

# **GREENVILLE HYDROELECTRIC PROJECT**

*Norwich, CT*

## **RECERTIFICATION APPLICATION TO THE LOW IMPACT HYDROPOWER INSTITUTE**

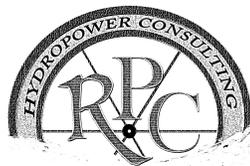
**FERC NO. 2441 and LIHI CERTIFICATE 106**

February 2018

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**GREENVILLE HYDROELECTRIC PROJECT**  
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## 1.0 *INTRODUCTION*

The Greenville Hydroelectric Project (Project) is located in New London County, Norwich, CT on the Shetucket River and is owned and operated by Norwich Public Utilities (NPU). The Project was certified by the Lower Impact Hydropower Institute (LIHI) as a low impact hydropower facility in March 2013. LHI Certificate No. 000106 became effective on March 6, 2013 and expires on March 6, 2018. NPU is submitting this re-certification application to the LIHI as the Project continues to be a low impact hydropower facility.

There have been no material changes in the facility design, operations or regulatory requirements since the original certificate was issued. The Project remains in compliance with all FERC License order and Water Quality Certificate conditions and terms. Appendix D provides a letter from NPU confirming compliance with the WQC conditions since issuance of the original certificate. The information and conclusions contained in the original reviewer's report (2013 report) of May 16, 2013

<https://lowimpacthydro.org/assets/files/Greenville%20Files/GreenvilleCertificationFinalReport23May2013.pdf>) remain valid. NPU has also continued to cooperate and complied with all agency requests to support effective fish passage and protection for both anadromous and catadromous fish species.

## 2.0 *FACILITY DESCRIPTION*

### 2.1 General Description

The Greenville Hydroelectric Project (Project) is located on the Shetucket River, a tributary to the Thames River, and includes the 2<sup>nd</sup> St and the 10<sup>th</sup> St developments. The Project consist of the 16-inch flashboard equipped 399-foot-long timber crib Greenville Dam, a 70-foot-wide by 3,200-foot-long canal, a canal gatehouse containing six 10.25-foot-wide timber control gates, an upstream fish elevator system, an angled canal bar rack with associated downstream fish bypass, upstream eel passage ladder, recreational facilities, the single unit 10<sup>th</sup> Street development approximately 750 feet downstream of the dam and the twin unit 2<sup>nd</sup> Street development located at the end of the canal.

### 2.2 Project Data

The key features and data for the Project is provided in the following Table B-1.

**Table B-1. Facility Description Information for Greenville Hydroelectric Project (LIHI #106)**

| <b>Information Type</b>     | <b>Variable Description</b>  | <b>Response (and reference to further details)</b>           |
|-----------------------------|--|--|
| <b>Name of the Facility</b> | Facility name (use FERC project name if possible)  | Greenville Dam Project (FERC No. 2441)                       |
| <b>Location</b>             | River name (USGS proper name)  | Shetucket River  |
|                             | River basin name   | Thames   |
|                             | Nearest town, county, and state  | Norwich, New London County, CT                               |
|                             | River mile of dam above next major river   | 2.0  |
|                             | Geographic latitude  | 41.5383  |
|                             | Geographic longitude   | -72.0517   |
| <b>Facility Owner</b>       | Application contact names (IMPORTANT: you must also complete the Facilities Contact Form): | Chris LaRose (860) 823-7300                                  |
|                             | - Facility owner (individual and company names)  | Norwich Public Utilities                                     |
|                             | - Operating affiliate (if different from owner)  | N/A  |
|                             | - Representative in LIHI certification   | Alfred Nash (207) 992-3926<br>Renewable Power Consulting, PA |
| <b>Regulatory Status</b>    | FERC Project Number (e.g., P-xxxxx), issuance and expiration dates                         | P-2441<br>Issued: March 31, 1993<br>Expires: March 1, 2043   |

|                                    |  |   |
|------------------------------------|--|---|
|                                    | FERC license type or special classification (e.g., "qualified conduit")  | Major   |
|                                    | Water Quality Certificate identifier and issuance date, plus source agency name  | WQC 2441<br>Issued: December 16, 1992 by the State of Connecticut Department of Environmental Protection<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19921228-0440">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19921228-0440</a>   |
|                                    | Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.) | License Order:<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19930406-0228">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19930406-0228</a><br><br>Order Modifying License to install single phase fish passage system<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19940418-0193">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19940418-0193</a><br><br>Order Approving Fish Passage Plans<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19960513-0118">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19960513-0118</a><br><br>Order Approving Report and Recommendations for Continued Fish Passage Operation<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000912-0114">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000912-0114</a><br><br>Environmental Compliance Report<br><a href="https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20050804-0201">https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20050804-0201</a><br><br>(NOTE: FERC has confirmed that the 2005 report is the most recent report and that there are no compliance inspections scheduled in the near future) |
| <b>Power Plant Characteristics</b> | Date of initial operation (past or future for operational applications)  | 2 <sup>nd</sup> St development began operation in 1926<br>10 <sup>th</sup> St development began operation in 1966   |
|                                    | Total name-plate capacity (MW)   | 2.2   |
|                                    | Average annual generation (MWh)  | 4,825 (average from 1993 to 2017)   |
|                                    | Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit                              | 10 <sup>th</sup> St development: contains a single 1,400 KW horizontal Kaplan unit with a 1,200 cfs maximum hydraulic capacity and a 340 cfs minimum hydraulic capacity.<br>2 <sup>nd</sup> St development: contains twin 400 Kw vertical Francis turbines with each unit having a maximum hydraulic capacity of 350 cfs and a minimum hydraulic capacity to of 100 cfs   |

|  |   |  |
|--|---|--|
|  | Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)                       | Run-of-River   |
|  | Dates and types of major equipment upgrades   | 2 <sup>nd</sup> St Development Runner Replacement in 1999. The new runner matched the hydraulic capacity of the original runners.  |
|  | Dates, purpose, and type of any recent operational changes  | No significant operational changes have occurred since license order issuance and the completion of fish passage facilities in 1996.   |
|  | Plans, authorization, and regulatory activities for any facility upgrades                         | No facility upgrades have been or are proposed since initial license order issuance.   |
| <b>Characteristics of Dam, Diversion, or Conduit</b> | Date of construction  | The First dam was built approximately 1,200 ft upstream of the current dam in 1829. The first dam was abandoned upon completion of the current dam in 1882. The 1882 dam consisted of granite rubble and concrete. The middle portion of the dam was damaged and replaced in 1886 with a timber crib style dam. The upper section of the dam was rebuilt in 1915. Ongoing rebuilding of dam sections has been implemented since 2013 and is ongoing. The repairs are in-kind and in accordance with Condition 2 of the CRMP do not require notification. |
|  | Dam height  | 24 ft structure height.  |
|  | Spillway elevation and hydraulic capacity   | Crest elevation 21.0'  |
|  | Tailwater elevation   | 6.1 ft   |
|  | Length and type of all penstocks and water conveyance structures between reservoir and powerhouse | 70 ft wide by 3,200 ft long stone lined canal  |
|  | Dates and types of major, generation-related infrastructure improvements                          | 1882 dam relocation downstream of the original dam with shortened and wider canal installed.<br>1926 installation of generation equipment at the 2 <sup>nd</sup> St development.<br>1966 installation of 10 <sup>th</sup> St development generation equipment.<br>1995 canal rack and downstream fish passage system installed.<br>1996 upstream fish elevation system installed.<br>2013 to present: Ongoing in-kind repair of the timber crib dam. Condition 2 of the  |

|   |  |   |
|---|--|---|
|   |  | CRMP indicates that in-kind repairs do not require notification to the SHPO. Depending upon the repair location, repairs may occasionally require short duration (less than 2 weeks) pond lowering (between 8 to 12 inches) to permit access to the area. Pond lowering events are recorded for agency review. Repairs generally do not require ground disturbance of the impoundment sediment. |
|   | Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)                                  | Power Generation  |
|   | Water source   | Shetucket River   |
|   | Water discharge location or facility   | Water discharge occurs into the Shetucket River at both the 2 <sup>nd</sup> St and 10 <sup>th</sup> St developments.  |
| <b>Characteristics of Reservoir and Watershed</b> | Gross volume and surface area at full pool   | Gross storage capacity at normal pond level is 240-acre feet with a surface impoundment area of about 80 acres.   |
|   | Maximum water surface elevation (ft. MSL)  | 22.3 ft   |
|   | Maximum and minimum volume and water surface elevations for designated power pool, if available                            | The Project is operated in a run-of-river mode utilizing 16-inch high flashboards for a normal pond elevation of 22.3 ft. Flashboard failure results in a pond level of 21.0 ft until the boards are replaced (except during excess river flows). The 16-inch change in water level is equivalent to approximately 104 acre-feet of storage change.   |
|   | Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile  | The next dam upstream of the Greenville dam is the Taftville dam at river mile 4.3 which is non-FERC jurisdictional and owned by FirstLight Hydro Generating Company.   |
|   | Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile  | The Greenville dam is the first dam on the river.   |
|   | Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation | None  |
|   | Area inside FERC project boundary, where appropriate   | 85.3 acres (including 80-acre impoundment)  |

|                                   |  |  |
|-----------------------------------|--|--|
| <b>Hydrologic Setting</b>         | Average annual flow at the dam   | 2,216 cfs  |
|                                   | Average monthly flows  | <p>January 2,118 cfs</p> <p>February 2,429 cfs</p> <p>March 3,716 cfs</p> <p>April 3,659 cfs</p> <p>May 2,270 cfs</p> <p>June 1,114 cfs</p> <p>July 571 cfs</p> <p>August 450 cfs</p> <p>September 500 cfs</p> <p>October 786 cfs</p> <p>November 1,507 cfs</p> <p>December 2,128 cfs</p>  |
|                                   | Location and name of relevant stream gauging stations above and below the facility | <p>There are three USGS stream gages above the Project. These gages are:</p> <p>Gage No. 01123000 Little River near Hanover, CT with a 30-square mile drainage area.</p> <p>Gage No. 01127000 Quinebaug River at Jewett City, CT with a 713-square mile drainage</p> <p>Gage No. 011230695 Shetucket River at Taftville, CT with a 512-square mile drainage</p> <p>There are no gages downstream of the project.</p> |
|                                   | Watershed area at the dam  | The site has a 1,264-square mile drainage area   |
| <b>Designated Zones of Effect</b> | Number of zones of effect  | 4  |
|                                   | Upstream and downstream locations by river miles                                   | <p>ZOE 1: Impoundment RM 2.0</p> <p>ZOE 2: Bypass Reach RM 1.3 to RM 2.0</p> <p>ZOE 3: Power Canal RM 1.3 to RM 2.0</p> <p>ZOE 4: Downstream of Project RM 1.3</p>   |
|                                   | Type of waterbody (river, impoundment, by-passed reach, etc.)                      | <p>ZOE 1: 80-acre Impoundment</p> <p>ZOE 2: 3,400 ft Bypass Reach</p> <p>ZOE 3: 3,200 ft Power Canal</p> <p>ZOE 4: River Downstream of Project</p>   |
|                                   | Delimiting structures  | <p>ZOE 1: Greenville Dam</p> <p>ZOE 2: Greenville Dam to Second St Tailrace</p> <p>ZOE 3: Greenville to Second St Intake</p>   |

|  |   |   |
|--|---|---|
|  |   | ZOE 4: Second St Tailrace   |
|  | Designated uses by state water quality agency   | Class B: suitable for recreational uses, fish and wildlife habitat, agricultural and industrial supply and other uses including navigation. |
| <b><i>Additional Contact Information</i></b> | Names, addresses, phone numbers, and e-mail for local state and federal resource agencies | Refer to Appendix B   |
|  | Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders       | Refer to Appendix B   |
| <b><i>Photographs and Maps</i></b>           | Photographs of key features of the facility and each of the designated zones of effect    | Refer to Appendix A   |
|  | Maps, aerial photos, and/or plan view diagrams of facility area and river basin           | Refer to Appendix A   |

### 3.0 STANDARDS MATRICES

#### 3.1 Zone of Effect: Zone 1-Impoundment

| Criterion |  | Alternative Standards |   |   |   |      |
|-----------|--|-----------------------|---|---|---|------|
|           |  | 1                     | 2 | 3 | 4 | Plus |
| A         | Ecological Flow Regimes                      |                       | X |   |   |      |
| B         | Water Quality                                |                       | X |   |   |      |
| C         | Upstream Fish Passage                        | X                     |   |   |   |      |
| D         | Downstream Fish Passage                      |                       | X |   |   |      |
| E         | Watershed and Shoreline Protection           | X                     |   |   |   |      |
| F         | Threatened and Endangered Species Protection | X                     |   |   |   |      |
| G         | Cultural and Historic Resources Protection   |                       | X |   |   |      |
| H         | Recreational Resources                       |                       | X |   |   |      |

#### 3.2 Zone of Effect: Zone 2-Bypass Reach

| Criterion |  | Alternative Standards |   |   |   |      |
|-----------|--|-----------------------|---|---|---|------|
|           |  | 1                     | 2 | 3 | 4 | Plus |
| A         | Ecological Flow Regimes                      |                       | X |   |   |      |
| B         | Water Quality                                |                       | X |   |   |      |
| C         | Upstream Fish Passage                        |                       | X |   |   |      |
| D         | Downstream Fish Passage                      |                       | X |   |   |      |
| E         | Watershed and Shoreline Protection           | X                     |   |   |   |      |
| F         | Threatened and Endangered Species Protection | X                     |   |   |   |      |
| G         | Cultural and Historic Resources Protection   |                       | X |   |   |      |
| H         | Recreational Resources                       |                       | X |   |   |      |

#### 3.3 Zone of Effect: Zone 3-Power Canal

| Criterion |  | Alternative Standards |   |   |   |      |
|-----------|--|-----------------------|---|---|---|------|
|           |  | 1                     | 2 | 3 | 4 | Plus |
| A         | Ecological Flow Regimes                      |                       | X |   |   |      |
| B         | Water Quality                                |                       | X |   |   |      |
| C         | Upstream Fish Passage                        |                       | X |   |   |      |
| D         | Downstream Fish Passage                      |                       | X |   |   |      |
| E         | Watershed and Shoreline Protection           | X                     |   |   |   |      |
| F         | Threatened and Endangered Species Protection | X                     |   |   |   |      |
| G         | Cultural and Historic Resources Protection   |                       | X |   |   |      |
| H         | Recreational Resources                       |                       | X |   |   |      |

3.4 Zone of Effect: Zone 4-Tailwater

| Criterion |   | <i>Alternative Standards</i> |          |          |          |             |
|-----------|---|------------------------------|----------|----------|----------|-------------|
|           |   | <i>1</i>                     | <i>2</i> | <i>3</i> | <i>4</i> | <i>Plus</i> |
| <b>A</b>  | <b>Ecological Flow Regimes</b>                      |                              | X        |          |          |             |
| <b>B</b>  | <b>Water Quality</b>                                |                              | X        |          |          |             |
| <b>C</b>  | <b>Upstream Fish Passage</b>                        |                              | X        |          |          |             |
| <b>D</b>  | <b>Downstream Fish Passage</b>                      | X                            |          |          |          |             |
| <b>E</b>  | <b>Watershed and Shoreline Protection</b>           | X                            |          |          |          |             |
| <b>F</b>  | <b>Threatened and Endangered Species Protection</b> | X                            |          |          |          |             |
| <b>G</b>  | <b>Cultural and Historic Resources Protection</b>   |                              | X        |          |          |             |
| <b>H</b>  | <b>Recreational Resources</b>                       |                              | X        |          |          |             |

## 4.0 ***SUPPORTING DOCUMENTATION FOR STANDARDS***

### 4.1 Ecological Flow Standards

#### **All ZOE's      Criteria A-2 (Agency Recommendation)**

The Project is operated in a run-of-river mode and provides a bypass flow release through various systems installed as part of the fish passage requirements. Condition 4 of the WQC required that the Project be operated in a manner to promote fish passage movement through the Project area. Article 403 and Condition 5 of the WQC required the release of 250 cfs or inflow, whichever is less, into the bypass reach for the enhancement of water quality, protection of resident fish habitat and to provide passage for anadromous fish species in the bypass reach. Article 402 and Condition 6 requires that the Project be operated in a run-of-river mode to protect aquatic resources in the Shetucket River. Article 404 required the development of a stream gage plan to confirm compliance with these requirements. The gage plan was developed in consultation with resource agencies and approved by the FERC (Order Approving Stream gage plan: [https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19950922-0199](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19950922-0199))

The minimum flow requirements for the bypass reach were developed during the license application process. The site-specific flow analysis addressed the resource agencies' main objectives of maintaining aquatic habitat for specific fish species and life stages, maintenance of water quality standards and providing a zone of passage through the bypass reach for migrating fish. NPU collected field data throughout the bypass reach including habitat type surveys, velocity at various flow rates, and channel profiles. Consultation with the resource agencies based upon the study results established the bypass flow requirements. The requirement results in a site-specific watershed runoff value of 0.2 cfs/m or drainage area. The FERC conducted an Environmental Assessment (EA) during the licensing process (copy attached to the license order at [https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19930406-0228](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19930406-0228)) and concluded (pg 20 of the EA) that Project operations have no impacts to wetlands, vegetation or wildlife resources. Appendix D provides a signed confirmation that NPU has remained in compliance with the WQC conditions.

## 4.2 Water Quality Standards

### **All ZOE's      Criteria B-2 (Agency Recommendation)**

The Project is operated in a run-of-river mode and provides a bypass flow release through various systems installed as part of the fish passage requirements. Condition 4 of the WQC required that the Project be operated in a manner to promote fish passage movement through the Project area. Article 403 and Condition 5 of the WQC required the release of 250 cfs or inflow, whichever is less, into the bypass reach for the enhancement of water quality, protection of resident fish habitat and to provide passage for anadromous fish species in the bypass reach. Article 402 and Condition 6 requires that the Project be operated in a run-of-river mode to protect aquatic resources in the Shetucket River. Article 404 required the development of a stream gage plan to confirm compliance with these requirements. The gage plan was developed in consultation with resource agencies and approved by the FERC (Order Approving Stream gage plan: [https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19950922-0199](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19950922-0199))

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Table 1 of the 2012 Shetucket River Watershed Summary (2012 report, [www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/shetucketriver3800.pdf](http://www.ct.gov/deep/lib/deep/water/tmdl/statewidebacteria/shetucketriver3800.pdf)) indicates that the Greenville dam is the boundary between river Segment CT3800-00\_01 and Segment CT3800-00\_02. The 2012 report and the 2016 State of Connecticut Integrated Water Quality

Report (2016 report,

[www.ct.gov/deep/lib/deep/water/water\\_quality\\_management/305b/2016\\_iwqr\\_final.pdf](http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf))

indicates that the upper sections have not been assessed for use support for Aquatic Life and for Recreation. The lower section is listed as impaired for recreational use (Table 2-3, page 64 and Table 3-4, page 216 of the 2016 report) and has not been assessed for Aquatic Life support. The impaired listing for recreation relates to bacteriological contamination and is likely attributable to storm water, illicit discharges or combined sewer overflows and not the project.

#### 4.3 Upstream Fish Passage Standards

##### **ZOE-1 (Impoundment)      Criteria C-1 (Not Applicable/De Minimis Effect)**

Once passed through the project's fish passage system there are no additional impediments to fish passage through the impoundment.

##### **All ZOEs EXCEPT ZOE-1 Criteria C-2 (Agency Recommendation)**

Fish species known to be present at the project include: American shad, Blueback Herring, Alewife, Eel, Gizzard shad, hickory shad, striped bass, sea-run brown trout, sea lamprey, white perch, pickerel, smallmouth and largemouth bass, bluegills, rainbow smelt. Atlantic salmon was a target species for the fish passage restoration program but have not been observed at the site and the updated 2009 Plan to Restore Diadromous Fishes to the Shetucket River Watershed (2009 Plan) eliminated this species. The 2009 Plan details can be found at [www.thamesriverbasinpartnership.org/acrobat\\_files/Shetucket%20River%20Plan%20-%20Connecticut%20DEP%20December%202009.pdf](http://www.thamesriverbasinpartnership.org/acrobat_files/Shetucket%20River%20Plan%20-%20Connecticut%20DEP%20December%202009.pdf)

Article 405 of the license (and Conditions 1 and 3 of the WQC) required the installation of an upstream fish passage system. Article 407 of the license required the testing of the passage facilities and Article 409 required the development of an O&M plan. NPU has completed all the license requirements and continues to operate the upstream passage system. Testing of the facility concluded that the operational protocols for the passage systems provide sufficient flow characteristic for a zone of passage through the bypass for all migrants. In addition, though not required by the license order, NPU has supported and assisted in providing upstream eel passage

at the Project.

The upstream passage was designed in consultation and approved by the resource agencies and sized to pass the required population estimates for the target species. The upstream fish passage system sizing was based upon the CTDEP's 1985 Preliminary Plan for the Restoration of Anadromous Fish to the Thames River Basin (1985 Plan). The 2009 Plan maintained the required population amounts. The population estimates were based on a 60 shad per acre of nursery habitat for American shad with river herring estimates (alewife and blueback herring) determined by multiplying the shad estimate by 1.5 (90 fish per acre of nursery habitat). Lamprey estimates are based on around 94 lampreys per river mile.

The upstream passage system's approval, effectiveness and O&M plan were approved in a series of FERC orders as listed below:

Order Approving and Modifying Fish Passage Design Drawings & Approving erosion and sediment control plan

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19941026-0103](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19941026-0103)

Order Modifying and Approving Fish Passage Assessment Plans

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19960513-0118](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19960513-0118)

Submittal of addenda to final report for fish p evaluation

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20000201-0289](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000201-0289)

Submittal of Fish P evaluation report

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19990426-0204](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19990426-0204)

Agency comments on Fish P evaluation report

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19990319-0246](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19990319-0246)

Order Approving Report and Recommendations for Continued Fish Passage Operation

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20000912-0114](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000912-0114)

Order Approving Fishway Maintenance Plan

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19951025-0151](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19951025-0151)

The CTDEEP letter of March 8, 2013 (DEP 2013, copy in the reviewer's report) in support of NPU's original certification states that "The license for the Greenville 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.” Though not documented, NPU meets annually with representatives from the CTDEEP (typically Steve Gephart and Tim Wildman) to review expectations and potential concerns with the fish passage facilities. The last meeting with the CTDEEP occurred on February 9, 2018 with no changes in operation or other specific request being made. Previous testing of the facility and historic observations have satisfied the original concern with shad passage through the bypass reach and this is no longer a concern for the passage system. In addition to the annual meetings, NPU maintains frequent interaction with the resource agencies during the migration season to promote successful fish passage and protection.

The DEP 2013 letter also notes that NPU has allowed resources agencies to maintain fish counting capability and assisted with and permitted the installation of upstream eel passage systems which were not required in the license order. NPU has voluntarily began trucking live shad from the Project’s fish elevator to upstream spawning habitat, which is described in the DEP 2013 letter as “a significant contribution and will accelerate the pace of restoration of shad to the river”. The CTDEEP provides weekly web-based updates and commentary on passage counts throughout the State, including Greenville, during the passage season. This information is summarized in an annual report prepared by the CTDEEP ([www.ct.gov/deep/lib/deep/fishing/performance\\_reports/f50d37.pdf](http://www.ct.gov/deep/lib/deep/fishing/performance_reports/f50d37.pdf)), which documents NPU’s assistance during the passage season.

#### 4.4 Downstream Fish Passage and Protection Standards

##### **ZOE-4 (Downstream Reach)      Criteria D-1 (Not Applicable/De Minimis Effect)**

Once passed through the project’s fish passage systems there are no additional impediments to fish passage downstream of the project.

##### **All ZOEs EXCEPT ZOE-4      Criteria D-2 (Agency Recommendation)**

The Project has installed and operated a downstream passage system since 1995. The

system includes a close-spaced angled bar rack system within the canal leading to a bypass pipe system depositing fish into the bypass reach downstream of the dam. The passage system is also used to pass eels. License article 406 and WQC Condition 2 required the installation of downstream passage facilities. License article 408 required testing of the installed facilities and article 409 required the development of an O&M plan.

The downstream passage system was designed and tested in consultation with and approved by the resource agencies. The passage system satisfied the US Fish and Wildlife Service criteria for the projection and passage of the target species as indicated in the CTDEP's 1985 Preliminary Plan for the Restoration of Anadromous Fish to the Thames River Basin (1985 Plan) and conforms to the updated 2009 Plan to Restore Diadromous Fishes to the Shetucket River Watershed (2009 Plan, [www.thamesriverbasinpartnership.org/acrobat\\_files/Shetucket%20River%20Plan%20-%20Connecticut%20DEP%20December%202009.pdf](http://www.thamesriverbasinpartnership.org/acrobat_files/Shetucket%20River%20Plan%20-%20Connecticut%20DEP%20December%202009.pdf)).

Testing of the system's effectiveness has been completed with resource agency suggested modification incorporated. The system's approval, effectiveness and O&M plan were approved in a series of FERC orders as listed below:

Order Approving and Modifying Fish Passage Design Drawings & Approving erosion and sediment control plan

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19941026-0103](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19941026-0103)

Order Modifying and Approving Fish Passage Assessment Plans

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19960513-0118](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19960513-0118)

Submittal of addenda to final report for fish p evaluation

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20000201-0289](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000201-0289)

Submittal of Fish P evaluation report

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19990426-0204](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19990426-0204)

Agency comments on Fish P evaluation report

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19990319-0246](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19990319-0246)

Order Approving Report and Recommendations for Continued Fish Passage Operation

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20000912-0114](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20000912-0114)

## Order Approving Fishway Maintenance Plan

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19951025-0151](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19951025-0151)

Additional testing and formal monitoring of the passage system is not required. NPU and CTDEEP staff routinely observed the canal rack and bypass system throughout the passage season to confirm fish passage for both anadromous and catadromous fish species is occurring without delays or mortalities. The CTDEEP provide weekly web-based updates and commentary on passage counts throughout the State, including Greenville, during the passage season. This information is summarized in an annual report prepared by the CTDEEP ([www.ct.gov/deep/lib/deep/fishing/performance\\_reports/f50d37.pdf](http://www.ct.gov/deep/lib/deep/fishing/performance_reports/f50d37.pdf)) The CTDEEP letter of March 8, 2013 (DEP 2013, copy in the reviewer's report) in support of NPU's original certification states that "The license for the Greenville 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." Though not documented, NPU meets annually with representatives from the CTDEEP (typically Steve Gephard and Tim Wildman) to review expectations and potential concerns with the fish passage facilities. The last meeting with the CTDEEP occurred on February 9, 2018 with no changes in operation or other specific request being made. In addition to the annual meetings, NPU maintains frequent interaction with the resource agencies during the migration season to promote successful fish passage and protection. As also noted in the DEP 2013 letter, NPU has voluntarily supported the resource agency efforts to research migratory eels migratory path and behavior past three hydroelectric projects.

### 4.5 Shoreline and Watershed Protection Standards

#### **All ZOE's      Criteria E-1 (Not Applicable/De Minimis Effect)**

The Project topography is generally composed of low rolling hills. The area around the Project is developed with industrial, commercial and urban residential land use abutting the river. Ground level vegetation at the immediate Project site is largely represented by native grasses and herbaceous growth. A minimal amount of exposed (bare) soil is present. There are no shoreline or watershed protection plans required for the Project as can be noted in the license order and environmental assessment. The Project has been constructed for numerous years and shoreline

development have been established with little to no ability for changes to the shoreline. Local groups (*i.e.* Shetucket.org and thamesriverbasinpartnership.org) are involved with the Shetucket River valley protection and have not identified a need in the Project area.

#### 4.6 Threatened and Endangered Species Standards

##### **All ZOE's      Criteria F-1 (Not Applicable/De Minimis Effect)**

There are no federally listed Threatened and Endangered Species (T&E) specific to the Project area as confirmed in the federal listing available at

<https://www.fws.gov/newengland/pdfs/CT%20species%20by%20town.pdf>

The northern long-eared bat range map

<https://www.fws.gov/midwest/endangered/mammals/nleb/nlebRangeMap.html> indicates the northern long-ear bat range is statewide, as indicated in the listing. However, the mapping for Connecticut [www.ct.gov/deep/lib/deep/endangered\\_species/images/nleb\\_approved2\\_16.pdf](http://www.ct.gov/deep/lib/deep/endangered_species/images/nleb_approved2_16.pdf) indicates that the project area does not have known northern long-eared bat hibernacula.

Stated listed T&E species for New London County can be obtained at

[www.ct.gov/deep/lib/deep/endangered\\_species/species\\_listings/newlondonctyspecies.pdf](http://www.ct.gov/deep/lib/deep/endangered_species/species_listings/newlondonctyspecies.pdf) with area maps available for download via

[www.depdata.ct.gov/naturalresources/endangeredspecies/nddbpdfs.asp?nddsel=104](http://www.depdata.ct.gov/naturalresources/endangeredspecies/nddbpdfs.asp?nddsel=104)

The Project and Project operations have been established for a number of years with no proposed changes to established habitats. In addition, there is no proposed land disturbing or clearing activities planned for the Project which could impact any of the state listed species. The established fish passage facilities provide mitigation for aquatic species that may enter the Project area.

#### 4.7 Cultural and Historic Resource Standards

##### **All ZOE's      Criteria G-2 (Approved Plan)**

Article 412 and 413 of the license required the development of a Cultural Resource

Management Plan (CRMP) and implementation of the Memorandum of Agreement (MOA) with the CT State Historic Preservation Office (SHPO). The dam, canal gatehouse, the canal spillway deck bridge and the canal were historically documented prior to installation of the fish passage facilities. NPU maintains consultation with the SHPO during periods of construction that may impact cultural resources in accordance with the CRMP and MOA. NPU has implemented a dam repair and maintenance program to maintain the structural integrity of the dam. The work is limited to the dam and does not result in an alteration of the project's configuration. The work replaces damaged or decayed dam members using similar materials (*i.e.* timber beams and planks) as the original dam construction details. In accordance with Condition 2 of the CRMP in-kind repairs do not require notification regarding the work. Pond lowering or ground disturbance is generally not required for the work. However, depending upon the work location, the pond level may be lowered 8 to 12 inches for less than 2 weeks to permit access to the work area. Pond level lowering, if required, is recorded for agency review. A localized area (16 ft in width) of the sediment against the dam's upstream face was temporary removed during the 2017 repairs to permit repairs to damaged crib planking. The approved CRMP (including documentation) can be obtained from the FERC Elibrary system using the following links:

CRMP

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19970730-0435](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19970730-0435)

Order Approving CRMP

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=19970825-0273](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=19970825-0273)

Compliance Report

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20050804-0201](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20050804-0201)

(NOTE: FERC has confirmed that the 2005 report is the most recent report and that there are no compliance inspections scheduled in the near future)

#### 4.8 Recreational Resources Standards

##### **All ZOE's      Criteria H-2 (Agency Recommendation)**

Page 23 of the Environmental Assessment states that “the primary recreational activity along the Shetucket River and diversion canal is fishing with some boating.” Articles 410 and 411 of the license required the installation and periodic monitoring of recreational enhancements

to the Project as recommended by the resource agencies. These enhancements were developed and installed in consultation with resource agencies. These enhancements have been installed and are free to the public. Recreational opportunity access is provided to the impoundment and the section between the dam and Eight Street. Downstream of Eight Street the east riverbank is under private ownership and access along the west riverbanks is not provided due to safety concerns. The current recreational use information and compliance confirmation can be found on the FERC elibrary website with the links provided below.

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20150306-5119](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150306-5119)

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20150306-5230](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20150306-5230)

[https://elibrary.ferc.gov/idmws/file\\_list.asp?accession\\_num=20050804-0201](https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20050804-0201)

The last FERC environmental compliance report was completed in 2005. FERC has indicated that additional compliance inspections have not occurred and are not currently scheduled to occur in the near term. Appendix C provides copies of the most recent annual report required by license article 411 but not available on the FERC elibrary system. NPU has not received any comments regarding the recreational use reports. The reports indicate that current recreational facilities are satisfying the historic and current needs at the project.

**5.0 SWORN STATEMENT AND WAIVER FORM**

**SWORN STATEMENT**

As an Authorized Representative of Norwich Public Utilities, the Undersigned attests that the material presented in the application is true and complete.

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's Certification Program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

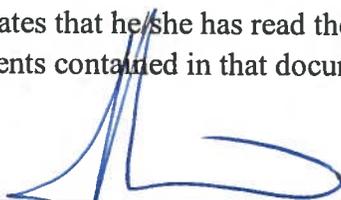
The undersigned further acknowledges that if certification of the applying facility is issued, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified.

The undersigned Applicant further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's Certification Program.

State of \_\_\_\_\_,

County of \_\_\_\_\_

The undersigned, being first duly sworn, states that he/she has read the above document and knows the contents of it, and that all of the statements contained in that document are true and correct, to the best of his/her knowledge and belief.

  
\_\_\_\_\_  
(Signature of appropriate company official)

John F. Bilda  
\_\_\_\_\_  
(Printed name of appropriate company official)

Sworn to me and subscribed before me this 16<sup>th</sup> of January, 20 18  
Day Month

[SEAL]

  
\_\_\_\_\_  
(Signature of Notary Public or other state or local  
Official authorized by law to notarize documents)

Greenville Project (Cert #106)

 MICHELE L. ADDABBO  
Notary Public, State of Connecticut  
My Commission Expires Dec. 31, 2021

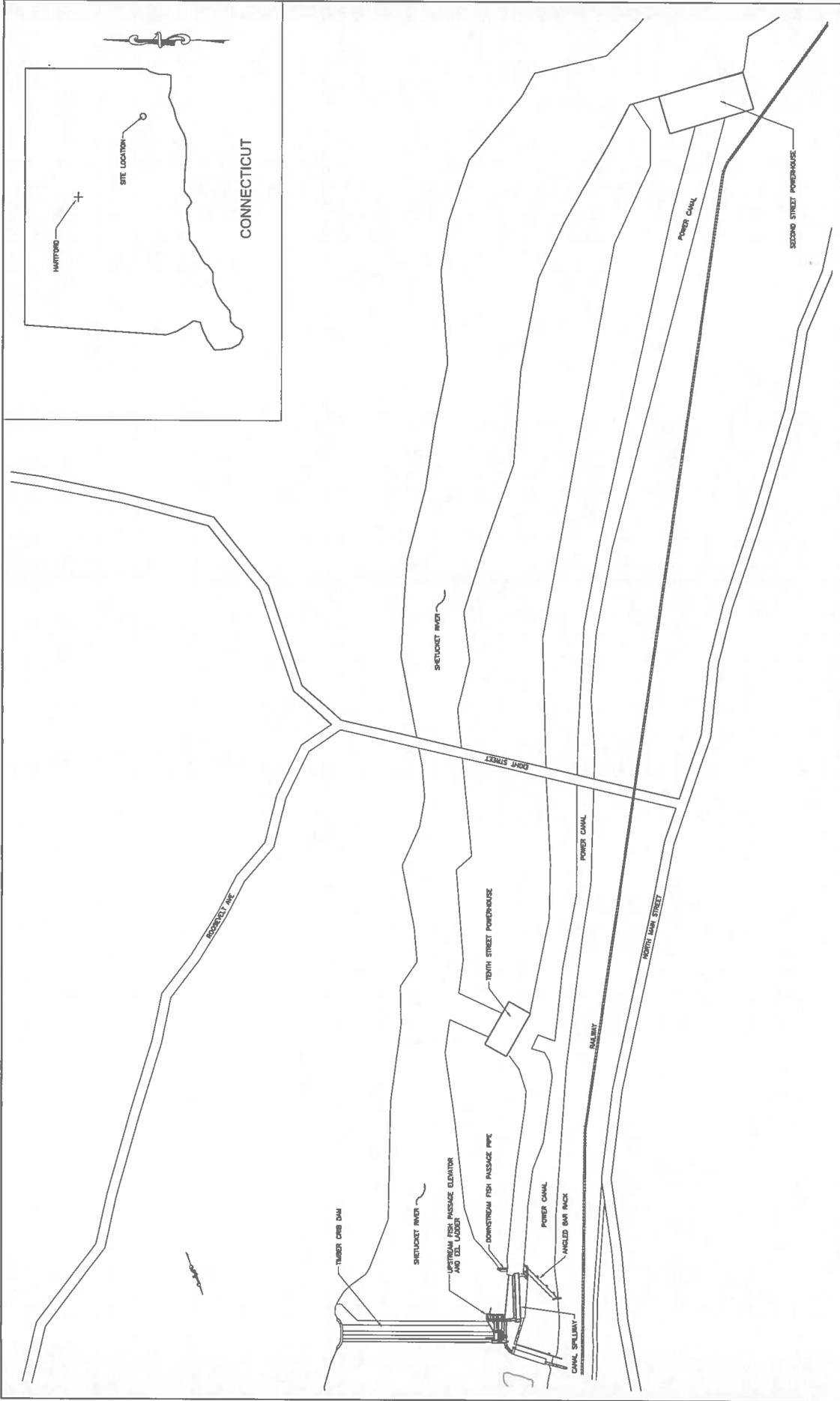
GREENVILLE HYDROELECTRIC PROJECT  
(FERC NO. 2441)

LIHI CERTIFICATE 106

**LIHI RECERTIFIATION APPLICATION**

APPENDIX A

BASIN MAP AND FACILITY PHOTOS



|  |  |  |  |                            |
|--|--|--|--|----------------------------|
| Project No. 681-007<br>Title: General Site Plan    |  | NORWICH PUBLIC UTILITIES<br>NORWICH, CT    |  | DRAWING NO.<br><b>LIHI</b> |
| Date: 06/10/11<br>Drawn by: ALM<br>Checked by: ALM |  | GREENVILLE DAM PROJECT<br>FERC NO. 2441-CT |  |                            |
| No. 1<br>Description: Issued for final application |  | Date: 07-10-12<br>Drawn by: ALM            |  | GENERAL SITE PLAN          |



Greenville Dam

Upstream Fish Passage Elevator & Eel Ladder

10th St Development

Downstream Fish Passage Bar Rack

Power Canal

2nd Street Development

Greenville Project  
General Area Map



Photo 1: Greenville Dam, Fish Elevator, Downstream Fish Passage System and Canal

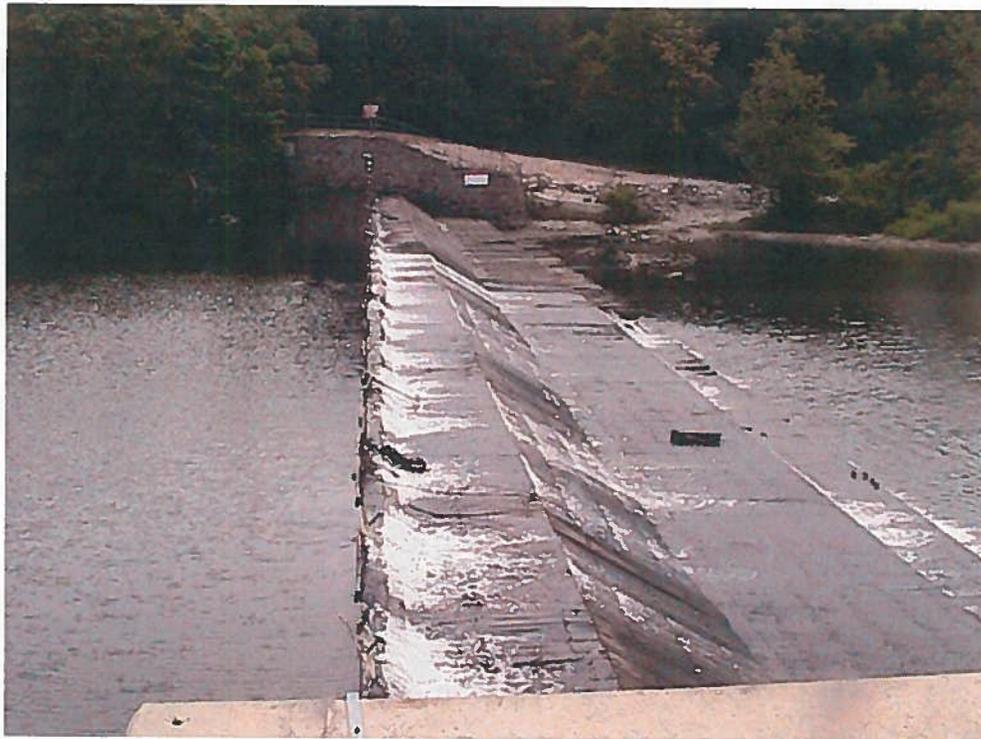


Photo 2: Greenville Timber Crib Dam

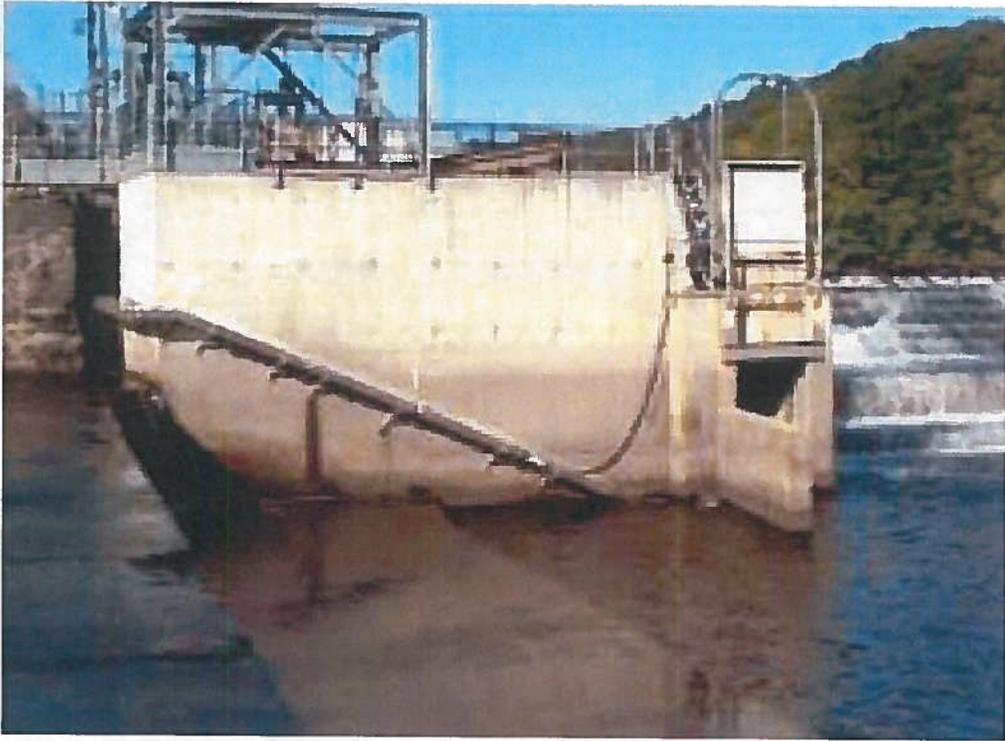


Photo 3: Upstream Fish Elevator and Eel Ladder

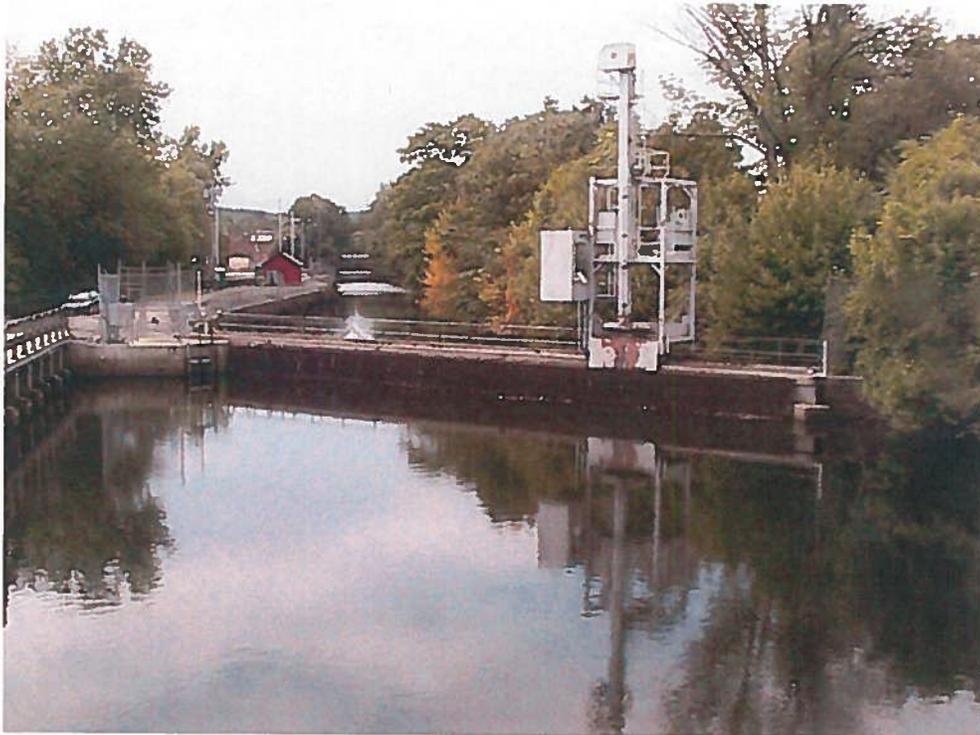


Photo 4: Canal Angled Bar Rack and Downstream Fish Bypass Inlet

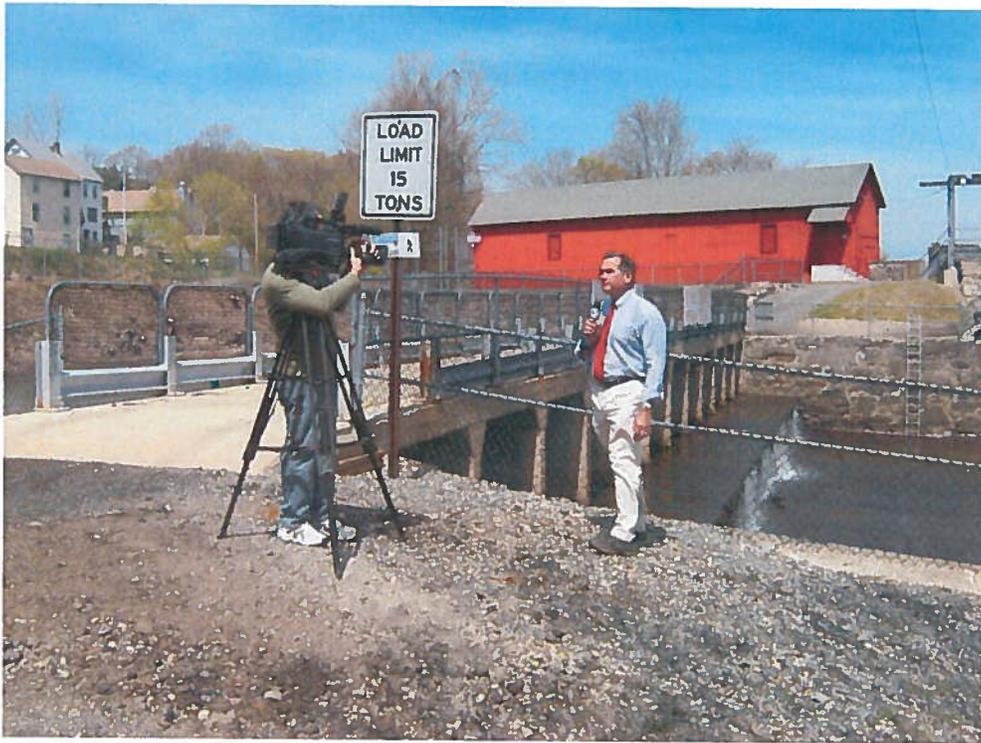


Photo 5: Canal Gate House and Side Spillway



Photo 6: 10<sup>th</sup> Street Development Intake Channel and Powerhouse

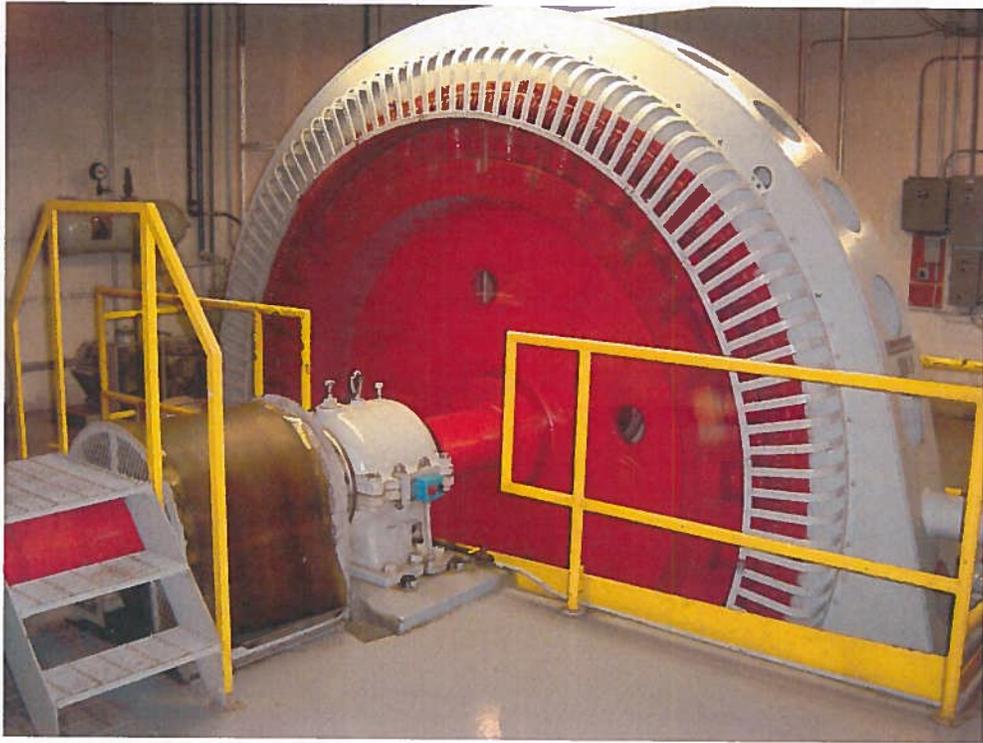


Photo 7: 10<sup>th</sup> Street Development Generator



Photo 8: 2<sup>nd</sup> Street Development Powerhouse



Photo 9: 2<sup>nd</sup> Street Development Generators



Photo 10: Recreational Trail Entrance with Informational Kiosk

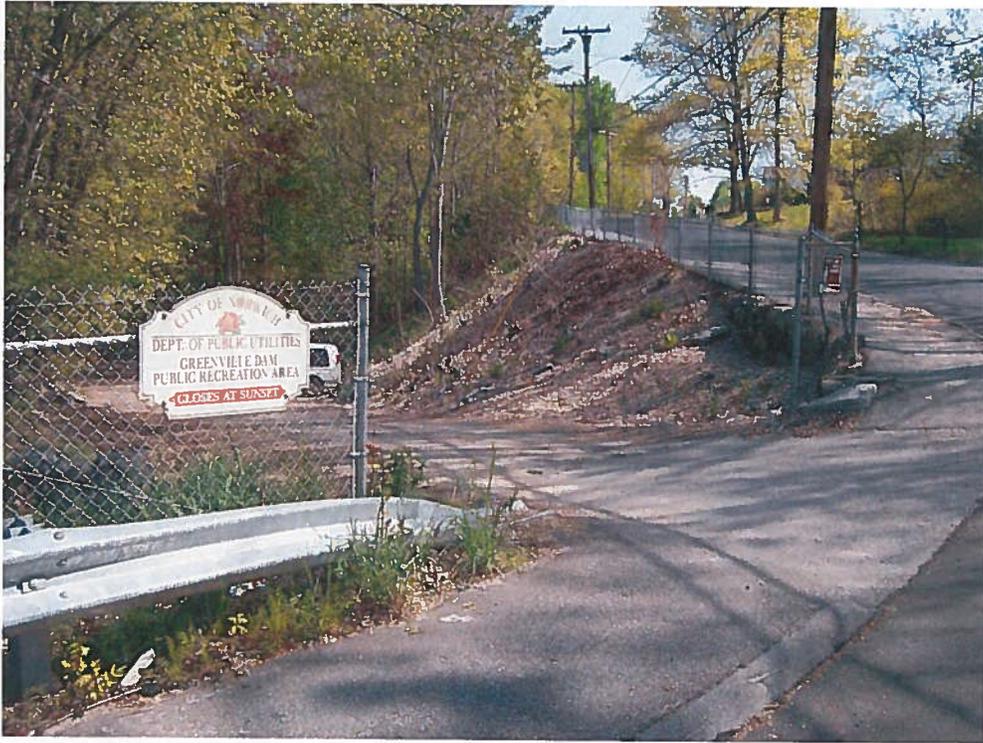


Photo 11: Vehicle Entrance to Recreational Area

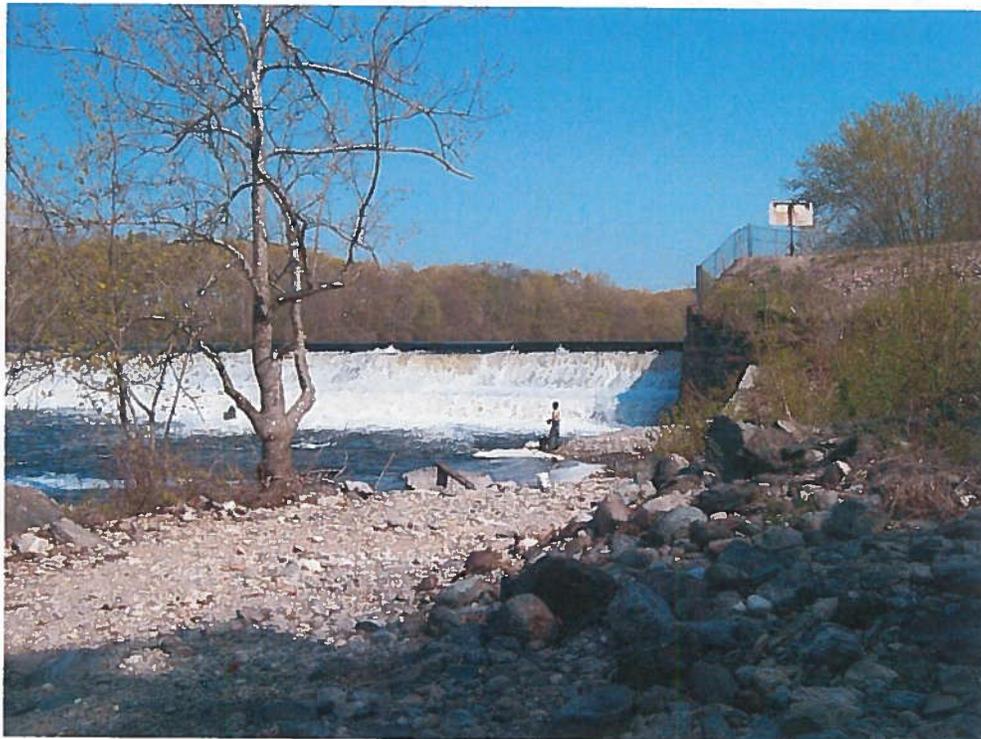


Photo 12: Angler Access Trail along River Shore downstream of Dam

GREENVILLE HYDROELECTRIC PROJECT  
(FERC NO. 2441)

LIHI CERTIFICATE 106

**LIHI RECERTIFICATION APPLICATION**

APPENDIX B

FACILITY CONTACTS FORM

## FACILITY CONTACTS FORM

|  |  |
|--|--|
| <b>Project Owner:</b>  |  |
| Name and Title   | Chris LaRose, Assistance General Manager |
| Company  | Norwich Public Utilities                 |
| Phone  | (860) 823-7300                           |
| Email Address  | Chrislarose@npumail.com                  |
| Mailing Address  | 16 South Golden St., Norwich CT 06360    |
| <b>Project Operator (if different from Owner):</b>                         |  |
| Name and Title   |  |
| Company  |  |
| Phone  |  |
| Email Address  |  |
| Mailing Address  |  |
| <b>Consulting Firm / Agent for LIHI Program (if different from above):</b> |  |
| Name and Title   | Alfred Nash, President                   |
| Company  | Renewable Power Consulting, PA           |
| Phone  | (207) 992-3926                           |
| Email Address  | Al.nash@renewablepowerconsulting.com     |
| Mailing Address  | P.O. Box 195 Palmyra, ME 04965           |
| <b>Compliance Contact (responsible for LIHI Program requirements):</b>     |  |
| Name and Title   | Chris LaRose, Assistance General Manager |
| Company  | Norwich Public Utilities                 |
| Phone  | (860) 823-7300                           |
| Email Address  | Chrislarose@npumail.com                  |
| Mailing Address  | 16 South Golden St., Norwich CT 06360    |
| <b>Party responsible for accounts payable:</b>                             |  |
| Name and Title   | Chris LaRose, Assistance General Manager |
| Company  | Norwich Public Utilities                 |
| Phone  | (860) 823-7300                           |
| Email Address  | Chrislarose@npumail.com                  |
| Mailing Address  | 16 South Golden St., Norwich CT 06360    |

**Current and relevant state, federal, provincial, and tribal resource agency contacts**

|   |   |
|---|---|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources <u>X</u> , Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __): |   |
| Agency Name   | CT Department of Energy and Environmental Protection, Inland Fisheries Division |
| Name and Title  | Stephen Gephard, Supervising Fisheries Biologist                                |
| Phone   | (860) 447-4316  |
| Email address   | Steve.gephard@ct.gov  |
| Mailing Address   | P.O. Box 719, 333 Ferry Road, Old Lime, CT 06371                                |

|   |  |
|---|--|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources <u>X</u> , Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __): |  |
| Agency Name   | U.S. Fish and Wildlife Service   |
| Name and Title  | Melissa Grader, Fish and Wildlife Biologist                            |
| Phone   | (413) 548-8002 x8124   |
| Email address   | Melissa_grader@fws.gov   |
| Mailing Address   | New England Field Office, 103 East Plumtree Road, Sunderland, MA 01375 |

|   |   |
|---|---|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources <u>X</u> , Recreation __): |   |
| Agency Name   | CT State Historic Preservation Office                             |
| Name and Title  | Danial Forrest, Archaeologist/Environmental Review Coordination   |
| Phone   | (860) 256-2761  |
| Email address   | Daniel.Forrest@ct.gov   |
| Mailing Address   | One Constitution Plaza, 2 <sup>nd</sup> Floor, Hartford, CT 06103 |

|   |  |
|---|--|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds <u>X</u> , T/E Spp. __, Cultural/Historic Resources __, Recreation __): |  |
| Agency Name   | River Alliance of CT   |
| Name and Title  | Margaret Minor, Executive Director                                     |
| Phone   | (860) 361-9349   |
| Email address   | rivers@riversalliance.org  |
| Mailing Address   | P.O. Box 1797, West Street 3 <sup>rd</sup> Floor, Litchfield, CT 06759 |

|   |   |
|---|---|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality __, Fish/Wildlife Resources __, Watersheds <u>X</u> , T/E Spp. __, Cultural/Historic Resources __, Recreation __): |   |
| Agency Name   | CT Department of Energy and Environmental Protection, Bureau of Water Protection and Land Reuse |
| Name and Title  | Brian Golembiewski, Supervisor  |
| Phone   | (860) 424-3867  |
| Email address   | Brian.golembiewski@ct.gov   |
| Mailing Address   | 79 Elm St, Hartford, CT 06106-5127  |

|   |   |
|---|---|
| <b>Agency Contact</b> (Check area of responsibility: Flows __, Water Quality <u>X</u> , Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __): |   |
| Agency Name   | NOAA  |
| Name and Title  | Sean McDermott, Hydropower Coordinator                      |
| Phone   | (978) 281-9113  |
| Email address   | Sean.mcdermott@noaa.gov                                     |
| Mailing Address   | 55 Great Republic Drive, F/GARFO, Gloucester, MA 01930-2298 |