

Quinebaug Associates, LLC
A Subsidiary of Gravity Renewables, Inc.



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June 20, 2019

Shannon Ames, Executive Director
Low Impact Hydropower Institute
329 Massachusetts Ave, Suite 2
Lexington, MA 02420
sames@lowimpacthydro.org

**Re: LIHI Application submittal for the Quinebaug and Five Mile Hydroelectric Projects
(FERC P-5062-CT) - REVISED**

Dear Director Ames:

Quinebaug Associates, LLC (QA), a wholly-owned subsidiary of Gravity Renewables, Inc., (Gravity) submitted a draft application to the Low Impact Hydropower Institute (LIHI) in February 2019. In April 2019, LIHI provided a list of questions and comments to Gravity. The enclosed application and statements made therein, having been made to the best of the knowledge of Gravity, addresses the questions and comments.

If you have any questions or comments regarding the submittals, please feel free to contact the undersigned at celeste@gravityrenewables.com.

Best regards,

A handwritten signature in black ink, appearing to read "Celeste Fay".

Celeste Fay
Regulatory Manager
celeste@gravityrenewables.com

B.3 Sworn Statement and Waiver Form

All applications for LIHI Certification must include the following sworn statement before they can be reviewed by LIHI:

SWORN STATEMENT

As an Authorized Representative of Quinebaug Associates LLC, the Undersigned attests that, to the best of my knowledge, 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 LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified®.

The Undersigned 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.

PLEASE INSERT FOR PRE-OPERATIONAL CERTIFICATIONS (see [Section 4.5.3](#)):

The Undersigned acknowledges that LIHI may suspend or revoke the LIHI Certification should the impacts of the facility, once operational, fail to comply with the LIHI program requirements.

Company Name: Quinebaug Associates LLC

Authorized Representative:

Name: Mark J. Boumansour

Title: Manager

Authorized Signature: 

Date: 6-14-2019

SECTION 1

Application Submission for the Quinebaug Project

Introduction

The Quinebaug - Five Mile Pond Project (FERC P-5062) is an existing 2.6 MW hydropower project, which consists of two developments, one on the Quinebaug River and one on the Five Mile River; **the Quinebaug Development is the focus of Section 1 of this application.** The Quinebaug Development, (the “Project”) is a 2,250 kW run-of-river facility located on the Quinebaug River in the Towns of Brooklyn and Killingly, CT. QA and the associated Project assets were acquired by Gravity Renewables, Inc. (Gravity) in May 2017.

The Project is in compliance with its FERC license and State issued Water Quality Certificate; there have been no notices of violation issued. Operations are monitored closely to ensure compliant operations are maintained. Based on the information provided herein, Gravity believes that the Project is a strong candidate for certification by the Low Impact Hydropower Institute (LIHI).

Project Location

The Project is located at the confluence of the Five Mile and Quinebaug Rivers in the Towns of Brooklyn and Killingly in Windham County, Connecticut. The Towns of Brooklyn and Killingly are located in the Northeastern region of the State of Connecticut approximately 50 miles east of the City of Hartford and 25 miles west of the City of Providence, Rhode Island. The Quinebaug River watershed is located in south-central Massachusetts and eastern Connecticut with watershed extending into Rhode Island. The Quinebaug River is 69 miles in length and is part of the Thames River basin. It originates from East Brimfield Lake and ponds northwest of Sturbridge, Massachusetts, flows generally southeast and south through Connecticut (Putnam, Killingly, Plainfield, Canterbury and Jewett City), the river joins Aspinook Pond which begins in Canterbury and ends in Jewett City. The river then continues to the Shetucket river northeast of Norwich. That river flows from there into the Thames River and drains into the Long Island Sound. It is dammed in its upper reaches at East Brimfield Dam, Westville Dam and West Thompson Dam, all for flood control, as well as numerous mill dams, which powered mills along the river’s course. Some of these locations provide hydroelectric power today.

There are two dams downstream of the Project on the Quinebaug River and one on the Shetucket River. Approximately 20 miles downstream, the Quinebaug River joins the Shetucket River and approximately 25 miles downstream the Shetucket River and the Yantic River join to form the Thames River, a short tidal estuary with a direct connection to Long Island Sound/Atlantic Ocean; there are several dams located between the Project dam and Long Island Sound (see Figure 1).

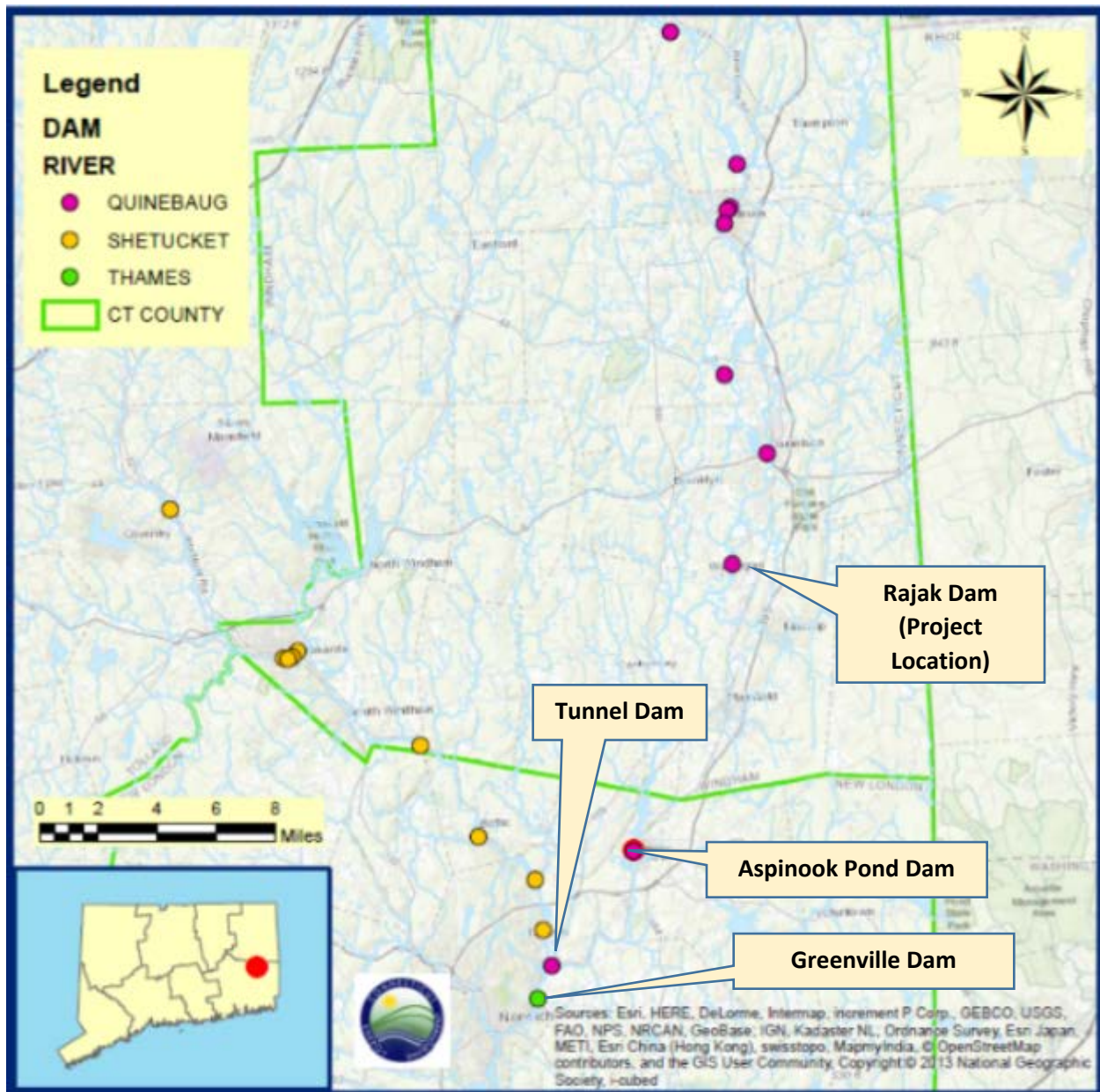


Figure 1. Overview Thames River Basin. See Figure 15 for additional details on dams in the basin.

The following dams are located downstream of the Quinebaug Project (RM 26.2).

- Aspinook Dam – Quinebaug River RM: 7.5 (Hydro, P-3472)
- Tunnel Dam – Quinebaug River RM: 0.2 (Hydro, non-jurisdictional)

- Greenville Dam¹ –Shetucket River RM: 1.3 (Hydro, P-2441)

The following dams are located upstream of the Quinebaug Project (RM 26.2).

- Rogers Dam – Quinebaug RM: 30.9 (mill pond)
- Cargill Falls – Quinebaug RM:37.9 (hydro p-13080)
- Putnam– Quinebaug RM 38.4 (hydro p-5645)
- MSC– Quinebaug RM 38.6 (Hydro p-5689)
- West Thompson Dam – Quinebaug RM 40.3 (Flood Control)

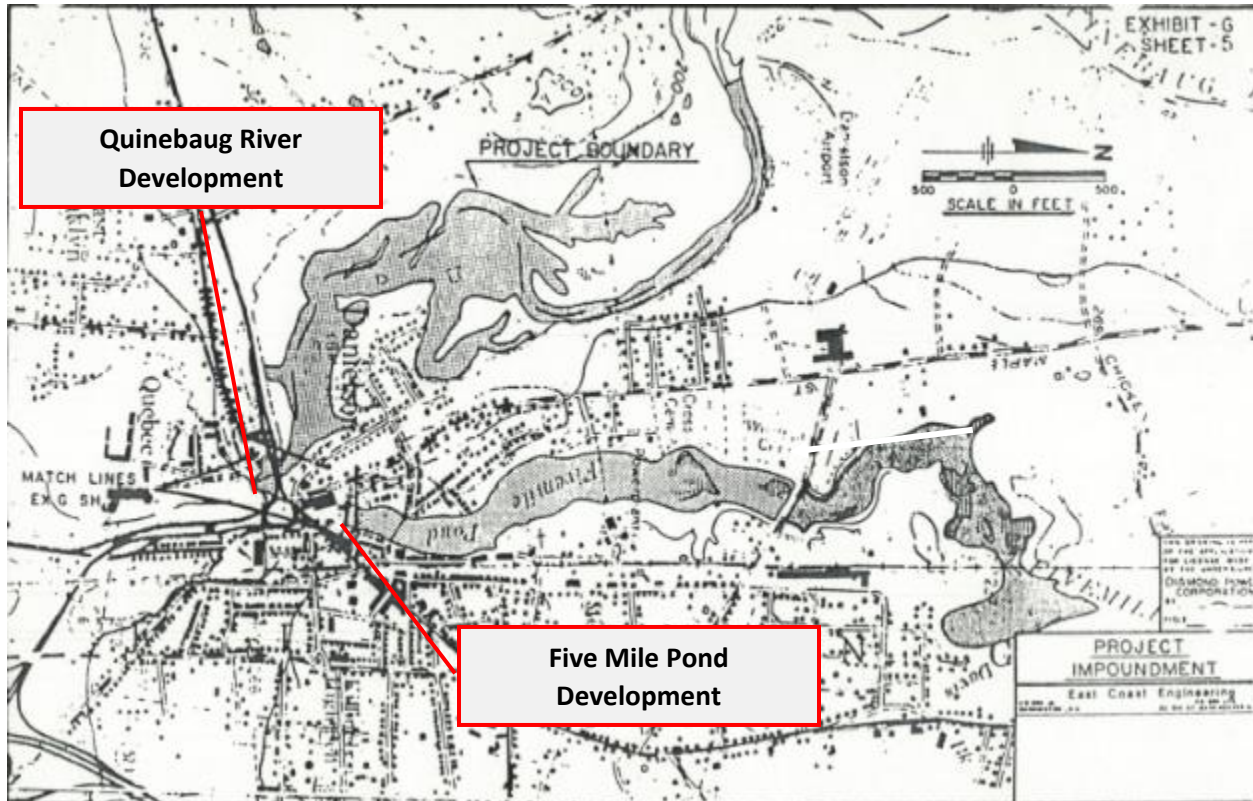


Figure 2. Location of P-5062 Developments

¹ In some reference documents the Greenville Project is listed as being located on the Thames River and in some the Shetucket River. This is likely due to the close proximity of the joining of the Quinebaug, Shetucket and Thames Rivers. LIHI certificate #106 for the Greenville Project lists the project as located on the Shetucket River and this document assumes as such.

Project Description



Figure 3. Overview Site Features

The Quinebaug development's Rojak Dam is a cut stone structure approximately 250 feet long, including a 130 foot spillway. The dam stands approximately 14 feet high and is built of rock. The dam contains four 6-foot square waste gates. Two of the waste gates have been plugged with concrete. A new sluice gate and guides have been added to one of the two remaining sluiceways. The fourth sluiceway opening has been utilized for the installation of a steel penstock (39 3/8" I.D.) for a minimum flow unit at the dam. The concrete and steel canal headwork's structure located near the dam's right abutment contains three gates with approximate 8'-3" by 9'-1" clear openings. The headwork's structure has been rehabilitated and new gates, guides and hoist have been added. The canal is approximately 900 feet long, averaging 30' in width and 9.5' in depth. The canal walls are primarily constructed of stone masonry with some sections having a gunite concrete coating. Post-tensioned rock anchors were added along the top of the wall extended to bed rock on the river ward side of the canal near the lower end.

The minimum flow unit is a submersible axial flow propeller turbine/generator unit located in line with a 39.5" I.D. Steel penstock with reinforced concrete base slab anchored to bedrock. The turbine is located approximately 38.5 feet downstream of the intake structure at the entrance to the original sluiceway. The intake structure is of reinforced concrete construction and contains a slide gate with a hydraulic operator and steel trash racks. Power and control cables for the turbine/generator unit and intake gate are brought underground across the canal headwork's structure to an adjacent equipment house on the right bank of the river. The equipment house is approximately 8' by 14' in plan with concrete floor slab and concrete block walls. The step-up transformer (480v to 23.5 KV) is located adjacent to the equipment house in a separate enclosure.

The two unit lower powerhouse with integral intake structure is of reinforce concrete construction and founded on bedrock. The overall dimensions of the powerhouse and intake structure are 71 feet long by 32.5 feet wide by 43 feet high. A steel draft tube gate with hydraulic operator is provided for each unit. Steel intake gates are provided for both units with the gates dogged in the up position in the gate slots. A truck crane is used to raise and lower these gates for servicing of the units. Steel trash racks are provided upstream of the intake gates. The Trash racks are automatically raked.

Hydrology

Based on a StreamStats evaluation, the site drainage area is approximately 456 square miles, the majority of which is located in Connecticut with small areas extending into Rhode Island and Massachusetts. The Quinebaug River flows in a generally north to south direction and discharges into the Shetucket/Thames River complex before continuing into Long Island Sound. The mean annual flow at the project is estimated at 830 cfs.

Project Operations

The project is operated in instantaneous run-of-river mode with no pondage or storage. The plant is attended part time and has automatic operation for pond level maintenance to ensure compliance with minimum flow operation requirements. Turbine flow is controlled by the project's automatic programable logic controller. A minimum bypass flow of 77 cfs is released to the Quinebaug River through the minimum flow turbine or over the dam spillway. The approximate operating range of the two unit lower powerhouse is 90 to 960 cfs.

Table B-1. Facility Description Information for Quinebaug-Five Mile Project (P-5062)

Information Type	Variable Description	Response (and reference to further details)
Name of the Facility	Facility name (use FERC project name if possible)	Quinebaug-Five Mile Project (P-5062) Note: FERC license P-5062 consists of two separate developments: Quinebaug Project and Five Mile Project. Section 1 of this application is for the Quinebaug Project.
Location	River name (USGS proper name)	Quinebaug River
	River basin name	Thames River Basin
	Nearest town, county, and state	Town of Brooklyn, Windham County, CT
	River mile of dam above next major river	The dam is the third on the Quinebaug River and is located at river mile (RM) 26.8.
	Geographic latitude	41°48'6.21" N
	Geographic longitude	71°53'14.16" W
Facility Owner	Application contact names:	Celeste Fay, Regulatory Manager Celeste@gravityrenewables.com
	- Facility owner (individual and company names)	Quinebaug Associates, LLC Ted Rose, Manager
	- Operating affiliate (if different from owner)	Gravity Operational Services, LLC
	- Representative in LIHI certification	Celeste Fay, Regulatory Manager
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates	FERC P-5062 FERC license issued March 19, 1987 FERC License Amendment Order Issued August 18, 2006 FERC license expires February 28, 2027
	FERC license type or special classification (e.g., "qualified conduit")	Major Project – 5 MW or less
	Water Quality Certificate identifier and issuance date, plus source agency name	Water Quality Certificate issued October 4, 1983 by State of Connecticut Department of Environmental Protection. See Attachment A; no permit identifier or number noted.
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	See Attachment A for electronic records.
Power Plant Characteristics	Date of initial operation (past or future for operational applications)	Project commissioned 1990
	Total name-plate capacity (MW)	2.24 MW
	Average annual generation (MWh)	6,925 MWh/yr

	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	Unit 1: 1,120 kW, Kaplan/Bulb Unit 2: 711 kW, Kaplan/Bulb Unit 3 (min flow): 70 kW, Axial Flow Propeller Hydraulic operating range: Units 1 & 2: 90 – 960 cfs Unit 3: 77 cfs
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	Instantaneous run-of-river mode
	Dates and types of major equipment upgrades	N/A
	Dates, purpose, and type of any recent operational changes	None.
	Plans, authorization, and regulatory activities for any facility upgrades	N/A
Character- istics of Dam, Diversion, or Conduit	Date of construction	Reportedly 1855
	Dam height	Approximately 14 ft
	Spillway elevation and hydraulic capacity	Crest Elevation Main Spillway: 188.0 ft MSL
	Tailwater elevation	161.8 ft MSL, Unit 1 & 2 powerhouse tailwater
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	A power canal conveys water from the dam to the powerhouse. The power canal is approximately 900 ft long and 30 ft wide. A short penstock approximately 40 inches in diameter and 25 ft in length is located immediately adjacent to the right side of the dam and conveys flow to the minimum flow turbine.
	Dates and types of major, generation-related infrastructure improvements	1990, development under current FERC license.
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	Power Generation
	Water source	Quinebaug River
Characte- ristics of Reservoir and Watershed	Water discharge location or facility	Quinebaug River
	Gross volume and surface area at full pool	Volume: 238 ac-ft Surface Area: 85 acres
	Maximum water surface elevation (ft. MSL)	188.0 ft MSL
	Maximum and minimum volume and water surface elevations for designated power pool, if available	N/A
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	<ul style="list-style-type: none"> • Rogers Dam – Quinebaug RM: 30.9 (non-powered) • Cargill Falls – Quinebaug RM:37.9 (Hydroelectric, FERC P-13080)

		<ul style="list-style-type: none"> Putnam– Quinebaug RM 38.4 (Hydroelectric, FERC P-5645) MSC– Quinebaug RM 38.6 (Hydroelectric, FERC P-5689) West Thompson Dam – Quinebaug RM 40.3 (ACOE, Flood Control)
	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	<ul style="list-style-type: none"> Aspinook Dam – Quinebaug River RM: 7.5 (Hydroelectric, FERC P-3472) Tunnel Dam – Quinebaug River RM: 0.2 (Hydroelectric, FERC non-jurisdictional) Greenville Dam –Shetucket River RM: 1.3 (Hydroelectric, FERC P-2441)
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	N/A
	Area inside FERC project boundary, where appropriate	N/A
Hydrologic Setting	Average annual flow at the dam	830 cfs USGS Gage No. 01127000 QUINEBAUG R AT JEWETT CITY, CT with drainage area ratio applied (0.64)
	Average monthly flows	<ul style="list-style-type: none"> January – 1022 cfs February – 1062 cfs March – 1605 cfs April – 1563 cfs May – 961 cfs June – 672 cfs July – 360 cfs August – 307 cfs September – 330 cfs October – 441 cfs November – 685 cfs December – 964 cfs
	Location and name of relevant stream gauging stations above and below the facility	There are two Stream gages located on the lower Quinebaug River. <ul style="list-style-type: none"> Upstream - USGS Gage No. 01125500 QUINEBAUG R AT PUTNAM, CT – 1930-2017, 328 square miles Downstream - USGS Gage No. 01127000 QUINEBAUG R AT JEWETT CITY, CT – 1918-2017, 713 square miles
	Watershed area at the dam	456 square miles

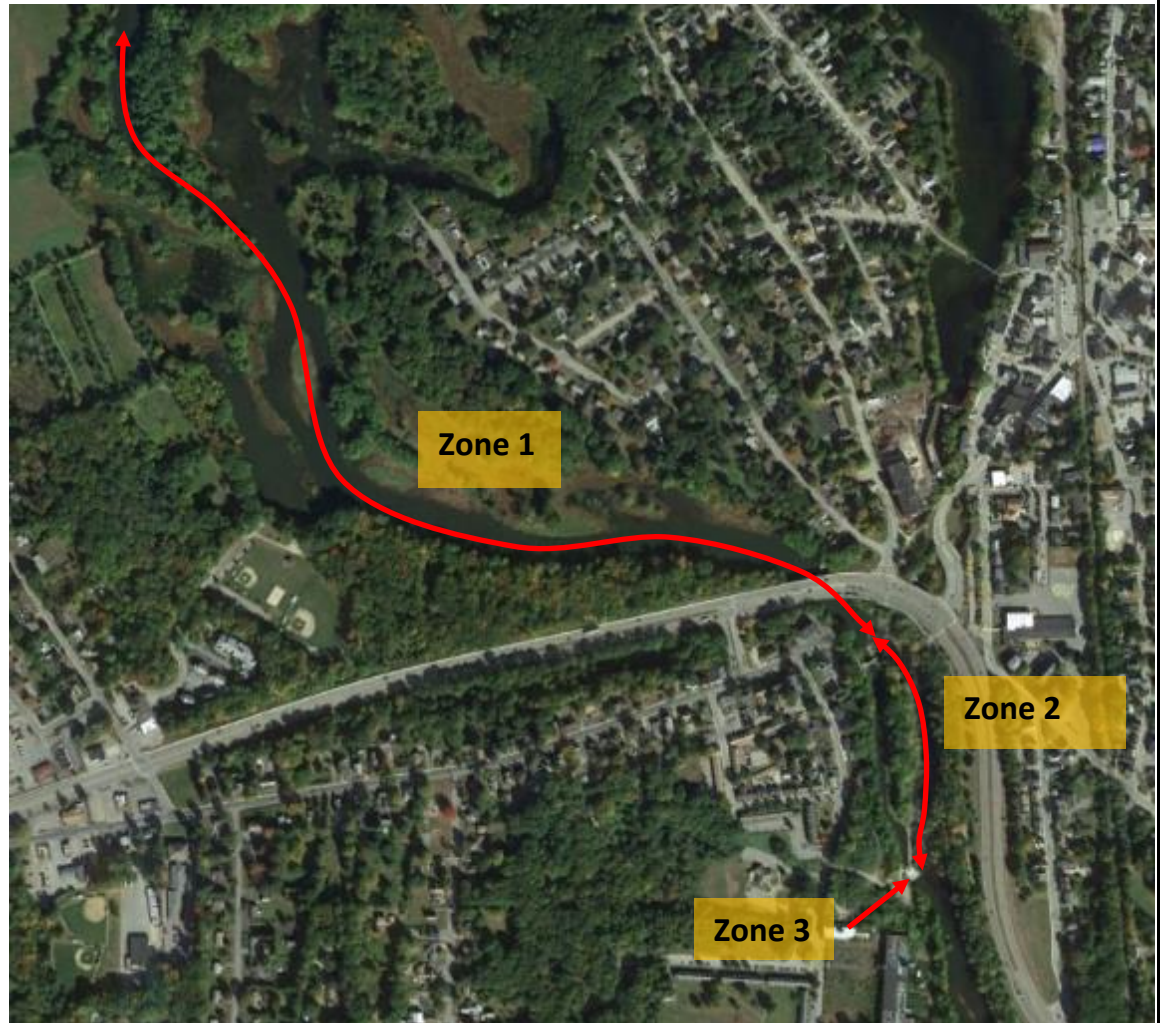
**Designated
Zones of
Effect**

Figure 4. Overview of Project Zones

Upstream and downstream locations by river miles

- Zone 1 – Reservoir, RM 26.2
- Zone 2 – Bypass Reach, RM 26.0
- Zone 3 – Tailrace, RM 25.7

Type of waterbody (river, impoundment, bypassed reach, etc.)

- Zone 1 – Reservoir
- Zone 2 – Bypass Reach
- Zone 3 – Tailrace

Delimiting structures

- Zone 1 – Downstream defined by dam, upstream defined by contour 188 ft (MSL)
- Zone 2 – Downstream defined by confluence with tailrace, upstream defined by dam
- Zone 3 – Downstream defined by end of tailrace, upstream defined by powerhouse wall.


	Designated uses by state water quality agency	The Quinebaug River in the Project area is classified as a Class B-B* resource. Class B waters are designated to be used for fish and wildlife habitat, agricultural and industrial supply and other uses such as navigation. See Attachment A.
	Length of Development	Approximately 1.3 miles
Additional Contact Information	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	See attachment B
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	See Attachment B
Photographs and Maps	Photographs of key features of the facility and each of the designated zones of effect	
	Zone 1 – Reservoir	
		
<i>Figure 5. Overview of Zone 1 – Reservoir</i>		



Figure 6. Quinebaug Reservoir Looking Upstream from Headgates

Zone 2 – Bypass Reach

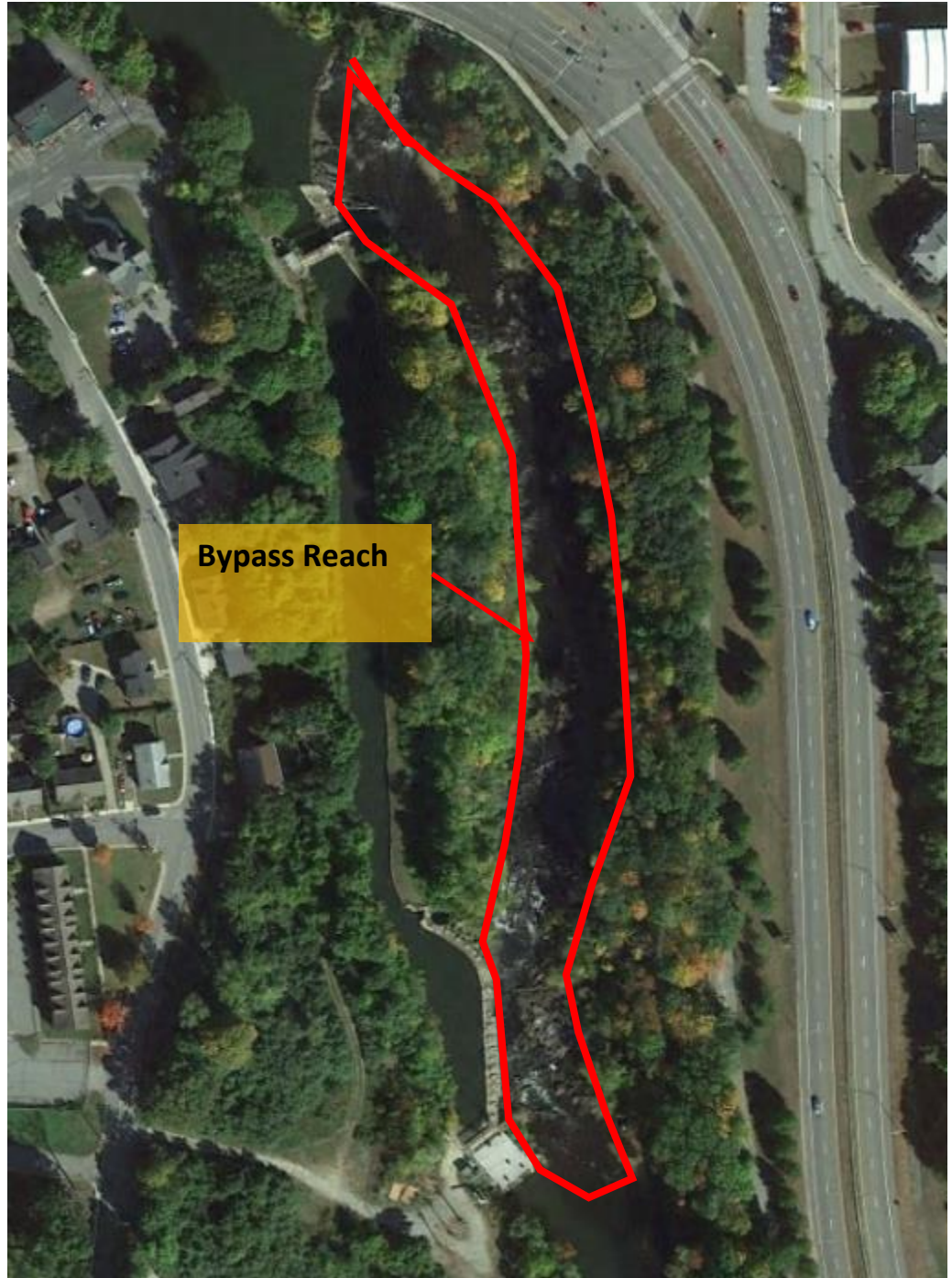


Figure 7. Overview of Zone 2 – Bypass Reach; approximate boundary in red.



Figure 8. Bypass Reach Looking Upstream from Auxiliary Spillway

Zone 3 – Tailrace

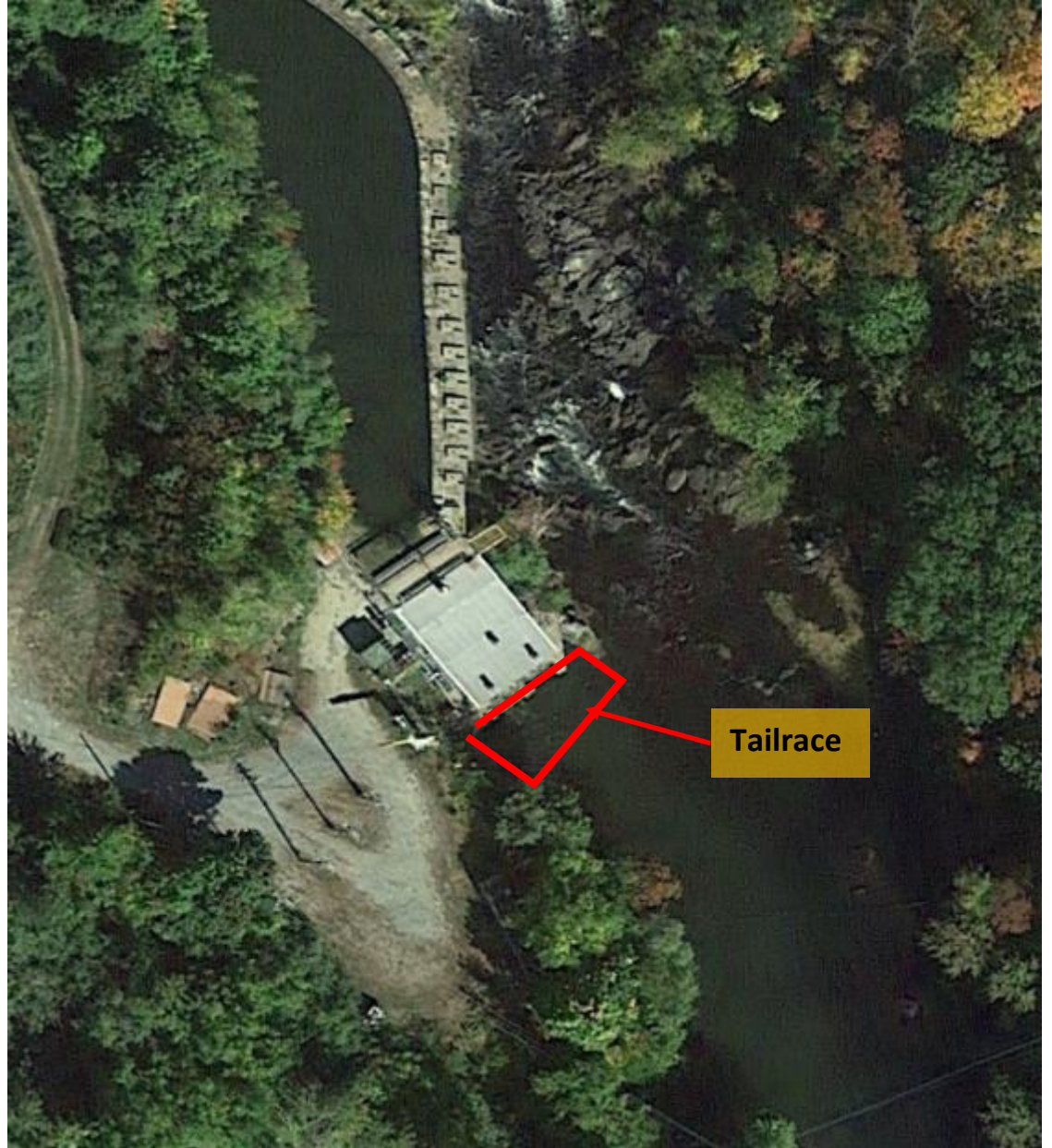


Figure 9. Overview Zone 3 – Tailrace (\pm 5 ft long); approximate boundary in red.



Figure 10. Tailrace Looking Downstream from Auxiliary Spillway

Maps, aerial photos, and/or plan view diagrams of facility area and river basin

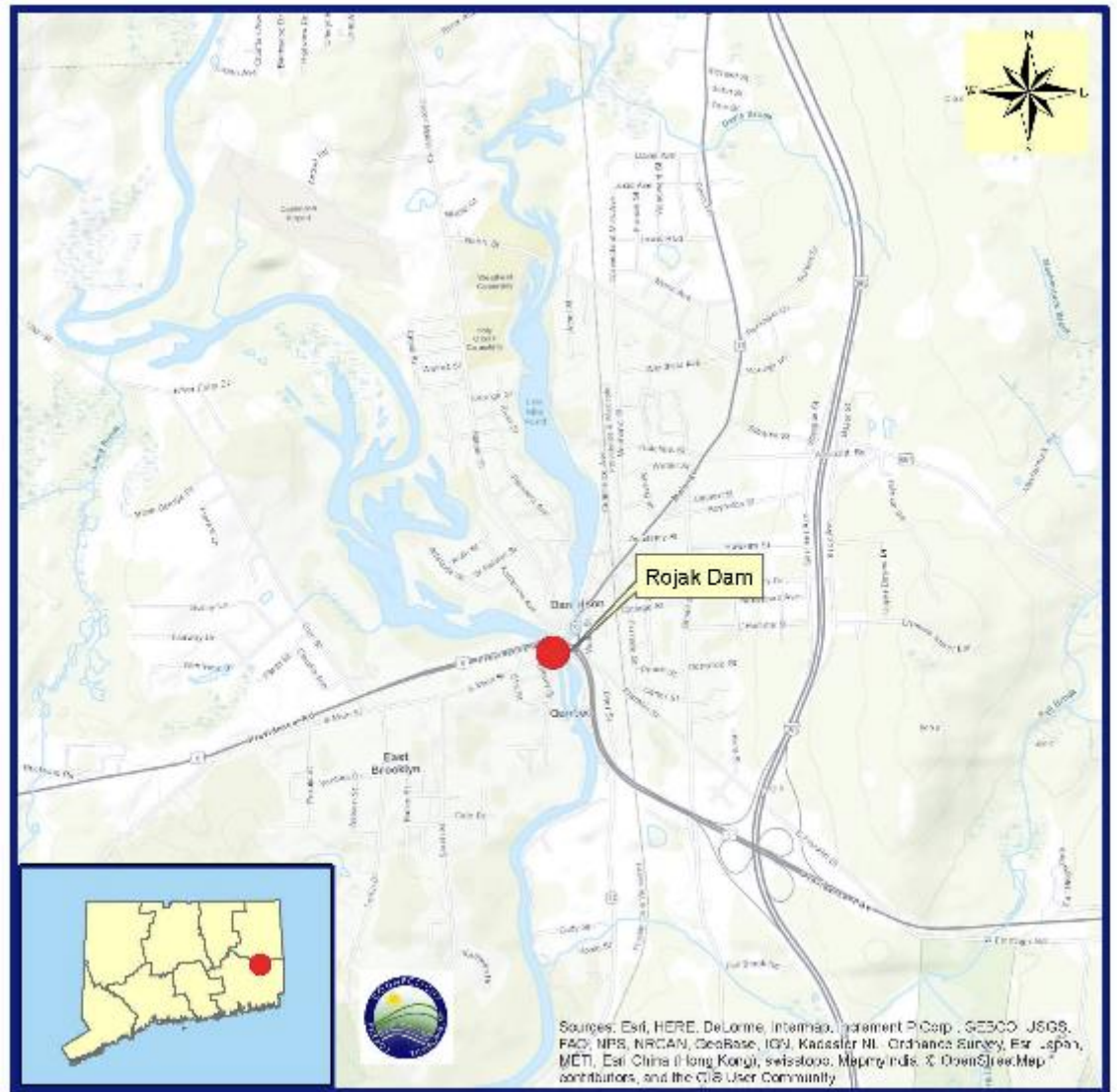


Figure 11. Site Locus Map



Figure 12. Site Topo Map

Table B-1.2. Matrix of Alternative Standard Template Responses for Zones 1, 2 and 3 – Quinebaug Project

Zone of Effect # 1: Impoundment

Criterion		<i>Alternative Standards</i>				
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Plus</i>
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				

Zone of Effect # 2: Bypass Reach

Criterion		<i>Alternative Standards</i>				
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Plus</i>
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				

Zone of Effect # 3: Confluence of Turbine Flow and Quinebaug River

Criterion		<i>Alternative Standards</i>				
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>Plus</i>
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				

B.2.1 Ecological Flow Standards – Quinebaug Project

Zone of Influence #1, #3- Impoundment & Tailrace Ecological Flow Standards

Zone of Influence #1 and #3 have a de minimis effect on ecological flow standards. These Zones consist of the impoundment and tailrace and the project is operated as run-of-river. Therefore, these zones have no effect on ecological flow standards.

Zone of Influence #1 is limited to the 85 acre impoundment and does not include a bypass reach. The site is operated in an instantaneous run-of-river mode with a PLC controller to maintain the project impoundment at 188.0 ft (MSL) during normal project operation.

Zone of Effect #3 does not include a bypass reach. Since the project is operated in instantaneous run-of-river mode with all inflows equaling outflows, Zone of Effect #3 is not affected by the Project since it is downstream of all Project diversions.

The Project has a pressure transducer installed in the project reservoir; upstream of the headgate structure. The readings from this transducer are supplied to the project's programmable logic controller (PLC) located in the powerhouse. The PLC has pre-set elevations within the programming to ensure pond level is maintained. When the pressure transducer readings meet the set point, the turbine flow is adjusted or the turbine is shut off to maintain the run of river operations and normal pond level.

Zone of Influence #1, #2, #3- Impoundment, Bypass Reach & Tailrace Ecological Flow Standards

Zone of Influence #2 is classified as standard A-2.

A minimum bypass flow of 77 cfs is released downstream of the impoundment (to Zone 2) into the bypass reach either through the minimum flow turbine or over the spillway crest. Habitat characteristics and management needs were evaluated during the NEPA and State review processes associated with the issuance of the FERC license and WQC, respectively. NEPA analysis conducted at that time calculated the 7Q10 flow at the Project dam to be 7.7 cfs (FERC 1987). As part of the initial licensing process the FWS recommended a continuous minimum flow at the Rojak Dam of 77 cfs; the State of Connecticut initially recommended a minimum flow of 23 to 77 cfs before including a final requirement of 77 cfs in the 401 WQC (FERC 1987). Requirements for these project operations are specified in the FERC Order Granting License issued March 19, 1987 and CT State Water Quality Certificate issued October 4, 1983. Details of additional studies or analysis that were completed in 1983 are not available to the licensee at this time.

Zone of Effect #2 is the bypass reach. To maintain adequate aquatic flow in the bypassed reach, the WQC and License Order prescribe a minimum bypass reach flow of 77 cfs. When river flows meet or exceed 77 cfs, the bypass flow is provided via minimum flow turbine located at the dam. When flows are less than

77 cfs or the minimum flow turbine is not operational, the bypass flow is provided over the dam spillway crest. Up to the minimum flow of the plant (77 cfs), flow is discharged over the dam spillway.

At 77 cfs, the minimum flow turbine is operational and bypass flows are met through discharge from the minimum flow turbine. In the event that the minimum flow turbine is not available, the pond level is set at 188.32 ft MSL (based on weir equation calculations) in order to meet the 77 cfs minimum flow requirement with flow over the project spillway. At 167 cfs, the main turbines are turned on and 77 cfs is discharged through the bypass over the spillway. The maximum turbine capacity is 960 cfs. At a flow of 1,037 cfs, all turbines are fully operational and the bypass flow is being met. Flows exceeding 1,037 are discharged over the spillway. The following is a tabular representation of the above described protocol.

Flow Dispatch		
River Inflow (cfs)	Description of Operations	
0-76	Inflow is less than the Plant's minimum operating capacity. All flows released over the spillway.	
77-167	Min flow turbine operates at 77 cfs. Remaining flow insufficient to operate main turbines; additional flow discharged over dam spillway.	
167-1,037	Min flow turbine operating at 77 cfs. Main turbines operational from 90 to 960 cfs.	
1,038+	Min flow turbine operating at 77 cfs. Main turbines operational from 167 to 960 cfs. Additional flow discharged over dam spillway.	
Flow Distribution		
River Inflow (cfs)	Primary Spillway	Turbine(s)
0 - 76	0 - 76	0
77	0	77
78-167	1-89	77
168-1,037	0	167-1,037
1,038+	1+	1,037

At this time, there are no anadromous fish species at the Quinebaug project due to the presence of a downstream barrier at the Aspinook Pond Dam. Although no American eels have been documented at the Quinebaug Development; eels have been reported upstream at Cargill Falls in Putnam. In order for eels to be observed upstream they must be present downstream (i.e., at the Quinebaug Project). Therefore, the bypass reach supports eels, resident fish species and other aquatic species. The bypass consists of lentic habitat consisting of a series of riffles, small pools and runs; although it is primarily riffles under normal operations.

The Quinebaug River supports a mixed coldwater and warmwater fishery (FERC 1987). The fish community in Quinebaug River in the vicinity of Rojak Dam has been surveyed several times between 1994 and 2014 by the CT DEEP. Tabulated below are results of the fishery surveys indicating presence of fish species upstream and downstream of the Project (CT ECO; <https://cteco.uconn.edu/projects/fish/viewer/index.html>).

SPECIES	UPSTREAM ²	DOWNSTREAM ³
Black Crappie		X
Green Sunfish		X
Banded Killifish	X	
Longnose Dace	X	X
Brook Trout - Wild		X
White Catfish		X
White Perch		X
Rainbow Trout - Wild		X
Yellow Bullhead	X	X
Brown Bullhead	X	
Chain Pickerel	X	
Common Shiner	X	
American Eel	X	X
Bluegill Sunfish	X	X
Blacknose Dace	X	X
Common Carp	X	X
Fallfish	X	X
Golden Shiner	X	X
Spottail Shiner	X	
Rock Bass	X	
Largemouth Bass	X	X
Pumpkinseed	X	X
Redbreast Sunfish	X	X
Smallmouth Bass	X	X
Tessellated Darter	X	X
White Sucker	X	X
Yellow Perch	X	X
SPECIES RICHNESS	21	21

In terms of species richness, the fish community data are identical, suggesting that a comparably diverse fishery exists upstream and downstream of the Project.

According to data obtained from the Connecticut Environmental Conditions Online (CT ECO); CT DEEP Fish Community Data – Inland Waters, the following macroinvertebrates Families have been observed in the Quinebaug River in the vicinity of the Project.

Ancylidae	Hydroptilidae
Baetidae	Isonychiidae
Brachycentridae	Molannidae
Cambaridae	Naididae

² Data from Quinebaug River in Killingly (Station ID 14412) collected in 2008 and Quinebaug River in Putnam (Station ID 16990) collected in 1994).

³ Data from Quinebaug River in Killingly (Station ID 16304) collected in 2008, 2009, 2010, 2012 and 2014.

Chironomidae	Odontoceridae
Coenagrionidae	Perlidae
Corbiculidae ⁴	Perlodidae
Elmidae	Philopotamidae
Empididae	Physidae
Ephemerellidae	Pisidiidae
Gammaridae	Psephenidae
Glossosomatidae	Simuliidae
Heptageniidae	Siphonuridae
Hydropsychidae	Tipulidae

⁴ Survey data only identifies occurrences to Family level, however the occurrence of Corbiculidae may represent the presence of the invasive Asiatic clam, Corbicula fluminea. This occurrence was recorded only once in 2014 downstream of Aspinook Dam (CT ECO Station ID: 14598).

B.2.2 Water Quality Standards – Quinebaug Project

Zone of Effect #1, #2, #3- Impoundment, Bypass Reach & Tailrace Water Quality Standards

Zone of Influence #1, #2 and #3 have a de minimis effect on water quality.

The freshwater ecosystem of the Thames River Basin is reported to be strongly influenced by nutrients from urban and agricultural areas even though the majority of the basin is forested (USGS 2005). The Connecticut Department of Energy and Environmental Protection (CT DEEP) classified the Quinebaug River in the project area as class B-B* as shown in Figure 13. Class B waters are designated to be used for fish and wildlife habitat, agricultural and industrial supply and other uses such as navigation. Class B* waters have good to excellent aesthetic quality and have a minimum dissolved oxygen (DO) standard of 5 milligrams per liter (mg/l).

The State of Connecticut's 2016 305b Water Quality Assessment (http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf) of the Quinebaug River downstream of the Project (Aspinook Pond inlet at Butts Bridge Rd crossing, upstream to confluence with Mill Brook, Canterbury – ID; CT3700-00_2, and Confluence of Mill Brook, near Yaworski Landfill, upstream to confluence with Moosup River – ID; CT3700-00_3) was not assessed for aquatic life and was found to be fully supporting for recreation. The same 305b report indicated that the Quinebaug River upstream of the Project (Confluence Moosup River upstream to Putnam POTW, Putnam – ID; CT3700-00_04) was found to be not supporting for aquatic life and fully supporting for recreation. The impaired designated uses for this reach are identified as: habitat for fish and other aquatic life and wildlife. The causes of this impairment are unknown. The potential source of impairments for aquatic life in this reach are not linked to Project operations and are listed in the 305b report as: stormwater, remediation sites, groundwater impacts, salt storage facilities, industrial discharges and municipal discharges.

Based on a review of the 2016 Integrated Water Quality Report developed by the State of Connecticut, the Quinebaug Project appears to be located within the section of the Quinebaug River defined as CT3700-00_03. This stretch of river is approximately 6.3 miles in length and extends from the confluence of Mill Brook, near Yaworski Landfill to the upstream confluence with the Moosup River. The assessment report indicated that the stretch of river has not been assessed for aquatic life but is fully supporting for recreation activities. The report did not indicate that the Quinebaug River in the project area is impaired.

USGS gage No. 01124000 has some water quality data; however, it is not located near the Project. Gage No. 01124000 is located on the Quinebaug River adjacent to the border with the State of Massachusetts. A review of all USGS gages on the Quinebaug did not indicate any other gages close to the project that do include water quality data pertinent to the project. The closest downstream gauge is USGS Gauge 01127000. This gauge does not provide DO readings.

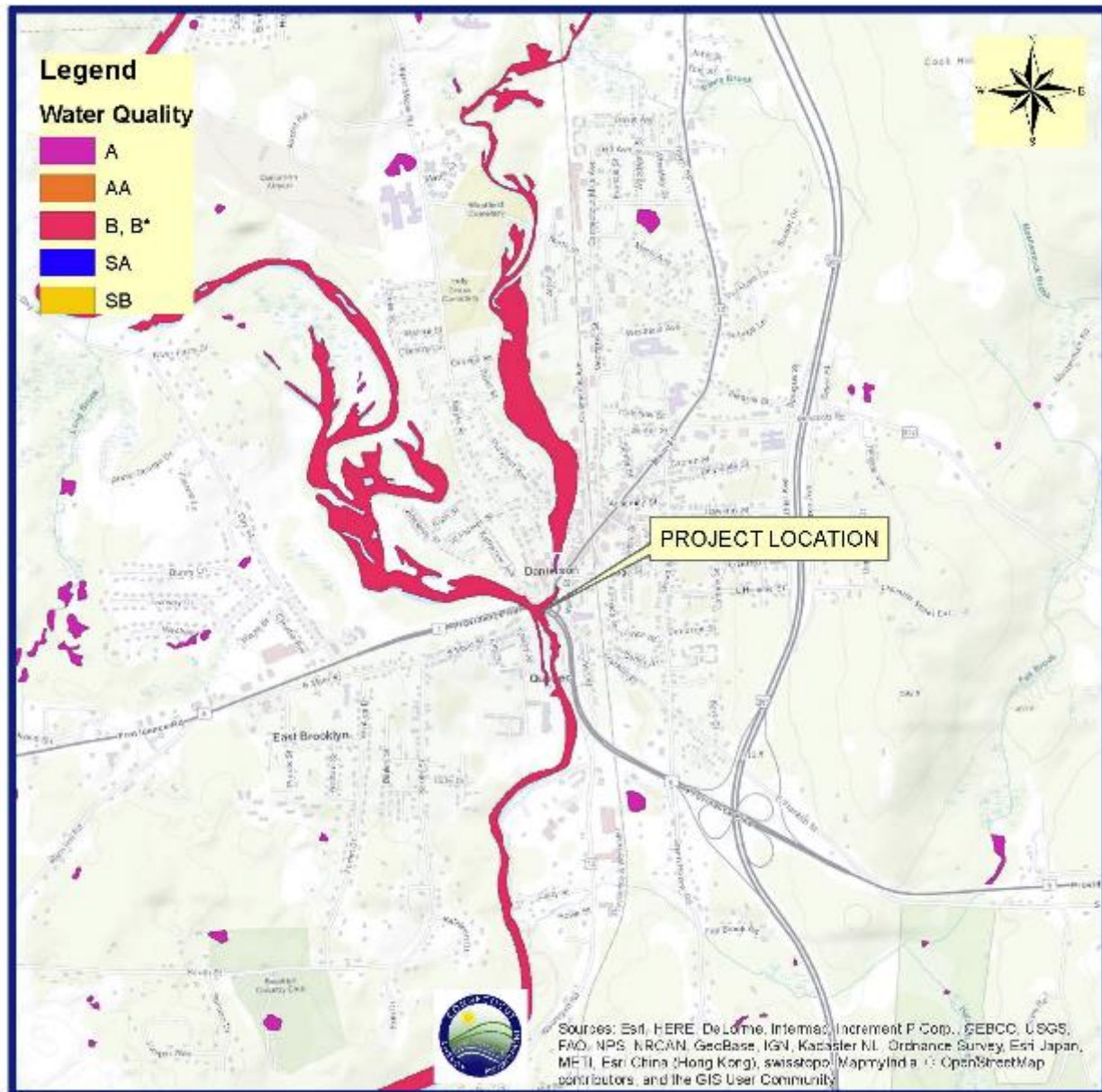


Figure 13. CT DEEP Water Quality Classifications

Water quality data on the downstream Quinebaug River is available at the downstream Jewett City USGS Gage, which indicates that water quality in the area meets state criteria. This is key information as typically water quality declines in the lower reaches of a river system (as compared to the upper reaches).

USGS Gage No. 01127000 Quinebaug River at Jewett City, CT, located approximately 7 miles downstream from the Project, has collected intermittent water quality data since 1952. Figure 13 shows historic dissolved oxygen (DO) levels recorded at the gage. These data demonstrate an average DO level of 10.5 mg/L; further there have been no recorded instances where the State water quality standard of 5 mg/L has been violated.

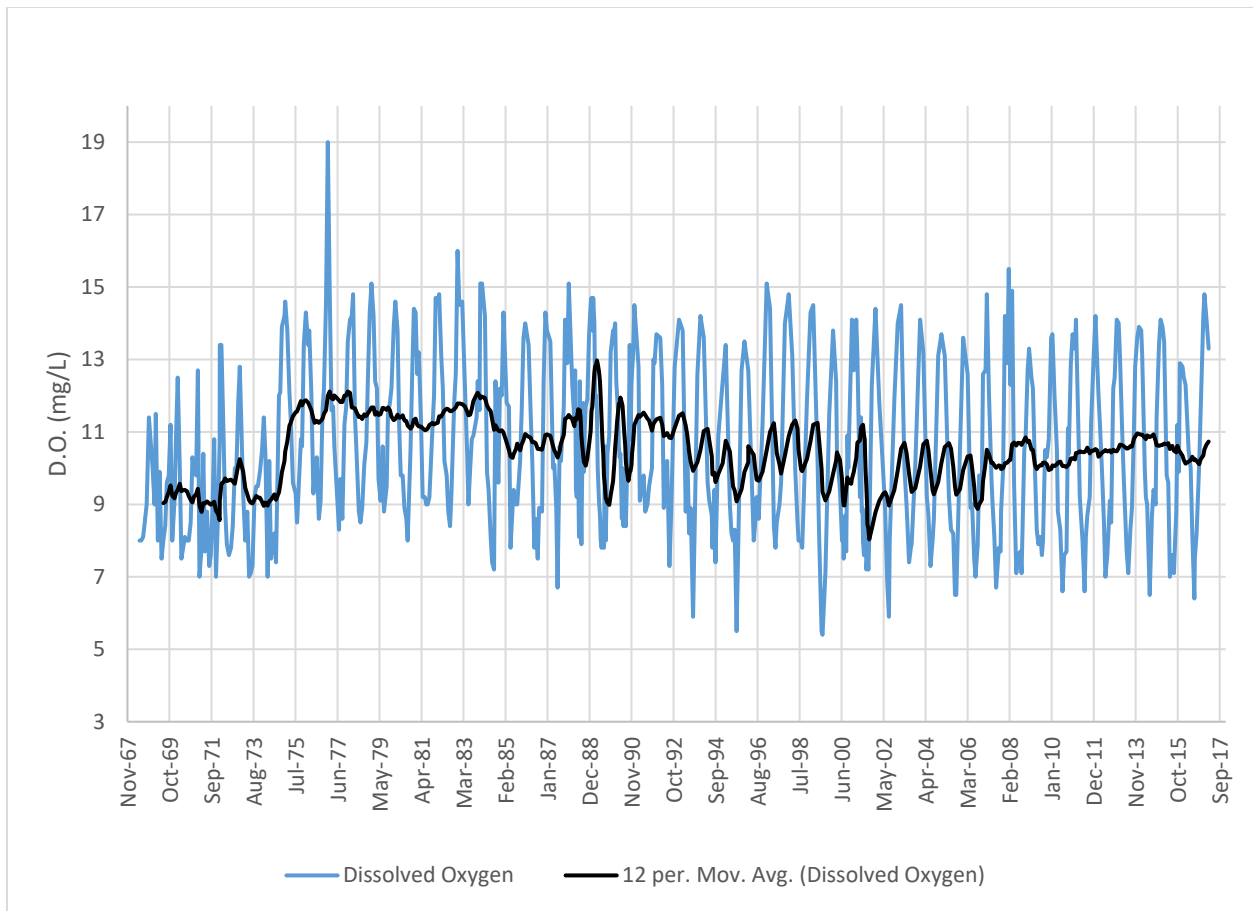


Figure 14. Historic Dissolved Oxygen Levels USGS Gage, Quinebaug River at Jewett City, CT (USGS Gage No. 01127000)

Additional data from the USGS gage indicates an average water temperature of 13.6° Celsius (C), with a historic maximum of 30° C recorded in 1977.

B.2.3 Upstream Fish Passage Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace Upstream Fish Passage Standards

Zone of Influence #1, #2 and #3 have a de minimis effect on upstream fish passage.

Although it does not currently have upstream fish passage installed at the dam, there are downstream barriers to fish passage and a clear regulatory pathway for installation of fish passage when necessary.

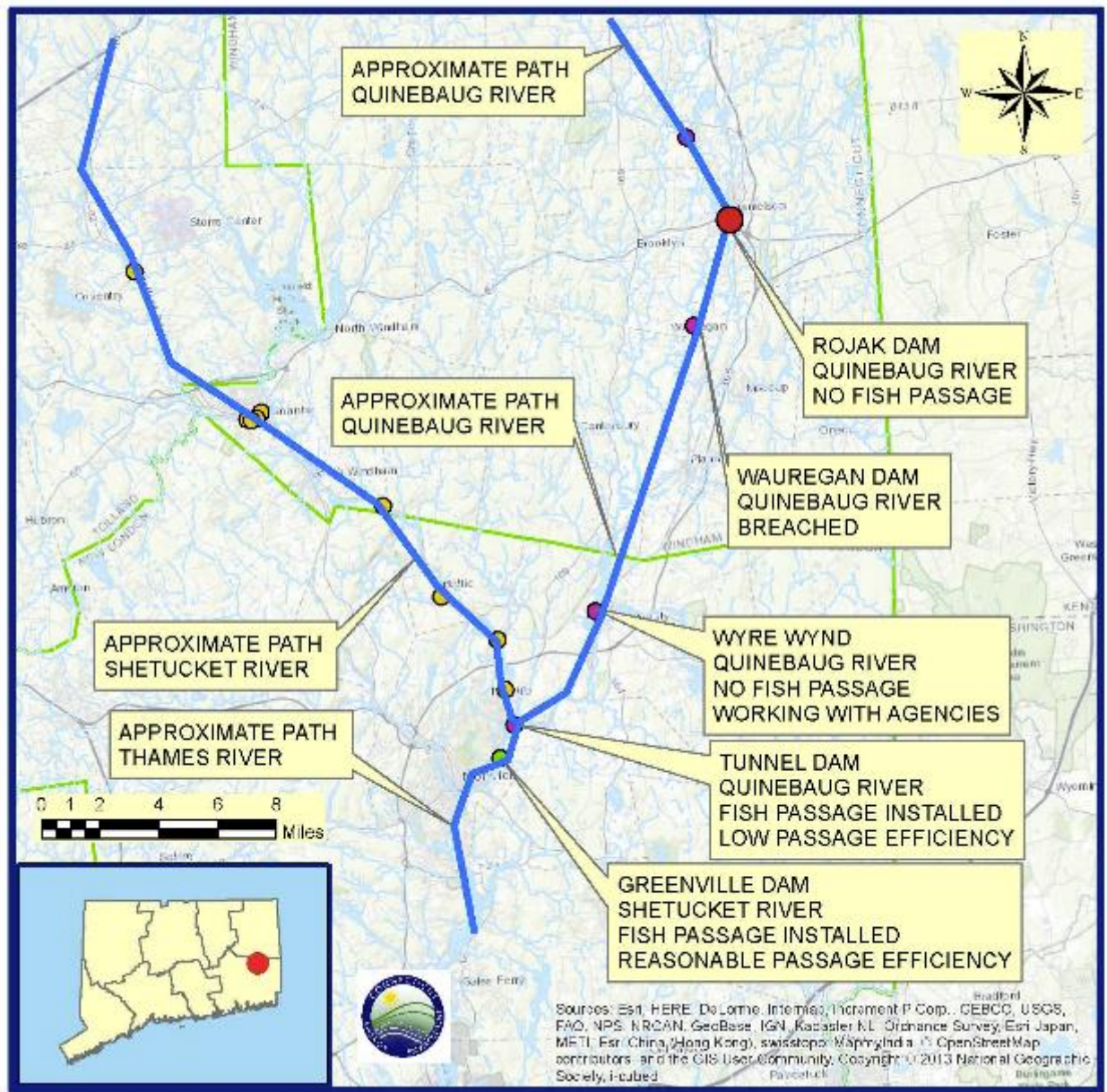
The Quinebaug Dam is the third dam located on the Quinebaug River. Approximately 25 miles downstream, the Quinebaug River and Shetucket River join to form the Thames River which ultimately discharges into the Atlantic Ocean. Downstream of the Rojak Dam, there are two dams located on the Quinebaug River and one dam located on the Shetucket River. There are migratory fish species in the Thames, Shetucket and Quinebaug River and an ongoing restoration effort at downstream dams. As shown Figure 15, the Wyre Wynd Hydroelectric Project (FERC P-3472) is currently the upstream barrier to migratory fish species. The Wyre Wynd Hydroelectric Project is currently engaged in the FERC relicensing process and working with resource agencies to address fish passage restoration goals. Upon completion of fish passage at the Wyre Wynd Hydroelectric Project, The Rojak Dam will be the upstream barrier to fish passage. The condition below was recognized during initial conditioning of the Project as noted in the 1983 WQC which specifies the following:

“recognition and acceptance of a responsibility to provide effective anadromous fish passage facilities on the Quinebaug and Fivemile Rivers upon request by the Department.”

Further, the FERC License includes Article 402, which states, in part:

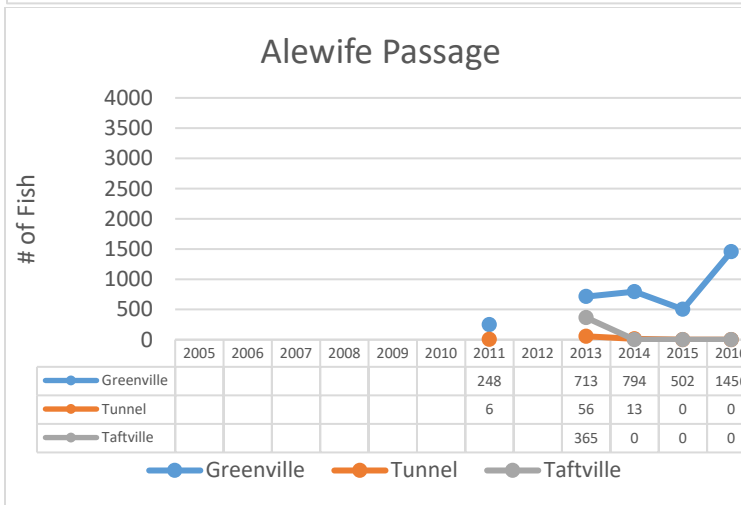
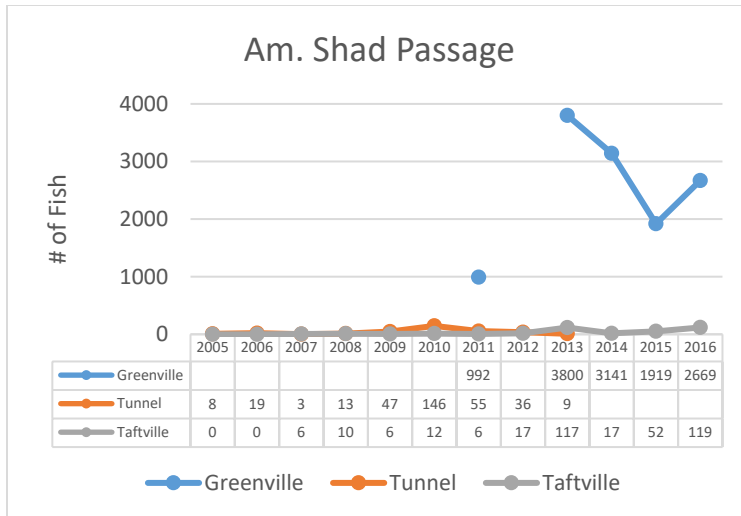
“The licensee, no later than 6 months after the start of construction of fish passage facilities at the Aspinook Pond Dam, shall file for Commission approval, functional design drawings for upstream and downstream passage facilities at Five Mile Pond and Rojak Dam, prepared after consultation with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Connecticut Department of Environmental Protection....”

Subsequent to the issuance of the FERC license and WQC, the CT DEEP developed, *The Shetucket River Fisheries Restoration Plan*, which includes consideration of the Quinebaug River. The Project will be commencing the relicensing process in the near future (NOI due by February 2022 with pre-consultation prior) which Gravity anticipates will include a detailed review of fish passage with environmental agencies.



The migratory species located further downstream in the watershed and which are the target of upstream fish passage include American shad, blueback herring and alewife as well as American eel.

The two projects downstream of Rojak Dam which currently have fish passage are the Greenville Dam (FERC P-2442) on the Shetucket, and Tunnel Dam (FERC, non-jurisdictional) on the Quinebaug River. Figure 16 summarizes fish counts at these facilities (availability of data prior to 2013 is limited). Information on the Taftville Dam (first on the Shetucket River) is included also as an indicator of the total number of fish moving past the Greenville dam which then continue to ascend a second dam in the basin.



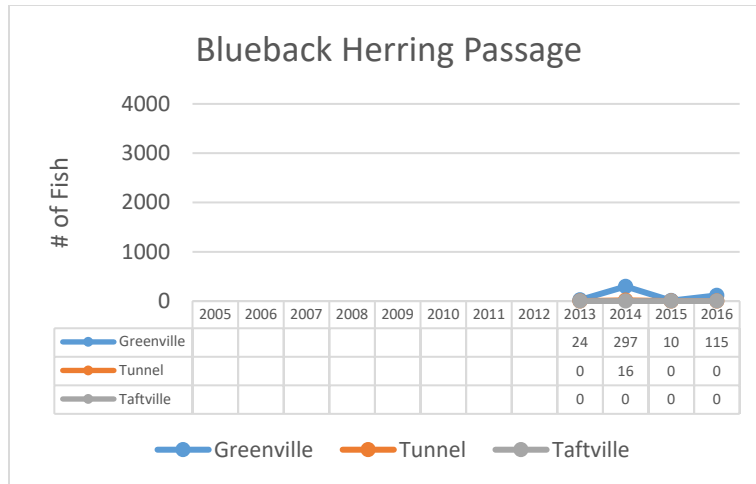


Figure 16. Summary Fish Counts at Greenville, Tunnel and Taftville Projects

Table 1 summarizes the percentage of fish observed ascending the first dam (Greenville on the Shetucket River) which were subsequently observed at either of the next upstream fish ways (Taftville in the Shetucket River, or Tunnel in the Quinebaug River). These data suggest limited success of migratory fish to navigate between the Greenville Dam and existing passage facilities further upstream.

Table 1. Percentage of Fish Observed Ascending Greenville Dam and Taftville or Tunnel

Species	2013	2014	2015	2016	Species Avg.
American Shad	7%	2%	5%	5%	5%
Alewife	59%	3%	2%	2%	15%
Blueback Herring	0%	5%	0%	0%	1%
Yearly Average	22%	3%	2%	2%	
Overall Average					7%

The CT DEEP estimated that by opening up the stretch of river from the Aspinook Dam (Wyre Wynd Project) to the upstream Rojak Dam (Quinebaug Project) a total of 684 acres of habitat would be opened to anadromous fish species supporting a projected American shad population of 41,040 fish, and projected herring population of 61,560 fish (CT DEEP 2009). These estimates are based on an assumed 90 fish per acre production rate for river herring and a 60 fish per acre production rate for American shad (CT DEEP 2009).

Based on these per acre utilization estimates and the amount of habitat currently accessible above the Greenville Dam (96 acres of open water habitat, NWI Mapping), the population potential between the Greenville and Taftville/Tunnel Dams is 5,760 American shad and 8,640 river herring. Actual usage of this area by these species (based on the four year average fish counts at the Tunnel and Taftville Dams) between 2013 and 2016 was 2,800 American shad and 488 river herring. These values correlate to approximately 49% usage of available habitat by American shad and 6% habitat usage by river herring. Over the same period <1% of the available habitat upstream of the Tunnel Dam was accessed (and presumably utilized) by American shad, blueback herring and alewife.

American eel are known to reside throughout the Quinebaug watershed. Upstream passage facilities are located downstream at the Greenville, Tunnel and Aspinook Dams as well as at least one upstream location at the Cargill Falls Project located in Putnam, CT. There are no formal upstream eel passage facilities installed at the Quinebaug Project's Rojak Dam; however, it is known that eels are able to migrate upstream of the Project due to their documented occurrences upstream. American eels have the capacity to surmount obstacles through crawling movements out of water on wet surfaces (Tremblay et. al., 2015⁵). Therefore, we surmise that the eels utilize this crawling ability to pass up and over the wetted face of the Rojak Dam spillway, over the canal embankment and/or over the left abutment of the dam to enter into the project headwaters and continue their movement to the upper reaches of the watershed.

⁵ Tremblay V, Cossette J, Dutil J-D, Verreault G, and Dumont P (2015). *Assessment of upstream and downstream passability for eel at dams*. *ICES Journal of Marine Science*. 73(1). Pp 22-32.
<https://academic.oup.com/icesjms/article/73/1/22/2458709>

B.2.4 Downstream Fish Passage and Protection Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace Downstream Fish Passage Standards

Zones of Effect #1, #2 and #3 have a de minimis effect on downstream fish passage.

Anadromous fisheries are located downstream of the project; catadromous fishery is reported to extend to the base of the upstream dam located at Cargill Falls. Based on Gravity's relicensing work at the Wyre Wynd Project downstream, resource managers are focused on migratory fisheries management in the lower watershed. Fish survey data are provided in a previous section of this application.

The trashrack spacing at the Quinebaug Project is 3 inch and the approach velocity is estimated to be about 1.4 ft/second which is less than the standard Agency guidance of 2 ft/second or less to protect fish against entrainment and impingement. Due to these low velocities, it is unlikely that fish are impinged on the trashrack or entrained through the turbines. Therefore, they are free to swim within the project impoundment and migrate downstream during times of spill. Note that with the exception of American eel, there are no migratory fish species in the project area (known at this time) that are dependent on moving downstream of the dam to complete life cycle.

The FERC License includes a stipulation from US Fish and Wildlife Services (FWS) that fish passage facilities be provided following installation of fish passage at the downstream Aspinook Pond Dam. Gravity is committed to work collaboratively with resource managers to address fish passage facilities at such a time as required to support and advance management goals.

B.2.5 Shoreline and Watershed Protection Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace Shoreline and Watershed Protection Standards

Zone of Effect #1, #2 and #3 have a de minimis effect on shoreline protection or watershed protection.

There are no specific Agency recommendations for shoreline protection or watershed protection nor any mention of these protections in the WQC or FERC license.

The project does not have, nor is it required to have, a watershed enhancement fund or specific watershed land protection plan. The project is in compliance with all State and Federal resource Agency recommendations in the License.

The project operates in an instantaneous run-of-river mode which minimizes impoundment fluctuations and disturbances to the natural hydrograph mitigating any Project related impacts to shoreline and watershed resources. See discussion in Zones of Effect 1 and 2, Ecological Flow Regimes.

The Quinebaug and Five Mile Projects are co-licensed under a single FERC license and single project boundary. The project boundary is approximately 130 acres. Of that, about 126 acres is land under water, about 2 acres has tree and brush cover and about 2 acres is urban/developed. The Project does not include any of the lands adjacent to the reservoirs (Quinebaug or Five Mile). See Figure 17.



Figure 17. Approximate Project Boundary for Quinebaug and Five Mile Project

B.2.6 Threatened and Endangered Species Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace

Threatened and Endangered Species

Zone of Effect #1, #2 and #3 have a de minimis effect on threatened and endangered species.

A review of the CT State Natural Diversity Database (updated December 2017) was completed for more up-to-date information (see Figure 17).

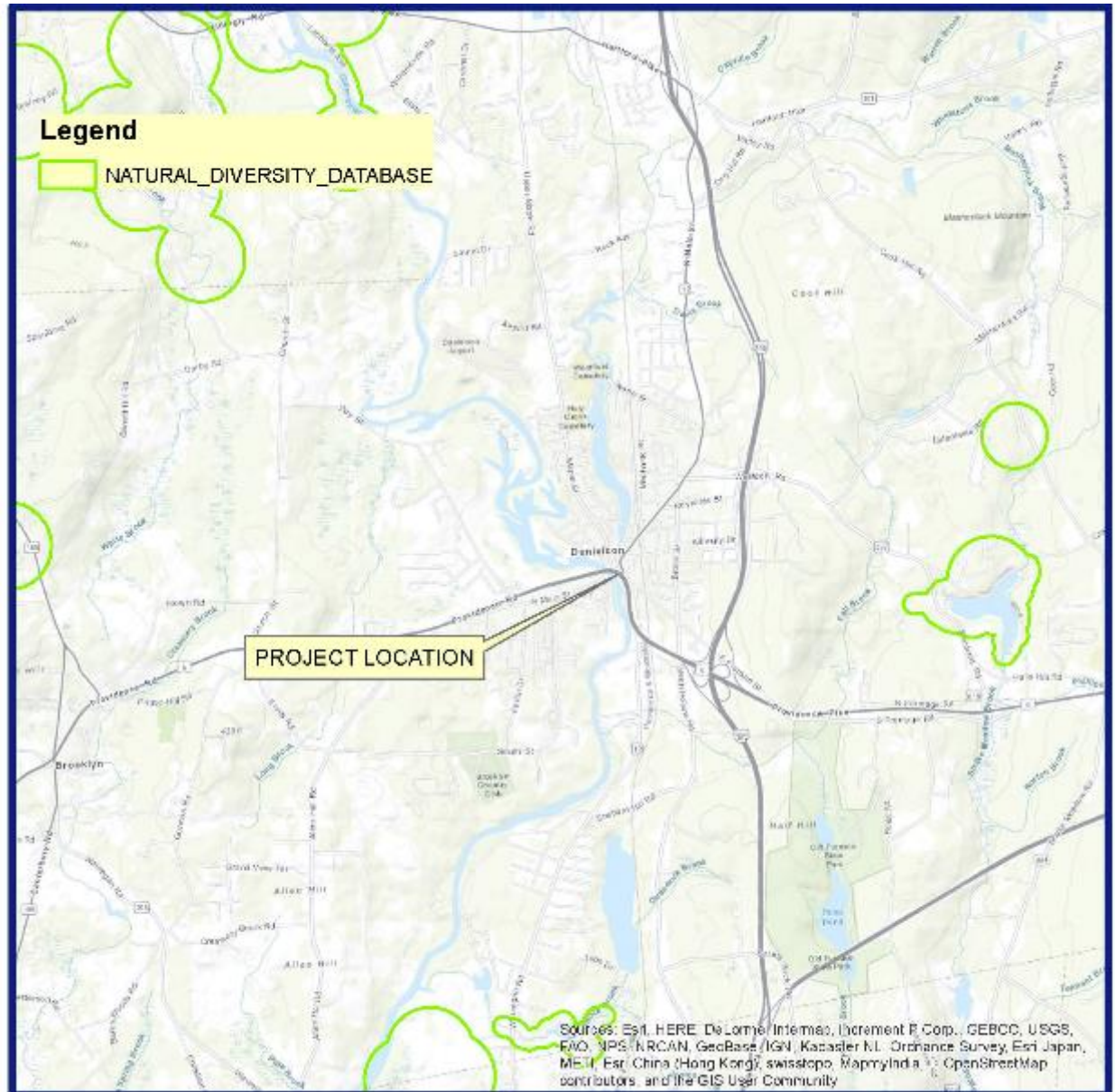


Figure 18. CT Natural Diversity Database (Threatened, Endangered, Protected Species). Updated December 2017.

Review of the US FWS list of Federally listed Endangered and Threatened Species in Connecticut (https://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm) , only the Federally Threatened, Northern Long-eared bat (NLB) is identified with potential habitat in the ZoE (a large swath of the US is listed as potential habitat, see Figure 18).

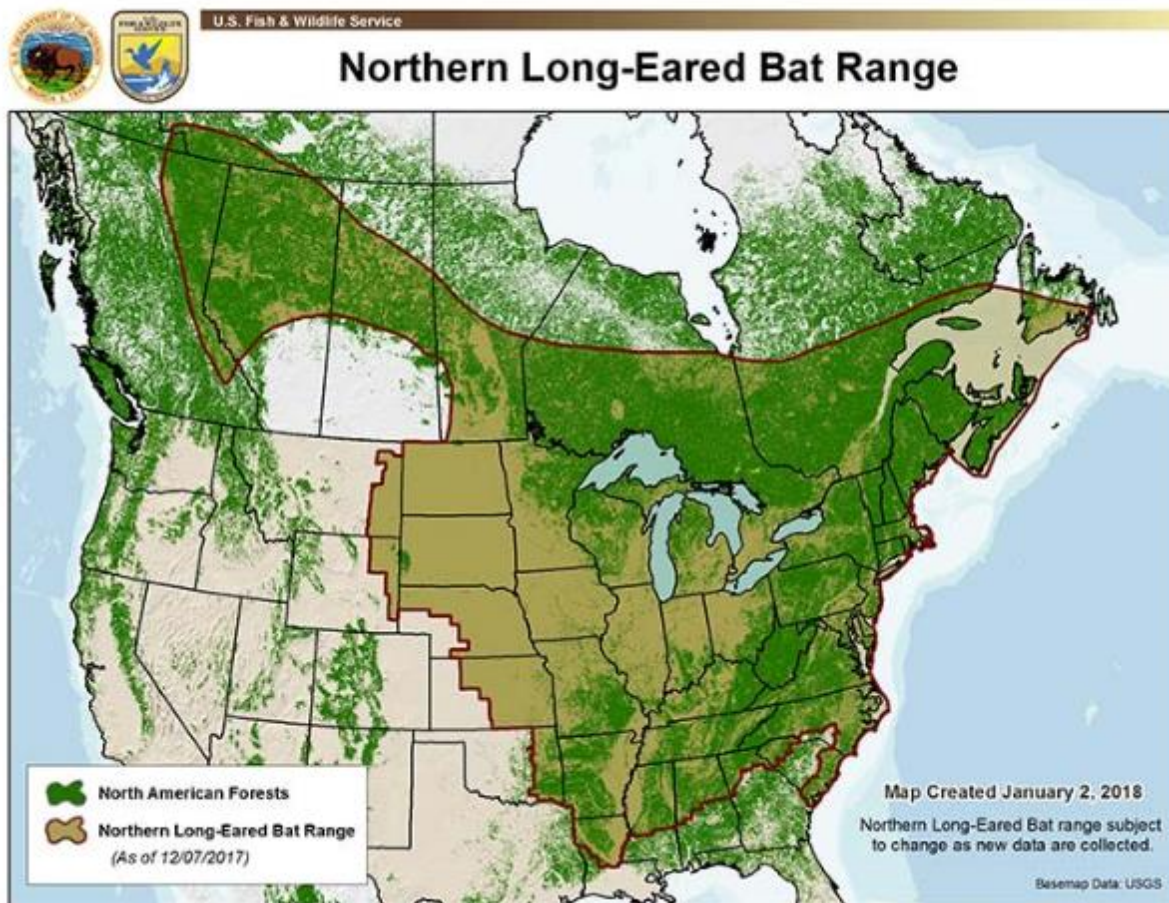


Figure 19. Northern Long-Ear Bat Range (USFWS)

Pursuant to the instructions provided by the USFWS related to ESA Section 7 consultations, general habitat characteristics for this species includes mines and caves (over-wintering) and forested habitats (summer). There are no mines or caves within any of the Project ZoE's, further there are no project-related activities which would disturb existing forested habitat. Despite the potential for NLB to be present, there are no State or Federally listed species with recorded observations within the Project area, therefore there are not likely any project related effects.

The licensee completes regular vegetation removal; however, this does not typically include trees. Normal maintenance includes mowing of lawns and cutting back of brush and other low growing vegetation primarily on the banks of the power canal.

B.2.7 Cultural and Historic Resources Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace

Cultural and Historic Resources

Zone of Effect #1, #2 and #3 have a de minimis effect on historic resources.

During initial construction, a survey of the property was completed and mitigation efforts completed to minimize adverse impacts to the resource. The FERC license includes the following text:

“...If the applicant discovers any previously unidentified archaeological or historic sites during the course of constructing or developing the project works or other facilities at the project, the applicant should halt construction and development activities in the vicinity of the sites, and should consult a qualified cultural resources specialist and the SHPO about eligibility of the sites for listing in the National Register of Historic Places and about any measures needed to avoid the sites or to mitigate effects on the sites. ”

Further, a 2003 FERC Environmental Inspection Report notes the following relative to Cultural Resources (FERC 2003⁶):

“There are no known prehistoric archaeological sites within the boundaries of the Five Mile Pond or Quinebaug Developments. There has been extensive industrial development in the area in addition to construction and development of the hydroelectric generating facilities. The possibility of uncovering previously unknown archaeological sites in the area is remote. There are no structures within the project area that are listed on or eligible for inclusion on the National Register of Historic Places. The licensee must consult with the Connecticut State Historic Preservation Officer prior to any land-disturbing activities. The licensee appears to be in compliance with its requirements with regards to cultural resources.”

Gravity is committed to completing the proper SHPO consultation prior to completion of any significant ground disturbing activities.

⁶ 20031125-0427 Issued by FERC OSEC 11/24/2003 in Docket#: P-5062-000

B.2.8 Recreational Resources Standards – Quinebaug Project

Zone of Effect #1, #2 & #3- Impoundment, Bypass Reach & Tailrace Recreational Resources

Zone of Effect #1, #2 and #3 have a de minimis effect on recreational resources.

There are no specific Agency recommendations for recreation nor any mention of this resource in the WQC or FERC license other than FERC Standard Article 18, which “requires the licensee to allow free public access to project lands and waters” (FERC 2003). While there are no formal project-related recreational facilities within any of the ZoE’s there are several public areas which provide free access to the impoundment in the upstream reaches. According to the latest FERC Form 80 submission, public use of these areas has historically been very limited.

The project is in compliance with all State and Federal resource Agency recommendations in the license.

SECTION 2

Application Submission for the Five Mile Pond Project

Introduction

The Quinebaug - Five Mile Pond Project (FERC P-5062) is an existing 2.6 MW hydropower project which consists of two developments, one on the Quinebaug River and one on the Five Mile River; **the Five Mile Pond Development is the focus of Section 2** of this application. The Five Mile Pond Development, (the “Project”) is a 350 kW run-of-river facility located on the Five Mile River in the Town of Killingly, CT. QA and the associated Project assets were acquired by Gravity Renewables, Inc. (Gravity) in May 2017. Note: there is another river named Five Mile River in western Connecticut that flows through New Canaan and West Norwalk.

The Project is in full compliance with its FERC license and State issued Water Quality Certificate; there have been no notices of violation issued. Operations are monitored closely to ensure compliant operations are maintained. Based on the information provided herein, Gravity believes that the Project is a strong candidate for certification by the Low Impact Hydropower Institute (LIHI).

Project Location

The Project is located on the Five Mile River in the Town of Killingly in Windham County, Connecticut. The Town of Killingly is located in the Northeastern region of the State of Connecticut approximately 50 miles east of the City of Hartford and 25 miles west of the City of Providence, Rhode Island. The Five Mile River watershed is located primarily in Connecticut and flows through the towns of Thompson, Putnam and Killingly, CT. The Five Mile River is 23.5 miles long and is a tributary of the Quinebaug River which is part of the Thames River basin, its source is Little Pond near the Massachusetts – Connecticut border. The Five Mile River discharges into the Quinebaug River in Killingly, CT, near the intersection of Connecticut Route 12 and US Route 6 approximately 0.2 River Miles (RM) downstream of the Project.

There are no dams downstream of the Project on the Five Mile River. There are three dams downstream of the Project on the Quinebaug River and one on the Shetucket River. Approximately 20 miles downstream, the Quinebaug River joins the Shetucket River and approximately 25 miles downstream the Shetucket River and the Yantic River join to form the Thames River, a short tidal estuary with a direct connection to Long Island Sound/Atlantic Ocean; there are several dams located between the Project dam and Long Island Sound (see Figure 1).

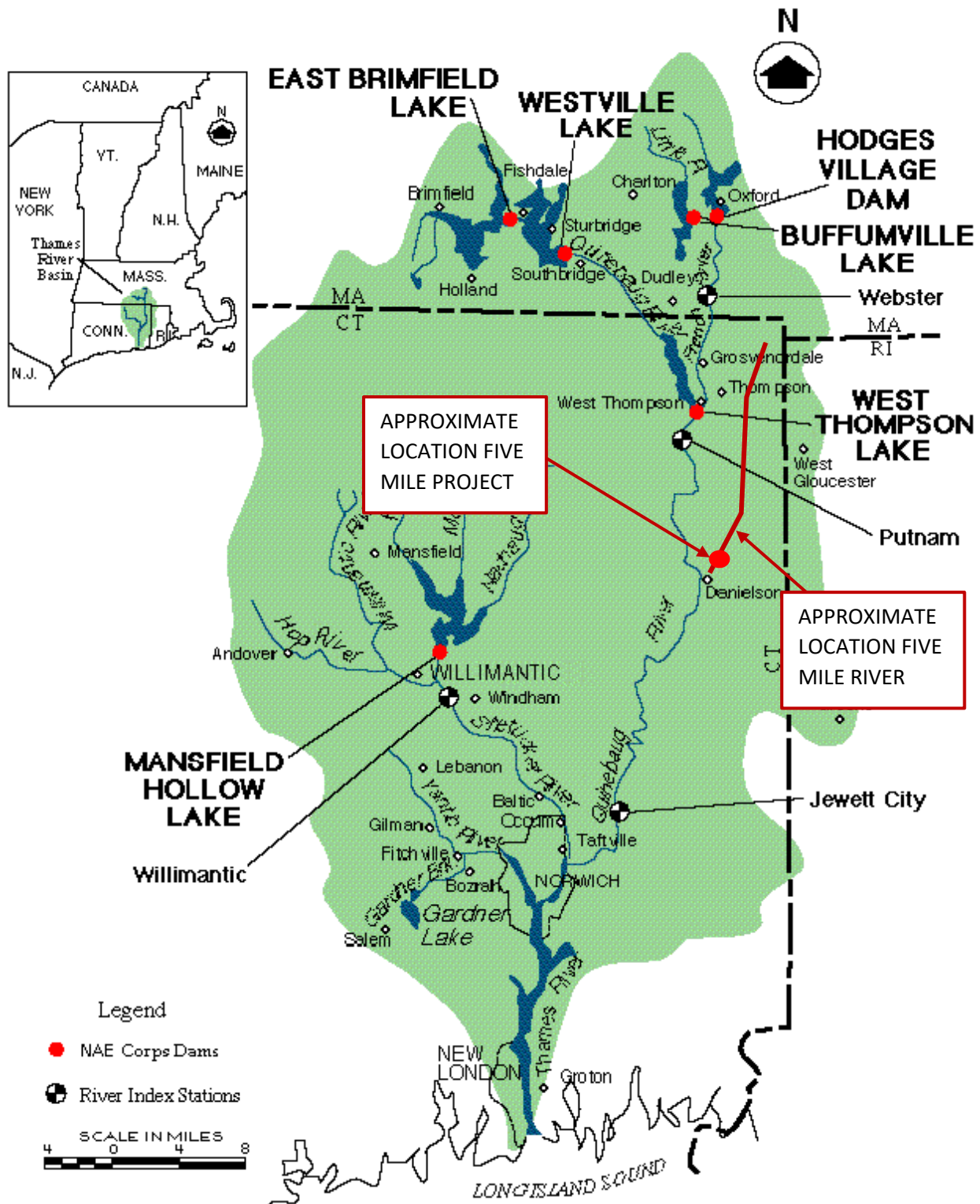


Figure 20. Overview Thames River Basin. See Figure 15 for additional information on dams in the basin.

The following dams are located downstream of the Five Mile Project.

- Aspinook Dam – Quinebaug River RM: 7.5 (Hydro, P-3472)
- Tunnel Dam – Quinebaug River RM: 0.2 (Hydro, non-jurisdictional)
- Greenville Dam –Shetucket River RM: 1.3 (Hydro, P-2441)

The following dams are located upstream of the 5-Mile Project.

- Old Daniels Dam – Five Mile River RM 8.1
- Ballouville Dam – Five Mile River RM 7.1
- Un-Named Dam – Five Mile River RM 5.6
- Un-Named Dam – Five Mile River RM 5.0

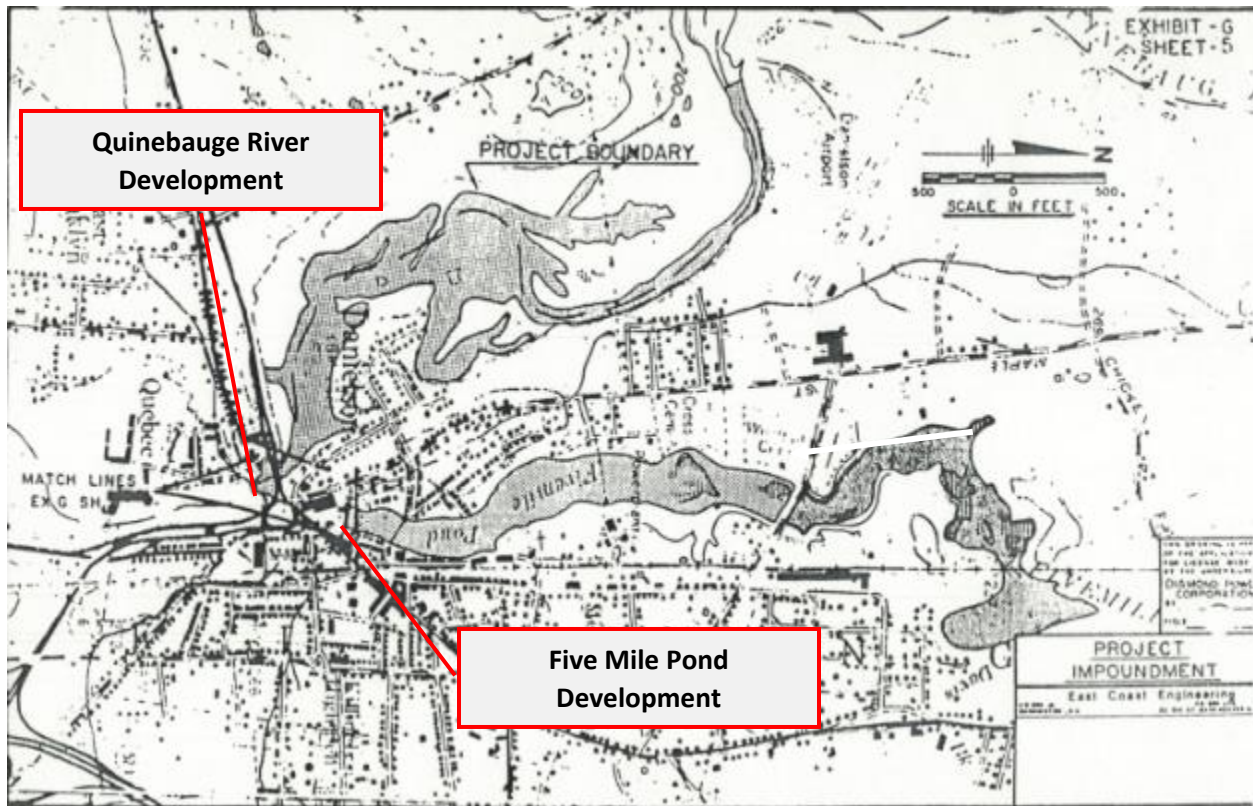


Figure 21. Location of P-5062 Developments

Project Description



Figure 22. Overview Site Features

The Five Mile Pond Development consists of a dam, spillway, impoundment, intake structure, canal and powerhouse (see Figure 3). The dam is known as both the Quinebaug Dam and Rojak Dam. The dam is approximately 135 ft long with a canal intake structure toward the right and spillway on the left (looking

downstream). The dam is a stone masonry gravity structure with an overflow spillway section approximately 100 ft long. The maximum height of the dam is 16.5 ft.

The canal headgate structure contains five manually operated vertical steel gates. The canal width varies along its length but is approximately 30 ft wide, 12 ft deep and 280 ft long. The left side of the canal is formed by the natural elevation of the surrounding terrain and lined with concrete and stone. The right side of the canal is formed by stone lined earthen embankment. A trashrack with an automatic raking system is located at the terminus of the power canal. Immediately downstream of the trashrack, water is conveyed to the powerhouse. Immediately upstream of the powerhouse is a canal overflow spillway. The spillway is concrete lined and approximately 80 ft long.

The powerhouse is approximately 30 ft wide by 20 ft long and constructed of masonry block and wood. The powerhouse contains a single double regulated Kaplan turbine rated for 350 kW.

The Project tailrace is minimal. Water from the draft tube enters a channel which conveys water directly to the Five Mile River. An approximately 15 ft long concrete wall angles flow from the draft tube back to the main river channel for gradual reintroduction and separation from the main channel.

The reservoir created from the Five Mile Dam is approximately 65 acres with a storage capacity of 260 ac-ft and a normal water surface elevation of 220.75 ft.

Hydrology

The site drainage area is approximately 75 square miles, the majority of which is located in Connecticut with areas extending into Rhode Island and Massachusetts. The Five Mile River flows in a generally north to south direction and discharges into the Quinebaug River approximately 1,000 ft downstream of the Five Mile Pond Development. The mean annual flow at the project is estimated at 130 cfs.

Project Operations

The project is operated in instantaneous run-of-river mode with no pondage or storage. Turbine flow is controlled by the project's automatic programmable logic controller. A minimum bypass flow of 15 cfs is released to the bypass reach through a notch in the flashboards.

Table B-1. Facility Description Information for Five Mile Pond Development

Information Type	Variable Description	Response (and reference to further details)
Name of the Facility	Facility name (use FERC project name if possible)	Quinebaug-Five Mile Pond Project (P-5062) Note: FERC license P-5062 consists of two separate developments: Quinebaug and Five Mile Pond. Section 2 of this application is for the 5-Mile Pond Development only.
Location	River name (USGS proper name)	Five Mile River
	River basin name	Thames River Basin
	Nearest town, county, and state	Borough of Danielson, Town of Killingly, Windham County, CT
	River mile of dam above next major river	The dam is the first on the Five Mile River and is located approximately 1,000 ft upstream of the confluence with the Quinebaug River.
	Geographic latitude	41°48'14.69" N
	Geographic longitude	71°53'10.50" W
Facility Owner	Application contact names (IMPORTANT: you must also complete the Facilities Contact Form):	Celeste Fay, Regulatory Manager Celeste@gravityrenewables.com
	- Facility owner (individual and company names)	Quinebaug Associates, LLC Ted Rose, Manager
	- Operating affiliate (if different from owner)	Gravity Operational Services, LLC
	- Representative in LIHI certification	Celeste Fay, Regulatory Manager
Regulatory Status	FERC Project Number (e.g., P-xxxxx), issuance and expiration dates	FERC P-5062 FERC license issued March 19, 1987 FERC License Amendment Order Issued August 18, 2006 FERC license expires February 28, 2027
	FERC license type or special classification (e.g., "qualified conduit")	Major Project – 5 MW or Less
	Water Quality Certificate identifier and issuance date, plus source agency name	Water Quality Certificate issued October 4, 1983 by State of Connecticut Department of Environmental Protection. See Attachment A; no identifier or number noted.
	Hyperlinks to key electronic records on FERC e-library website (e.g., most recent Commission Orders, WQC, ESA documents, etc.)	See Attachment A for electronic records.

Power Plant Characteristics	Date of initial operation (past or future for operational applications)	Project originally commissioned 1990; Unit replacement commissioned 2007.
	Total name-plate capacity (MW)	0.350 MW
	Average annual generation (MWh)	1,020 MWh/yr
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	Unit 1 – 350 kW, Kaplan Hydraulic operating range: 25-227 cfs
	Modes of operation (run-of-river, peaking, pulsing, seasonal storage, etc.)	Instantaneous run-of-river mode
	Dates and types of major equipment upgrades	2007, Increase in Installed Capacity (260 kW to 350 kW) resulting from turbine replacement.
	Dates, purpose, and type of any recent operational changes	2007, replaced submersible 260 kw single regulated Kaplan unit with a 350 kw double regulated Kaplan unit. Unit replacement required no change in hydraulic capacity.
	Plans, authorization, and regulatory activities for any facility upgrades	None proposed.
Characteristics of Dam, Diversion, or Conduit	Date of construction	Reportedly 1855
	Dam height	Approximately 16.5 ft
	Spillway elevation and hydraulic capacity	Crest Elevation Main Spillway: 219.8 ft MSL Normal WSEL (w/1 ft flashboards): 220.8 ft MSL
	Tailwater elevation	197.2 ft MSL
	Length and type of all penstocks and water conveyance structures between reservoir and powerhouse	Canal conveys water from the dam to the powerhouse. The canal is approximately 280 ft long, 30 ft wide and 12 ft deep.
	Dates and types of major, generation-related infrastructure improvements	Unit replaced 2007.
	Designated facility purposes (e.g., power, navigation, flood control, water supply, etc.)	Power Generation
	Water source	Five Mile River
	Water discharge location or facility	Five Mile River
Characteristics of Reservoir and Watershed	Gross volume and surface area at full pool	Volume: 260 ac-ft Surface Area: approximately 65 acres
	Maximum water surface elevation (ft. MSL)	220.8 ft MSL
	Maximum and minimum volume and water surface elevations for designated power pool, if available	220.8 ft MSL
	Upstream dam(s) by name, ownership, FERC number (if applicable), and river mile	<ul style="list-style-type: none"> • Old Daniels Dam – RM 8.1 • Ballouville Dam – RM 7.1 • Un-Named Dam – RM 5.6 • Un-Named Dam – RM 5.0

	Downstream dam(s) by name, ownership, FERC number (if applicable), and river mile	<ul style="list-style-type: none"> Aspinook Dam – RM7.5 (Quinebaug River) – Aspinook Hydro, LLC P-3472⁷ Tunnel Dam – RM 0.2 (Quinebaug River) – Hydro Power, FERC non-jurisdictional Greenville Dam – RM 1.3 (Shetucket River) P-2441
	Operating agreements with upstream or downstream reservoirs that affect water availability, if any, and facility operation	N/A
	Area inside FERC project boundary, where appropriate	N/A
Hydrologic Setting	Average annual flow at the dam	<p>130 cfs (1937-71)</p> <p>Based on historic flow data obtained from USGS Gage No. 01126000 FIVEMILE R AT KILLINGLY, CT with drainage area ratio applied (1.3); discontinued on 10/13/1971</p>
	Average monthly flows	<ul style="list-style-type: none"> January – 149 cfs February – 171 cfs March – 253 cfs April – 247 cfs May – 159 cfs June – 104 cfs July – 66 cfs August – 52 cfs September – 61 cfs October – 64 cfs November – 104 cfs December – 135 cfs
	Location and name of relevant stream gauging stations above and below the facility	<p>There are no active Stream gages located on the Five Mile River, however historic gaging information was obtained from:</p> <ul style="list-style-type: none"> Gage No. 01126000 FIVEMILE R AT KILLINGLY, CT – 1937-1971 <p>Discontinued, 58 square miles</p>
	Watershed area at the dam	76 square miles
	Number of zones of effect (ZoE)	3

⁷ Owned by Gravity Renewables, Inc.

**Designated
Zones of
Effect**

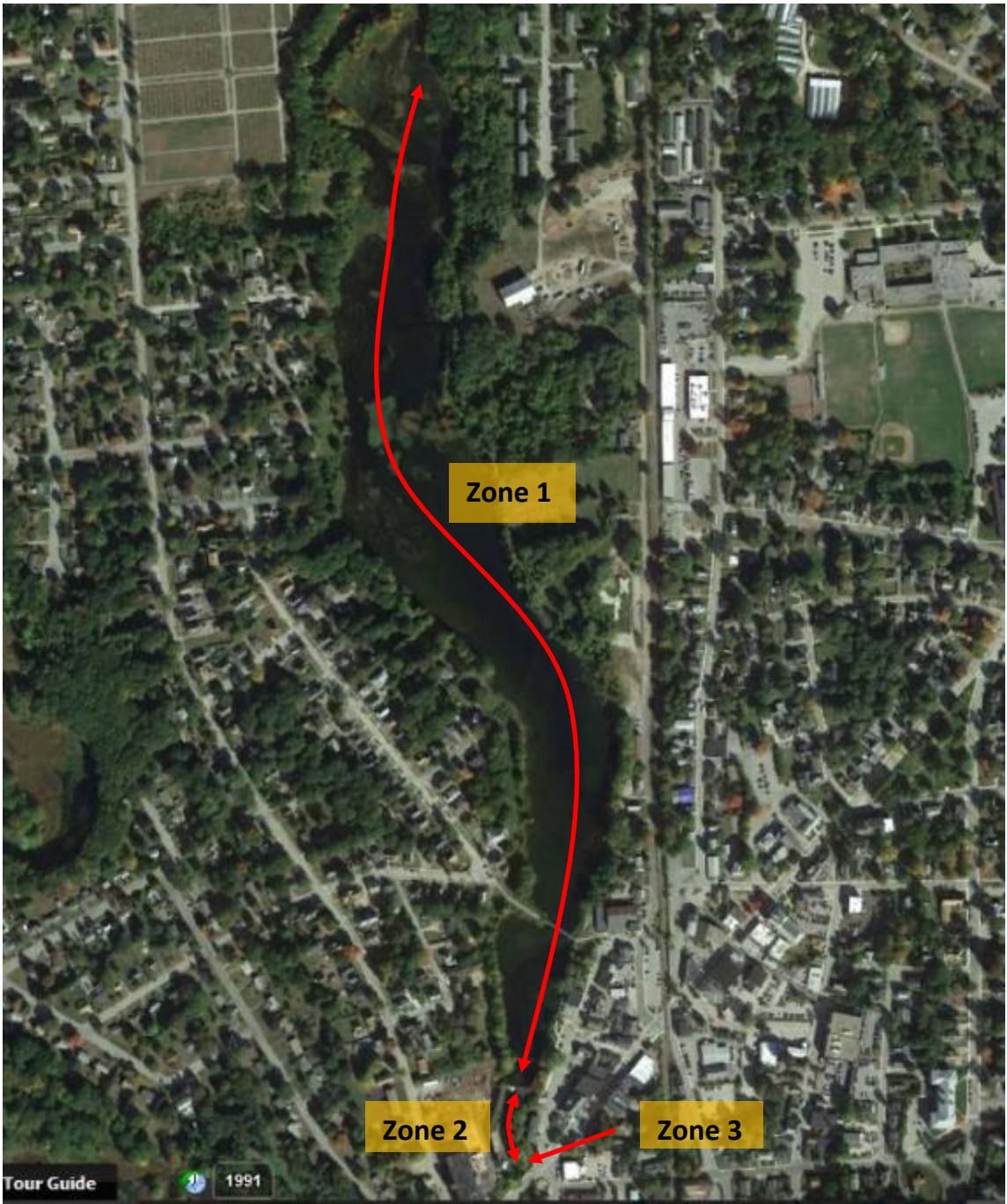


Figure 23. Overview of Project Zones

	Upstream and downstream locations by river miles	<ul style="list-style-type: none"> • Zone 1 – Reservoir, RM 0.2 • Zone 2 – Bypass Reach, RM 0.15 • Zone 3 – Tailrace, RM 0.12
	Type of waterbody (river, impoundment, bypassed reach, etc.)	<ul style="list-style-type: none"> • Zone 1 – Impoundment • Zone 2 – Bypass Reach • Zone 3 – Tailrace
	Delimiting structures	<ul style="list-style-type: none"> • Zone 1 – Downstream defined by dam, upstream defined by contour 220.8 ft • Zone 2 – Downstream defined by confluence with tailrace, upstream defined by dam • Zone 3 – Downstream defined by end of tailrace wall, upstream defined by powerhouse wall.
	Length of Development	Approximately 1 mile
	Designated uses by state water quality agency	Operation of hydroelectric facilities. See Attachment A.
Additional Contact Information	Names, addresses, phone numbers, and e-mail for local state and federal resource agencies	See attachment B
	Names, addresses, phone numbers, and e-mail for local non-governmental stakeholders	See Attachment B
Photographs and Maps	Photographs of key features of the facility and each of the designated zones of effect	

Zone 1 – Impoundment

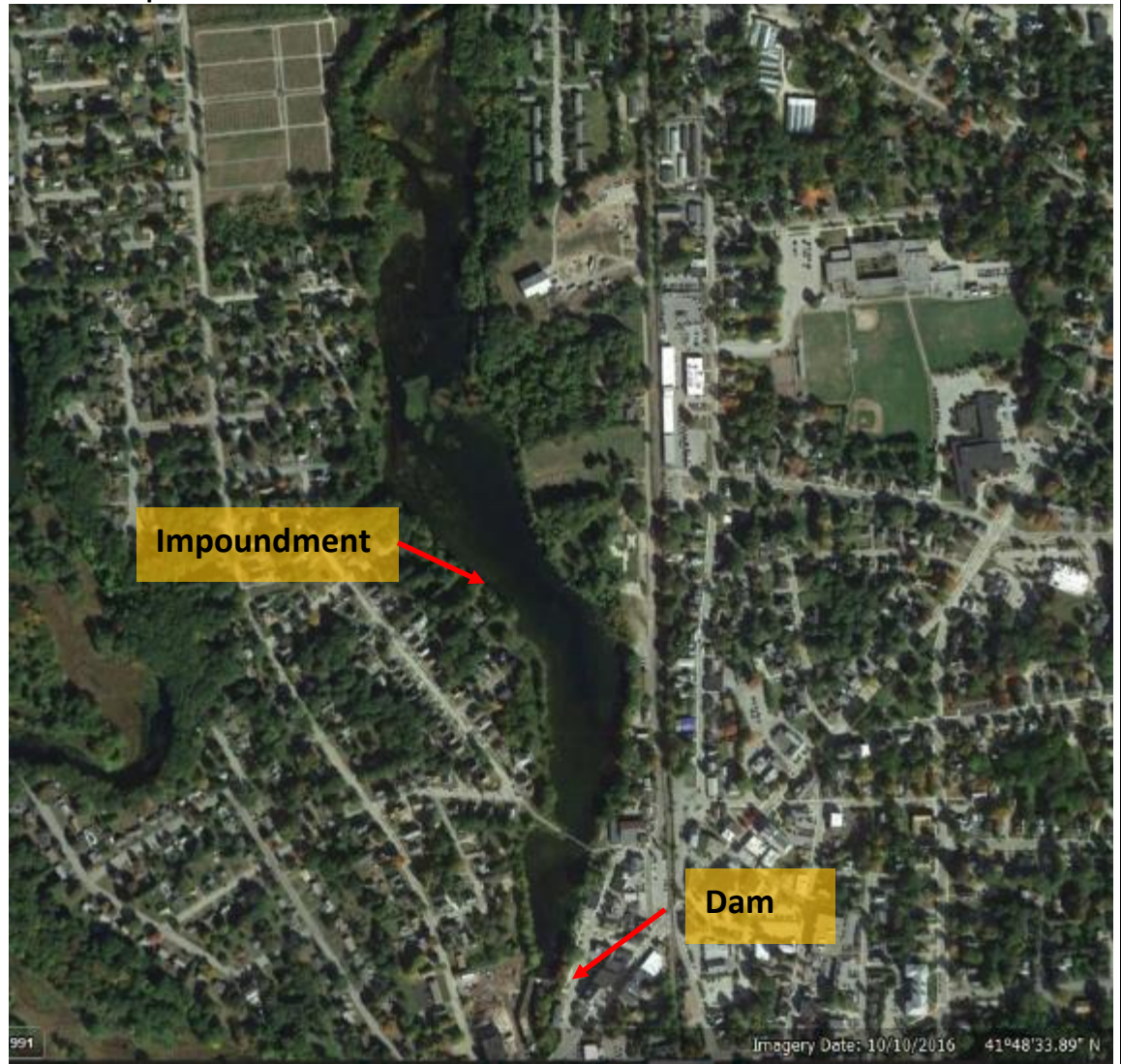


Figure 24. Overview of Zone 1 – Impoundment



Figure 25. Five Mile Pond Impoundment Looking Upstream from Powercanal Headgate Structure.

Zone 2 – Bypass Reach



Figure 26. Overview of Zone 2 – Bypass Reach; approximate boundary in red.



Figure 27. Bypass Reach Looking Upstream.

Zone 3 – Tailrace

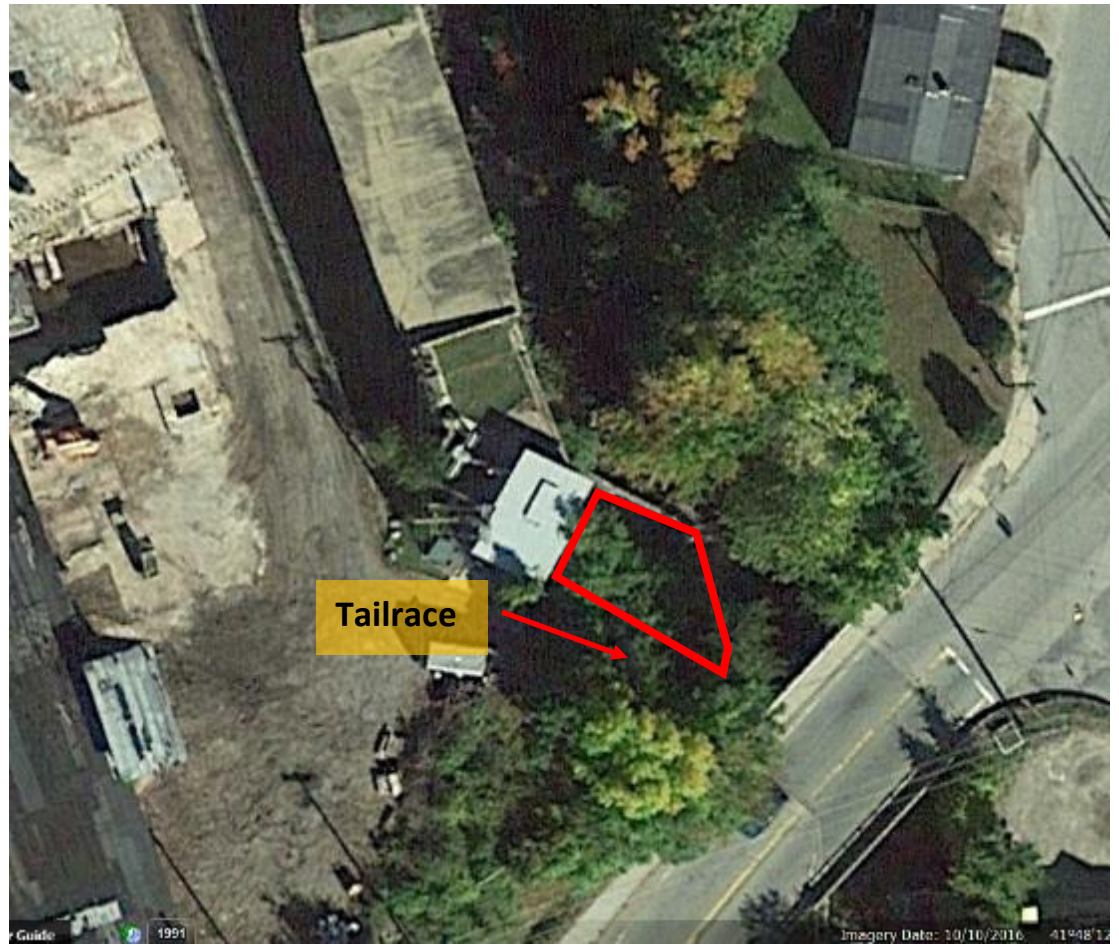


Figure 28. Overview Zone 3 – Tailrace; approximate boundary in red.



Figure 29. Tailrace Looking Downstream

Maps, aerial photos, and/or plan view diagrams of facility area and river basin

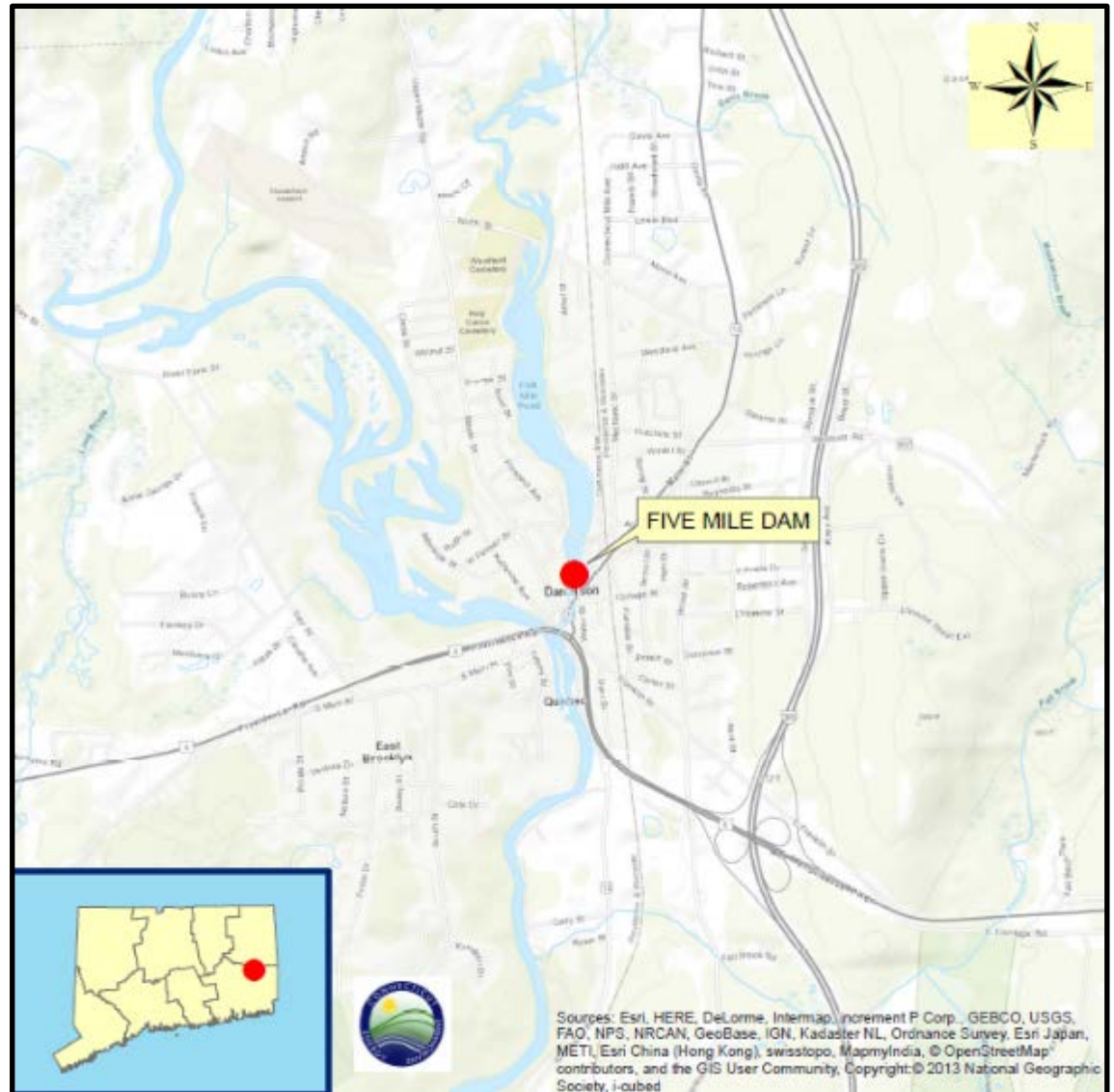


Figure 30. Site Locus Map



Figure 31. Site Topo Map

Table B-1.2. Matrix of Alternative Standard Template Responses for Zones 1, 2 and 3 – Five Mile Pond Project

Zone of Effect # 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				

Zone of Effect # 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				

Zone of Effect # 3: Confluence of Turbine Flow and Five Mile River

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				

B.2.1 Ecological Flow Standards - Five Mile Pond Project

Zone of Influence #1, #3- Impoundment, & Confluence Downstream of Turbine Flow and Five Mile River -Impoundment Ecological Flow Standards

Zone of Influence #1 and #3 have a de minimis effect on ecological flow standards.

Zone of Influence #1 is limited to the 65 acre impoundment and does not include a bypass reach. The site is operated in an instantaneous run-of-river mode with a PLC controller to maintain the project impoundment at 220.8 ft (MSL) during normal project operation. A minimum bypass flow of 15 cfs is released downstream of the impoundment (to Zone 2) into the bypass reach through a permanent notch in the spillway flashboards. Habitat characteristics and management needs were evaluated during the NEPA and State review processes associated with the issuance of the FERC license and WQC, respectively. According to the NEPA analysis the 7Q10 flow in the river is 1.5 cfs (FERC 1987). The State of Connecticut initially recommended a bypass flow of 12 to 15.4 cfs, and subsequently included a 15 cfs bypass flow requirement, consistent with the recommendation of the FWS (FERC 1987). Requirements for these project operations are specified in the FERC Order Granting License issued March 19, 1987 and CT State Water Quality Certificate issued October 4, 1983.

Zone of Effect #3 does not include a bypass reach. Since the project is operated in instantaneous run-of-river mode with all inflows equaling outflows, Zone of Effect #3 is not affected in any way by the Project since it is downstream of all Project diversions. See discussions above in Zone of Effect #1 and #2 for additional details of run-of-river operations.

Project compliance with reservoir and bypass flow requirements is outlined in the FERC approved 2007 Compliance Plan for Minimum Flows at the 5 Mile Project (FERC 2007). The 15 cfs continuous bypass flow requirement is met by providing discharge through a permanent notch in the spillway (sized through weir equation calculations). The notch is inspected regularly to remove debris and other potential blockages and ensure appropriate through flows are provided. Run-of-river operations are achieved through pond level maintenance linking transducer recorded impoundment levels with the generating unit's PLC to adjust gate settings appropriately. In addition, the Project maintains a CT 7300 Omega 168-hour data recorder with a ± 5 ft scale linked to a water level transducer located in the project impoundment to monitor compliance with run-of-river operations. Data recorder charts are changed weekly and retained for a period of 3 years.

Zone of Influence #2- Bypass Reach Ecological Flow Standards

Zone of Influence #2 is classified as A-2.

Zone of Effect #2 is the bypass reach. To maintain adequate aquatic flow in the bypassed reach, the WQC prescribes a minimum bypass reach flow of 15 cfs. A copy of the Minimum Stream Flow Compliance Plan is included in Attachment A. The licensee does not have access to the original studies or scientific evaluations for the bypass flow. This flow discharges into the bypass reach are provided via a permanent

engineered notch in the flashboards installed on the dam crest. Up to the minimum flow of the plant (25 cfs) plus the minimum bypass reach flow (15 cfs) will be discharged over the spillway (and through spillway notch). Flow to the turbine is increased automatically by the PLC manipulation of the wicket gates and turbine blade settings until the site flow reaches 227 cfs at which time the maximum flow for the turbine (200 cfs) is reached. For all inflows over 227 cfs, the remaining flows beyond the turbine capacity are discharged over the spillway. The following is a tabular representation of the above described protocol.

Flow Regime Summary		
River Inflow (cfs)	Description of Operations	
0-39	Inflow is less than the Plant's minimum operating capacity. All flows released over the spillway.	
40-242	Minimum capacity of the Plant has been met. The turbine comes online and runs from Qmin to Qmax. A continuous 15 cfs spills over the dam.	
243+	Maximum capacity for the Plant has been met. All remaining flows spill over the dam.	
Flow Distribution		
River Inflow (cfs)	Primary Spillway	Turbine
0 - 39	0 - 39	0
40-242	15	25-227
243+	15+	227

Pursuant to the 2006 License Amendment, the Project has an approved Minimum Stream Flow Compliance Plan which is relevant to all ZoEs. The Plan includes the following components:

“...the 5 Mile Hydro Project has been required by the original FERC license to maintain a weir notch in the dam for minimum flow at the dam and has maintained a data recorder that records water level continuously 24/7. The data recorder and spillway notch are already part of the project operation. We propose that the existing monitoring plan and notch be accepted and continue to operate to meet the Amendment Order. They are described in greater detail below;

The Spillway Notch

The existing spillway notch, has dimensions (0.75 ft H x 7.0 ft W). Using weir tables provide as part of agency filings, the existing 9 inch notch by 7 ft wide, gives a flow calculation of 6,639 gpm. Divide by 449 gpm per CFS we have 15 cfs notch. Per agency recommendations, the notch is regularly monitored and any debris accumulation is removed to ensure full flow through the notch thus maintaining the 15 cfs minimum flow requirement.

Data Recorder

We monitor water level with a CT 7300 Omega 168 hour chart recorder with a 5.0 ft and +5.0 ft scale which the scale of the water level transmitter. The charts are changed weekly and are saved for 3 years.”

There are no anadromous fish species at the Five Mile project due to downstream natural barrier to upstream passage. However, there are most likely American eels. Therefore, the bypass reach supports eels, resident fish species and other aquatic species.

According to data obtained from the Connecticut Environmental Conditions Online (CT ECO); CT DEEP Fish Community Data – Inland Waters, the following macroinvertebrates Families have been observed in the Quinebaug River and are likely present in the Five Mile River.

Ancylidae	Hydroptilidae
Baetidae	Isonychiidae
Brachycentridae	Molannidae
Cambaridae	Naididae
Chironomidae	Odontoceridae
Coenagrionidae	Perlidae
Corbiculidae ⁸	Perlodidae
Elmidae	Philopotamidae
Empididae	Physidae
Ephemerellidae	Pisidiidae
Gammaridae	Psephenidae
Glossosomatidae	Simuliidae
Heptageniidae	Siphonuridae
Hydropsychidae	Tipulidae

The Fivemile River supports a coldwater fishery (FERC 1987). The fish community in Quinebaug and Fivemile Rivers in the vicinity of Fivemile Pond Dam has been surveyed several times between 1994 and 2014 by the CT DEEP. Tabulated below are results of the fishery surveys indicating presence of fish species upstream and downstream of the Project (CT ECO); <https://cteco.uconn.edu/projects/fish/viewer/index.html>).

SPECIES	UPSTREAM ⁹	DOWNSTREAM ¹⁰
Black Crappie		X
Green Sunfish		X
Longnose Dace	X	X
Brook Trout - Wild	X	X
White Catfish		X
White Perch		X
Rainbow Trout - Wild		X
Yellow Bullhead	X	X

⁸ Survey data only identifies occurrences to Family level, however the occurrence of Corbiculidae may represent the presence of the invasive Asiatic clam, *Corbicula fluminea*. This occurrence was recorded only once in 2014 downstream of Aspinook Dam (CT ECO Station ID: 14598).

⁹ Data from Fivemile River in Killingly (Station ID 16664) collected in collected in 1994.

¹⁰ Data from Quinebaug River in Killingly (Station ID 16304) collected in 2008, 2009, 2010, 2012 and 2014.

Chain Pickerel	X	
Common Shiner	X	
American Eel	X	X
Bluegill Sunfish	X	X
Blacknose Dace	X	X
Common Carp		X
Fallfish	X	X
Golden Shiner	X	X
Largemouth Bass	X	X
Pumpkinseed	X	X
Redbreast Sunfish	X	X
Smallmouth Bass		X
Tessellated Darter	X	X
White Sucker	X	X
Yellow Perch	X	X
<i>Species Richness</i>	<i>16</i>	<i>21</i>

In terms of species richness, the fish community data are comparable given the relative size differences of the aquatic habitat resource, suggesting that a comparably diverse fishery exists upstream and downstream of the Project.

The bypass consists of lentic habitat consisting of a series of riffles, small pools and runs; although it is primarily riffles under normal operations.

B.2.2 Water Quality Standards - Five Mile Pond Project

Zone of Influence #1, #2, #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River Water Quality Standards

Zone of Influence #1, #2 and #3 have a de minimis effect on water quality.

The freshwater ecosystem of the Thames River Basin is reported to be strongly influenced by nutrients from urban and agricultural areas even though the majority of the basin is forested (USGS 2005). The Connecticut Department of Energy and Environmental Protection (CT DEEP) classified the Five Mile River in the project area as class B-B* as shown in Figure 13. Class B waters are designated to be used for fish and wildlife habitat, agricultural and industrial supply and other uses such as navigation. Class B* waters have good to excellent aesthetic quality and have a minimum dissolved oxygen (DO) standard of 5 milligrams per liter (mg/l).

According to the State of Connecticut's 2016 305b Water Quality Assessment Report this reach of the Five Mile River was not assessed for aquatic life, recreation or drinking water supply; the river is described as fully supporting for fish consumption (http://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_iwqr_final.pdf).

A review of the State of Connecticut's 2016 Impaired Waters List was completed to identify if any information is available on the Five Mile River in the project area. The Five Mile River on which the Project is located is not listed in the report. Note: there is another Five Mile River in southwest Connecticut which is included in the report; this is not the river of interest.

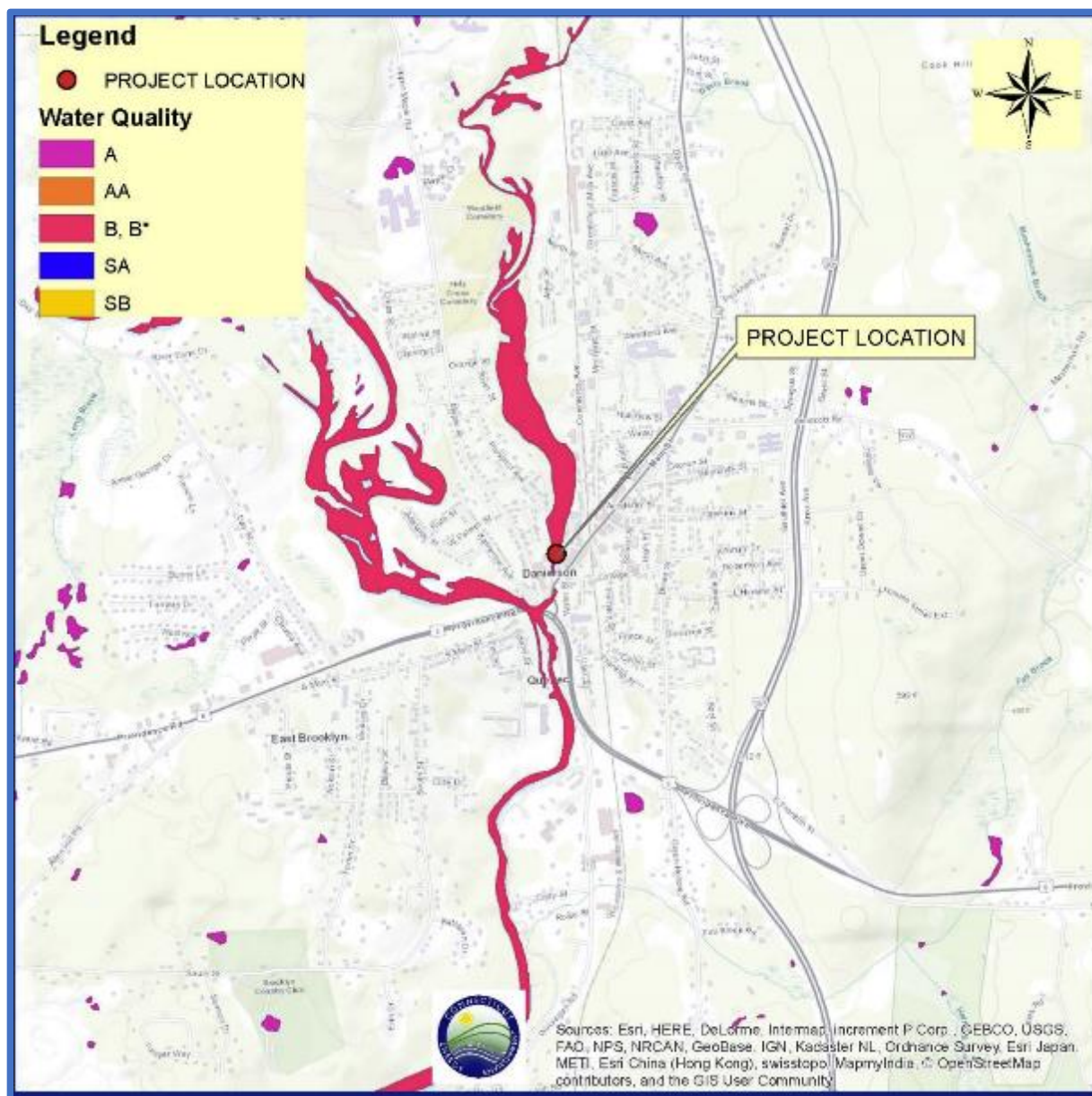


Figure 32. CT DEEP Water Quality Classifications

Water quality data on the Five Mile River is not available for review. However, data on the downstream Quinebaug River is available, which indicates that water quality in the area meets state criteria. This is key information as typically water quality declines in the lower reaches of a river system (as compared to the upper reaches).

USGS Gage No. 01127000 Quinebaug River at Jewett City, CT, located approximately 7 miles downstream from the Project, has collected intermittent water quality data since 1952. Figure 14 shows historic dissolved oxygen (DO) levels recorded at the gage. These data demonstrate an average DO level of 10.5 mg/L; further there have been no recorded instances where the State water quality standard of 5 mg/L has been violated.

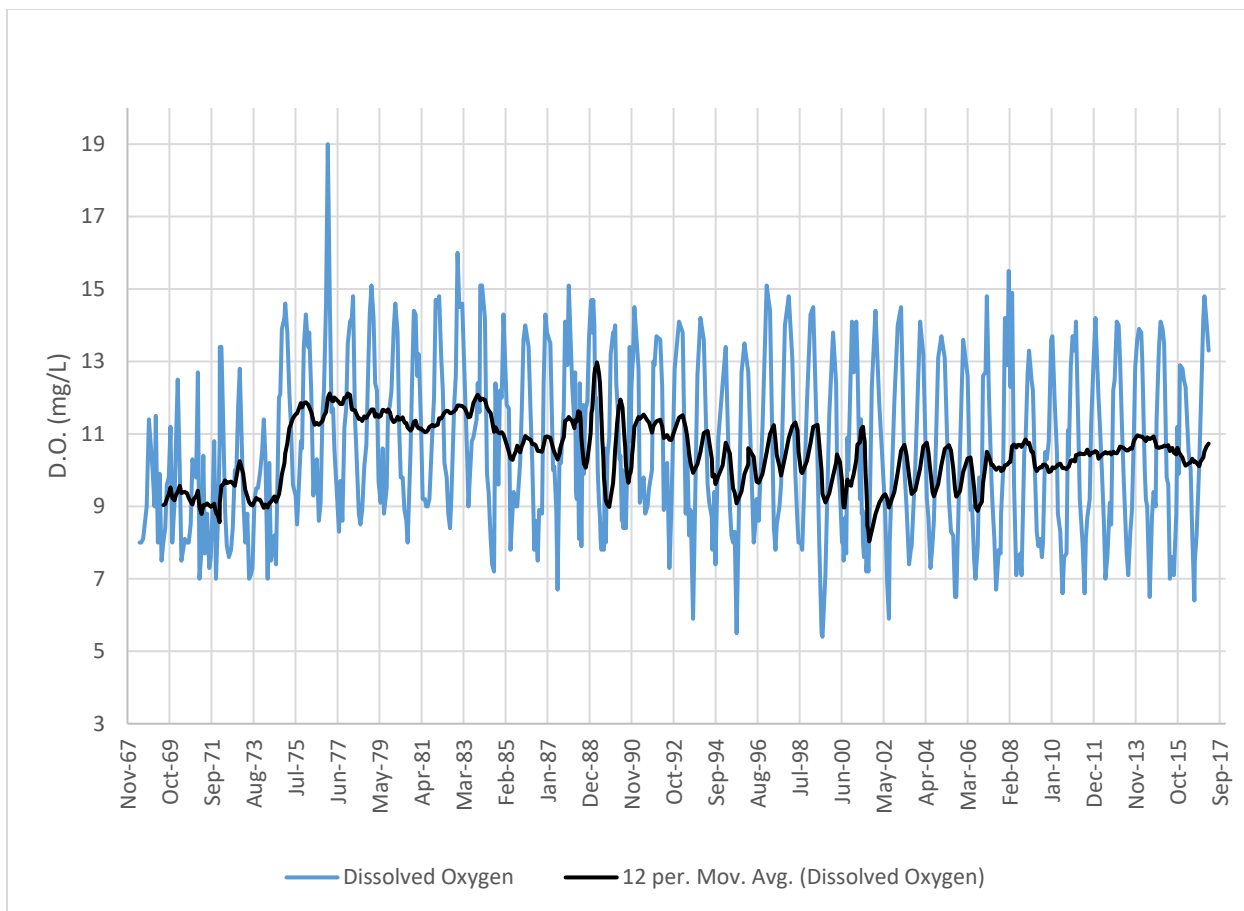


Figure 33. Historic Dissolved Oxygen Levels USGS Gage, Quinebaug River at Jewett City, CT (No. 01127000)

Additional data from the USGS gage indicates an average water temperature of 13.6° Celsius (C), with a historic maximum of 30° C recorded in 1977.

B.2.3 Upstream Fish Passage Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River **Upstream Fish Passage Standards**

Zone of Influence #1, #2 and #3 have a de minimis effect on upstream fish passage.

Although it does not currently have upstream fish passage installed at the dam, there are downstream barriers to fish passage and a clear regulatory pathway for installation of fish passage when necessary.

The Five Mile Pond Dam is the downstream most dam located on the Five Mile River. Approximately 1,000 ft downstream of the Five Mile Pond Dam, the Five Mile River discharges into the Quinebaug River, and the Quinebaug River and Shetucket River join 20 miles downstream to form the Thames River, which ultimately discharges into the Atlantic Ocean. Downstream of the Five Mile River, there are two dams located on the Quinebaug River and one dam located on the Shetucket River. There are migratory fish species in the Thames, Shetucket and Quinebaug River; however, the Five Mile Pond Dam is not currently the downstream most barrier to migratory fish species. As shown in Figure 15, the Wyre Wynd Hydroelectric Project is currently the upstream barrier to migratory fish species. The Wyre Wynd Hydroelectric Project is currently engaged in the FERC relicensing process and working with resource Agencies to address upstream fish passage. Upon completion of fish passage at the Wyre Wynd Hydroelectric Project, The Five Mile Pond Dam will be the upstream barrier to fish passage. The condition below was recognized during initial conditioning of the Project as noted in the 1983 WQC which specifies the following:

“...recognition and acceptance of a responsibility to provide effective anadromous fish passage facilities on the Quinebaug and Fivemile Rivers upon request by the Department.”

Further, the FERC License includes Article 402, which states, in part:

“The licensee, no later than 6 months after the start of construction of fish passage facilities at the Aspinook Pond Dam, shall file for Commission approval, functional design drawings for upstream and downstream passage facilities at Five Mile Pond and Rojak Dam, prepared after consultation with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Connecticut Department of Environmental Protection....”

Subsequent to the issuance of the FERC license and WQC, the CT DEEP developed, The Shetucket River Fisheries Restoration Plan, which includes consideration of the Five Mile River. This plan indicates that the cascade located at the mouth of the Five Mile River (downstream of the Project) is a natural historic barrier to aloidid passage (CT DEEP 2009). Passage for American eel is identified as a future enhancement activity. The Project will be commencing the relicensing process in the near future (NOI due by February 2022 with pre-consultation prior) which Gravity anticipates will include a detailed review of fish passage with environmental Agencies.

The elevation drop and rock riffles located at the downstream section of the Five Mile River have been identified as a natural barrier to migratory fish moving upstream into the Five Mile River. No upstream fish passage is needed at the Five Mile Development as historically the fish were not present.

There are no formal upstream eel passage facilities installed at the Quinebaug Project's Five Mile Pond Dam; however, it is known that eels are able to migrate upstream of the Project due to their documented occurrences upstream. American eels have the capacity to surmount obstacles through crawling movements out of water on wet surfaces (Tremblay et. al., 2015). Therefore, we surmise that the eels utilize this crawling ability to pass up and over the wetted face of the Five Mile Dam spillway, over the canal embankment and/or over the left abutment of the dam to enter into the project headwaters and continue their movement to the upper reaches of the watershed.

Approach velocities at the headgates and in front of the trashracks are less than 2.0 ft/s, significantly reducing the risk of impingement or entrainment. Further, the existing minimum flow notch on the Project spillway may provide a downstream passage route for outmigrating American eels.

B.2.4 Downstream Fish Passage and Protection Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River **Downstream Fish Passage Standards**

Zone of Influence #1, #2 and #3 have a de minimis effect on downstream fish passage.

The existing fish community is described in a previous section. Anadromous fisheries are located downstream of the project; catadromous fishery is reported to extend to the base of the upstream dam located at Cargill Falls. Based on Gravity's relicensing work at the Wyre Wynd Project downstream, resource managers are focused on migratory fisheries management in the lower watershed. In general, the only migratory species known to occur in the Five Mile River watershed is the American eel (documented both upstream and downstream of the Project).

The trashrack spacing at the Five Mile Project is 2 inches and the approach velocity is estimated to be about 1.5 ft/second which is less than the standard Agency guidance of 2 ft/second or less to protect fish against entrainment and impingement. Due to these low velocities, it is unlikely that fish are impinged on the trashrack or entrained through the turbines. Therefore, they are free to swim unencumbered within the project impoundment and migrate downstream through the bypass flow notch or during times of spill at the spillway.

As noted earlier, subsequent to the issuance of the FERC license and WQC, the CT DEEP developed, The Shetucket River Fisheries Restoration Plan, which includes consideration of the Five Mile River. This plan indicates that the cascade located at the mouth of the Five Mile River (downstream of the Project) is a natural historic barrier to alosid passage (CT DEEP 2009). Passage for American eel is identified as a future enhancement activity. The Project will be commencing the relicensing process in the near future (NOI due by February 2022 with pre-consultation prior) which Gravity anticipates will include a detailed review of fish passage with environmental Agencies.

The FERC License includes a stipulation from US Fish and Wildlife Services (FWS) that fish passage facilities be provided following installation of fish passage at the downstream Aspinook Pond Dam. Gravity is committed to work collaboratively with resource managers to address fish passage facilities at such a time as required to support and advance management goals.

B.2.5 Shoreline and Watershed Protection Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River **Shoreline and Watershed Protection Standards**

Zone of Influence #1, #2 and #3 have a de minimis effect on shoreline protection or watershed protection.

There are no specific Agency recommendations for shoreline protection or watershed protection nor any mention of these protections in the WQC or FERC license.

The project does not have, nor is it required to have, a watershed enhancement fund or specific watershed land protection plan. The project is in compliance with all State and Federal resource Agency recommendations in the License.

The project operates in an instantaneous run-of-river mode which minimizes impoundment fluctuations and disturbances to the natural hydrograph mitigating any Project related impacts to shoreline and watershed resources. See discussion in Zone of Effect #1 Ecological Flow Regimes and Zone of Effect #2 Ecological Flow Regimes.

The Quinebaug and Five Mile Projects are co-licensed under a single FERC license and single project boundary. The project boundary is approximately 130 acres. Of that, about 126 acres is land under water, about 2 acres has tree and brush cover and about 2 acres is urban/developed. The Project does not include any of the lands adjacent to the reservoirs (Quinebaug or Five Mile). See Figure 34.



Figure 34. Approximate Project Boundary for Quinebaug and Five Mile Project

B.2.6 Threatened and Endangered Species Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River Threatened and Endangered Species

Zone of Influence #1, #2 and #3 have a de minimis effect on threatened and endangered species.

A review of the CT State Natural Diversity Database (updated December 2017) was completed for more up-to-date information (see Figure 17).

Immediate surrounding land use is dominated by dense residential and urban development. The Project conducts periodic vegetation management on the abutment of the dam as a function of dam safety maintenance. This vegetation management is limited to shrubby and herbaceous cover, which is not known to provide habitat for any listed species (i.e., NLEB).

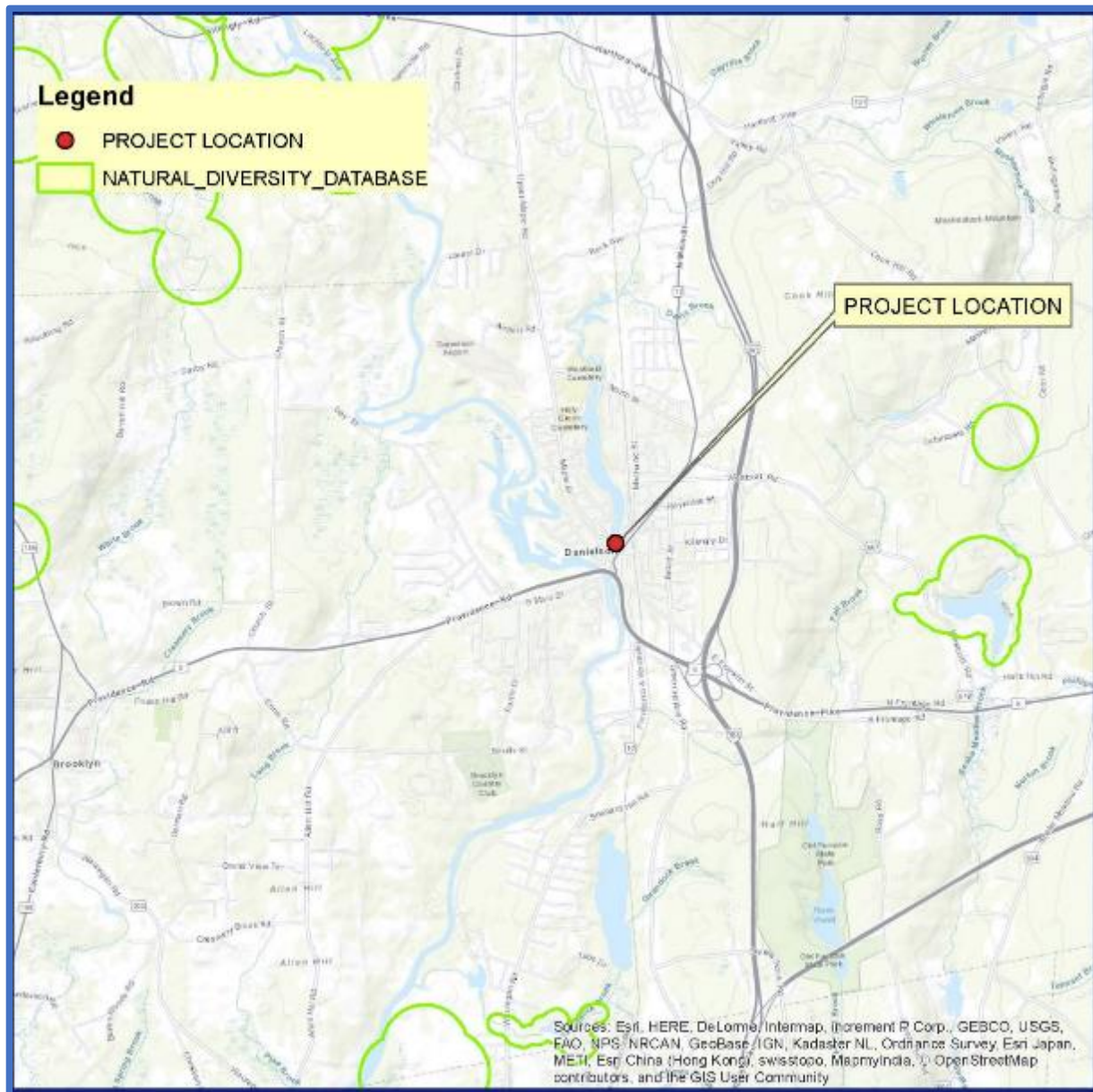
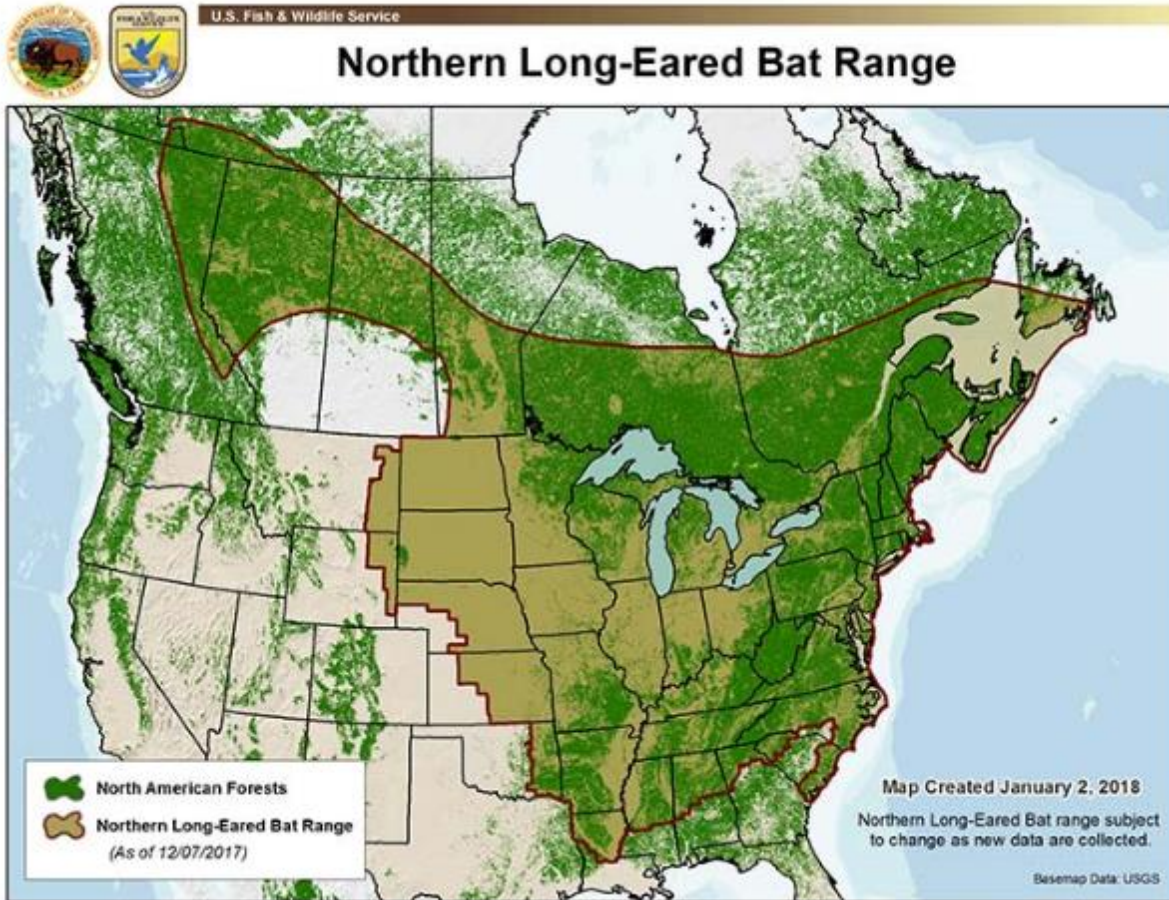


Figure 35. CT Natural Diversity Database (Threatened, Endangered, Protected Species). Updated December 2017.

Review of the US FWS list of Federally listed Endangered and Threatened Species in Connecticut ([https://www.fws.gov/newengland/EndangeredSpec-Consultation Project Review.htm](https://www.fws.gov/newengland/EndangeredSpec-Consultation%20Project%20Review.htm)), only the Federally Threatened, Northern Long-eared bat (NLB) is identified with potential habitat in the ZoE (a large swath of the US is listed as potential habitat, see Figure 17).



Pursuant to the instructions provided by the USFWS related to ESA Section 7 consultations, general habitat characteristics for this species includes mines and caves (over-wintering) and forested habitats (summer). There are no mines or caves within any of the Project ZoE's, further there are no project-related activities which would disturb existing forested habitat. Despite the potential for NLB to be present, there are no State or Federally listed species with recorded observations within the Project area, therefore there are not likely any project related effects.

The licensee completes regular vegetation removal; however, this does not typically include trees. Normal maintenance includes mowing of lawns and cutting back of brush and other low growing vegetation associated with dam maintenance (around the abutments).

B.2.7 Cultural and Historic Resources Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River Cultural and Historic Resources

Zone of Influence #1, #2 and #3 have a de minimis effect on historic resources.

During initial construction, a survey of the property was completed and mitigation efforts completed to minimize adverse impacts to the resource. The FERC license includes the following text:

“...If the applicant discovers any previously unidentified archaeological or historic sites during the course of constructing or developing the project works or other facilities at the project, the applicant should halt construction and development activities in the vicinity of the sites, and should consult a qualified cultural resources specialist and the SHPO about eligibility of the sites for listing in the National Register of Historic Places and about any measures needed to avoid the sites or to mitigate effects on the sites. “

Further, a 2003 FERC Environmental Inspection Report notes the following relative to Cultural Resources (FERC 2003¹¹):

“There are no known prehistoric archaeological sites within the boundaries of the Five Mile Pond or Quinebaug Developments. There has been extensive industrial development in the area in addition to construction and development of the hydroelectric generating facilities. The possibility of uncovering previously unknown archaeological sites in the area is remote. There are no structures within the project area that are listed on or eligible for inclusion on the National Register of Historic Places. The licensee must consult with the Connecticut State Historic Preservation Officer prior to any land-disturbing activities. The licensee appears to be in compliance with its requirements with regards to cultural resources.”

Gravity is committed to completing the proper SHPO consultation prior to completion of any significant ground disturbing activities.

¹¹ 20031125-0427 Issued by FERC OSEC 11/24/2003 in Docket#: P-5062-000

B.2.8 Recreational Resources Standards - Five Mile Pond Project

Zone of Influence #1, #2 & #3- Impoundment, Bypass Reach & Confluence Downstream of Turbine Flow and Five Mile River **Recreational Resources**

Zone of Influence #1, #2 and #3 have a de minimis effect on recreational resources.

There are no specific Agency recommendations for recreation nor any mention of this resource in the QWC or FERC license other than FERC Standard Article 18, which “requires the licensee to allow free public access to project lands and waters” (FERC 2003). While there are no formal project-related recreational facilities within any of the ZoE’s there are several public areas which provide free access to the impoundment and downstream reach (near the confluence with the Quinebaug). According to the latest FERC Form 80 submission (See Attachment A), public use of these areas has historically been very limited.

The project is in compliance with all State and Federal resource Agency recommendations in the license.

Attachment A

Summit

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Diamond Power Corporation

Project No. 5062-000

ORDER ISSUING LICENSE
(Major Project - 5MW or Less)
(Issued March 19, 1987)

Diamond Power Corporation has filed a license application under Part I of the Federal Power Act (Act) to construct, operate, and maintain the Quinebaug - Five Mile Pond Project, located in Windham County, Connecticut, on the Quinebaug and Five Mile Rivers. The project would affect the interests of interstate or foreign commerce.

Notice of the application has been published. The motions to intervene that have been granted and the comments and protests filed by agencies and individuals have been fully considered in determining whether to issue this license, as discussed below.

Recommendations of Federal and State Fish and Wildlife Agencies

Section 10(j) of the Federal Power Act (FPA), as amended by the Electric Consumers Protection Act of 1986 (ECPA), Pub. L. No. 99-495, requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife. The environmental assessment for the Quinebaug-Five Mile Pond Project addresses the concerns of the federal and state fish and wildlife agencies, and makes recommendations consistent with those of the agencies.

Comprehensive Plans

Section 10(a)(2) of the FPA, as amended by ECPA, requires the Commission to consider the extent to which a project is consistent with comprehensive plans (where they exist) for improving, developing, or conserving a waterway or waterways affected by the project that are prepared by an agency established pursuant to federal law that has the authority to prepare such a plan or by the state in which the facility is or will be located. The Commission considers plans to be within the scope of section 10(a)(2) only if such plans reflect the preparers' own balancing of the competing uses of a waterway, based on their data and applicable policy considerations (*i.e.*, consider and balance all relevant public use considerations). With regard to plans prepared at the state level, such plans are within the scope of

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section 10(a)(2) only if they are prepared and adopted pursuant to a specific act of the state legislature and developed, implemented, and managed by an appropriate state agency. ^{1/}

No comprehensive plans of the types referred to in section 10(a)(2) of the FPA relevant to this project have been identified. One resource plan ^{2/} has been reviewed in relation to the proposed project as part of our broad public interest examination under section 10(a)(1) of the FPA. No conflicts were found.

Based upon our review of the agency and public comments filed in this proceeding and upon our independent analysis, as discussed herein, we conclude that the Quinebaug-Five Mile Pond Project is best adapted to a comprehensive plan for the Quinebaug and Five Mile Rivers, taking into consideration the beneficial public uses described in section 10(a)(1) of the Federal Power Act.

Summary of Findings

An Environmental Assessment (EA) was issued for this project. Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment are contained in the EA attached to this order. The Water Quality Certificate was issued on October 4, 1983, by the Connecticut Department of Environmental Protection. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if constructed, operated, and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment attached to this order.

The Director, Office of Hydropower Licensing, concludes that the project would not conflict with any planned or authorized development, and would be best adapted to comprehensive development of the waterway for beneficial public uses.

^{1/} 99 Cong. Rec. 54140 (remarks by Senator McClure, April 11, 1986).

^{2/} Statewide Comprehensive Outdoor Recreation Plan, Connecticut - 1983.

- 3 -

The Director orders:

(A) This license is issued to Diamond Power Corporation (licensee), for a period of 40 years, effective the first day of the month in which this order is issued, to construct, operate, and maintain the Quinebaug - Five Mile Pond Project. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the Act.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, enclosed by the project boundary shown by Exhibit G:

<u>Exhibit G-</u>	<u>FERC No. 5062-</u>	<u>Showing</u>
G-1	12	General Location Map
G-2	13	Detail Location Map
G-3	14	Site Plan
G-4	15	Project Boundary Map
G-5	16	Project Impoundments Map

(2) Project works consisting of:

Quinebaug Development

(a) the 250-foot-long, 14-foot-high Royale Dam; (b) the impoundment having a surface area of 85-acres, a storage capacity of 283 acre-feet, and a normal water surface elevation of 188 feet msl; (c) the gated intake; (d) the 990-foot-long, 30-foot-wide, 7-foot-deep canal; (e) a powerhouse containing 5 generating units with a total installed capacity of 1670-kW; (f) the tailrace; (g) the 2.3-kV generator leads; (h) a 2.3/23-kV transformer; (i) the 250-foot-long, 2.3-kV transmission line; and (j) appurtenant facilities.

Five Mile Pond Development

(a) the 135-foot-long, 16.5-foot-high stone dam; (b) an impoundment having a surface area of 65 acres, a storage capacity of 260 acre-feet, and a normal water surface elevation of 220.75 feet m.s.l.; (c) a gated intake structure; (d) the 450-foot-long, 30-foot-wide, 12-foot-deep canal; (e) the powerhouse containing two generating units with a total installed capacity of 386-kW; (f) the tailrace; (g) the 2.3-kV generator leads; (h) a 2.3/23-kV transformer; (i) the 120-foot-long, 2.3-kV transmission line; and (j) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibits A and F recommended for approval in the attached Safety and Design Assessment.

(3) All of the structures, fixtures, equipment or facilities used to operate or maintain the project and located within the project boundary, all portable property that may be employed in connection with the project and located within or outside the project boundary, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) The Exhibit G described above and those sections of Exhibits A and F recommended for approval in the attached Safety and Design Assessment are approved and made part of the license.

(D) This license is subject to the articles set forth in Form L-11, (October 1975), entitled "Terms and Conditions of License for Major Project Affecting the Interests of Interstate or Foreign Commerce," except Article 20. The license is also subject to the following additional articles:

Article 201. The licensee shall pay the United States the following annual charge, effective the first day of the month in which this license is issued:

For the purpose of reimbursing the United States for the cost of administration of Part I of the Act, a reasonable amount as determined in accordance with the provisions of the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 2750 horsepower.

Article 202. Pursuant to Section 10(d) of the Act, after the first 20 years of operation of the project under license, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. One half of the project surplus earnings, if any, accumulated after the first 20 years of operation under the license, in excess of the specified rate of return per annum on the net investment, shall be set aside in a project amortization reserve account at the end of each fiscal year. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year after the first 20 years of operation under the license, the amount of that deficiency shall be deducted from the amount of any surplus earnings subsequently accumulated, until absorbed. One-half of the remaining surplus earnings, if any, cumulatively computed, shall be set aside in the project amortization reserve account. The amounts established in the project amortization reserve account shall be maintained until further order of the Commission.

The annual specified reasonable rate of return shall be the sum of the annual weighted costs of long-term debt, preferred stock, and common equity, as defined below. The annual weighted cost for each component of the rate of return shall be calculated based on an average of 13 monthly balances of amounts properly includable in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rates for long-term debt and preferred stock shall be their respective weighted average costs for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10 year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 203. The licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representative of the Commission and in accordance with appropriate federal, state, and local statutes and regulations.

Article 301. The licensee shall commence construction of project works within two years from the issuance date of the license and shall complete construction of the project within four years from the issuance date of the license.

Article 302. The licensee shall file, for approval by the Commission, revised Exhibit F drawings showing the final design of project structures. The revised Exhibit F drawings shall be accompanied by a supporting design report and the licensee shall not commence construction of any project structure until the corresponding revised Exhibit F drawing has been approved.

Article 303. The licensee shall at least 60 days prior to start of construction, submit one copy to the Commission's Regional Director and two copies to the Director, Division of Inspections of the final contract drawings and specifications for pertinent features of the project, such as water retention structures, powerhouse, and water conveyance structures. The Director, Division of Inspections may require changes in the plans and specifications to assure a safe and adequate project.

Article 304. The licensee shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days prior to start of construction of the cofferdam, the licensee shall submit to the Commission's Regional Director and Director, Division of Inspections, one copy each of the approved cofferdam construction drawings and specifications and the letter(s) of approval.

Article 305. The licensee shall within 90 days of completion of construction file, for approval by the Commission, revised Exhibits A, F and G to describe and show the project as built.

Article 306. The licensee shall within six months from the issuance date of this license submit to the the Director, OHL a report based on stability and dam break analyses, that identifies and quantifies the hazard to downstream life and property of failure of any susceptible project structure(s). The stability analyses shall determine what flood would cause instability of the structure(s). The dam break analyses shall encompass floods which could cause dam failure and flood flows up to and including either the PMF or the flood flow where dam failure would cause no significant increase in hazard to downstream life and property. The report shall fully document all reconnaissance and other studies made in its preparation. In the event that failure of any project structure(s) under flood conditions presents a hazard to human life or would cause significant property damage then the licensee shall simultaneously submit to the Director, OHL, for approval, a plan and schedule for modifying the project to ensure that the project can safely pass floods up to and including the PMF.

Article 401. The licensee, after consultation with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection, shall file with the Commission, within 1 year from the date of issuance of this license, a plan to control erosion and dust, to stabilize slopes, and to minimize the quantity of sediment or other potential water pollutants resulting from construction and operation of the project, including spoil disposal. The plan shall include descriptions and map locations of control measures, an implementation schedule, monitoring and maintenance programs for project construction and operation, and provisions for periodic review of the plan and for making any necessary revisions to the plan. Documentation of agency consultation on the plan and copies of any agency comments or recommendations shall be included in the filing.

If the licensee does not concur with any agency recommendations, the licensee shall provide a discussion of the reasons for not concurring, based on actual-site geological, soil, and groundwater conditions. The Commission reserves the right to require changes to the plan. Unless the Director of the Office of Hydropower Licensing directs otherwise, the licensee may commence land-clearing, ground-disturbing, and spoil-producing activities at the project 90 days after filing the above plan.

Article 402. The licensee, no later than 6 months after the start of construction of fish passage facilities at the Aspinook Pond Dam, shall file for Commission approval, functional design drawings for upstream and downstream fish passage facilities at Five Mile Pond Dam and Rojak Dam, prepared after consultation with the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Connecticut Department of Environmental Protection. Comments from these agencies on the adequacy of the design drawings shall be included with the filing to the Commission. The licensee shall provide fish passage facilities at Five Mile Pond Dam and Rojak Dam within 1 year after the completion of fish passage facilities at the Aspinook Pond Dam. Further, the licensee shall file as-built drawings of the project fish passage facilities with the Commission within 6 months after constructing the facilities.

Article 403. The licensee shall operate the Quinebaug-Five Mile Pond Project in an instantaneous run-of-river mode for the protection of fish and wildlife resources in the Quinebaug and Five Mile Rivers. The licensee, in operating the project in an instantaneous run-of-river mode, shall at all times act to minimize the fluctuation of the reservoir surface elevation by maintaining a sufficient discharge from the project so that the flows in the Quinebaug and Five Mile Rivers, as measured immediately downstream from each powerhouse tailrace, approximate the instantaneous sum of the inflow to each project reservoir. Instantaneous run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the licensee and for short periods upon mutual agreement between the licensee and the Connecticut Department of Environmental Protection.

Article 404. The licensee shall maintain in the bypass reaches below Rojak Dam and Five Mile Pond Dam continuous minimum flows of 77 cubic feet per second (cfs) and 15 cfs, respectively, as measured immediately below the project dams, or inflow to the reservoirs, whichever is less, for the protection of fish and wildlife resources in the Quinebaug River and Five Mile River. These flows may be temporarily modified if required by operating emergencies beyond the control of the licensee and for short periods upon mutual agreement between the licensee and the Connecticut Department of Environmental Protection.

Article 405. The licensee, before beginning land-clearing or land-disturbing activities within the project boundaries, shall file with the Commission a cultural resources management plan designed to avoid or mitigate adverse impacts to properties at the Quinebaug-Five Mile Pond Project that are listed on or eligible for listing on the National Register of Historic Places. The licensee shall design a cultural resources management plan for filing with the Commission only after the licensee has conducted the appropriate preliminary studies and investigations and consulted with the State Historic Preservation Officer (SHPO). In performing the appropriate preliminary studies and investigations and in reporting their results, the licensee shall devote particular attention to the disturbance potential of constructing temporary access roads, establishing material storage areas, and imposing operational stresses upon unstable industrial archeological remains.

At a minimum the plan should contain the written results of all preliminary studies and investigations completed for the purpose of designing the cultural resources management plan, and provisions for executing the following functions: (1) modifying, restoring, and rehabilitating existing structures in a manner sympathetic with their historic character; (2) constructing additional buildings, structures, and facilities that do not needlessly conflict with the historic character of the existing structures; (3) documenting historic structures that would be dismantled according to the standards of the Historic American Engineering Record, and other relevant standards; (4) avoiding effects from staging activities on historic structures; (5) minimizing visual effects; and (6) filing with the Commission, within 4 years of the date of issuance of this license, copies of a letter from the SHPO containing its opinion as to whether the facilities have been constructed, modified, restored, rehabilitated, and dismantled consistent with the plan. The Commission may require changes to the plan.

The plan, together with a copy of a letter from the SHPO commenting on the plan, shall be filed with the Commission. If recommendations of the SHPO are not adopted, the plan should state the reasons. The licensee shall not begin modifying, restoring, rehabilitating, or dismantling existing structures, nor constructing new buildings, structures, or facilities, until notified that the plan complies with the requirements of this article. The licensee shall make funds available in a reasonable amount for developing and implementing the plan.

Article 406. The licensee, before starting any land-clearing or land-disturbing activities within the project boundaries, other than those specifically authorized in this license, shall consult with the State Historic Preservation Officer (SHPO). If the licensee discovers previously unidentified archeological or historic properties during the course of constructing or developing project works or other facilities at the project, the licensee shall stop all land-clearing and land-disturbing activities in the vicinity of the properties and consult with the SHPO. In either instance, the licensee shall file with the Commission a cultural resources management plan prepared by a qualified cultural resource specialist after having consulted with the SHPO.

The management plan shall include (1) a description of each discovered property indicating whether it is listed on or eligible to be listed on the National Register of Historic Places, (2) a description of the potential effect on each discovered property, (3) proposed measures for avoiding or mitigating effects, (4) documentation of the nature and extent of consultation, and (5) a schedule for mitigating effects and conducting additional studies. The Commission may require changes to the plan.

The licensee shall not begin land-clearing or land-disturbing activities, other than those specifically authorized in this license, or resume such activities in the vicinity of a property discovered during construction, until informed that the requirements of this article have been fulfilled.

Article 407. The licensee shall consult with the U.S. Fish and Wildlife Service, the National Park Service, and the Connecticut Department of Environmental Protection to determine any measures necessary to provide public access to project lands and waters and to enhance recreational opportunities at the project. Within 1 year from the date of issuance of this license, the licensee shall file a report on these findings with the Commission, and shall file for Commission approval a plan to implement any measures that have been determined necessary to provide public access and to enhance recreational opportunities at the project. The licensee shall include in the filing documentation of consultation with the aforementioned agencies.

Article 408. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain other types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of

protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the uses and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, cancelling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The types of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the uses and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges and roads for which all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone-distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certificates or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from the edge of the project reservoir at normal maximum surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 45 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraphs (c) or (d) of this article: to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved Exhibit R or approved report on recreational resources of an Exhibit E; or, if the project does not have an approved Exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

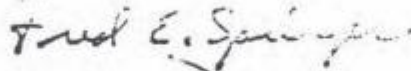
(3) The instrument of conveyance must include covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; and (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(F) This order is issued under authority delegated to the Director and is final unless appealed under Rule 1902 to the Commission by any party within 30 days from the issuance date of this order. Filing an appeal does not stay the effective date of this order or any date specified in this order. The licensee's failure to appeal this order shall constitute acceptance of the license.



Fred E. Springer
Acting Director, Office
of Hydropower Licensing

ENVIRONMENTAL ASSESSMENT
DIVISION OF ENVIRONMENTAL ANALYSIS, OFFICE OF HYDROPOWER LICENSING

FEDERAL ENERGY REGULATORY COMMISSION

Quinebaug-Five Mile Pond Project
FERC No. 5062-000--Connecticut
June 20, 1986

I. APPLICATION

Diamond Power Corporation (applicant) applied on June 22, 1981, for a major license, 5 megawatts (MW) or less, for the Quinebaug-Five Mile Pond Project. The application was supplemented on November 2, 1981, April 10, April 17, and July 1, 1985, and February 24, 1986.

The Quinebaug-Five Mile Pond Project would be located on the Quinebaug and Five Mile Rivers, in the towns of Brooklyn and Killingly, in Windham County, Connecticut (figure 1). The Quinebaug River is a tributary of the Thames River, which discharges into Long Island Sound. No federal lands would be included within the project boundary.

II. RESOURCE DEVELOPMENT

A. Purpose

The proposed project would provide an estimated annual generation of 8,562,000 kilowatthours (kWh) to the Connecticut Light and Power Company, a local utility.

B. Need for Power

Available data show that growth in the demand for electric power and energy will continue. Given positive load growth and an existing generating resource base, a need for additional generating resources can be projected to exist in the future for any power system. Additional resources would have to be obtained for any system at some time in order to meet projected additional load requirements with the same degree of reliability required by an existing criterion for the system. Timing of the need would vary in different systems, depending upon such factors as the rates of load growth, the load characteristics, the available existing power resources, and the reliability criteria established for each system. A power generating facility may, however, be added to a system before a generating resource deficit exists, if, over its operating life, the generating addition provides benefits that would not be available through operation of the system without the addition.

The proposed project is located in the New England Power Pool (NEPOOL) area of the Northeast Power Coordinating Council (NPCC) region. In the April 1986, Regional Reliability Council's

coordinated bulk power supply program, NEPOOL projects average annual growth rates of 2.4 percent for summer peak demand and 2.6 percent for annual energy requirements. Existing generating resources in the NEPOOL area as of January 1, 1986, include approximately 17,000 MW of thermal generating capacity. An additional 4,800 MW of thermal capacity are projected for installation in the next 10 years to meet load growth in the area.

Because of the small size of the proposed project in relation to the existing and projected generating capability in the NEPOOL area, the traditional approach of linking project development with a forecasted need for a specific project is inapplicable to assessing need for the proposed project.

The small size of the project ensures that the project power would be integrated into the existing generating resource base without the temporary overbuilding commonly associated with bringing large power projects on-line (initiating commercial operation). Moreover, in accordance with the Federal Power Act, the schedule for the project can be made to accommodate uncertain market conditions to some extent by the licensee's delaying commencement of construction as much as 4 years after the license is issued.

The power from the project would be useful in meeting a small part of the need for power projected by the NEPOOL. From the time the project goes on-line, it would be available to displace fossil-fueled power generation in the NPCC region thereby conserving nonrenewable fossil fuels and reducing the emission of noxious byproducts caused by the combustion of fossil fuels.

C. Economic Feasibility

Projected avoided costs in the northeast region, identified by the staff, range from a low of 41 mills per kWh to a high of about 85 mills per kWh. Since the levelized cost of energy from the project is estimated to be 72 mills per kWh the staff is reasonably confident that there will be a market for the project power at a price sufficient to support the project's construction and operation.

The applicant anticipates that it will obtain a power sales contract based on Public Utilities Regulatory Policy Act (PURPA) rates. The staff's analysis reaches no conclusion as to the applicant's ability to achieve qualifying facility status for the proposed project under section 201 of PURPA.

D. Comprehensive Development

The proposed Quinebaug Project's five units of 75, 150, 310, 510, and 625 kilowatts (kW), respectively, have a combined maximum

hydraulic capacity of 1,054 cubic feet per second (cfs). The Five Mile development's two units of 193 kW each have a combined hydraulic capacity of 200 cfs. The minimum bypass flows for the Quinebaug and Five Mile developments are 77 cfs and 15 cfs, respectively. The proposed 75-kW unit would generate power from the Quinebaug River bypass flows. The river flows for each of the two developments exceed the hydraulic capacities of the units about 20 percent of the time.

The project develops a gross head of about 26 feet at the Quinebaug site and a gross head of about 30 feet at the Five Mile site. Head losses through the canals result in average net hydraulic heads of about 25 feet and about 29 feet for the Quinebaug and Five Mile sites, respectively.

The applicant estimates that the project would generate about 8,562,000 kWh annually. The staff finds this estimate of annual generation reasonable.

Neither site has a stream gage, so the applicant used stream gages (nos. 01125200 and 01126000) on the Quinebaug and Five Mile Rivers, respectively, upstream of the project sites and prorated the streamflow data based on the size of the drainage basins. The staff agrees with the applicant's methodology for the estimated streamflow.

The Commission's Planning Status Report for the Thames River Basin (Federal Power Commission, 1965) discusses the existing water resource developments and reconnaissance level plans of possible future development within the basin. The project does not conflict with any existing or planned development or with any pending applications for exemption, license, or preliminary permit.

In summary, the staff's analysis shows that the proposed project is properly designed to develop the hydropower potential of the Five Mile and Quinebaug Rivers.

III. PROPOSED PROJECT AND ALTERNATIVES

A. Proposed Project

1. Project Description

Quinebaug River Development

Rojak Dam is located on the Quinebaug River just upstream from its confluence with the Five Mile River (figure 2). The dam is 14 feet high and 250 feet long, and impounds an 85-acre reservoir with a storage capacity of 283 acre-feet. Gates in the right end

of Rojak Dam allow water to flow into the 30-foot-wide, 7-foot-deep Quinebaug Canal. Two tailraces associated with the remains of mills return flows to the river 625 feet and 900 feet downstream from the canal headgates.

The applicant would dredge the canal, repair the masonry walls, and seal off the upper tailrace. The applicant would build a small powerhouse at the Quinebaug Canal intake. This powerhouse would contain one 75-kW bulb turbine that would utilize the minimum flow release for the Quinebaug River Development. The applicant would also build a new concrete powerhouse at the lower tailrace. This powerhouse would contain four vertical Francis turbines with installed capacities of 150, 310, 510, and 625 kW. The total generating capacity of the Quinebaug River Development would be 1,670 kW. A new tailrace would be cut in the bedrock. A new, 2.3-kilovolt (kV) transmission line, approximately 200 feet long, would interconnect with an existing 12.5-kV distribution line owned by the Connecticut Light and Power Company. The applicant would extend the road to Rojak Dam, and would build a new road to the lower powerhouse site (Diamond Power Corporation, 1985).

Five Mile Pond Development

The existing Five Mile Pond Dam is located on Five Mile River about 1,050 feet upstream from the confluence of Five Mile River with the Quinebaug River (figure 2). The dam is 16.5 feet high and 135 feet long, and impounds a 65-acre reservoir with a storage capacity of 260 acre-feet. Gates located at the end of the dam are inoperable, and allow flows to enter the Five Mile Canal. The canal is 20 to 30 feet wide and 12 feet deep, and extends south for 450 feet to a 10-foot-diameter penstock opening in the Pan-National Mill. A turbine room is located in the basement of the Pan-National Mill. The existing tailrace consists of a concrete box culvert extending underneath the roadbed of Connecticut Route 6 into the Five Mile River. About 280 feet downstream from the canal headgates, a debris sluice, its gate missing, allows canal flows to fall 14 feet to the Five Mile River and a concrete wall blocks the canal, 35 feet beyond the sluice (Diamond Power Corporation, 1981).

The applicant proposes to clean the Five Mile Canal, to construct a low-flow-release gate in the canal wall, and to remove the concrete wall blocking the canal. Two horizontal Francis turbines with a combined generating capacity of 386 kW would be installed in the existing turbine room. The applicant would use the existing tailrace to return flows to the Five Mile River. A new, 2.3-kV transmission line, 120 feet long, would extend to an existing 12.5-kV distribution line owned by the Connecticut Light and

Power Company (Diamond Power Corporation, 1985). The applicant would operate both developments in a run-of-river mode.

2. Proposed Mitigative Measures

The applicant proposes to avoid significant historic sites in the project area (see section V.A.7.) where possible, document historic structures that would be physically altered in accordance with the standards of the Historic American Engineering Record of the Department of the Interior, construct project facilities so as to be visually compatible with significant historic structures in the vicinity, and record any historic archeological remains that may be affected by the project, or that may be discovered during project construction. Documentation of identified sites would be undertaken prior to any construction that would affect such sites (Raber and McBride, 1986).

During project construction, the applicant would use signs, adequate detours, and accommodative construction scheduling to minimize the disruption of local traffic. The applicant proposes to use stone riprap to protect areas having the potential for erosion as a measure to limit increases in turbidity and sedimentation caused by project construction.

The applicant would operate the project in run-of-river mode to protect the aquatic biota upstream and downstream of the project dams from rapid changes in water flow and level. The applicant proposes the installation of trash racks and screens, and the use of an intake design to maintain low approach velocities, as measures to prevent entrainment and turbine-related mortality of fish during project operation.

B. Alternatives to the Proposed Project

Hydroelectric projects are unique in the electric power generation field, because of their rugged machinery, high reliability, low operating and maintenance costs, long life, and use of a renewable resource. These characteristics, plus potential markets based on electric utility avoided costs and tax advantages such as rapid amortization and energy credits, have made small hydroelectric project development an attractive business venture for many and have fostered a considerable amount of competition for the more feasible hydroelectric projects.

The number of undeveloped and economically feasible hydroelectric sites is finite and limited. Generally, the criteria considered in the selection of hydroelectric project sites are: (1) adequate streamflow; (2) favorable topography or maximum hydraulic head (fall) in a short run of the stream (horizontal distance); (3) accessibility; (4) availability of electric transmission system;

(5) minimum water release; and (6) environmental effects. If the applicant is not an electric utility, the alternative is not to construct the project.

If the project is not constructed, the energy of falling water will continue to be wasted and the power that would have been developed will eventually be provided by nonrenewable fuels. With regard to considering other nonpassive generation from renewable resources instead of the project, it is presumed these projects will be installed when commercially and economically feasible. Likewise, whether the project is built or not, the installation of passive devices using renewable resources and energy conservation efforts will both continue until the market is saturated or until these installations become uneconomical.

C. Alternative of No Action

No action would prohibit the applicant from constructing the proposed project. No action would mean no alteration of the existing environment and no use of the potential hydropower that could be derived from the project.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The Commission's regulations require prospective applicants to consult with the appropriate resource agencies before filing an application for license. This constitutes an initial step in compliance with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Prefiling consultation must be complete and must be documented in accordance with the Commission's regulations.

After the Commission accepts the application, formal comments may be submitted by concerned entities during the public notice period. In addition, organizations and individuals may petition to intervene and become a party to any subsequent proceedings. The comments provided by concerned entities are made part of the record and are considered during the review of the proposed project. The following entities commented on the application subsequent to the public notice, which was issued on January 22, 1982.

<u>Commenting entity</u>	<u>Date of letter</u>
Office of the State Historic Preservation Officer	February 8, 1982
Department of the Army, New England Division Corps of Engineers	March 19, 1982
Environmental Protection Agency	March 23, 1982
Connecticut Department of Environmental Protection	April 1, 1982
U.S. Fish and Wildlife Service	April 2, 1982

The applicant responded to the agency comments in a letter dated June 17, 1982.

B. Water Quality Certification

On October 4, 1983, the Connecticut Department of Environmental Protection (DEP) issued a water quality certificate for the proposed project, as authorized in section 401 of the Clean Water Act.

V. ENVIRONMENTAL ANALYSIS

A. Proposed Project

The staff's analysis shows that adverse effects of the proposed project on visual and socioeconomic resources would be insignificant.

1. General Description of the Locale

The banks of the Rojak Dam impoundment are gently sloping, wooded, and undeveloped. Several small areas of forested wetland, scrub shrub wetland, and emergent wetland are located in the impoundment. Downstream from Rojak Dam, the Quinebaug River is lined by steeply sloping, wooded banks.

The banks of Five Mile Pond are moderately sloped, and are lined with lightly wooded areas interspersed with open areas. Some residential and light commercial development has occurred along the lower end of the impoundment. Downstream from the Five Mile Pond Dam, the left bank of the Five Mile River is forested; the right bank consists of a retaining wall between the dam and the Main Street bridge.

2. Geology and Soils

Affected Environment: Bedrock in the project area is Quinebaug Formation Gneiss, which forms outcroppings at or immediately below both dams and at many places in the project area. The Five Mile Pond Dam and Canal area was originally part of a sandy loam hill, developed on stratified drift between the two rivers. Sandy loam soils also occur in the area of Rojak Dam and the Quinebaug Canal, but bedrock is at or immediately below the surface over much of the area (Raber and McBride, 1986).

The banks of the Five Mile Pond and the Rojak Dam impoundment are generally composed of sand, clay, or stony gravel. The river channel is composed of cobbles and ledge for almost all of the distance from the dams downstream to the point where the Quinebaug Canal joins the river, and the banks are rocky (Diamond Power Corporation, 1981).

Environmental Impacts and Recommendations: Renovating the existing power canals and constructing the new powerhouse and tailrace on the Quinebaug River would cause minor, short-term increases in soil erosion, sedimentation, and turbidity. The applicant, after consultation with appropriate resource agencies, and before starting any land-clearing or ground-disturbing activities, should prepare a plan to control erosion and sedimentation at the project.

Unavoidable Adverse Impacts: Some minor, short-term, localized erosion and sedimentation would be unavoidable during construction.

3. Water Resources

Affected Environment: The Quinebaug River originates in southern Massachusetts and flows approximately 40 miles south to its confluence with the Shetucket River, the major tributary of the Thames River. The Quinebaug drainage area at Rojak Dam encompasses 384 square miles of rolling terrain that contains suburban, rural, and urban development. The gradient of the Quinebaug River above Rojak Dam is approximately 50 feet per mile.

The Five Mile River originates in northeastern Connecticut and flows approximately 20 miles to its confluence with the Quinebaug River. The drainage area of Five Mile River encompasses 77 square miles of rural, suburban, and forested lands. The gradient of Five Mile River is approximately 35 feet per mile.

The flow of the Quinebaug River at Rojak Dam is greatest in spring primarily because of rainfall, with maximum monthly average flows of about 1,240 cfs in March and April. Low flows occur in the summer months, with minimum monthly average flows of about 220 cfs in July and August. The mean flow

is 576 cfs and the mean low flow over 7 consecutive days with a 10-year recurrence (7Q10) is 7.7 cfs.

The flow pattern of the Five Mile River is similar to that of the Quinebaug River, with maximum monthly average flows of about 238 cfs in March and April, and minimum monthly average flows of about 58 cfs in August and September. The average flow is 119 cfs, with a 7Q10 flow of 1.5 cfs.

Improved treatment of industrial and sewage discharges over the past 20 years has greatly improved water quality in the Quinebaug River. DEP presently classifies water quality in the Quinebaug River as Class C, which is not considered to be acceptable for swimming. Despite the Class C designation, the Quinebaug River in the project area probably meets the state's minimum dissolved oxygen (DO) standard of 5.0 milligrams per liter (mg/l) for Class B water (personal communication, Arthur Major, Connecticut Department of Environmental Protection, Hartford, Connecticut, May 28, 1986).

DEP classifies the Five Mile River as Class Bc water, which is suitable for swimming and coldwater fish habitat, and which has a DO level higher than 5.0 mg/l.

Environmental Impacts and Recommendations: The repair of the existing facilities and other construction activities would cause increased sedimentation downstream from the project site. The applicant proposes to minimize sedimentation and turbidity by using stone riprap in areas of the streambed that could be eroded. The applicant should incorporate the use of riprap into a comprehensive soil erosion and sedimentation control plan to ensure the protection of the water quality in the Quinebaug and Five Mile Rivers.

Unavoidable Adverse Impacts: A minor, short-term increase in sedimentation and turbidity would occur during project construction.

4. Fishery Resources

Affected Environment: The Quinebaug River supports a mixed coldwater and warmwater fishery. Species inhabiting the Quinebaug River include brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout (*Salmo gairdneri*), chain pickerel (*Esox niger*), largemouth bass (*Micropterus salmoides*), redbreast sunfish (*Lepomis auritus*), and various members of the minnow family Cyprinidae. Although some natural brook trout populations occur, the major portion of the trout fishery is supported by the stocking of hatchery fish, predominantly brown trout (Connecticut Department of Environmental Protection, 1985).

The Five Mile River supports a coldwater fishery of brook, brown, and rainbow trout. As with the Quinebaug River, hatchery operations support most of the fishery. Other species found in the Five Mile River include white sucker (Catostomus commersoni) and various minnows.

The Thames River Basin, including the Quinebaug and Five Mile Rivers, historically supported populations of anadromous fish, including Atlantic salmon (Salmo salar), American shad (Alosa sapidissima), blueback herring (A. aestivalis), and alewife (A. pseudoharengus). The construction of impassible dams was a major factor in the elimination of Atlantic salmon and American shad from the Thames River Basin. Remnant populations of river herring (alewife and blueback herring) remain downstream from the Greenville Dam (figure 1).

Environmental Impacts and Recommendations: Project operation would reduce flows in the 1,000-foot-long bypass reach below the Rojak Dam and in the 600-foot-long bypass reach below the Five Mile Pond Dam. The reduced flows would reduce the habitat available to fish below the project dams and would interfere with the upstream passage of Atlantic salmon and American shad currently scheduled for restoration to the Thames River Basin.

The U.S. Fish and Wildlife Service (FWS) recommends the discharge of continuous minimum flows of 77 cfs below Rojak Dam and 15.4 cfs below Five Mile Dam in order to maintain suitable aquatic habitat for resident and migratory fish between the dams and tailrace discharges. DEP, in the letter of comment of April 1, 1982, originally recommended that the applicant operate the project in a run-of-river mode and maintain continuous minimum flows of 23 to 77 cfs below Rojak Dam and 12 to 15.4 cfs below Five Mile Pond Dam. However, in the letter dated October 4, 1983, issuing water quality certification, DEP recommends flows of 77 cfs and 15 cfs below Rojak Dam and Five Mile Pond Dam, respectively.

The applicant agrees to provide minimum flows of 77 cfs below Rojak Dam and 15 cfs below Five Mile Pond Dam. The applicant should operate the project in a run-of-river mode and should maintain minimum flows of 77 cfs and 15 cfs in the bypass reaches below Rojak Dam and Five Mile Pond Dam, respectively, to maintain aquatic habitat for fish below the project dams.

Project operation could cause entrainment and turbine-related mortality of fish from the project reservoirs. To prevent fish entrainment, the applicant proposes to install trash racks and fish screens on the powerhouse intakes, and design the intakes to

reduce approach velocities. There is no evidence at this time that the operation of the proposed project would cause significant turbine-related mortality of fish. Resident fish are not known to move downstream past the project dams and trout are not stocked in the project reservoirs. The applicant, therefore, should not be required to install fish screens. If in the future, it is determined that turbine-related mortality of fish is significant, the Commission by its own action or by recommendation from FWS or DEP, may order the installation of fish screens or other structural or operational modifications for the protection of fisheries resources.

The Thames River Basin is scheduled for anadromous fish restoration as part of a cooperative effort between the FWS and DEP. The major target species for the restoration are Atlantic salmon and American shad.

FWS and DEP recommend that the applicant construct fish passage facilities at Rojak Dam and Five Mile Pond Dam after the completion of fish passage facilities at downstream dams. Currently, three impassable dams prevent the upstream migration of anadromous fish to the Rojak Dam and the Five Mile Pond Dam. The construction of fish passage facilities at the Greenville, Tunnel, and Aspinook Pond Dams is scheduled for completion in the 1990's. Fish passage facilities at the Rojak Dam and the Five Mile Pond Dam are also targeted for the 1990's (personal communication, Peter Minta, Fishery Biologist, Connecticut Department of Environmental Protection, Hartford, Connecticut, May 14, 1986). The operation of fish passage facilities at the project dams would allow direct access to 652 acres of shad spawning and nursery habitat in the Quinebaug River and would allow access to substantial spawning and nursery habitat for both salmon and shad (Connecticut Department of Environmental Protection, 1985).

The applicant accepts the obligation to provide fish passage facilities. The successful restoration of Atlantic salmon and American shad to the Thames River Basin necessitates the construction of upstream and downstream fish passage facilities at the Rojak and Five Mile Pond Dams. The applicant therefore should file plans for fish passage facilities at the project dams for Commission approval, within 6 months after the start of construction of fish passage facilities at the downstream Aspinook Pond Dam, and should complete fish passage facilities at the Rojak Dam and the Five Mile Pond Dam within 1 year after the completion of fish passage facilities at the Aspinook Pond Dam.

Unavoidable Adverse Impacts: None.

5. Terrestrial Resources

Affected Environment: The project area is vegetated with a hardwood forest, made up of tree species such as red oak (Quercus rubra), white oak (Q. alba), black oak (Q. velutina),

shagbark hickory (Carva ovata), red maple (Acer rubrum), sugar maple (A. saccharum), and willows (Salix spp.). Conifers present in the project area are white pine (Pinus strobus) and hemlock (Tsuga canadensis) (Diamond Power Corporation, 1981). Wildlife utilizing the lands around the impoundments include raccoon (Procyon lotor), striped skunk (Mephitis mephitis), woodchuck (Marmota monax), cottontail rabbit (Sylvilagus floridanus), gray squirrel (Sciurus carolinensis), and eastern chipmunk (Tamias striatus). Mallard duck (Anas platyrhynchos), black duck (Anas rubripes), and wood duck (Aix sponsa), and Blue-winged teal (Anas discors) use the lands and waters of the proposed project as habitat (Diamond Power Corporation, 1981).

Environmental Impacts and Recommendations: Trees and shrubs growing on the dams' abutments and the canals' walls and in the dry section of the Five Mile Pond Canal would be removed to ensure the stability and efficient operation of the existing structures. The applicant would also remove trees to gain access to the headgates of the Rojak Dam for repair work and in order to construct the Quinebaug River powerhouse.

The removal of trees and other vegetation, increased noise, and human activity would cause wildlife to avoid the project area during the 18-month-long construction period.

Unavoidable Adverse Impacts: Wildlife would avoid the project area during the 18-month-long construction period.

6. Threatened and Endangered Species

Affected Environment: No plant or animal species federally listed as threatened or endangered are known to occur in the project area (personal communication, Ron Joseph, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Department of the Interior, Concord, New Hampshire, June 4, 1986).

Environmental Impacts and Recommendations: None.

Unavoidable Adverse Impacts: None.

7. Cultural Resources

Affected Environment: The applicant has conducted an archeological and historical survey of the project area (Diamond Power Corporation, 1985; Raber and McBride, 1986). The survey indicates that several historic structures and archeological remains associated with the Quinebaug Mill-Quebec Square Historic District (District) and the Danielson Cotton Company (Company) would be affected by the construction of project facilities. The District is listed on the National Register of Historic Places. The Company is considered eligible for inclusion in the National Register (Raber and McBride,

1986; letter from Ms. Dawn Maddox, Deputy State Historic Preservation Officer, Office of the State Historic Preservation Officer of Connecticut, Hartford, Connecticut, March 10, 1986).

The survey did not produce an inventory of any prehistoric sites. The potential of project construction for affecting any buried prehistoric sites is minimal (Raber and McBride, 1986).

Environmental Impacts and Recommendations: Several historic structures and areas of historic archeological remains within boundaries of the District and the Company would be physically altered or removed by project construction activities. The applicant and the Connecticut State Historic Preservation Officer (SHPO) concur that some of the project's impacts would have an adverse effect on the historical integrity of the District and the Company. Other impacts would not be adverse (Raber and McBride, 1986; letter from Ms. Dawn Maddox, Deputy State Historic Preservation Officer, Office of the State Historic Preservation Officer for Connecticut, Hartford, Connecticut, March 10, 1986).

To minimize impacts to the District and the Company, the applicant should implement the cultural resources management plan recommended by the SHPO, as described in a letter to the applicant (letter from Ms. Dawn Maddox, Deputy State Historic Preservation Officer, Office of the State Historic Preservation Officer of Connecticut, Hartford, Connecticut, March 10, 1986). The plan incorporates the applicant's recommendations for mitigating the effects of the project and includes other measures to ensure the protection of the District and the Company and the proper recording, curation, and dissemination of information about the historic structures and archeological remains that would be affected by the project. If the applicant discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the applicant should halt construction and development activities in the vicinity of the sites, and should consult a qualified cultural resources specialist and the SHPO about the eligibility of the sites for listing in the National Register of Historic Places and about any measures needed to avoid the sites or to mitigate effects on the sites.

Unavoidable Adverse Impacts: Several component historic structures and archeological areas of the District and the Company would be altered or removed.

8. Recreation and Other Land and Water Uses

Affected Environment: Recreational use of the Rojak Dam impoundment and Five Mile Pond chiefly consists of fishing by local residents (Diamond Power Corporation, 1981). No public access areas or recreational developments exist in the project area.

Environmental Impacts and Recommendations: FWS recommends that the applicant provide access for anglers to all project waters, except where such access would jeopardize personal safety, and DEP recommends that the applicant provide public access to the Quinebaug River portion of the project area. The applicant does not propose any recreational development at the project, citing poor accessibility and poor water quality as reasons for not expecting a substantial increase in recreational use of the project (Diamond Power Corporation, 1981). The applicant states that it would cooperate with the state or with the town of Killingly in the formulation of plans for recreational development.

The applicant, FWS, and DEP identify poor public access to the two impoundments as a major factor in the low recreational use of the impoundments. The applicant therefore should consult with the aforementioned agencies to determine the feasibility of providing public access to project lands and waters, and should implement measures as necessary to provide access and enhance recreational opportunities at the project.

Unavoidable Adverse Impacts: None.

B. Alternative of No Action

Implementation of the no-action alternative would not change the existing physical or biological components of the area, but would preclude the use of the renewable water resources of the Quinebaug and the Five Mile Rivers for generating electricity.

C. Recommended Alternative

The proposed project is the recommended alternative, because electricity generated from a renewable resource would be sold to Connecticut Light and Power Company, thus lessening the use of existing fossil-fueled, steam-electric generating plants, and because the environmental effects of constructing and operating the project would be minor.

VI. FINDING OF NO SIGNIFICANT IMPACT

Minor soil erosion and increased sedimentation and turbidity would occur during project construction. Wildlife would avoid the project area during the 18-month-long construction period. Historic structures and archeological components of the District and the Company would be adversely affected by the construction of project facilities, but these impacts would be minimized by implementing a mitigative plan recommended by the SHPO. The plan would also ensure that other effects of the project on the District and the Company would not be adverse.

Implementing the applicant's and the staff's proposed mitigative measures would ensure that the environmental effects of project construction and operation would be insignificant.

In accordance with the National Environmental Policy Act of 1969, this environmental assessment was prepared for the Quinebaug-Five Mile Pond Hydroelectric Project. On the basis of the staff's independent environmental analysis, issuance of a license for the project would not constitute a major federal action significantly affecting the quality of the human environment.

VII. LITERATURE CITED

- Connecticut Department of Environmental Protection. 1985. A preliminary plan for the restoration of anadromous fish to the Thames River Basin. 14 pp. August 1, 1985.
- Diamond Power Corporation. 1981. Application for license for major water power project, 5 megawatts or less, for the Quinebaug-Five Mile Pond Hydroelectric Reactivation Project, FERC No. 5062, Connecticut.
- _____. 1985. Cultural resource site survey. Barkan Properties, Chestnut Hill, Massachusetts. 39 pp.
- Federal Power Commission. 1965. Thames River Basin: planning status report, Washington, D.C. 13 pp.
- Raber, M. S., and K. A. McBride. 1986. Cultural resource assessment of proposed Quinebaug River-Five Mile River hydroelectric reactivation project: Killingly and East Brooklyn, Connecticut. Cobalt, Connecticut. 32 pp. February, 1986.

VIII. LIST OF PREPARERS

- Dianne Rodman--EA Coordinator; Geology and Soils, Terrestrial Resources, Threatened and Endangered Species, Recreation and Other Land and Water Uses (Ecologist; M.S., Biology).
- Stacy Michaels--Purpose, Economic Feasibility, and Comprehensive Development (Civil Engineer; B.S., Civil Engineering)
- John Mitchell--EA Editor (Writer-editor; B.S., Social Science).
- Edwin Slatter--Cultural Resources (Archeologist; PhD., Anthropology).
- Martin Thorpe--Need for Power (Electrical Engineer; B.S., Electrical Engineering).
- John Warner--Water and Fishery Resources (Fishery Biologist; M.S., Wildlife and Fisheries Biology).

SAFETY AND DESIGN ASSESSMENT
QUINEBAUG-FIVE MILE POND PROJECT
PERC No. 5862--CONNECTICUT

DAM SAFETY

The Commission's New York Regional Director (director), on May 13, 1986, classified the Quinebaug (Rojak) dam as a low hazard structure because there are no residences downstream of the dam and no loss of life would occur as a result of failure of the dam. The director, on the same date, classified the Five Mile Pond dam as a significant hazard because failure of the dam could possibly result in loss of life and damage to residential properties.

The applicant does not own either of the two dams. According to the applicant's sworn statements in the license application, a family estate represented by Roberta Weil and Rachelle Rojak owns the Rojak dam. The Crouse-Hinds Company may also have ownership rights to this dam. The Pan National Fence Company owns the Five Mile Pond dam, but the property on which the dam is located was the subject of a foreclosure proceeding at the time the license application was filed.

The Five Mile Pond dam is classified as a significant hazard structure and the spillway capacity is less than the probable maximum flood. Because the dam is owned by parties other than the applicant and applicant has no control over the safety of the dam at this time, we recommend that the license include an article that requires the licensee to conduct a dam break analysis that identifies and quantifies the hazard to downstream life and property of failure of the Five Mile Pond dam. If failure of the dam would result in loss of human life or cause significant damage to downstream property, the licensee would be required to submit a plan and schedule to modify the dam to make it safe.

PROJECT DESIGN

As a condition to the Connecticut Department of Environmental Protection's issuance of a water quality certificate, the applicant changed the project design and the installed capacity proposed in the original filing of their license application to their present proposal. The Exhibit F drawings presently on file with the Commission do not reflect these design changes. The staff recommends the a special license article be included in the license that would require the licensee to file revised Exhibit F drawings showing the final design of the project along with a supporting design report, for approval by the Commission, prior to the start of construction.

The project consists of two separate developments, one on the Quinebaug River and the other on the Five Mile River.

Quinebaug River Development

Water would be diverted from the Quinebaug River into the existing 900-foot-long canal. The wastegate would regulate flows so that 77 cfs would enter the wasteway to the 75-kW low-flow powerhouse and then be released back into the Quinebaug River.

Those flows diverted into the canal that would not be necessary to maintain the minimum flow of 77 cfs would be conveyed through the 900-foot canal to the new 1595-kW concrete powerhouse. The flow from the four turbines would be discharged through the tailrace back to the Quinebaug River.

Five Mile River Development

Water would be diverted from the Five Mile River into the existing 450-foot-long canal. The canal would convey the flows to the two 193-kW units in the existing powerhouse. Flow released from the two turbines would be discharged through the tailrace back to the Five Mile River.

Many of the project facilities are in disrepair. The applicant proposes to make the necessary repairs and modifications to make the project operational. The proposed powerhouse design and the proposed repairs and modifications to the project canals, headgates, and tailraces comply with acceptable engineering design criteria. The Commission's staff has concluded that the project construction can be completed within two years after commencement of construction.

Economic Feasibility

We have reanalyzed the economic feasibility of the proposed project using the revised 1986 tax code. Staff remains reasonably confident that there will be a market for the project power at a price sufficient to support the project construction and operation.

Conservation

The proposed project is being developed by the Diamond Power Corporation, a private developer, and therefore not subject to the provisions of ECPA.

EXHIBITS

The following portions of Exhibit A and the following Exhibit F drawings conform to the Commission's rules and regulations and should be included in the license.

Exhibit A, entitled Project Description, filed with the Commission on June 22, 1981, as amended in the July 8, 1985, filing, pages 18, 19, 20A, 21, 22, 23A, 24A, 25A, 27, 28A, 29, and Figure A.5-1, entitled Electrical Single Line Diagram.

<u>Exhibit F Drawing</u>	<u>FERC No. 5062</u>	<u>Description</u>
Sheet 1	1	Five Mile Pond dam
Sheet 2	2	Five Mile Pond gatehouse and canal wastegate details
Sheet 3	3	Quinebaug dam wastegate and canal headgate
Sheet 4	4	Quinebaug dam section, and elevations of headgate structure and wastegates

FEDERAL POWER COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR UNCONSTRUCTED
MAJOR PROJECT AFFECTING THE INTERESTS
OF INTERSTATE OR FOREIGN COMMERCE

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project works shall be constructed in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its

judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Upon the completion of the project, or at such other time as the Commission may direct, the Licensee shall submit to the Commission for approval revised exhibits insofar as necessary to show any divergence from or variations in the project area and project boundary as finally located or in the project works as actually constructed when compared with the area and boundary shown and the works described in the license or in the exhibits approved by the Commission, together with a statement in writing setting forth the reasons which in the opinion of the Licensee necessitated or justified variation in or divergence from the approved exhibits. Such revised exhibits shall, if and when approved by the Commission, be made a part of the license under the provisions of Article 2 hereof.

Article 4. The construction, operation, and maintenance of the project and any work incidental to additions or alterations shall be subject to the inspection and supervision of the Regional Engineer, Federal Power Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of the project and for any subsequent alterations to the project. Construction of the project works or any feature or alteration thereof shall not be initiated until the program of inspection for the project works or any such feature thereof has been approved by said representative. The Licensee shall also furnish to said representative such further information as he may require concerning the construction, operation, and maintenance of the project, and of any alteration thereof, and shall notify him of the date upon which work will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and

across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction, maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights of occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for

the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Commission may prescribe for the purposes hereinbefore mentioned.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall consult with the appropriate State and Federal agencies and, within one year of the date of issuance of this license, shall submit for Commission approval a plan for clearing the reservoir area. Further, the Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. Upon approval of the clearing plan all clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the

Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 22. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 23. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

14-40

Exhibit B



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



WATER QUALITY CERTIFICATION

October 4, 1983

Mr. Peter C. Kasch
Diamond Power Corporation
Suite 512
1330 Boylston Street
Chestnut Hill, MA 02167

Dear Mr. Kasch,

The Department of Environmental Protection has reviewed Diamond Power Corporation's request for Water Quality Certification of the proposed Quinebaug-Fivemile Pond Hydropower Facility in Brooklyn and Killingly, CT in accordance with the June, 1981 application as amended by a letter dated May 20, 1983, to the Federal Energy Regulatory Commission (FERC Project No. 5062).

Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act, as amended, the Department of Environmental Protection hereby certifies that the proposed project will not permanently violate Connecticut's Water Quality Standards provided that the following conditions are met:

- 1) hydraulic separation of the Quinebaug-Fivemile Pond Hydropower facilities;
- 2) recognition and acceptance of a responsibility to provide effective anadromous fish passage facilities on the Quinebaug and Fivemile Rivers upon request by the Department;
- 3) maintenance of an instantaneous flow at the base of the Rojak and Fivemile Dams of 77 cfs and 15 cfs, respectively. If the inflow immediately upstream of these projects falls below the minimum stream flow prescribed here, then outflow from the proposed facilities should be no less than the inflow.

This certification shall override the prior water quality certification denial issued on May 9, 1982. This is not the permit or authorization required under Section 22a-32; 22a-36 to 45, inclusive; 22a-361; 22a-384; or 22a-365 to 377, inclusive of the Connecticut General Statutes as amended. These sections pertain to encroachments, dredging, or work waterward of mean high water in coastal, tidal or navigable waters, work in designated tidal wetlands, encroachments or obstructions channelward of established stream channel encroachment lines, work in inland wetlands and watercourses, and Connecticut's Water Diversion Policy Act.

Sincerely yours,

Stanley J. Gire
STANLEY J. GIRE
PAC
COMMISSIONER

SJP/TM/job

Phone:

**Licensed Hydropower Development
Recreation Report**

General Information:

This form collects data on recreation amenities at projects licensed by FERC under the Federal Power Act (16 USC 791a-825r). This form must be submitted by licensees of all projects except those specifically exempted under 18 CFR 8.11 (c). For regular, periodic filings, submit this form on or before April 1, 2015. Submit subsequent filings of this form on or before April 1, every 6th year thereafter (for example, 2021, 2027, etc.). For initial Form No. 80 filings (18CFR 8.11(b)), each licensee of an unconstructed project shall file an initial Form No. 80 after such project has been in operation for a full calendar year prior to the filing deadline. Each licensee of an existing (constructed) project shall file an initial Form No. 80 after such project has been licensed for a full calendar year prior to the filing deadline. Filing electronically is preferred. (See <http://www.ferc.gov> for more information.) If you cannot file electronically, submit an original and two copies of the form to the: Federal Energy Regulatory Commission, Office of the Secretary, 888 First St., NE, Washington, DC 20426.

The public burden estimated for this form is three hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the collection of information. Send comments regarding the burden estimate or any aspect of this collection of information, including suggestions for reducing burden, to: FERC via e-mail DataClearance@ferc.gov; or mail to 888 First Street NE, Washington, DC 20426 (Attention: Information Clearance Officer) and Office of Management and Budget (OMB), via e-mail to pira_submission@omb.eop.gov; or mail to OMB, Office of Information and Regulatory Affairs, Attention: Desk Officer for FERC, Washington, DC 20503. Include OMB Control Number 1902-0106 as a point of reference. No person shall be subject to any penalty for failing to comply with a collection of information if the collection of information does not display a valid control number (44 U.S.C. § 3512 (a)).

Instructions:

- All data reported on this form must represent publicly available recreation amenities and services located within the project boundary.
- To ensure a common understanding of terms, please refer to the Glossary on page 3.
- Report actual data for each item. If actual data are unavailable, then please estimate.
- Submit a completed form for each development at your project.

Schedule 1. General Data

1. Licensee Name: <u>Quinebaug Associates</u>		Complete the following for each development if more than one.	
2. Project Name: <u>Quinebaug and Five Mile Project</u>		8. Reservoir Surface Area at Normal Pool (acres): <u>85</u>	
3. Project Number: <u>P-5062</u>		9. Shoreline Miles at Normal Pool: <u>+/- 2.5</u>	
4. Development Name: _____		10. Percent of Shoreline Available for Public Use: <u><10%</u>	
States Development/Project Traverses (List state with largest area within the development/project boundary first): 5. State #1: <u>CT</u> 6. State #2: _____		11. Data Collection Methods (enter percent for each method used; total must equal 100%): ____ traffic count/trail count ____ attendance records <input checked="" type="checkbox"/> staff observation ____ visitor counts or surveys ____ estimate (explain)	
7. Type of Project License: Major _____ (check one) Minor <input checked="" type="checkbox"/>			
For 2014, enter only the licensee's annual recreational construction, operation, and maintenance costs for the development (project). Also, enter the annual recreational revenues for that year.			
Item	Licensee's Annual Recreation Costs and Revenues (In Whole Dollars)		
	Construction, Operation and Maintenance Costs		Recreation Revenues for Calendar Year
12. Dollar Values	<u>+/- \$500</u>		<u>\$0</u>
13. Length of Recreation Season: Summer: From (MM/DD) <u>JUNE</u> To <u>OCT</u> Winter: From (MM/DD) <u>N/A</u> To _____			
Period	Number of visits to all recreational areas at development/project (in Recreation Days)		
	Annual Total		Peak Weekend Average (see Glossary)
14. Daytime	<u>300</u>		<u>15</u>
15. Nighttime	<u>0</u>		<u>0</u>

Respondent Certification: The undersigned certifies that he/she examined this report; and to the best of his/her knowledge, all data provided herein are true, complete, and accurate.

Legal Name _____	Title _____	Area Code/Phone No. _____
Signature _____	Date Signed _____	2017
		Reporting Year Ending

Title 18 U.S.C.1001 makes it a crime for any person knowingly and willingly to make to any Agency or department of the United States any false, fictitious or fraudulent statement or misrepresentation as to any matter within its jurisdiction.

Licensed Hydropower Development Recreation Report

Schedule 2. Inventory of Publicly Available Recreation Amenities Within the Project Boundary

16. Enter data for each Recreation Amenity Type (a). For User Free (b) and User Fee (c) enter the number of publicly available recreation amenities located within the project boundary, regardless of provider. For FERC Approved (d) enter the number of amenities identified under User Free (b) and User Fee (c) for which the licensee has an ongoing responsibility for funding or maintenance (see Glossary for further detail). For Capacity Utilization (f), of the total publicly available amenities (b) + (c), compare the average non-peak weekend use (see Glossary) for each recreation amenity type (during the recreation season, with the highest use, reported on Schedule 1, Item 13) with the total combined capacity of each amenity type and enter a percentage that indicates their overall level of use. For example, if all public boat launches are used to half capacity during the non-peak weekend days, enter 50% (if should use exceed capacity for an amenity type, enter the appropriate percentage above 100).

Recreation Amenity Type (a)	Number of Recreation Amenities			Total Units (e)	Capacity Utilization (%) (f)
	User Free (b)	User Fee (c)	FERC Approved (d)		
Boat Launch Areas. Improved areas having one or more boat launch lanes (enter number in column e) and are usually marked with signs, have hardened surfaces, and typically have adjacent parking.	0	0	0	Lanes	
Marinas. Facilities with more than 10 slips on project waters, which include one or more of the following: docking, fueling, repair and storage of boats; boat/equipment rental; or sell boat/food (see Glossary FERC approved).	0	0	0	N/A	
Whitewater Boating. Put-ins/Take-outs specifically designated for whitewater access.	0	0	0	N/A	
Portages. Sites designed for launching and taking out canoes/kayaks and the improved, designated, and maintained trails connecting such sites (enter length of trail in column e).	0	0	0	Feet	
Tailwater Fishing. Platforms, walkways, or similar structures to facilitate below dam fishing.	0	0	0	N/A	
Reservoir Fishing. Platforms, walkways, or similar structures to facilitate fishing in the reservoir pool or feeder streams.	0	0	0	N/A	
Swim Areas. Sites providing swimming facilities (bath houses, designated swim areas, parking and sanitation facilities).	0	0	0	Acres	
Trails. Narrow-trail used for non-motorized recreation travel which are mapped and designated for specific use(s) such as hiking, biking, horseback riding, snowshoeing, or XC skiing (excludes portages, ports or accessible routes. See Glossary).	0	0	0	Miles	
Active Recreation Areas. Playground equipment, game courts/fields, golf/disc golf courses, jogging tracks, etc.	0	0	0	Acres	
Picnic Areas. Locations containing one or more picnic sites (each of which may include tables, grills, trash cans, and parking).	0	0	0	Sites	
Overlooks/Views. Sites established to view scenery, wildlife, cultural resources, project features, or landscapes.	0	0	0	Acres	
Visitor Centers. Buildings where the public can gather information about the development/project, its operation, nearby historic, natural, cultural, recreational resources, and other items of interest.	0	0	0	N/A	
Interpretive Displays. Signage/Kiosks/Bulletins which provide information about the development/project, its operation, nearby historic, natural, cultural, recreational resources, and other items of interest.	0	0	0	N/A	N/A
Hunting Areas. Lands open to the general public for hunting.	0	0	0	Acres	
Winter Areas. Locations providing opportunities for skiing, sledding, curling, ice skating, or other winter activities.	0	0	0	Acres	
Campgrounds. Hardened areas developed to cluster campers (may include sites for tents, trailers, recreational vehicles (RV), yurts, cabins, or a combination, but excludes group camps).	0	0	0	Acres	N/A
Composites. Sites for tents, trailers, recreational vehicles (RV), yurts, cabins, or a combination of temporary uses.	0	0	0	N/A	
Cottage Sites. Permanent, all-weather, buildings rented for short-term use by the public for recreational purposes.	0	0	0	N/A	
Group Camps. Areas equipped to accommodate large groups of campers that are open to the general public (may be operated by public, private, or non-profit organizations).	0	0	0	Sites	
Dispersed Camping Areas. Places visitors are allowed to camp outside of a developed campground (enter number of sites in column e).	0	0	0	Sites	
Informal Use Areas. Well used locations which typically do not include amenities, but require operation and maintenance and/or public safety responsibilities.	0	0	0		
Access Points. Well-used sites (not accounted for elsewhere on this form) for visitors entering project lands or waters, without trespassing for recreational purposes (may have limited development such as parking, restrooms, signage).	2	0	0	N/A	
Other. Amenities that do not fit in the categories identified above. Please specify (if more than one, separate by commas):	0	0	0		

Glossary of FERC Form 80 Terms

Data Collection Methods. (Schedule 1, Item 11) – If a percentage is entered for the estimate alternative, please provide an explanation of the methods used (if submitted on a separate piece of paper, please include licensee name, project number, and development name)

Development. The portion of a project which includes:

- (a) a reservoir; or
- (b) a generating station and its specifically-related waterways.

Exemption from Filing. Exemption from the filing of this form granted upon Commission approval of an application by a licensee pursuant to the provisions of 18 CFR 8.11(c).

General Public. Those persons who do not have special privileges to use the shoreline for recreational purposes, such as waterfront property ownership, water-privileged community rights, or renters with such privileges.

Licensee. Any person, state, or municipality licensed under the provisions of Section 4 of the Federal Power Act, and any assignee or successor in interest. For the purposes of this form, the terms licensee, owner, and respondent are interchangeable except where:

- (a) the owner or licensee is a subsidiary of a parent company which has been or is required to file this form; or
- (b) there is more than one owner or licensee, of whom only one is responsible for filing this form. Enter the name of the entity that is responsible for filing this report in Schedule 1, Item 2.1.

Major License. A license for a project of more than 1,500 kilowatts installed capacity.

Minor License. A license for a project of 1,500 kilowatts or less installed capacity.

Non-Peak Weekend. Any weekend that is not a holiday and thus reflects more typical use during the recreation season.

Number of Recreation Amenities. Quantifies the availability of natural or man-made property or facilities for a given recreation amenity type. This includes all recreation resources available to the public within the development/project boundary. The resources are broken into the following categories:

User Free (Schedule 2, column b) – Those amenities within the development/project that are free to the public;

User Fee (Schedule 2, column c) – Those amenities within the development/project where the licensee/facility operator charges a fee;

FERC Approved (Schedule 2, column d) – Those amenities within the development/project required by the Commission in a license or license amendment document, including an approved recreation plan or report. Recreation amenities that are within the project boundary, but were approved by the licensee through the standard land use article or by the Commission through an application for non-project use of project lands and waters, are typically not counted as FERC approved, unless they are available to the public, but may be counted as either user free or user fee resources. The total FERC approved amenities column does not necessarily have to equal the sum of user free and user fee amenities.

Peak Use Weekend. Weekends when recreational use is at its peak for the season (typically Memorial Day, July 4th & Labor Day). On these weekends, recreational use may exceed the capacity of the area to handle such use. Include use for all three days in the holiday weekends when calculating Peak Weekend Average for Items 14 & 15 on Schedule 1.

Recreation Day. Each visit by a person to a development (as defined above) for recreational purposes during any portion of a 24-hour period.

Revenues. Income generated from recreation amenities at a given project/development during the previous calendar year. Includes fees for access or use of area.

Total Units (Schedule 2, column e) – Provide the total length, or area, or number that is appropriate for each amenity type using the metric provided.

Trails. Narrow tracks used for non-automobile recreation travel which are mapped and designated for specific use(s) such as hiking, biking, horseback riding, snowmobiling, or XC skiing. Trails are recreation amenities which provide the opportunity to engage in recreational pursuits, unlike paths (means of egress whose primary purpose is linking recreation amenities at a facility) or accessible routes (means of egress which meets the needs of persons with disability and links accessible recreation amenities and infrastructure at a facility).

Page 1 of 3

ORIGINAL

QUINEBAUG ASSOCIATES, LLC

Quinebaug Partnership
80A Elm Street
Lancaster, NH 03584
603.788.9892 Fax 802.892.1280
February 14, 2007

2007 FEB 23 P 3:03

The Secretary
Federal Energy Regulatory Commission
Mail Code: DHAC, PJ-12.1
888 First Street, NE
Washington, DC 20426

Project No. 5062-Connecticut-Quinebaug-Five Mile Project- Response to Order Amending
License August 18, 2006 Compliance Plan for Minimum Flow at 5 Mile

Dear Secretary,

As required in the FERC August 18, 2006 Amendment order for Project 5062 , the Licensee was given approval to make a capacity change to the project from 260 kw to 350 kw . The new 5 Mile Turbine was installed in October and November of 2006 and became operational on November 27, 2006.

As required by the Amendment Order, the Licensee is to file, for Commission approval, a flow monitoring plan that would include: a description of the mechanisms and structures used to monitor and maintain run-of-river operation and bypass flows; methods used for recording data; and a procedure for maintaining data for inspection by resource agency staff. In addition, the plan shall include the dimensions of the spillway notch, and associated calculations that show the opening passes the required 15-cfs minimum flow.

On January 10, 2007, the licensee submitted a Minimum Stream Flow Compliance Plan for comment with the United States Department of the Interior Fish and Wildlife Service and the State of Connecticut Department of Environmental Protection. The plan documentation that was submitted to the agencies for consultation are made a part of this filing

Further the licensee allowed a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. Only the Connecticut Department of Environmental Protection made a timely response and there comments are made part of this filing.

The Proposed Monitoring Plan Overview

The 5 Mile project has been in operation as a hydroelectric plant since 1989. The change of the 260 kw Niagara turbine to a more efficient 350 kw Canadian Hydro Component turbine did not make any changes to the Civil Features of the project or did it change any of the license required water levels. The installation of the new double regulated turbine will be more efficient with the water flow as well as more effective at water level control.

Further, the 5 Mile River Hydro Project has been required by the original FERC license to maintain a weir notch in the dam for minimum flow at the dam and has maintained a Data recorder that records water level continuously 24/7.

The Data Recorder and spillway notch are already part of the project operation. We propose that the existing monitoring plan and notch be accepted and continue to operate to meet the Amendment Order. They are described in greater detail below;

The Spillway Notch

The existing spillway notch, has dimensions (0.75' H x 7.0' Wide). Using weir tables provide as part of agency filings, the existing 9 inch notch by 7 feet wide, gives a flow calc of 6639 gpm. Divide by 449 gpm per CFS we have 15 cfs notch.

Data Recorder

We monitor water level with a CT 7300 Omega 168 hour chart recorder with a - 5.0' and +5.0' scale which the scale of the water level transmitter. The charts are changed weekly and are saved for 3 years.

Agency Comments

At the time of this FERC filing the only Agency to comment was the State of Connecticut, Department of Environmental Protection, which is attached. In general, the continued use of the existing impoundment stage recorder and the dam sill beam notch was adequate to meet compliance with the minimum stream flow release and impoundment water level monitoring.

Licensee Comments

We agree with all comments made in the Connecticut Department of Environmental Protection January 30, 2007 response. At the request of the Agency we will inspect the notch regularly for any accumulated debris.

Page 3 of 3

If there are any questions, don't hesitate to contact me at the above numbers.

Sincerely,

Greg Cloutier
Partner



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION



January 30, 2007

Mr. Gregory Cloutier
Quinebaug Associates, LLC
80A Elm Street
Lancaster, NH 03584

Dear Mr. Cloutier:

I am responding to your January 10, 2007 request to have the Department review and comment on the Minimum Stream Flow Compliance Plan - Five Mile Project. The Plan has been reviewed by staff from various disciplines of the Department, and this is a coordinated reply.

The continued use of the existing impoundment stage recorder and the dam sill beam notch should adequately provide, and document compliance with, the minimum stream flow release and impoundment water level fluctuation requirements of the project. To ensure the effectiveness of the notch in providing the minimum stream flow release, it should be inspected regularly for any accumulated debris, with removal promptly occurring, as necessary.

If I can be of any further assistance, please contact me at 860 424 4109. Thank you.

Sincerely,

Brian J. Emerick
Supervising Environmental Analyst
Office of Environmental Review

cc. Melissa Grader, USFWS
Brian Murphy, DEP/IFD
Bob Kaliszewski, DEP/OPPD

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Page 1 of 5

QUINEBAUG ASSOCIATES, LLC

Quinebaug Partnership

80A Elm Street

Lancaster, NH 03584

603.788.9892 Fax 802.892.1280

January 10, 2007

U.S. Fish and Wildlife Office
103 East Plumtree Rd.
Sunderland, MA 01375
Att: Ms Melissa Grader

Project No. 5062-Connecticut-Quinebaug-Five Mile Project- Response to Order Amending
License August 18, 2006 Compliance Plan for Minimum Flow at 5 Mile

Dear Melissa;

As required in the August 18, 2006 Amendment order for FERC Project 5062 , the Licensee was given approval to make a capacity change to the project from 260 kw to 350 kw . The new 5 Mile Turbine was installed in October and November of 2006 and became operational on November 27, 2006. As part of that FERC Order the Licensee is to consult with you office on the following;

Ferc Order for Minimum Flow

As required by the Amendment Order, the licensee is to file, for Commission approval, a flow monitoring plan that would include: a description of the mechanisms and structures used to monitor and maintain run-of-river operation and bypass flows; methods used for recording data; and a procedure for maintaining data for inspection by resource agency staff. In addition, the plan shall include the dimensions of the spillway notch, and associated calculations that show the opening passes the required 15-cfs minimum flow.

"The licensee shall prepare the plan and schedule following consultation with the United States Department of the Interior Fish and Wildlife Service and the State of Connecticut Department of Environmental Protection. The licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project- specific information."

Page 2 of 5

The Commission reserves the right to require changes to the plan or schedule. Upon Commission approval, the licensee shall implement the plan according to the approved schedule, including any changes to the plan or schedule required by the Commission.

Propose Monitor Plan Overview

The 5 Mile project has been in operation as a hydroelectric plant since 1989. The change of the 260 kw Niagara turbine to a more efficient 350 kw Canadian Hydro Component turbine did not make any changes to the Civil Features of the project or did it change any of the license required water levels. The installation of the new double regulated turbine will be more efficient with the water flow as will as more effective at water level control.

Further, the 5 Mile River Hydro Project has been required by the original FERC license to maintained a weir notch in the dam for minimum flow at the dam and has maintained a Data recorder that records water level continuously 24/7.

This Data Recorder and spillway notch are already part of the project operation. We propose that the existing monitoring plan be accepted and continue to operate to meet the Amendment Order.

The Spillway Notch

Dimensions (0.75' H x 7.0' Wide)

12 Improved-Structure Weir - Cameron Hydraulic Data



Discharge From Rectangular Weir with End Contractions

Figures in Table are in Customary Units

Head H in feet	Length (L) of weir in feet				Head H in meters	Length (L) of weir in feet			
	1	2	3	4		1	2	3	4
1	86.4	108.6	129.8	150.8	2.44	2440	3060	3680	4300
1 1/4	90.8	113.2	134.8	156.2	2.59	2540	3180	3820	4460
1 1/2	95.2	117.6	139.2	161.6	2.74	2640	3300	3960	4620
2	104.0	128.0	150.4	176.0	3.05	2940	3660	4380	5040
2 1/4	108.8	133.6	156.0	181.6	3.20	3040	3780	4520	5200
2 1/2	113.6	139.2	161.6	187.2	3.35	3140	3900	4660	5360
3	122.4	149.6	172.0	197.6	3.66	3440	4260	5020	5720
3 1/4	127.2	155.2	177.6	203.2	3.81	3540	4380	5160	5880
3 1/2	132.0	160.8	183.2	208.8	3.96	3640	4500	5300	6040
4	140.8	171.2	193.6	219.2	4.27	3940	4860	5660	6400
4 1/4	145.6	176.8	200.0	224.8	4.42	4040	4980	5800	6560
4 1/2	150.4	182.4	206.4	230.4	4.57	4140	5100	5940	6720
5	159.2	192.8	216.8	240.8	4.88	4440	5460	6300	7080
5 1/4	164.0	198.4	223.2	246.4	5.03	4540	5580	6440	7240
5 1/2	168.8	204.0	229.6	252.0	5.18	4640	5700	6580	7400
6	177.6	214.4	239.2	262.4	5.49	4940	6060	6940	7760
6 1/4	182.4	220.0	245.6	268.0	5.64	5040	6180	7080	7920
6 1/2	187.2	225.6	252.0	273.6	5.79	5140	6300	7220	8080
7	196.0	236.0	262.4	284.0	6.10	5440	6660	7580	8440
7 1/4	200.8	241.6	268.8	289.6	6.25	5540	6780	7720	8600
7 1/2	205.6	247.2	275.2	295.2	6.40	5640	6900	7860	8760

This table is based on Francis Formula

$$Q = 3.33 C L H^{3/2}$$

in which

Q = ft³ of water flowing per second

L = length of weir opening in feet (between toe 4 to 5 ft from 16)

H = height of water in feet (to be measured at about 4 ft back of weir opening)

C = coefficient for all head 1 ft

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Using the table above for 9 inch notch by 7 feet wide, gives a flow calc of 6639 gpm. Divide by 449 gpm per CFS we have 15 cfs notch. (See attached photo showing the actual notch in the dam)

Data Recorder

We have installed a CT 7300 Omega 168 hour chart recorder with a - 5.0' and +5.0' scale which the scale of the water level transmitter. See Attached Photos. and Recorder Specifications). Please note that the chart recorder is 2 pen and the second pen is used for recording unit vibration.

The charts are changed weekly and are saved for 3 years.

Request For Review

We respectfully request your review of the existing Minimum Flow Spillway Notch and the Data recorder as a reasonable monitoring plan for this project which will provide an acceptable method for Resource Staff to monitor compliance.

If there are any questions, don't hesitate to contact me at the above numbers.

Sincerely,

Greg Cloutier
Partner

CC
Brian Emerick
CTDEP
Office of Environmental Review and Policy
79 Elm Street
Hartford, CT. 06106-5127

Brian Murphy
Fisheries Biologist CT-DEP
209 Hebron Rd
Marlborough, CT 06447

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Copy:

Quinebaug, Associates, LLC
80A Elm Street
Lancaster, NH 03584
603.788.9892 fax 802.892.1280
January 10, 2007

Brian Murphy
Fisheries Biologist CT-DEP
209 Hebron Rd
Marlborough, CT 06447

Project No. 5062-Connecticut-Quinebaug-Five Mile Project- Response to Order Amending
License August 18, 2006 Compliance Plan for Minimum Flow

Dear Sir:

Please find your copy of my recent letter to Melissa Grader of the USF&W for comments
on our proposed Minimum Flow spillway notch and Data Recorder.

I would appreciate your review, so I can include your comments with my FERC filing on
the same matter.

If you have any questions don't hesitate to contact me at the above phone numbers.

Sincerely,

Gregory Cloutier

Page 5 of 5

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80A Elm Street
Lancaster, NH 03584
603.788.9892 fax 802.892.1280
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Sincerely,

Gregory Cloutier

UNITED STATES OF AMERICA 116 FERC ¶ 62, 141
FEDERAL ENERGY REGULATORY COMMISSION

Quinebaug Associates, LLC

Project No. 5062-044

ORDER AMENDING LICENSE

(Issued August 18, 2006)

On June 1, 2006, Quinebaug Associates, LLC, licensee for the Quinebaug-Five Mile Pond Hydroelectric Project, FERC No. 5062, filed an application to revise the installed capacity of the project.¹ The licensee is proposing to increase the installed capacity of the Five Mile Pond Development from 260 kW to 350 kW. The project is located on the Quinebaug and Five Mile Rivers in Windham County, Connecticut.

BACKGROUND

The project consists of two developments, Quinebaug and Five Mile Pond. By an order issued January 9, 1992,² the Commission authorized the Quinebaug Development consisting of two generating units rated at 1,120 kW and 711 kW, and the Five Mile Pond Development with a single 260-kW generating unit, for a total authorized installed capacity of 2,091 kW.

PROPOSED AMENDMENT

In its filing, the licensee states that the existing single 260-kW regulated submersible Kaplan turbine unit at the Five Mile Pond Development is having maintenance problems. The unit was completely rebuilt in 2001, with a new generator, new seals and bearings, and again in 2003. However, the turbine has operational problems that results in low flow efficiency. Therefore, the licensee is requesting Commission approval to replace the existing unit with a double regulated Kaplan turbine. The nameplate capacity of the unit would increase from 260 kW to 350 KW, but the hydraulic capacity would remain at 200 cubic feet per second (cfs). The new unit would substantially increase unit efficiency from 77% up to 91%. In addition, the new unit would operate over a wider range of river flows from 30 cfs to 200 cfs, which would minimize flow fluctuations that occur under the current turbine conditions.

¹ See, 38 FERC ¶ 62,272, Order Issuing License, issued March 19, 1987.

² See, 58 FERC ¶ 62,022, Order Approving As-built Exhibits and Revising Annual Charges (1992).

Project No. 5062-044

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The installation would be basically a direct replacement of the existing turbine. No changes to the existing civil works are expected and the new generator will utilize the existing 800 amp system already installed. The licensee is planning to install the new turbine and generator during the month of September when the project would be shut down for low flows. All work would be completed behind existing power house inlet flow gates. In addition, there will be no work done in the river, to the dam, or to the civil structures.

CONSULTATION

Prior to filing its amendment application, the licensee solicited comments from the United States Department of the Interior Fish and Wildlife Service (FWS), and the State of Connecticut Department of Environmental Protection (CDEP). Neither agency objected to the proposed changes to the project.

REVIEW

A. Installed Capacity

In the application, the licensee proposes to remove the 260-kW single regulated turbine and install a 350-kW unit. This change represents a 90-kW increase in the authorized installed capacity, but no change in the hydraulic capacity of the project. The proposed action will not change project operation, which will continue to operate in its current run-of-river mode of operation. The increase in installed capacity will lead to revising the annual charges under Article 201 of the license, for the purpose of reimbursement to the United States Government for the costs of administration of Part I of the Federal Power Act. The revised annual charges will be effective the date of commencement of construction of the revised capacity.³ As such, we are requiring the licensee in ordering paragraph (F), to notify the Commission, within 30 days from the start of such construction, of the exact date of commencement of replacement of the unit. We will use such date to amend Article 201 of the license.

³ International Falls Power Co., 66 FERC ¶ 61,086 at 61,117 (1994). The order states that, "With respect to substantial changes in installed capacity that receive prior approval, the effective date for revised annual charges will be the date of the commencement of construction of the revised capacity."

Project No. 5062-044

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In addition, this order will revise the project description in the license to reflect the approved action. The licensee will be required to submit for approval as-built Exhibits A and F, as needed, upon completion of the unit replacement.

B. Environmental Review

In our review of the application, we determined that the licensee's proposal would increase the overall plant efficiency, but will not adversely impact the operation of the project or environmental resources. The proposed turbine replacement will not result in a change of the hydraulic capacity of the unit, which remains at 200 cfs, as authorized in the license. Replacing the unit would substantially increase turbine efficiency only (from 77% to 91%). In addition, the new unit would operate over a wider range of river flows (30 cfs to 200 cfs), which should reduce flow fluctuations that occur under the present operations due to the turbine frequently starting and stopping. No impacts to the aquatic resources are expected from the installation of the new unit.

Under Article 403 of the license, the licensee is required to operate the project in an instantaneous run-of-river mode for the protection of fish and wildlife resources. In addition, under Article 404 of the license, the licensee is required to maintain in the bypassed reaches below Rojak Dam and Five Mile Pond Dam continuous minimum flows of 77 cfs and 15 cfs respectively, as measured immediately below the project dams, or inflow to the reservoirs, whichever is less for the protection of fish and wildlife resources.

In a letter dated April 17, 2006, the FWS requested the licensee to develop a flow monitoring plan that would include: a description of the mechanisms and structures used to monitor and maintain run-of-river operation and bypass flows; methods used for recording data; and a procedure for maintaining data for inspection by its office. In addition, the FWS required the plan to include the dimensions of the spillway notch and associated calculations that show the opening passes for the required 15 cfs. In a letter dated April 27, 2006, the CDEP concurred with the FWS's recommendations.

In order for the Commission to ensure compliance with the run-of-river requirements specified under Article 403 of the license and the minimum flow requirements specified by Article 404 of the license, the licensee should file the monitoring plan with the Commission for approval. The licensee should prepare the plan and schedule following consultation with the FWS and CDEP. The licensee should include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by

Project No. 5062-044

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the plan. The licensee should allow a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons, based on project-specific information.

SUMMARY

Staff concludes that the proposed change to the project would not constitute a major federal action significantly affecting the quality of the human environment. This order will approve the licensee's proposal which will revise the installed capacity at the Five Mile Pond Development from 260 kW to 350 kW. The installed capacity at the Quinebaug Dedevlopment would remain as authorized. Consequently, the project's total authorized capacity will increase from 2,091 kW to 2,181 kW.

The Director orders:

(A) The application to amend the license for the Quinebaug-Five Mile Pond Project, FERC No. 5062, to revise the installed capacity of the project, as filed on June 1, 2006, is approved as provided in this order.

(B) The project description in Ordering Paragraph B(2)(f) of the license for the Five-Mile Pond Development is revised as follows:

(f) a powerhouse containing a single double regulated Kaplan turbine unit rated at 350-kW.

(C) Within 30 days after the start of construction of the unit upgrade the licensee shall notify the Commission of the date the unit upgrade began. The filing should include written documentations and photographs of all work performed since the start of construction. The date of commencement of construction will be used to amend Article 201 of the license.

(D) Within 30 days of the date of completion of the unit upgrade at the Five Mile Pond Development the licensee shall install a nameplate on the upgraded generating unit to reflect the capacity authorized in this order. Within 30 days of installation of the nameplate, the licensee shall provide photographs of the nameplate for verification to the Commission and the Commission's New York Regional Office.

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(E) Within 90 days from completion of construction of the project and installation of the generating unit, the licensee must submit revised Exhibits A, and F, as needed, describing and showing the as-built conditions of the project.

(F) By February 1, 2007, the licensee shall file, for Commission approval, a flow monitoring plan that would include: a description of the mechanisms and structures used to monitor and maintain run-of-river operation and bypass flows; methods used for recording data; and a procedure for maintaining data for inspection by resource agency staff. In addition, the plan shall include the dimensions of the spillway notch, and associated calculations that show the opening passes the required 15-cfs minimum flow.

The licensee shall prepare the plan and schedule following consultation with the United States Department of the Interior Fish and Wildlife Service and the State of Connecticut Department of Environmental Protection. The licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan or schedule. Upon Commission approval, the licensee shall implement the plan according to the approved schedule, including any changes to the plan or schedule required by the Commission.

Project No. 5062-044

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(G) This order constitutes final agency action. Requests for a rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Mohamad Fayyad
Engineering Team Lead
Division of Hydropower Administration
and Compliance

Attachment B

Appendix B

All applications for LIHI Certification must include complete contact information.

A. Applicant-related contacts

Facility Owner:	
Name and Title	Ted Rose, CEO
Company	Hitchcock Hydro, LLC c/o Gravity Renewables, Inc.
Phone	303-440-3378
Email Address	ted@gravityrenewables.com
Mailing Address	1401 Walnut Street, Boulder, CO 80302
Facility Operator (if different from Owner):	
Name and Title	Same
Company	
Phone	
Email Address	
Mailing Address	
Consulting Firm / Agent for LIHI Program (if different from above):	
Name and Title	N/A
Company	
Phone	
Email Address	
Mailing Address	
Compliance Contact (responsible for LIHI Program requirements):	
Name and Title	Celeste N. Fay, Regulatory Manager
Company	Gravity Renewables, Inc.
Phone	413-262-9466
Email Address	celeste@gravityrenewables.com
Mailing Address	1401 Walnut Street, Boulder, CO 80302
Party responsible for accounts payable:	
Name and Title	Megan Oaks, Accounting Manager
Company	Gravity Renewables
Phone	303-440-3380
Email Address	megan@gravityrenewables.com
Mailing Address	1401 Walnut Street, Boulder, CO 80302

Contact	Resource Agency	Email
Robert Hannon	CTDEEP – Water Quality	Robert.Hannon@ct.gov
Stephen Gephard	CTDEEP - Fisheries	Steve.Gephard@ct.gov
Melissa Grader	USFWS	Melissa_Grader@fws.gov

Contact	Organization	Email
Jean Pillo	Thames River Basin Partnership and Rivers Alliance of CT	Jean.pillo@conservect.org
Louis Bruinooge	Last Green Valley	lois@tlgv.org