ct.us

Please let us know if you need any additional information or clarification.

Alfred Nash, P.E.
Renewable Power Consulting, PA
43 Spaulding Road
P.O. Box 195
Palmyra, ME 04965
(207) 992-3926
email: AL.Nash@renewablepowerconsulting.com

From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Sunday, April 21, 2013 9:27 AM
To: 'Al Nash'
Cc: 'Mark Greene'
Subject: Greenville

Hi, Al. I am reviewing the Greenville application and have a few questions/requests:

1. The FERC order approving the flow management plan included in your Attachment A is actually the one for Occum. You did include the correct one in the original application, but it would be good if you could at least resend Attachment A with the correct order for LIHI's records. Ideally you might also send the corrected full application file as well (but it it's a big effort, don't bother).
2. Under Water Quality, you state, "The 2012 Integrated Water Quality Report (excerpt below) indicated that the river segment containing the project (CT3800-00_01) has not been re-assessed for use support for Aquatic Life and for Recreation." Technically, as I said on the Intake Review, Recreation was assessed for the segment below the dam, and the use is impaired. The report doesn't mention the segment from the dam going upstream (CT3800-00_2); I assume it wasn't assessed, which was the case in the prior report.

3. Did you get any other resource agency letters? You sent Steve Gephart's letter, but I don't have USFWS, CTDEEP water quality, CTDEEP T&E, CTDEEP recreation, and historic preservation. I'll contact them directly, but letters would help expedite things.
4. Are any special measures taken to pass outmigrating eels downstream?
5. Article 411 of the license requires recreational monitoring above and beyond the normal Form 80 requirements. Use and assessment reports are to be files at intervals of six years or less after resource agency consultation. Please provide the last report. The license mentions the CTDEP Bureau of Parks and Forests. Please provide the contact information for that agency.

Thanks.
Jeff

><{{{˚> ***Jeffrey R. Cueto, P.E.***
><{{{˚> (802) 223-5175
><{{{˚> ompompanoo@aol.com

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From: Gephard, Steve [mailto:Steve.Gephard@ct.gov]
Sent: Thursday, May 02, 2013 1:25 PM
To: 'Jeffrey Cueto'
Cc: Melissa_Grader@fws.gov
Subject: RE: Greenville and Occum - sturgeon

Hi Jeff,
We have no evidence of sturgeon in this watershed. We have previously looked for them downstream of Greeneville and never found them and gave up. The Occum reach is landlocked and if there were fish there, some angler would have stumbled across them. I can say with confidence there are no sturgeon there and no native sturgeon below Greeneville. That's not to say that some Hudson River fish might not wander into the estuary some day but there no evidence of a natal population.

Steve

Stephen Gephard
Supervisor
Diadromous Fish Program *and* Habitat and Conservation Enhancement Program
Inland Fisheries Division
Dept. Energy and Environmental Protection
P.O. Box 719, Old Lyme, CT 06371
860-447-4316

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Thursday, May 02, 2013 9:44 AM
To: Gephard, Steve
Cc: Melissa_Grader@fws.gov
Subject: Greenville and Occum - sturgeon

Hi, Steve. I thought I sent you an email previously, but I couldn't find any trace of it. So maybe not. The state T&E list includes shortnose sturgeon (endangered) and Atlantic sturgeon (threatened). Do you know whether they are present at either dam reach and, if so, whether the projects have any significant adverse impact on these fish?
Thanks.
Jeff

><{{{˚> ***Jeffrey R. Cueto, P.E.***
><{{{˚> (802) 223-5175
><{{{˚> ompompanoo@aol.com

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From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Thursday, May 02, 2013 9:20 AM
To: 'markgreene@npumail.com'
Cc: 'Al Nash'
Subject: FW: Greenville

Mark -- I don't view this as an issue with respect to LIHI certification. It appears to be an administrative oversight. But you may want to do a late filing with FERC so that it is in the FERC record.
Jeff

-----Original Message-----
From: Al Nash [mailto:al.nash@renewablepowerconsulting.com]
Sent: Thursday, May 02, 2013 9:10 AM
To: 'Jeffrey Cueto'
Cc: markgreene@npumail.com
Subject: RE: Greenville

Jeff - it appears that the separate report was either not placed on elibrary or may not have been filed with the Commission. The former watch manager has retired and NPU has been unable to confirm whether the report was also filed with the Commission. In the recent supplement we supplied a copy of the report that was sent to the CTDEEP and City Planning (at least fulfilling the intent of the Article). We also noted that comments on the report were not received by either entity. NPU did generate the report which concluded there were no issues or deficiencies associated with the recreational facility. The FORM 80 information also supports this conclusion. NPU has made the current watch manager aware of the need to file this separate report along with the FORM 80 and to ensure they have the appropriate documentation for future filings.

Alfred Nash, P.E.
Renewable Power Consulting, PA
43 Spaulding Road
P.O. Box 195
Palmyra, ME 04965
(207) 992-3926
email: AL.Nash@renewablepowerconsulting.com

-----Original Message-----
From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Thursday, May 2, 2013 6:23 AM

To: 'Al Nash'
Cc: markgreene@npumail.com
Subject: RE: Greenville

I looked at eLibrary. Doesn't look like the recreation report was filed in 2009, just Form 80.

-----Original Message-----
From: Al Nash [mailto:al.nash@renewablepowerconsulting.com]
Sent: Sunday, April 28, 2013 9:59 PM
To: ompompanoo@aol.com
Cc: markgreene@npumail.com
Subject: RE: Greenville

The consultation letters to Brian and the City serve as the report indicated in Art 411. I included a copy of the last report in the information I had sent. When I grabbed the FORM 80 off elibrary (this was done awhile ago) I did not check to see if the report was on their also. I'll see if it is in the morning - assuming elibrary is working.

Alfred Nash, P.E.
Renewable Power Consulting, PA
43 Spaulding Road
P.O. Box 195
Palmyra, ME 04965
(207) 992-3926
email: AL.Nash@renewablepowerconsulting.com

-----Original Message-----
From: ompompanoo@aol.com [mailto:ompompanoo@aol.com]
Sent: Sunday, April 28, 2013 6:38 PM
To: al.nash@renewablepowerconsulting.com
Cc: markgreene@npumail.com
Subject: RE: Greenville

Thanks, Al. I didn't expect a response on a Sunday. Guess you had better luck with eLibrary.
As I read the article in the license, there is supposed to be a formal report and not just a Form 80. I thought the contents of the consultation letters covered the bases and was maybe going to be turned into a short report to go with the Form 80. That didn't happen?
Jeff

-----Original Message-----
From: Al Nash <al.nash@renewablepowerconsulting.com>

To: 'Jeffrey Cueto' <ompompanoo@aol.com>
Cc: 'Mark Greene' <MarkGreene@npumail.com>
Sent: Sun, Apr 28, 2013 5:55 pm
Subject: RE: Greenville

Attached is the form off the elibrary (I had grabbed this earlier but
sent the cleaner version). Alfred Nash, P.E.
Renewable Power Consulting, PA
43 Spaulding Road
P.O. Box 195
Palmyra, ME 04965
(207) 992-3926
email: AL.Nash@renewablepowerconsulting.com
From: Jeffrey Cueto [mailto:ompompanoo@aol.com]
Sent: Sunday, April 28, 2013 10:56 AM
To: 'Al Nash'
Cc: 'Mark Greene'
Subject: RE: Greenville

Al – In March 2009, the Form 80 was filed with FERC. eLibrary wasn't working today, so I couldn't look at the filing. You had provided the Form 80 and the consultation letters from February 2009. I'm just wondering what actually ended up being filed with FERC. Not a problem, but I would just prefer to have a copy if it's not too much trouble.Thanks.Jeff

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CONTACTS

Entity	Authorized Representatives	Contact Information
Norwich Public Utilities (applicant)	Chris LaRose	16 South Golden St Norwich, Connecticut 06360Telephone: (860) 823-7300 Email: Chrislarose@npumail.com
United States Fish and Wildlife Service	Melissa Grader Fish & Wildlife Biologist	US FWS/New England Field Office c/o CT River Coordinator's Office 103 East Plumtree Road Sunderland, MA 01375 Telephone: (413) 548-8002, x124 Email: melissa_grader@fws.gov
National Marine Fisheries Service	Marjorie Mooney	Northeast Fisheries Science Center 166 Water Street Woods Hole, MA 02543-1026 Telephone: (508) 495-2000 Email: Marjorie.Mooney-Seus@noaa.gov
CT Department of Energy & Environmental Protection Office of Planning and Program Development	Robert Hannon (water quality certification)	79 Elm Street Hartford, CT 06106 Telephone: (860) 424-3245 Email: robert.hannon@ct.gov
CT Department of Energy & Environmental Protection Bureau of Water Management	Eric Thomas Watershed Manager	79 Elm Street Hartford, CT 06106 Telephone: (860) 424-3548 Email: eric.thomas@ct.gov
CT Department of Energy & Environmental Protection Bureau of Water Protection and Land Reuse	Brian Golembiewski	79 Elm Street Hartford, CT 06106-5127 Telephone: (860) 424-3867 Email: Brian.Golembiewski@ct.gov
CT Department of Environmental Protection Inland Fisheries Division	Brian D. Murphy Senior Fisheries Habitat Biologist	Habitat Conservation and Enhancement Program 209 Hebron Road Marlborough, CT 06447 Phone:860-295-9523 Fax: 860-344-2941 Email: brian.murphy@ct.gov
CT Department of Energy & Environmental Protection Inland Fisheries Division	Steve Gephard	333 Ferry Road P.O. Box 719 Old Lyme, CT 06371 (860) 447-4316 Email: Steve.Gephard@ct.gov

CT Department of Environmental Protection Wildlife Division		79 Elm Street Hartford, CT 06106 Telephone: (860) 424-3548 Email: dep.wildlife@ct.gov
State Historical Preservation Office	Daniel Forrest Archaeologist/Environmental Review Coordinator	CT State Historic Preservation Office One Constitution Plaza, 2nd Floor Hartford, CT 06103 (860) 256-2761
National Park Service Rivers and Special Studies Branch	Kevin Mendik	Telephone: (617) 223-5299 Email: kevin_mendik@nps.gov