

REVIEW OF APPLICATION FOR RE-CERTIFICATION BY THE LOW IMPACT HYDROPOWER INSTITUTE OF THE OCCUM HYDROELECTRIC FACILITY

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I. INTRODUCTION

This report summarizes the review findings of the application submitted by the Norwich Public Utilities (NPU or Applicant) to the Low Impact Hydropower Institute (LIHI) for re-certification of the Occum Hydroelectric Project FERC P-11574 (Occum or Project). The Project was initially certified by LIHI as a low impact hydropower facility in March 2013. LIHI Certificate No. 000105, which became effective on March 6, 2013 and will expire on May 31, 2018. This re-certification review was conducted in compliance with LIHI's Handbook, 2nd Edition, dated March 7, 2016. The Applicant is concurrently filing for LIHI re-certification of a second facility located at the Greenville Dam (FERC Project No. 2441), also located on the Shetucket River mainstem. Both Projects were evaluated concurrently by the same LIHI Reviewer.

The original 2013 Certification Report can be accessed via the link below. Details on the project and several figures incorporated into this Report were taken from the 2013 Report.

<https://lowimpacthydro.org/assets/files/Occum%20files/OccumCertificationFinalReport23May2013.pdf>

One condition was incorporated into the 2013 LIHI certification:

“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 Occum 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. LIHI may suspend or revoke this certification should it determine that its passage criteria are not being met.”

The annual compliance statements did not specifically address this condition, however information received from the CT Department of Energy and Environmental Protection (CTDEEP), Fisheries Division, provided in the recertification application, demonstrated that agency recommendations have been implemented during the certification period. This is discussed under the two criteria for fish passage.

II. RECERTIFICATION PROCESS AND INITIAL ASSESSMENT

Under the 2016 LIHI Handbook, reviews are a two-phase process starting with a limited review of a completed LIHI application, focused on two questions:

- (1) Is there any missing information from the application?
- (2) Has there been a material change in the operation of the certified facility since the previous certificate term?
- (3) Has there been a change in LIHI criteria since the certificate was issued?

In accordance with the Recertification Standards, if the only issue is that there is some missing information, the applicant will have the opportunity to provide the missing information, and this may or may not trigger a Stage II review. These standards also state that "material changes" mean non-compliance and/or new or renewed issues of concern that are relevant to LIHI's criteria. If the answer to either question (2) or (3) is "Yes," the Application must proceed through a second phase, which consists of a more thorough review of the application using the LIHI criteria in effect at the time of the recertification application, and development of a complete Stage II Report. Because the new Handbook involves new criteria and a new process, the answer to question two for all projects scheduled to renew in 2017 is an automatic 'YES.' Therefore, all certificates applying for renewal in 2017 are required to proceed through both phases of the recertification process.

A review of the initial application, received on January 18, 2018, resulted in a Stage I or Intake Report, dated February 5, 2018. The response to the Stage I Report was provided in the form of a revised Application received on late February 28, 2018.

This Stage II assessment included review of the application package, public records in FERC's eLibrary since the most recent LIHI recertification in March 2013, public comments received and annual compliance statements received by LIHI during the past term of certification.

Outreach was made to the following stakeholders as part of this review. Only Melissa Grader responded to my inquiry. Her discussion is incorporated into the applicable criterion sections.

- CT Department of Energy and Environmental Protection (CTDEEP), Bureau of Water Protection and Land Reuse - Brian Golembiewski, Supervisor.
- US Fish and Wildlife Service (USFWS)- Melissa Grader, Fish and Wildlife Biologist
- River Alliance of CT - Margaret Minor, Executive Director

A support letter from CTDEEP, Inland Fisheries Division was included in the application.

III. PROJECT'S GEOGRAPHIC LOCATION

The Occum Hydroelectric Project (Project) is located on the Shetucket River, at river mile 6.4, in the Village of Occum, City of Norwich and Village of Versailles, Town of Sprague, New London County, Connecticut. The Shetucket River is a tributary to the Thames River. 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. The Shetucket River, with a basin area of about 1,270 square miles, drains an estimated 93% of the Thames River watershed.

The Applicant's Greenville Project is also located on the Shetucket mainstem, about five miles downstream of Occum Dam. Intermediate between the two projects is a third dam, Taftville Dam, about 2.1 miles downstream of Occum. Taftville Dam is 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. The Scotland Hydroelectric, a federally licensed facility also owned by FirstLight Power Resources, is about seven miles upstream of Occum Dam and controls the flows received at the Occum Project.

Figures 1 and 2 in Appendix A show the location of the Occum Project and other dams on the Shetucket River. Figure 3 is an aerial that shows key Project features. The Zones of Effect (ZOE) are also designated on Figure 3.

IV. PROJECT AND IMMEDIATE SITE CHARACTERISTICS

The dam was constructed in 1865 to supply water power to former mills. The project was adapted for hydropower generation between 1934 and 1937.

The Occum Project is composed of a concrete and masonry dam, impoundment, intake structure, forebay, powerhouse, fish passage facilities and appurtenant facilities. The dam is comprised of two contiguous spillway sections with a total length of 450 ft, bordered on either side by an earth embankment. The east spillway section is a concrete ogee spillway, 170 ft in length, with a crest elevation of 66.1 ft msl. The west section is a stone masonry spillway 280 ft in length with a permanent crest elevation of 64.35 ft msl and 1.75-ft-high wooden flashboards. The west section is equipped with a 4-ft-wide fish ladder and a downward opening 6-ft-wide trash gate with a sill elevation of 60.32 ft msl. The upstream fish ladder parallels the forebay and extends from the dam to the powerhouse tailrace.

The intake structure is approximately 85 ft in length and extends from the earth embankment that abuts the western side of the spillway to the west headgate wall. The intake gate structure controls the river flow into the forebay with 6 manually operated motorized rack and pinion gates. The forebay measures approximately 225 ft long by 160 ft wide. A forebay spillway with a crest elevation of 64.4 ft msl is topped with 1.7-ft flashboards that raise the pool elevation to the normal water surface elevation (66.1 ft msl). This spillway, bordered by the earth embankment to the north and the powerhouse to the south, is approximately 30-ft-wide and extends 50 ft along the east side of the forebay.

The bypass reach is short, only about 180 ft in length, before it merges with flows from the plant tailrace, forming the regulated reach. The water surface elevation in the forebay is maintained

the same as the Project impoundment, at elevation 66.1 ft msl. The dam creates an impoundment with a gross storage capacity at normal pond level of 600 acre-ft with a surface impoundment area of about 90 acres.

The powerhouse contains one vertical 800 KW Kaplan turbine-generator unit. This unit has a maximum hydraulic capacity of 900 cubic feet per second (cfs) and a minimum hydraulic capacity to of 250 cfs. The reported average annual production is 2,513 MWh (average from 1993 to 2017).

Two upstream fishways, a 4-ft-wide concrete Denil ladder for anadromous fish and an eel ladder, are located between the forebay and the masonry spillway. The downstream fish passage facility is located immediately adjacent to the project's powerhouse and intake structure and discharges to the tailrace. All fishways have been operational since 2006.

Photographs of the dam are shown on Photographs 1 and 2 in Appendix A. The locations of the fish passage features are shown in Photographs 3 and 4. Additional photographs of the Project, the fish passage facilities, as well as details on the fish passage facilities are contained in the original 2013 Certification Report.

V. ZONES OF EFFECT

Three Zones of Effect (ZOE) were designated by the applicant and were determined to be appropriate. These are identified on Figure 3 in Appendix A.

- ZOE #1 – Impoundment (includes forebay)
- ZOE #2 – Bypass Reach
- ZOE #3 – Tailrace and regulated Reach

VI. REGULATORY AND COMPLIANCE STATUS

The Project is operating under its FERC license P-11574 issued September 29, 1999 and a Water Quality Certification issued February 11, 1997. No changes to either have occurred since last certified by LIHI in 2013.

A review of FERC's eLibrary, data provided in the application, public comments received and outreach to regulatory agencies indicated that there are no new or continuing environmental issues at Project. No deviations from the minimum flow requirements have occurred since LIHI certification in 2013. My review also confirmed that no material changes in the facility design or operation have occurred since previous LIHI review.

VII. PUBLIC COMMENT RECEIVED OR SOLICITED BY LIHI

The deadline for submission of comments on the LIHI certification application was April 29, 2018. One public comment correspondence was received and is posted on the LIHI website.

VIII. SUMMARY OF COMPLIANCE WITH CRITERIA

The following tables show the Standards selected for each criterion for the three ZOE's.

ZOE #1 – Impoundment (includes forebay)

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			

ZOE #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			

ZOE #3 – Tailrace and regulated 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			

The Reviewer found that these standards are appropriate, and sufficient supporting data was provided which demonstrated compliance with the criteria and standard selected. Details of compliance with the criteria are presented in Section IX.

IX. DETAILED CRITERIA REVIEW

A. ECOLOGICAL FLOW REGIMES

Goal: The flow regimes in riverine reaches that are affected by the facility support habitat and other conditions suitable for healthy fish and wildlife resources.

Standards: All river reaches where stream flows are altered by the facility shall be defined. In all locations, appropriate flow management should apply an ecosystem-based approach that supports fish and wildlife resources by considering base flows, seasonal variability, high flow pulses, short-term rates of change, and year-to-year variability. Compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must also be demonstrated.

Assessment of Criterion Passage:

The Applicant has selected and demonstrated compliance with **Standard A-2, Agency Recommendation** to pass the Ecological Flow Regimes criterion. This standard requires:

“**STANDARD A-2. Agency Recommendation:** The flow regime at the Facility was developed in accord with a site--specific, science--based agency recommendation.”

Based on site-specific stream flow assessments, the FERC License Articles and Water Quality Certificate Conditions established the following requirements:

- pond level fluctuation be limited to 2 feet below the top of flashboards (or below the crest when boards are not present).
- the release of 100 cfs or inflow, whichever is less, during non-operational periods and the downstream's dam (Taftville) impoundment level is below elevation 48.9 msl.
- the development, in consultation with and approved by resource agencies, of a monitoring plan to confirm compliance.

The Occum Project has historically operated in a cycling mode due to the operation of the upstream Scotland Hydroelectric Project's operation (FERC No. 2662). The store and release operation of this upstream dam results in pulses of water flow (approximately 1,200 cfs) into the Occum impoundment which exceeds the Project's unit hydraulic capacity (900 cfs). The Project is operated during these pulses of inflow and remains off-line during other periods. New license conditions for the Scotland Project requires run-of-river operations which are scheduled to begin in the summer of 2018. Upon implementation of the Scotland operational change, the Applicant plans on operating the Occum Project in run-of-river mode, although limited pond level fluctuations are still allowed by the FERC license.

The downstream Taftville Hydroelectric Project's (Taftville) full pond backwaters to the Occum tailrace. Taftville cycles its headpond typically six feet, which impacts both the Project's tailwater level and the river segment between the two projects. Fish passage installation at Taftville resulted in the Taftville impoundment and Occum Project's tailwater fluctuation amounts being reduced. Since this change in pond level management at Taftville, the Occum Project's trigger elevation with the minimum Project flow requirement, has not been required, and is not expected.

NPU certified that it operated Occum in compliance with these requirements since LIHI certification in 2013. A February 21, 2018 support letter from Steve Gephard of CTDEEP, Fisheries Division, included in the application, states that NPU is "*in complete compliance with its Section 401 Water Quality Certificate in respect to the Occum Dam Hydroelectric Project.*"

This Project passes Criterion A – Ecological Flow Regimes- Go to B

B. WATER QUALITY

Goal: Water Quality is protected in waterbodies directly affected by the facility, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

Standards: Compliance with the appropriate state/provincial or federal water quality standards must be demonstrated with all waterbodies where water quality is directly affected by the facility, including those affected areas outside the facility boundary. In all cases, if any waterbody directly affected by the facility has been defined as being water quality limited (for example, on a list of waters with quality that does not fully support designated uses), it must be demonstrated that that the facility has not contributed to that substandard water quality. Compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must also be demonstrated.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard B-2, Agency Recommendation** to pass the Water Quality criterion. This Standard requires:

“STANDARD B-2. Agency Recommendation: The facility is in compliance with all water quality conditions contained in a science-based agency recommendation providing reasonable assurance that water quality standards will be met for all waterbodies that are directly affected by the facility (for example, a recent Water Quality Certification issued pursuant Section 401 of the Clean Water Act). Such recommendations, whether based on a generally applicable water quality standard or one that was developed on a site-specific basis, must include consideration of all water quality components necessary to preserve healthy fish and wildlife populations, human uses and recreation.”

The operating requirements established by both the license and WQC were developed to provide

for maintenance of compliance with water quality standards and fish protection, thus adherence to these are key to continued protection of water quality in this section of the Shetucket River. As noted above, the Applicant has reported that Project has met these flow requirements since certification by LIHI in 2013.

The waters within the Project are classified by the State of Connecticut as Class B suitable for recreational uses, fish and wildlife habitat, agricultural and industrial supply and other uses including navigation. There are no known direct point source discharges into the Project waters. Table 1 of the 2012 Shetucket River Watershed Summary indicates that the Occum Project is included in river Segment CT3800-00_02. The 2012 report, which is incorporated into the 2016 State of Connecticut Integrated Water Quality Report, indicates that this segment has not been assessed for use support for Aquatic Life and for Recreation. The segment is not included on Table 2-3 nor Table 3-4, which list impaired waters.

While the WQC is greater than 10 years old, I believe that the Project is nonetheless in compliance with this criterion because:

- the minimum flow established by the license and WQC were developed by the appropriate resource agencies and therefore, while not available at this time, must have been established using methods found acceptable during that time period;
- required minimum flows have been consistently met;
- I have assumed that the lack of response to my inquires to CTDEEP Bureau of Water Protection and Land Reuse, asking if any water quality concerns exist for the Project, suggests that there are no such issues;
- water quality standards were met for uses assessed by the CTDEEP; and
- a letter from Stephen Gephard from CTDEEP Fisheries Division included in the application stated that NPU is “*in complete compliance with its Section 401 Water Quality Certificate in respect to the Occum Dam Hydroelectric Project.*”

This Project passes Criterion B – Water Quality- Go to C

C. UPSTREAM FISH PASSAGE

Goal: The facility allows for the safe, timely, and effective upstream passage of migratory fish. This criterion is intended to ensure that migratory species can successfully complete their life cycles and maintain healthy, sustainable fish and wildlife resources in areas affected by the facility.

Standards: The applicant shall list all migratory fish species (for example, anadromous, catadromous, and potamodromous species) that occur now or have occurred historically at the Facility. Maintenance of upstream passage sufficient to support sustainable populations of these migratory species must be demonstrated by compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016.

Assessment of Criterion Passage

The Applicant has selected **Standard C-1, Not Applicable/De Minimis Effect** as applicable to ZOE #1 (Impoundment) and **Standard C-2, Agency Recommendation** for the Bypass and regulated Reach ZOEs. to pass the Upstream Fish Passage criterion. These standards require:

“STANDARD C-1. Not Applicable/De Minimis Effect: The facility does not create a barrier to upstream passage, or there are no migratory fish in the vicinity of the facility and the facility is not the cause of extirpation of such species if they had been present historically.”

“STANDARD C-2. Agency Recommendation: The facility is in compliance with science-based fish passage recommendations from appropriate resource agency(ies) which have been issued for the facility and which include provision for appropriate monitoring and effectiveness determinations.”

Fish species known to be present at the Project include: American shad, blueback herring, alewife, gizzard shad, hickory shad, striped bass, sea-run brown trout, sea lamprey, white perch, pickerel, smallmouth and largemouth bass, bluegills, rainbow smelt and American eel. Atlantic salmon was initially 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.

Standard C-1 is appropriate for the impoundment as no obstacles to upstream passage exist once fish have entered the impoundment.

Regarding the other two ZOE's, Article 405 of the FERC license and Condition 1 of the WQC required the installation of an upstream Denil fish passage system within four years of effective upstream passage at the downstream Taftville Project. The Denil fish ladder was installed in 2004. Effectiveness studies, also required by Article 405, were completed annually through 2012, when, with resource agency endorsement and FERC acceptance, the studies were suspended pending resolution of the problems at the Taftville project.

Testing of the Occum Denil ladder resumed in 2017, as reported in a March 8, 2018, comment email submitted to LIHI from Stephen Gephard, Supervising Fisheries Biologist of the Fisheries Division in the CTDEEP. He also noted:

“The results of the tests of the upstream fish passage facilities were highly encouraging but inconclusive due to passage difficulties at the non-jurisdictional project just downstream of it. Studies were suspended. Those studies resumed last year. Again, preliminary results are highly encouraging but we withhold final conclusions until the completion of the tests.

The eel pass was successful but had operational challenges. NPU replaced the eel pass with a more effective eel lift similar to one at another one of its projects and that is undergoing testing but it looks good. This improvement was initiated by NPU but done in consultation with us.

We have interacted with NPU at its Greeneville and Occum projects and find it to be highly cooperative and responsive. I suspect that it is one of the most cooperative hydro operators in New England, in terms of compliance with fisheries and flow issues.”

In an email dated March 14, 2018, Melissa Grader of USFWS noted that she agrees with the positions taken by CTDEEP on fishery issues. While Mr. Gephard noted his support for LIHI certification at this time, as testing is still ongoing, I am recommending a Certification Condition that LIHI be updated annually on the upstream passage studies and any modifications requested to enhance passage effectiveness.

This Project Conditionally passes Criterion C – Upstream Fish Passage- Go to D

D. DOWNSTREAM FISH PASSAGE AND PROTECTION

Goal: The facility allows for the safe, timely, and effective downstream passage of migratory fish. For riverine (resident) fish, the facility minimizes loss of fish from reservoirs and upstream river reaches affected by Facility operations. All migratory species are able to successfully complete their life cycles and to maintain healthy, sustainable fish and wildlife resources in the areas affected by the Facility.

Standards: The applicant shall list all fish species (for example, riverine, anadromous, catadromous, and potamodromous) that occur now or have occurred historically in the area affected by the Facility. To pass the downstream fish passage and protection criterion, compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard D-1, Not Applicable/De Minimis Effect** for ZOE #3 (Regulated Reach) and **STANDARD D-2. Agency Recommendation** for the impoundment and bypass ZOEs to pass the Downstream Fish Passage and Protection criterion. These standards require:

“STANDARD D-1. Not Applicable/De Minimis Effect: The facility does not create a barrier to downstream passage, or there are no migratory fish in the vicinity of the facility; if migratory fish had been present historically, the Facility is not responsible for extirpation of such species; the Facility does not contribute adversely to the sustainability of riverine fish populations or to their access to habitat necessary for the completion of their life cycles.”

“STANDARD D-2. Agency Recommendation: The Facility is in compliance with a science-based resource agency downstream fish passage or fish protection recommendations, which may include provisions for ongoing monitoring and effectiveness determinations that have been issued for the Facility.”

Standard D-1 is appropriate for ZOE #3 as no obstacles to downstream passage exist once fish have entered the Regulated Reach.

Article 406 of the FERC license and Condition 2 of the WQC required the installation of a downstream fish passage system. Downstream passage is via a sluice pipe discharging just below

the tailrace. The installed bypass system for both anadromous species and eel has been operational since 2006. The CTDEEP's May 8, 2013 letter in support of NPU's original LIHI application (copy included in the LIHI 2013 report) indicated that the system successfully passed many young-of-the-year shad. Downstream eel passage is not required by the license nor WQC, but NPU has voluntarily supported the resource agency efforts to research migratory eels migratory path and behavior past three hydroelectric projects, including Occum.

As noted in the 2013 certification report, License Article 406 required installation of a perforated plate across the trashrack during the fall outmigration period in order to reduce the risk of entrainment. That report also noted that FERC deferred the requirement pending a determination of its need. Both the current application and 2013 LIHI certification report denoted that for fish passage, it was determined that the plates were not needed based on the numerous studies performed until 2012 and the fact that the agencies have never requested they be installed. This position is supported by Steve Gephard of CTDEEP Fisheries Division in his March 2018 comment email to LIHI in which he states "*Evaluation tests were conducted and the downstream fish passage facilities were deemed effective.*" In an email dated March 14, 2018, Melissa Grader of USFWS noted that she agrees with the positions taken by CTDEEP on fishery issues. NPU also stated in a follow-up email that while a copy of the studies performed on downstream eel passage by Conte Lab, the USFWS and CTDEEP with NPU support, and incorporated into a 2014 technical paper, has not been provided to NPU, the agencies have not requested overlay installation based on these studies.

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. It is clear that excellent rapport exists between NPU and the resource agencies on the issue of fish and eel passage.

The Project Passes Criterion D – Downstream Fish Passage and Protection - Go to E

E. SHORELINE AND WATERSHED PROTECTION

Goal: The Facility has demonstrated that sufficient action has been taken to protect, mitigate and enhance the condition of soils, vegetation and ecosystem functions on shoreline and watershed lands associated with the facility.

Standards: To pass the watershed protection criterion for LIHI certification, the applicant shall demonstrate compliance with one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard E-1, Not Applicable/De**

Minimis Effect to pass the Shoreline and Watershed Protection criterion for the Project. This standard requires:

“STANDARD E-1. Not Applicable/De Minimis Effect: There are no lands associated with the facility under ownership and control of the applicant that have significant ecological value for protecting water quality, aesthetics, or low-impact recreation, and there has been no Shoreline Management Plan (SMP) or similar protection required at the facility; or the facility has no direct or indirect project-related land ownership, excluding lands used for power generation and transmission, flowage rights and required developed recreational amenities.”

The Applicant noted that Project lands are limited, consisting of 91 acres, of which 90 acres are the impoundment. No shoreline management or similar plans are required for the Project. The Project topography is generally composed of low rolling hills with steeper topography downstream of the Project. Hardwood forest is the predominant vegetative cover along the steep banks and upland areas of both impoundment shorelines. The impoundment shoreline is relatively undeveloped with no known areas of erosion within the impoundment area or downstream of the Project. The Project has been constructed for numerous years with the current operational parameters and shoreline conditions. The Applicant reported there are no plans for changes to the shoreline. Local groups are involved with the Shetucket River valley protection and have not identified a need in the Project area.

The Environmental Assessment prepared during licensing reported that the ecological resources with the Project boundaries “*were typical of the Southern New England region.*” Tree species found were “*characteristic tree type of the general area along the Shetucket River.*” It also states that wildlife species “*are typically associated with developed areas.*” Therefore, it does not appear that Project lands include any areas of significant ecological value.

The Project Passes Criterion E – Shoreline and Watershed Protection - Go to F

F. THREATENED AND ENDANGERED SPECIES PROTECTION

Goal: The Facility does not negatively impact listed species.

Standards: Facilities shall not have caused or contributed in a demonstrable way to the extirpation of a listed species. However, a facility that is making significant efforts to reintroduce an extirpated species may pass this criterion. To pass the Threatened and Endangered Species criterion compliance with at least one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard F-1, Not Applicable/De Minimis Effect** to pass the Threatened and Endangered Species Protection criterion for the Project. This standard requires:

“STANDARD F-1. Not Applicable/De Minimis Effect: There are no listed species present

in the facility area or downstream reach, and the facility was not responsible for the extirpation of the listed species if they were previously there.”

Project lands are limited, consisting of 91 acres, of which 90-acre impoundment are the impoundment. The Applicant stated that there are no federal or state threatened and endangered species known to occur within the project site. The Environmental Assessment prepared during licensing in 1995 included assessment by both USFWS and CT Department of Environmental Protection (now CTDEEP) Natural Resource Center. They found that Project operation would not negatively affect any protected species. Additionally, the application notes that Project operations have been established for a number of years with no proposed changes. There are no proposed land disturbing or clearing activities planned for the site.

A 2016 range map for the federally protected Northern Long-eared Bat indicates this species range is statewide, however the project area does not have known Northern Long-eared Bat hibernacula. State records provided in the application indicate that the Project is within possible range of several state protected species, however no specific species data for the site was included. Consultation between LIHI staff and Dawn McKay of the Bureau of Natural Resources at CTDEEP, found that the only state-listed species in the vicinity of the project are blueback herring and bald eagle. As previously discussed under Criterion C-Upstream Fish Passage, a Denil ladder is in-place at the Project and is again undergoing effectiveness testing since fish passage challenges at downstream sites have recently been resolved. Downstream fish passage has been found to be effective at the Project. No impacts are expected from normal Project operation to Bald Eagle that may visit the site.

The Project Passes Criterion F – Threatened and Endangered Species Protection - Go to G

G. CULTURAL AND HISTORIC RESOURCE PROTECTION

Goal: The Facility does not inappropriately impact cultural or historic resources that are associated with the Facility’s lands and waters, including resources important to local indigenous populations, such as Native Americans.

Standards: To pass the Cultural and Historic Resource criterion compliance with one or more of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard G-2, Approved Plan** to pass the Cultural and Historic Protection criterion for the Project for all ZOEs. This standard requires:

“STANDARD G-2. Approved Plan The facility is in compliance with approved state, provincial, federal, and recognized tribal plans for protection, enhancement, or mitigation of impacts to cultural or historic resources affected by the facility.

Article 408 of the FERC license required the implementation of the “Programmatic Agreement Among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the State of Connecticut, State Historic Preservation Officer, for Managing Historic Properties That May Be Affected By A License Issuing to the City of Norwich Connecticut For the Continued Operation and Maintenance of the Occum Hydroelectric Project in Connecticut”, and the development and implementation of a Cultural Resource Management Plan (CRMP). These requirements have been fulfilled. Review of the annual reports required by the CRMP have reported that no onsite activities affecting cultural resources have occurred in 2013 through 2017.

The Project Passes Criterion G - Cultural and Historic Resource Protection - Go to H

H. RECREATIONAL RESOURCES

Goal: The facility accommodates recreation activities on lands and waters controlled by the facility and provides recreational access to its associated lands and waters without fee or charge.

Standards: To pass the recreation criterion, compliance with at least one of the alternative standards identified in the Low Impact Hydropower Certification Handbook issued March 7, 2016 must be demonstrated. In all cases, it must be demonstrated that flow-related recreational impacts are mitigated to a reasonable extent in all zones where there is flow-related recreation. Where there is recognized, flow-related recreational use, the facility shall provide the public with relevant and up-to-date information on reservoir levels and river flows, preferably real-time updates. It is understood that recreational activities must be consistent with the assurance of reasonable safety of employees and the public, and with critical infrastructure protection dictated by state or federal authorities.

Assessment of Criterion Passage

The Applicant has selected and demonstrated compliance with **Standard H-2, Agency Recommendation** to pass the Recreational Resources criterion for the Project for all ZOE's. This standard requires:

“STANDARD H-2. Agency Recommendations: If there are comprehensive resource agency recommendations for recreational access or accommodation (including recreational flow releases) on record, or there is an enforceable recreation plan in place, the Facility demonstrates that it is in compliance with those.

Article 409 of the license required the installation a canoe portage system at the dam as recommended by the resource agencies. The portage was developed and installed in consultation with resource agencies. The site’s recreational facilities are free to the public. NPU does not own lands on the western impoundment shoreline that would provide access to the impoundment for public use. Access to the powerhouse facility and dam areas is prohibited for public safety. Public access is provided on the eastern shore with a parking area provided. An Americans with Disabilities Act compliant portage ramp has been installed and is maintained by NPU.

No FERC Environmental inspections of the Project have occurred during the past five years and the Applicant reported that FERC has no plans for one to be scheduled in the near future.

NPU's downstream Greenville Project (FERC No. 2441) requires annual reporting of recreational use. Although not required, NPU also collects recreational use data at the Occum Project. The reports are to be filed with FERC at intervals not greater than six years. These data are filed with the standard Form 80 reports. The most recent report was issued in 2015, simultaneously with the Form 80 report. All such reports issued indicate that current recreational facilities are satisfying the historic and current needs at the project.

The Project Passes Criterion H – Recreational Resources

X. GENERAL CONCLUSIONS AND REVIEWER RECOMMENDATION

Based on my review, I believe that this Project conditionally meets the requirements of a Low Impact facility and recommend it be re-certified for a five-year period with the condition noted below. I believe that the previous LIHI certification condition associated with the eel passage has been satisfied and is no longer needed, as evidenced by the comment letter received from CTDEEP which stated that the upstream eel passage is effectively passing American eel.

- The Owner shall provide an update on the status of the ongoing upstream fish passage studies in the annual compliance statement to LIHI. This update should summarize any findings made in the respective year's studies as well as any modifications that may be requested by CTDEEP or USFWS. NPU's response to such requests shall also be provided.

**THE OCCUM PROJECT CONDITIONALLY
MEETS THE LIHI CRITERIA FOR
CERTIFICATION AS A LOW IMPACT
FACILITY**