

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

The City of Norwich, Department
of Public Utilities

Project Nos. 2441-009
and 2508-002,
Connecticut

ORDER ISSUING NEW LICENSE
(Major Project)
(March 31, 1993)

The City of Norwich, Department of Public Utilities, Connecticut (Norwich), filed subsequent license applications(minor), under Part I of the Federal Power Act (Act), for the continued operation and maintenance of two projects - the Greenville Dam Project No. 2441-009 (Greenville) and the Tenth Street Hydro Station Project No. 2508-002 (Tenth Street). The projects are located on the Shetucket River in the City of Norwich, New London County, Connecticut. The projects would affect the interests of interstate commerce.

Norwich proposes substantial new construction and changes in operation. These changes include construction of a downstream fish passage facility and upstream fish passage facilities consisting of a Denil fish ladder, which will be supplemented with a fish lift at a later stage. These measures would cost about \$1.8 million dollars.

The Greenville Project consists of a 15-foot-high rock filled timber crib dam impounding an 80-acre reservoir, a 3,200-foot-long power canal, a powerhouse with an installed capacity of 800 kilowatts (kW), a 3,200-foot-long transmission line, new fishways, and related facilities (see ordering paragraph B(2) for a detailed project description).

The Tenth Street Project consists of an 80-foot-long concrete intake flume, a powerhouse with an installed capacity of 1,400 kW, a short tailrace, a short transmission line, and related facilities (see ordering paragraph B(2) for a detailed project description).

Tenth Street is located in the bypass reach of Greenville and receives water diverted from the Greenville dam. The operations of these two projects will continue to be coordinated. Therefore, I consider these two projects to comprise a single unit of development as defined in Section 3(11) of the Act.

In this order, I'm combining the two developments, with a total installed capacity of 2,200 kW, and issuing one new major license to be referred to as the Greenville and Tenth Street.

Hydro Project No. 2441. 1/

A notice of Norwich's applications was published for the two developments. No protests were filed and no agency objected to the issuance of a license. American Rivers, Inc., filed a motion to intervene stating that the developments have significant opportunities for enhancement of fish, wildlife, and recreational resources.

The staff completed an environmental assessment (EA) on November 20, 1992, for the Greenville and Tenth Street developments, which is attached to this order. The EA recommended issuance of one license for both developments with a total installed capacity of 2,200 kW.

Norwich, in its comments on the EA filed on January 26, 1993, opposes combining the projects into a single major license because of the potential to be assessed headwater benefit charges. Norwich contends this potential assessment places the already economically borderline development into a high risk category and could jeopardize the economic viability of the development.

We have determined that the headwater benefits accruing to Norwich from the operation of the project are de minimis based on an examination of the studies for developments in the Thames River Basin. 2/ Therefore, Norwich will not be assessed for any headwater benefits under the term of the new license unless changed conditions in basin development, or legislative or regulatory changes, dictate a reassessment.

Comments and motions to intervene received from interested agencies and individuals have been fully considered in determining whether to issue this license.

Comprehensive Development

Sections 4(e) and 10(a)(1) of the Act state that in deciding whether to issue a license, the Commission, in addition to the power and developmental purposes of the project, shall give equal consideration to the purposes of energy conservation, to the protection, mitigation of damage to, and enhancement of, fish and wildlife, to the protection of recreational opportunities, and to the preservation of other aspects of environmental quality.

1/ Unless otherwise indicated, "project" refers to both the Greenville and Tenth Street developments under Project No. 2441. Project No. 2508 will be retired in this license.

2/ See Connecticut Light and Power Company, 34 FERC 62,529 (1986).

These purposes are considered in the attached EA (see sections VI-Developmental Resources and VII-Comprehensive Development and Recommended Alternative).

To protect and enhance environmental conditions at the project site, staff recommended that Norwich:

- Operate the project in an instantaneous run-of-river mode
- Provide a continuous minimum flow of 250 cfs or inflow to the project, whichever is less
- Install structures to control flows through the fishway and crest gate
- Develop a gaging plan to monitor run-of-river operations and minimum flow releases
- Install upstream and downstream fishways
- Develop an operational plan, a post construction evaluation plan, and a fishway maintenance plan
- Provide recreation facilities and monitor recreational activities
- Document the portion of the historic Greenville dam that is affected by fishway construction
- Protect any undiscovered archaeological or historical sites that may be uncovered during construction

Overall, the recommended enhancement measures would improve the fishery resources, water quality, and recreational resources and still allow adequate generation and economics.

The project would continue to provide 7.6 gigawatthours (GWh) annually and reduce Norwich's annual purchase requirements a utility. The clean energy that would be produced by the project would continue to displace fossil-fueled power generation, thereby conserving nonrenewable energy resources and reducing the emissions of noxious gases that contribute to atmospheric pollution and global warming.

Section 10(a)(2) of the Act requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed five plans that address

various resources in Connecticut. Of these, the staff identified two plans relevant to the project. 3/ No conflicts were found.

I concur with the staff conclusion that the proposed project is best adapted to a comprehensive plan for improving, development, or conserving the Shetucket River.

Water Quality Certification

On December 22, 1991, the Connecticut Department of Environmental Protection (CDEP) received Norwich's application for water quality certification (WQC). On December 16, 1992, CDEP issued conditional water quality certifications for the two developments, and subsequently clarified those conditions by its January 27, 1993, letter to Norwich. This license is not in conflict with the CDEP conditions for WQC.

Norwich's Record as a Licensee

Norwich's record as a Licensee was evaluated in these areas: (1) conservation, required under section 10(a)(2)(c) of the Act and (2) complying with the present license. I accept the staff's conclusion in each of these areas.

Here are our findings:

Section 10(a)(2)(C): Conservation Efforts

Norwich is a member of the Connecticut Municipal Electric Energy Cooperative (CMEEC), which promotes conservation and load management among its member systems.

Norwich participates fully in implementing CMEEC's conservation programs. Norwich's conservation plans include these: (1) making surveys to identify conservation opportunities, (2) evaluating and upgrading lighting programs, (3) auditing the operation of large commercial and industrial customers on a cost-sharing basis, and (4) giving customers conservation information.

Norwich is making a good faith-effort to conserve electricity in compliance with the requirements of the Connecticut Public Utilities Commission.

3/ (1) Connecticut's statewide comprehensive outdoor recreation plan, 1987-1992, Connecticut Department of Environmental Protection, Hartford, Connecticut; (2) Connecticut's preliminary plan for the restoration of anadromous fish to the Thames River Basin, 1985, Connecticut Department of Environmental Protection, Bureau of Fisheries, Hartford, Connecticut.

Licensee's Potential for Compliance with the New License

Norwich's compliance record shows a good faith effort to comply with all license conditions.

Therefore, Norwich could perform in a competent manner if the Commission issues a new license for the project.

Recommendations of Federal and State Fish and Wildlife Agencies

Section 10(j)(1) of the Act requires the Commission to include license conditions, based on recommendations of federal and state fish and wildlife agencies, for the protection, mitigation of adverse impacts to, and enhancement of fish and wildlife. The EA and this order address these concerns. This license provides conditions consistent with these recommendations with one exception.

In the EA, the staff did not recommend adopting the Department of Interior's (Interior) recommendation that Norwich:

Operate the projects, during upstream passage season (April through November), such that Tenth Street Station is operated in a first-on and last-off mode to facilitate upstream fish movement to the fishway at Greenville dam.

The staff found that the recommendation was inconsistent with the public interest standard of section 4(e) and the comprehensive planning standard of section 10(a) of the Act for the following reasons. 4/

Staff agreed that project operation should be evaluated for possible changes to assist fish passage at Greenville dam, but concluded that operational procedures should not be set without first determining a need. Norwich's minimum flow proposal of 250 cfs meets or exceeds all criteria for fish passage and attraction. However, to ensure that this measure is effective, staff concluded that a postconstruction evaluation of the fishway, combined with monitoring in the bypass reach, should be required.

In addition, staff's analysis found (see EA, section VI.C) that the operation of the Tenth Street powerhouse as recommended by Interior would cost the city's ratepayers an additional \$6,000 annually based on a 50-year license term. Staff concluded that been determined, would be inconsistent with the comprehensive planning

4/ The staff considered this measure (proposed under section 18) as a recommendation for the protection of fish and wildlife under section 10(j) of the Federal Power Act.

standard.

Under section 10(j)(2) of the Act, whenever the Commission believes that any recommendation of federal and state fish and wildlife agencies may be inconsistent with the Act or other applicable law, the Commission shall attempt to resolve such inconsistencies.

By letter dated December 3, 1992, the staff asked Interior to consider other measures that would be agreeable to Interior and that would adequately protect the fishery resources in the project area.

By letter dated January 27, 1993, Interior agreed with the staff's recommendations in the EA and with the recommendation to monitor the effectiveness of the fishway.

I conclude that the fish and wildlife measures required in this license are consistent with the recommendations of the fish and wildlife agencies.

Section 18-Fishway Prescription

Interior prescribed the following provisions under authority of Section 18 of the Act: (1) an upstream Denil fish ladder; (2) a construction schedule for the Denil ladder -- starting in 1994 and an operation date for the ladder of April 1, 1995; (3) a fish lift/elevator, to supplement the Denil ladder, to be constructed at a future date, said date to be determined based on passage of a specified number of fish; the lift is to be operational by April 1 of the year following construction; (4) downstream fish passage facilities, with guidance screen and a bypass sluice; (5) a construction schedule for the downstream fish passage facilities similar to the upstream Denil ladder; and (6) a plant operation plan requiring Tenth Street to be operated in a first-on and last-off mode to facilitate upstream fish passage at Greenville dam.

By letter dated January 27, 1993, Interior amended its section 18 prescriptions. Interior agreed with the technical assessment in the EA about construction schedules and the operation of the Tenth Street powerhouse, and accordingly modified its Section 18 prescriptions. 5/ Interior agrees that fish passage facilities

5/ Interior expresses concern on how the construction, according to a required schedule, will be completed in the event Norwich can't pass a bond issue. It is the Licensee's responsibility to arrange for financing and construction of the project in compliance with the license. Should the Licensee fail to comply with the license, the Commission has the option to revoke the license.

should be operated within 3 years from issuance of the license (i.e. spring 1996). Interior also agrees that post-licensing fish passage monitoring would be appropriate in lieu of the first-on and last-off operational plan for Tenth Street (this issue is addressed in the previous section of this order and section V.B.3 of the EA). This license includes Interior's revised section 18 prescriptions.

Term of the License

In 1986, the Electric Consumers Protection Act (ECPA) modified section 15 of the Act to specify that any license issued shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more than 50 years. Our past Commission policy, which establishes 30-year terms for those projects which propose little or no redevelopment or new construction, 40-year terms for those projects that propose a moderate redevelopment or new construction, and 50-year terms for those projects that propose extensive redevelopment or new construction, is consistent with the Act as modified by ECPA.

Norwich proposes substantial new construction which includes a downstream fish passage facility and upstream fish passage facilities consisting of a Denil fish ladder and a fish lift. Therefore, I'm granting a 50-year license term for this project.

Memorandum of Agreement on Cultural Resources

On February 11, 1993, a Memorandum of Agreement (MOA) was executed between the Commission, Norwich, the Connecticut State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The MOA requires mitigative measures to protect the historical integrity of the Greenville dam, a component of the Greenville Industrial District which is eligible for inclusion in the National Register of Historic Places. This license requires implementation of the MOA.

Summary of Findings

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. Issuing 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 operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design

Assessment. 6/

I conclude that the project does not conflict with any planned or authorized development and is best adapted to comprehensive development of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to the City of Norwich, Department of Public Utilities, (Licensee) for a period of 50 years, effective January 1, 1994, to operate and maintain the Greenville and Tenth Street Hydro Project No. 2441. This license is subject to the terms and conditions of the Act, which is incorporated by reference as part of this license, and to the regulations the Commission issues under the provisions of the Act.

(B) The old Project No. 2508, for the Tenth Street Development, is hereby retired as this development is now made part of Project No. 2441. The Licensee shall file new aperture cards reflecting the revised drawing numbers shown in paragraph (C) within 45 days from the effective date of this license (these will replace the cards filed pursuant to the acceptance of the applications for the respective developments).

(C) 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:

Greenville Dam Development-Exhibit G:

Sheet number	FERC No. 2441 -	Title
1 of 2	111	Location Map
2 of 2	112	Project Area Map

6/ Staff has prepared a Safety and Design Assessment for the Greenville and the Tenth Street Project No. 2441-009, which is available in the Commission's public file associated with this project.

Tenth Street Hydro **Development-Exhibit G:**

Sheet number	FERC No. 2441 -	Title
1 of 2	113	Location Map
2 of 2	114	Project Area Map

* Formerly FERC Project No. 2508

(2) Project works consisting of:

(a) Greenville Dam Development -- (1) the 15-foot-high, 399-foot-long rock filled timber crib dam impounding the 80-acre reservoir; (2) the 13-foot-deep, 70-foot-wide, and 3,200-foot-long power canal; (3) the 28-foot-wide by 43-foot-long Second Street powerhouse containing two 400-kW turbine-generator units; (4) the 3,200-foot-long, 4.8-kV transmission line; (5) new fishways; and (6) other appurtenant structures.

(b) Tenth Street Hydro Development -- (1) the 15-foot-deep, 30-foot-wide, and 80-foot-long concrete intake flume; (2) the 23-foot-wide, 45-foot-long powerhouse containing one 1,400-kW turbine-generator unit; (3) the short tailrace which discharges directly into the Shetucket River; (4) the 150-foot-long, 4.8-kV transmission line; and (5) other appurtenant structures.

The project works generally described above are more specifically described in Exhibit A of the application and shown by exhibit F:

Greenville Dam Development

Exhibit A: Sections 1.1, 1.2, and Table A-1 of exhibit A of the application for license.

Exhibit F:

Sheet number	FERC No. 2441 -	Title
1 of 5	101	Site plan
2 of 5	102	Plan of dam
3 of 5	103	Dam sections
4 of 5	104	Dam sections
5 of 5	105	Powerhouse plan and section

Tenth Street Hydro Development

Exhibit A: Sections 1.8.2, 1.8.5, and Table A-1 of exhibit A of the application for license.

Exhibit F:

Sheet number	FERC No. 2441 -	Title
1 of 5	106	Hydro site plan
2 of 5	107	Hydro plant Plan and section
3 of 5	108	Hydro plant sections
4 of 5	109	Trash sluiceway - Pan and sections
5 of 5	110	Trash sluiceway - sections

* Formerly FERC Project No. 2508

(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.

(D) Exhibits A, F, and G described above are approved and made part of the license.

(E) The City of Norwich shall make no payments for any headwater benefits received during the term of the original license. Furthermore, the City of Norwich shall make no payments for any

for any headwater benefits received during the term of this new license unless changed conditions in basin development, or legislative or regulatory changes, dictate a reassessment.

(F) This license is subject to the articles set forth in Form L-10, (October 1975), entitled "TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING THE INTERESTS OF INTERSTATE OR FOREIGN COMMERCE", and the following additional articles.

Article 201. The Licensee shall pay the United States an annual charge, effective January 1, 1994, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act, as determined by the Commission. The authorized installed capacity for that purpose is 3,000 horsepower.

Article 202. (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 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 use 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, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water 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 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. 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 use 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 or roads where 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 certification 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 (measured over project waters) 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 project waters at normal 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 60 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 paragraph (c) or (d) of this article:

(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 the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure 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; and (iii) the grantee shall not unduly restrict public access to project waters.

(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.

Article 301. At least 60 days before the start of construction, the Licensee shall submit one copy to the Commission's Regional Director and two copies to the Commission (one of these shall be a courtesy copy to the Director, Division of Dam Safety and Inspections) of the final contract drawings and specifications for fishways and related structures.

The Commission may require changes in the plans and specifications to assure a safe and adequate project. If the Licensee plans substantial changes to location, size, type, or purpose of the water-retention structures, powerhouse, or water conveyance structures, the plans and specifications shall be accompanied by revised Exhibit F and G drawings, as necessary.

Article 302. Within 90 days after finishing construction, the Licensee shall submit for Commission approval eight copies of revised exhibits A, F, and G, describing the project as built. The Licensee shall submit six copies to the Commission, one copy to the Commission's Regional Director, and one to the Director, Division of Project Compliance and Administration.

Article 303. The Licensee, within 1 year from the effective date of this license, shall prepare and submit to the Director, Office of Hydropower Licensing, a feasibility analysis of upgrading the generating capacity at the project. If the study shows upgrading the generating units to be economically feasible, the Licensee shall

simultaneously submit a plan and schedule for amending its license to upgrade the units.

Article 401. At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval an Erosion and Sediment Control Plan for the installation of the fish passage facilities. The Licensee shall file the plan at the same time as the final plans required in Article 405 are filed.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection. The Licensee shall include with the plan: (1) documentation of consultation; (2) copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies; and (3) 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 to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt any 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. No land-disturbing or land-clearing activities shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 402. The Licensee shall operate the project in a run-of-river mode for the protection of aquatic resources in the Shetucket River. The Licensee shall at all times act to minimize the fluctuation of the forebay surface elevation by maintaining a discharge from the project so that, at any point in time, flows as measured immediately downstream from the project tailrace, approximate the sum of inflows to the project forebay.

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 U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection. If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 403. The Licensee shall release from the Greenville dam into the Shetucket River a minimum flow of 250 cubic feet per second (cfs), or inflow to the project forebay, whichever is less, for the enhancement of water quality, protection of resident fish habitat, and to provide passage for anadromous fish species in the project bypass reach.

This flow may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon agreement between the Licensee and the U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection. If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 404. At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval a plan to install streamflow gage(s) in the Shetucket River, to monitor compliance with the run-of-river operation and a 250 cfs minimum flow release, as required by articles 402 and 403.

The plan shall include a schedule for installing the gage(s), determination of the location(s) and design of the gage(s), the method of flow data collection, and a provision for providing the flow data to the agencies within 30 days after the date of the agencies' request for the data.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection. The Licensee shall include with the plan: (1) documentation of consultation; (2) copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies; and (3) 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 to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt any 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. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 405. The Licensee shall begin construction of the upstream fish passage and related facilities, with the exception of the fish lift, by April 1, 1995, and shall complete construction so as to begin operation by April 1, 1996. At least 90 days before the start of any land-clearing or land-disturbing activities related to upstream fish passage construction at the project site, the Licensee shall file for Commission approval, detailed design drawings of the Licensee's proposed denil fish ladder and fish lift.

Once a specific number of fish (referred to as trigger numbers) are passed through the facility, then a fish lift shall be required to supplement the denil ladder capacity for providing upstream

passage of fish. Trigger numbers of 20,000 American shad or 200,000 river herring, or a combination of the two, with one shad being equivalent to ten river herring, shall be used to determine when the capacity of the denil fish ladder is reached. The fish lift shall be constructed in the summer or fall of the year following the passage of the trigger numbers of fish. The lift shall be operational by April 1 of the year following construction.

The Licensee shall prepare the aforementioned drawings and schedule after consultation with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection. The Licensee shall include with the drawings documentation of consultation, copies of comments and recommendations on the drawings and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the Licensee's facilities. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the drawings and schedule 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 proposed facilities and schedule. No land-disturbing or land-clearing activities shall begin until the drawings are approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 406. The Licensee shall begin construction of the downstream fish passage and related facilities, with the exception of the fish lift, by April 1, 1995, and shall complete construction so as to begin operation by April 1, 1996.

At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval, detailed design drawings of the Licensee's proposed louver-style behavioral deterrent for guidance of downstream juvenile fish. To ensure appropriate approach velocity and guidance, the proposed angled trashrack shall have clear spacing of 1 inch, and the bypass sluice shall be designed to pass a flow of 40 cubic feet per second.

The Licensee shall prepare the aforementioned drawings and schedule after consultation with The U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection. The Licensee shall include with the drawings documentation of consultation, copies of comments and recommendations on the drawings and schedule after they have been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the Licensee's facilities. The Licensee shall allow

a minimum of 30 days for the agencies to comment and to make recommendations before filing the drawings and schedule 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 proposed facilities and schedule. No land-disturbing or land-clearing activities shall begin until the drawings are approved. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 407. At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval, a plan to assess upstream fish passage. This plan shall cover both a postconstruction evaluation of the fish ladder and lift, and an evaluation of the 250 cubic feet per second (cfs) minimum flow to provide sufficient attraction and passage of adult anadromous fish to the upstream fishway. The plan shall specify:

(1) how the Licensee shall evaluate tailrace flow patterns and make the adjustments or further structural modifications as needed, to achieve efficient upstream passage of adult fish through the facility.

(2) how the Licensee shall evaluate adult fish passage in the project bypass reach, and make adjustments or further project modifications as needed, to achieve efficient upstream passage of adult fish through the bypass reach.

The plan shall include a schedule for: (1) implementing the plan and making any necessary adjustments or project modifications; (2) consulting with the fisheries agencies concerning the results of the evaluations, and (3) filing the results, agency comments, and the Licensee's response to the agency comments with the Commission.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection. The Licensee shall include with the plan: (1) documentation of consultation; (2) copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies; and (3) 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 to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt any 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. Upon Commission approval, the Licensee shall implement the

plan, including any changes required by the Commission.

Article 408. At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval, a postconstruction evaluation plan to assess the efficiency of the downstream fish passage facility. The plan shall specify how the Licensee will evaluate approach velocities in providing guidance to downstream juvenile fish, and make the adjustments or further structural modifications as needed, to achieve efficient passage of juvenile fish through the facility.

The plan shall include a schedule for: (1) implementing the plan and making any necessary adjustments or further structural modifications; (2) consulting with the fisheries agencies concerning the results of the evaluation, and (3) filing the results, agency comments, and the Licensee's response to the agency comments with the Commission.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection. The Licensee shall include with the plan: (1) documentation of consultation; (2) copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies; and (3) 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 to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt any 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. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 409. At least 90 days before the start of any land-clearing or land-disturbing activities at the project site, the Licensee shall file for Commission approval, a fishways maintenance plan. To maintain continuous, effective operation of the fish passage facilities, the Licensee shall develop a maintenance plan for the fishways. The plan shall include a description of facility management and shall identify back-up equipment and supplies that will be maintained to ensure fast repairs in the event of equipment failure.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service, and the Connecticut Department of Environmental Protection. The Licensee shall include with the plan: (1) documentation of consultation; (2) copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies; and (3) 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 to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt any 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. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 410. The recreation plan filed August 7, 1992, and amended on November 4, 1992, is approved. The plan provides for six parking spaces, trails, portage facilities, and fishing areas along the river. After consulting with the Connecticut Department of Environmental Protection's Bureau of Parks and Forests and the city of Norwich's Planning Department, the Licensee shall finalize the design criteria and construction plans for recreation facilities and site design.

The Licensee shall: (1) be responsible for the construction, operation, and maintenance of the approved recreational facilities; (2) complete construction of the facilities within 2 years from the effective date of this license; and (3) show the facilities on the as-built drawings filed pursuant to this license.

Article 411. The Licensee, after consultation with the Connecticut Department of Environmental Protection's Bureau of Parks and Forests and the city of Norwich's Planning Department, shall monitor recreation use of the project area to determine whether existing recreation facilities are meeting recreation needs. Monitoring studies shall begin within 5 years of the effective date of this license. Monitoring studies, at a minimum, shall consist of collection of annual recreation use data, by activity.

In conjunction with Form 80 or intervals not to exceed 6 years, during the term of the license, the Licensee shall file a report with the Commission on the monitoring results. This report shall include: (1) the annual recreation use figures, by activity; (2) a discussion of the adequacy of the Licensee's recreation facilities at the project site to meet recreation demand; (3) a description of the methodology used to collect all study data; (4) if there is a need for additional facilities, a recreation plan proposed by the Licensee to accommodate recreation needs in the project area; (5) documentation of agency consultation and agency comments on the report after it has been prepared and provided to the agencies; and (6) specific descriptions of how the agencies' comments are accommodated by the report.

The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the report, and any recreation plan under item (4), with the Commission. If the Licensee doesn't adopt a recommendation, the filing shall include the Licensee's reasons, based on conditions at the site.

The Commission reserves the right to require changes to any recreation plan. No land-disturbing or land-clearing activities associated with the plan shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the commission.

Article 412. The Licensee shall implement the Memorandum of Agreement (MOA) executed on February 11, 1993, to avoid and mitigate impacts to Greenville dam, a component of the Greenville Industrial District which is eligible for inclusion in the National Register of Historic Places.

By April 1, 1995, the Licensee shall file the historical documentation and cultural resources management plan for Commission approval, together with the agency comment letters, identified in the MOA. The Commission may require additional work and changes to the plan based on this filing.

Article 413. The Licensee, before starting any future land-clearing or land-disturbing activities associated with the project, other than those activities authorized in this license, shall consult with the Connecticut State Historic Preservation Officer (SHPO), and shall conduct a cultural resources survey of the affected areas. Further, the Licensee shall file the following: (1) a report containing the survey results; (2) a cultural resources management plan, approved by the Commission, to avoid or mitigate impacts to any significant archeological or historic sites identified during the survey; and, (3) the written comments of the SHPO on the report and the plan.

If the Licensee discovers any previously unidentified archeological or historic sites during the course of constructing or developing project works or other facilities at the project, the Licensee shall stop all land-clearing or land-disturbing activities in the vicinity of the sites, consult with the SHPO, and file for Commission approval a cultural resources management plan to avoid or mitigate impacts to significant resources, together with the written comments of the SHPO on the plan.

The survey and the plan shall be based on the recommendations of the SHPO and adhere to the Secretary of Interior's Guidelines for Archeology and Historic Preservation. The Commission may require additional survey, revisions to the survey report, and changes to the

plan based on the filing. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

(G) The Licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to the Commission filing. Proof of service on these entities must accompany the filing with the Commission.

(H) This order is issued under authority delegated to the Director and constitutes final agency action. Request for rehearing by the Commission may be filed within 30 days of the date of this order, pursuant to 18 C.F.R. 385.713.

Fred E. Springer
Director, Office of
Hydropower Licensing

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED
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 area and project works shall be 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.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands

of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory 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 such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration 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 submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. 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 or 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 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 benefitted 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 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 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 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 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. 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.

ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION OFFICE OF HYDROPOWER LICENSING DIVISION OF PROJECT REVIEW

**Greenville Dam Project
FERC No. 2441-009-Connecticut
and
Tenth Street Hydro Station Project
FERC No. 2508-002-Connecticut**

I. APPLICATIONS

On December 23, 1991, the City of Norwich, Department of Public Utilities, Connecticut (Norwich), filed (1) an application for subsequent minor license for the Greenville Dam Project (Greenville) and (2) an application for subsequent minor license for the Tenth Street Hydro Station Project (Tenth Street). The projects are located on the Shetucket River in the City of Norwich, New London County, Connecticut (figure 1).

Tenth Street is located in the bypass reach of Greenville and receives water diverted from the Greenville dam. The operations of these two projects is currently coordinated and proposed to continue to be coordinated. Based on these factors, we consider these two projects to comprise a unit of development as defined in Section 3(11) of the Federal Power Act. Hence, in this document, Greenville and Tenth Street will be referred to as "developments" and the combination of the two as "project." Furthermore, although Norwich has proposed to continue operating as two separate licenses, we propose to combine any license issued for these two developments for the reasons stated above.

II. PURPOSE AND NEED FOR ACTION

A. Purpose of Action

Greenville and Tenth Street are existing, operating, licensed developments with total installed capacities of 800 kilowatts (kW) and 1,400 kW, respectively. Historically, Greenville has produced annually about 3.85 gigawatthours (GWh) and Tenth Street has produced about 5.35 GWh, for a total of 9.2 GWh. With Norwich's recommended 250 cubic feet per second (cfs) minimum flow release to the bypass reach, Greenville would generate annually 3.06 GWh and Tenth Street would generate 4.56 GWh, for a total of 7.61 GWh. Norwich would continue to use the renewable energy from the project to meet its system load requirements.

In this Environmental Assessment (EA) we analyze the impacts associated with the issuance of one new license for the two developments, make recommendations to the Commission on whether to issue a new license and on the term of the license, and

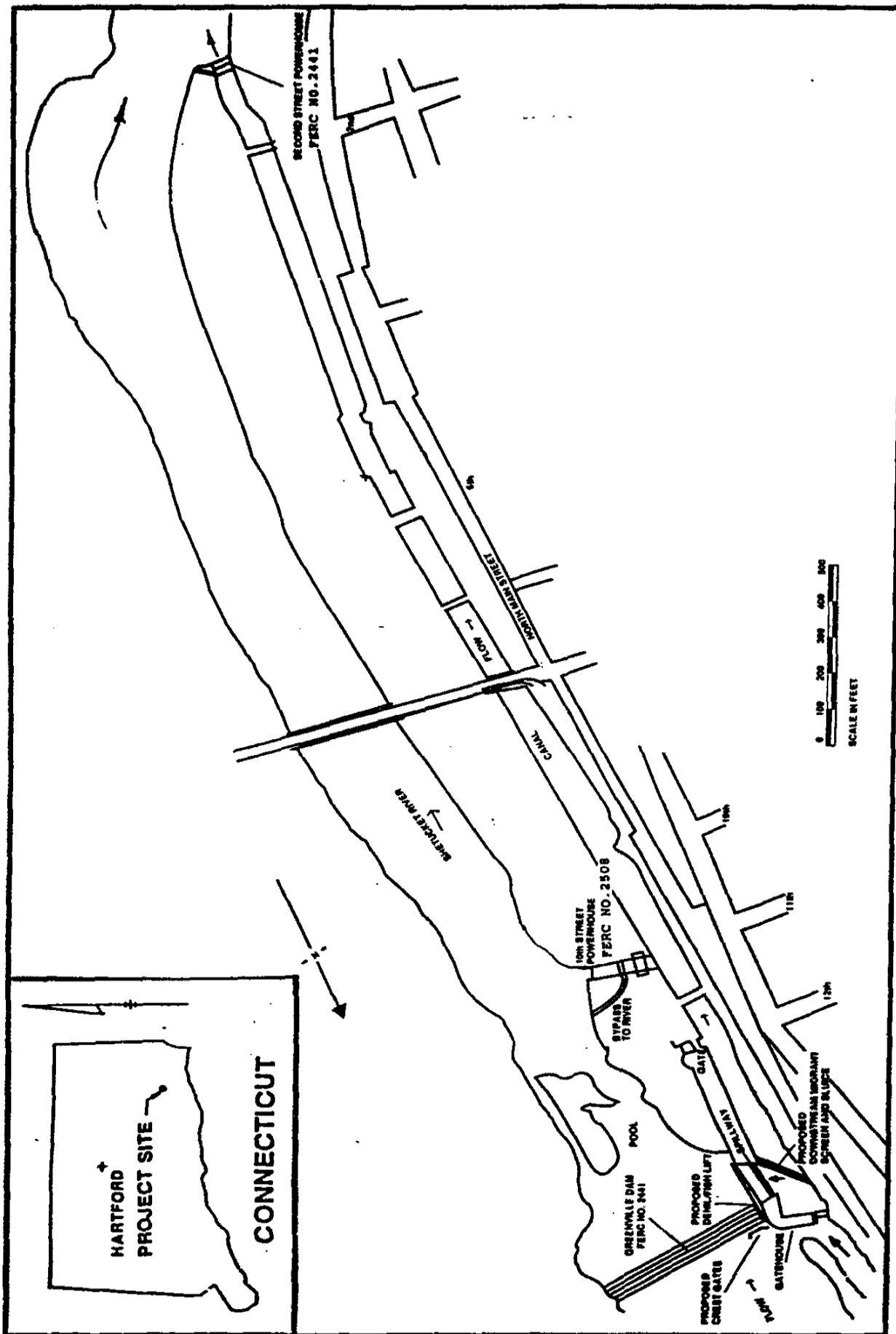


Figure 1. Existing and proposed projects' features - Greenville Dam Project, FERC No. 2441-009; and Tenth Street Hydro Station Project, FERC No. 2508-002; Connecticut (Source: City of Norwich, Dept. of Public Utilities 1991).

recommend terms and conditions to become a part of any license issued.

In deciding whether to issue any license, the Commission must determine that the project adopted will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related spawning grounds and habitat), the enhancement of recreational opportunities, and the preservation of other aspects of environmental quality.

B. Need for Power

Norwich is a municipal utility operating under state law. Greenville and Tenth Street are located in the New England Power Pool (NEPOOL) area of the Northeast Power Coordinating Council (Council).

To consider the need for power, we looked at both Norwich's and NEPOOL's need for power requirements.

Together, the developments current average annual generation is 9.2 GWh -- which is about 3 percent of Norwich's annual requirement. With Norwich's proposed enhancement measures, the annual generation would be about 7.6 GWh. Norwich uses the entire output to serve local loads and buys about 97 percent of its annual energy requirement from Connecticut Municipal Electric Energy Cooperative. Continuing to operate the project would maintain the existing system deficits and give Norwich's rate-payers benefits from avoiding the cost of purchased power.

Each year the Council gives the Department of Energy a report of their long-range, coordinated bulk power supply programs (DOE/IE-411 Report). The IE-411 Report forecasts summer and winter peak demands for capacity and annual energy requirements for each year of a 10-year planning period, and gives actual data for the previous year. The latest report, dated April 1, 1992, covers the projections for the 1992-2001 planning period and actual data for 1991.

For the 1992-2001 planning period, NEPOOL predicts an average annual growth rate of 1.0 percent or more for peak demand and 1.1 percent annual growth rate for energy requirements. The Council's report shows that during the first 5 years of the 10-year planning period NEPOOL plans to acquire about 2,400 megawatts of non-utility, fossil-fueled capacity.

The power generated by the project would displace an equal amount of power that would be produced from non-utility, fossil-fueled generating units NEPOOL plans to acquire.

The energy provided by the project would help meet a part of the need NEPOOL projects.

III. PROPOSED ACTION AND ALTERNATIVES

A. Norwich's Proposal

1. Project Facilities

a. Greenville Dam Development

Existing facilities include (figure 1): (a) the 15-foot-high, 399-foot-long rock filled timber crib dam, mounted with 1-foot-flash boards; (b) the 240 acre-feet storage reservoir with a surface area of 80 acres; (c) the 13-foot-deep, 70-foot-wide, and 3,200-foot-long power canal; (d) the 28-foot-wide by 43-foot-long Second Street powerhouse containing two 400-kW turbine-generator units; (e) the 3,200-foot-long, 4.8-kilovolt (kV) transmission line; and (f) other appurtenances.

In Phase 1 (within the specified period after license issuance), Norwich proposes to: (a) install a 20-foot section of hydraulically controlled flashboard on the west end of the dam to provide part of the minimum flow; (b) build a Denil fishway and fish counting window; (c) build a downstream fishway in the power canal; and (d) build a pedestrian access trail to project waters and parking.

In Phase 2, when enough fish are available to migrate upstream, Norwich proposes to build a mechanical fish crowder, fish lift, and attraction water system.

b. Tenth Street Hydro Station Development

Existing facilities include (figure 1): (a) the 15-foot-deep, 30-foot-wide, and 80-foot-long concrete intake flume; (b) the 23-foot-wide, 45-foot-long powerhouse containing one 1,400-kW turbine-generator unit; (c) the 52-foot-long tailrace which discharges directly into the Shetucket River; (d) the 150-foot-long, 4.8-kV transmission line; and (e) other appurtenances.

Norwich does not propose to construct any new facilities at this development.

2. Project Operation

Greenville and Tenth Street presently operate in coordination and in a modified run-of-river mode -- storing water and releasing during low-flow periods. Norwich proposes to operate Greenville and Tenth Street in an instantaneous run-of-river mode where inflows into the reservoir equal the combined outflows from the Second-Street and Tenth-Street powerhouses.

3. Proposed Environmental Measures

Norwich proposes to do the following:

Water Resources

- Operate the project in an instantaneous run-of-river mode where inflows into the reservoir equal the combined outflows from the Second-Street and Tenth-Street powerhouses.
- Provide a year-round minimum instream flow of 250 cfs or inflow, if less, at Greenville dam to improve water quality in the bypass reach, protect resident fish habitat, and provide a zone-of-passage for anadromous fish species
- Install structures at Greenville dam to control the flows through the fishway and crest gate to maintain the proposed minimum instream flow

Fishery Resources

- Provide upstream fish passage facilities in two phases according to the following plan:
 - a. Include a denil fishway and fish counting window (Phase 1)
 - b. Install a mechanical fish crowder, fish lift, and attraction water system (Phase 2). Install the fish lift in the summer or fall of the year, following the passage of 20,000 American shad or 200,000 river herring, or a combination of the two (with one shad equal to ten herring)
- Provide downstream fish passage facilities with an angled, 1.5-inch, clear-spaced trashrack, leading fish to a weir and then to a sluice with a 20 cfs discharge
- Distribute the 250-cfs minimum flow as follows:
Discharge 120 cfs for attraction and conveyance flow through the proposed upstream and downstream fishways

and supply the additional flow of 130 cfs through the crest gate adjacent to the fishway -- thus releasing the total bypass flow of 250 cfs at the dam and fishway at all times

- Construct a lead channel to help guide fish past the Tenth Street tailrace, if proven that the fish are delayed there

Cultural Resources

- Mitigate adverse impacts to the historical integrity of Greenville dam that would result from constructing a fish passage facility, by documenting the affected area according to the standards of the Historic American Engineering Record (HAER) before any disturbance of the dam, as recommended by the Connecticut State Historic Preservation Officer (SHPO)
- Undertake other construction activities so as not to affect the historical integrity of the Greenville dam

Recreation and other Land and Water Uses

- Formalize existing recreational use for Greenville by developing parking facilities, a public access trail to designated fishing sites on project waters, and develop portage facilities

Norwich estimates the cost of these environmental enhancement measures to be about \$1.8 million.

We discuss each of these proposals in the individual resource sections.

3. Mandatory Requirement: Section 18 Authority

The FWS timely filed the following measures under authority of Section 18 of the Act:

- (i) an upstream Denil fish ladder
- (ii) construction of Denil ladder in 1994 and operation by April 1, 1995
- (iii) a fish lift/elevator, with final design modifications based on consultation with FWS -- the fish/lift elevator should be constructed in the summer/fall of the year following the passage of 20,000 American shad or 200,000 river herring, or a combination of the two, with one shad equal to ten herring; the lift is to be operational by April 1 of the year following construction

(iv) downstream fish passage facilities, with guidance screen and a bypass sluice

(v) construction of downstream fish passage facilities in 1994 and operation by April 1, 1995 (concurrently with upstream fish passage)

(vi) a plant operation plan requiring Tenth Street to be operated in a first-on and last-off mode to facilitate upstream fish passage at Greenville dam

Items (i), (iii), and (iv) qualify as Section 18 measures. 1/ Items (ii), (v), and (vi) do not qualify as Section 18 measures; 2/ therefore, we have considered them under sections 10(a) and 10(j) of the Act. These issues are discussed in section V.B.3 of this EA.

B. Staff's Alternative

Under our alternative, the project would include, in addition to the measures proposed by Norwich, the following enhancement measures:

- A gaging plan to document run-of-river operation and minimum instream flows
- Amended designs for fish guidance screen spacing of 1 inch and bypass sluice to pass flows of 40 cfs
- A post-construction evaluation plan to verify adequate performance of the fishway
- A monitoring plan to verify the effectiveness of the 250-cfs minimum flow (providing sufficient attraction and passage to upstream fish)
- An operational plan describing plant procedures used to aid fish passage
- A fishway maintenance plan

1/ Section 18 of the Federal Power Act provides: " The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of ... such fishways as may be prescribed by the Secretary of Commerce or the secretary of Interior, as appropriate."

2/ Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

- Protecting any undiscovered archaeological or historical sites that may be uncovered during construction or affected by any project changes
- Monitoring recreational activities to determine if recreation demand is being met as a result of increased flow requirements in the bypass reach and the proposed fishway

We discuss each of these recommendations in the individual environmental resource sections.

C. No-Action Alternative

No action is defined as the current environmental conditions. The developments would continue to operate as required by the original project licenses. There would be no change to the existing environmental setting. The no-action alternative is addressed in the Environmental Analysis section of this EA.

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 consultation 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. Pre-filing consultation must be complete and documented in accordance with the Commission's regulations.

After the Commission issued a joint public notice on May 27, 1992, that the applications for the Greenville and Tenth Street developments were ready for environmental analysis, the following entities commented on the applications:

<u>Commenting Entities</u>	<u>Date of Letter</u>
• U.S. Department of the Army, Corps of Engineers, MA	July 14, 1992
• Department of the Interior	July 28, 1992
• Connecticut Department of Environmental Protection	July 28, 1992
• Connecticut Department of Environmental Protection (Additional Procedures Request)	July 28, 1992

• Connecticut Department
of Environmental Protection

October 2, 1992

Norwich responded to comments filed by the Department of Interior (Interior) and the Connecticut Department of Environmental protection (CDEP) on September 11, 1992; and it responded to the CDEP's July 28, 1992, and October 2, 1992, comments on August 11, 1992, and November 4, 1992, respectively. We address these comments in section V.B of our EA.

B. Interventions

In addition to providing comments, organizations and individuals may petition to intervene and become a party to any subsequent proceedings.

Intervenor

Date of Motion

American Rivers, Inc.

July 29, 1992

American Rivers, Inc., states Greenville and Tenth Street have significant opportunities for enhancement of fish and wildlife and recreational resources. It did not provide any specific recommendations or plans for enhancing these opportunities. It is not opposed to the project.

C. Water Quality Certification

On December 20, 1991, Norwich applied to CDEP for Section 401 water quality certification (WQC), required by the Clean Water Act, for both the developments. CDEP received the request on December 22, 1991. 3/ Pursuant to Commission Order 533, CDEP must act within 1 year from the date it received the request or the certification is deemed waived. CDEP has not yet acted on the WQC, but has until December 22, 1992, to act.

D. Coastal Management Program

Because the developments are located in a coastal zone and may affect coastal resources, CDEP must review the proposed developments for consistency with the state's Coastal Management Program (CMP). Under the Coastal Zone Management Act of 1972, before a license can be issued, CDEP must: (1) find the project consistent with the CMP or (2) waive the requirements by failing to act within 6 months from receipt of Norwich's self certification.

3/ Personal communication, Brian Emerick, Principal Environmental Analyst, Connecticut Department of Environmental Protection, Hartford, Connecticut, October 1, 1992.

By letter dated October 30, 1992, CDEP has advised the Commission that the developments are consistent with Connecticut's CMP as long as construction of a canoe portage is included in any license issued. Applicant has agreed to construct a portage as part of its proposal.

V. ENVIRONMENTAL ANALYSIS 4/

A. General Description of the Locale

1. Shetucket River Basin

The Shetucket River Basin has a drainage area of about 1,252 square miles, which accounts for about 85 percent of the drainage area of the Thames River watershed. The Shetucket River historically supported large runs of anadromous fish, including Atlantic salmon, striped bass, American shad, and river herrings.

The Greenville dam is located on the Shetucket River, approximately 2 river miles above its confluence with the Thames River and approximately 1.5 river miles below its confluence with the Quinebaug River. The dam is the first dam on the river and closes down the rest of the river basin to upstream migration. The Greenville dam is at the fall line -- the geological separation of the Piedmont plateau and the coastal plain-- and hence it is subject to tidal influence. Spring tides actually rise to the dam.

Land use varies in the Shetucket River Basin. In the project areas, the impoundment borders residential and multi-family zoned neighborhoods. The power canal passes through an area zoned for heavy industry.

2. Proposed and Existing Hydropower Development in the Shetucket River Basin, as of October 8, 1992:

<u>FERC Project No.</u>	<u>Project Name</u>	<u>Water Body</u>
<u>a. Pending Application</u>		
11217	Still River	Still River
<u>b. Licensed but Unconstructed</u>		
8945	Natchaug 1	Natchaug River
11143	Glenfalls	Moosup River

4/ Unless otherwise indicated, the source of our information is Norwich's applications (1991).

C. Existing

2441	Greenville Dam	Shetucket River
2508	Tenth Street Hydro	Shetucket River
2662	Scotland Dam	Shetucket River
*	Occum	Shetucket River
**	Taftville	Shetucket River
**	Tunnel	Quinebaug River
3472	Wirewind	Quinebaug River
5645	Putnam	Quinebaug River
5679	MSC	Quinebaug River
6077	Old Sturbridge	Quinebaug River
7254	West Dudley	Quinebaug River
5062A	Quinebaug	Quinebaug River
5062B	Five-Mile Pond	Five Mile River
9611	Mechanicville	French River
5824	North Village Pond	French River
8047	Willimantic 2	Willimantic River
8051	Willimantic 1	Willimantic River

* Unlicensed

** Non-Jurisdictional

3. Cumulative Impacts/Target Resources

We have identified anadromous fish -- American shad, river herrings (alewife and blueback), and Atlantic salmon -- as target resources, that is, important resources that may be cumulatively affected by the proposed action in conjunction with other developmental activities within the river basin.

American shad, river herrings, and Atlantic salmon were identified as target resources from the review of public and agency comments. The FWS and CDEP have targeted these fishes as important in their efforts to reestablish anadromous fish in the Shetucket drainage.

The proposed project, with our additional environmental measures, would not cause cumulative adverse impacts to the anadromous fish resources, but as we discuss in section V.B.3, would enhance the existing anadromous fishes presently restricted to the area below the dam.

B. Environmental Resources

1. Geology and Soils

Affected Environment: The project is located on the Shetucket River in the well-developed industrial area of Norwich, Connecticut. The area was disturbed during construction of the project in 1965, and by other buildings, roads and general development.

Environmental Impacts and Recommendations: Norwich is working with the FWS and CDEP to develop a plan for construction of the fish passage facilities at Greenville dam. Fishway construction activity has the potential to cause erosion and sedimentation. We recommend that an Erosion and Sediment Control Plan be filed for approval when the fish passage plans are finalized.

Unavoidable Adverse Impacts: There would be minor soil erosion and stream sedimentation during construction of fish passage and recreation facilities.

2. Water Resources

Affected Environment: The Shetucket River is typical of low gradient rivers of the eastern United States coastal plain. Large population centers and industrial developments influence the Shetucket River with point and non-point sources of pollution. Because of these influences, water quality in the vicinity of the project is eutrophic.

The average annual flow at the project is 2,216 cfs, with December through May being the peak precipitation months (Table 1). The maximum gauged flow at the USGS Shetucket River gauge (No. 01122500) was 52,200 cfs on Sept. 21, 1938; the minimum gauged flow was 19 cfs on August 22 and October 24, 1949.

Table 1. Monthly median streamflow estimates in cubic feet per second (cfs) at the Greenville dam site (Source: Norwich 1992).

Month	Median Flow	Month	Median Flow
January	2118	July	571
February	2429	August	450
March	3716	September	500
April	3659	October	786
May	2270	November	1507
June	1114	December	2128

CDEP designates the reach above Greenville dam as class B, which means that the water quality meets the requirements for: recreational use; fish and wildlife habitat; agricultural and industrial supply; and other uses including navigation. Class B waters exhibit good to excellent aesthetics, maintain dissolved oxygen (DO) concentrations of at least 5 milligrams per liter

(mg/l), have turbidity values less than 5 Nephelometric turbidity units (NTU's), and display fecal coliform counts less than 200 organisms per liter. CDEP's goal is to maintain these standards within the project's vicinity.

As a result of municipal sewer outflows below the dam and no minimum flow, the classification is lowered to C/B below the Greenville dam. The consequences of these effluences is that fecal coliform counts are significantly elevated in the bypass reach. Secondary effects of this nutrient loading is high chlorophyll-a concentrations, particularly during the low-flow summer and fall months (June to November). During this period no water is released (except leakage) into the 3,200-foot-long bypass reach. The combination of eutrophic conditions, increasing temperatures, and no flushing flow degrades the water quality, whereby DO concentrations may fall below 5 mg/l, turbidities may exceed 5 NTU's, and fecal coliform counts exceed the maximum Class B criterion.

Water Rights

Water diverted into the canal is used exclusively for hydropower generation and then returned into the Shetucket River. There are no known consumptive uses of project water. Therefore, the project would not affect any existing water rights.

Environmental Impacts and Recommendations: To protect aquatic resources, Norwich, CDEP, and FWS, agree the project should operate run-of-river, where inflow to the Greenville project reservoir is equal to the combined outflow from Greenville and Tenth Street on an instantaneous basis. In addition, Norwich and the resource agencies agree that an instream bypass flow of 250 cfs be released from the Greenville dam to improve water quality, protect resident fish habitat, and provide a zone-of-passage for anadromous fish species.

Fluctuating water surface levels can reduce fish spawning success and strand fish and invertebrates, subjecting them to desiccation and predation. Operating the project in an instantaneous run-of-river mode would minimize water level fluctuations upstream and downstream of the project and would protect aquatic resources. We therefore agree that the project should be operated instantaneous run-of-river.

Norwich's proposed and the agencies' recommended minimum bypass flow of 250 cfs is based on a watershed runoff value of 0.2 cubic feet per second per square mile (cfs/mi²) of drainage area. This method, which bases flow recommendations on the hydrologic and geologic characteristics of the drainage area, has been effective in establishing adequate base flows to protect water quality and fish in similar river basins in Connecticut.

A minimum flow analysis in the bypass reach found 250 cfs to be sufficient to maintain fish habitat for American shad, alewife, blueback herring, smallmouth bass, brown trout, striped bass and white perch. Additionally, the same study concludes that all standard stream depth and width criteria needed for passage is met or exceeded at 250 cfs at all transects.

We, therefore, agree that providing a minimum flow of 250 cfs to the bypassed portion of the Shetucket River should improve water quality and enhance the aquatic resources found in the reach.

The FWS recommends Norwich prepare a plan for maintaining run-of-river operation and the 250-cfs minimum flow release. FWS recommends the plan include: (1) a description of mechanisms that will be used; (2) the level of automatic or manned facility operation; (3) the methods to be used for recording data; and (4) a plan for providing this data to the agencies.

We agree that Norwich should consult with the FWS and CDEP to develop a plan to monitor compliance with the instantaneous run-of-river operation and with the provision of continuous minimum flows.

The plan should be filed with the Commission for approval and should include, but not be limited to, the following:

A description of the location and operation of stream flow gaging measures to monitor compliance with the run-of-river operation and a 250-cfs minimum flow release, and the methods for recording data and providing data to agencies.

Unavoidable Adverse Impacts: None

3. Fisheries Resources

Affected Environment: Impoundments in the basin above the Greenville dam provide a significant warmwater fishery. Game fish species include both smallmouth and largemouth bass, pickerel and bluegills. The free-flowing reaches of the mainstem Shetucket and Quinebaug Rivers are included among the five more important large trout streams in Connecticut (Connecticut Department of Environmental 1985).

Historically, anadromous fish ascended the Thames River Basin in significant numbers. American shad, Atlantic salmon, striped bass, and Atlantic sturgeon were abundant in the system. With the construction of the Greenville dam, only those anadromous fishes whose spawning habitat requirements were met in the areas below the Greenville dam were able to sustain some

populations. The surviving anadromous fishes are alewife, blueback herring, and rainbow smelt.

Environment Impacts and Recommendations:

a. Fish Passage Facilities and Section 18 Prescriptions

Upstream movement of anadromous fish is prevented by the Greenville dam. CDEP has targeted the restoration of American shad, river herrings, and Atlantic salmon to the Shetucket drainage. The CDEP restoration plan for these species to areas upstream of the project is based on installing upstream fish passage facilities at Greenville dam first. To complete restoration plans, fish passage installation at other upstream dams will need to follow.

Norwich proposes preliminary plans and design criteria for installing new upstream and downstream fishways. Under section 18 of the Act, the FWS prescribes adult and juvenile fish passage facilities that should be designed, constructed, and operated to avoid delay, injury, predation, and excessive stress to the fullest extent possible. The FWS prescribes specific items for the proposed fish passage facilities (see section III.A.3.a). The CDEP also recommends fish passage facilities.

Upstream Fishways

The FWS, in its Section 18 prescription, and the CDEP agree with the functional design drawings and design criteria of the denil fish ladder and fish lift depicted in Figures E-1, E-2, E-4, and described in appendix D of the final application for the Greenville dam.

Both FWS and CDEP recommend that once a specific number of fish (referred to as trigger numbers) are passed through the facility, then a fish lift should be required to supplement the denil ladder capacity for providing upstream passage of fish. Norwich and the resource agencies agree with trigger numbers of 20,000 American shad or 200,000 river herring, or a combination of the two, with one shad being equivalent to ten river herring.

The fish lift should be constructed in the summer or fall of the year following the passage of the trigger numbers of fish. The lift should be operational by April 1 of the year following construction. With the bulk of construction having been done during the initial phase, retrofitting the fish passage facility with the lift should be easily accomplished in this time frame.

Downstream Fishways

Norwich proposes a louver-style behavioral deterrent, in which spacing and flows are designed to ensure appropriate

approach velocity to provide guidance of downstream juvenile fish.

The FWS, in its section 18 prescription, requires the facility as depicted in Figures E-1 and E-3 and described in appendix D in the final application with the following modifications. The proposed angled trashrack should have clear spacing of 1 inch, rather than 1.5 inches as Norwich proposes, and the bypass sluice should be designed to pass a flow of 40 cfs rather than the proposed 20 cfs.

We concur that the preliminary design, with the FWS modifications to the downstream fishway design, is appropriate for passage of anadromous fishes both upstream and downstream at the Greenville dam. These measures would greatly improve fish movement in the lower Shetucket River as recommended in CDEP's Preliminary Plan for Restoration of Anadromous Fish to the Thames River basin (1985). Through restoration, anadromous fish would become a major recreational attraction in eastern Connecticut, with the cumulative impact to the area being beneficial.

Therefore, after consulting with the FWS and the CDEP, Norwich should file, for Commission approval, a final design plan for the fish passage facilities that conforms to these prescriptions and recommendations.

Construction Schedules for Upstream and Downstream Fishways

FWS seeks to require under section 18, and CDEP recommends, time frames for completing the upstream and downstream fish passage facilities. They target construction of the facilities for 1994, and operation by April 1, 1995. We believe these time frames do not constitute a fishway prescription because they are procedural [Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987)]. Rather, they are properly considered as recommendations under Section 10(a) of the Act.

Norwich says it remains committed to constructing the fish passage facilities expeditiously (Norwich's Response to FWS and CDEP 1992). However, Norwich believes the process must account for: (1) the Commission issuing the license in a timely manner; (2) the need to place the bond issue on a November ballot; (3) issuing bonds; and (4) construction. Even with these requirements, Norwich believes it may in fact meet the recommended dates.

While the Commission understands and shares the agencies desires to move forward quickly on construction and operation of the fish passage facilities, we believe that the construction and operation are constrained by the date of any Commission licensing action and by the need to place a bond issue on a November ballot. Therefore, though we encourage Norwich to fulfill the

schedules recommended by the agencies, we are setting time frames in relation to license issuance. We recommend that Norwich begin construction of the fish passage facilities (except fish lift) within 2 years from the issuance date of the new license and begin operation within 3 years from the issuance date of the license. 5/

Operational Procedures

The FWS seeks to require Norwich, under section 18, to operate Tenth Street in a first-on and last-off mode during the upstream passage season (April through November), to facilitate upstream fish movement to the fishway at the Greenville dam. The intent is to concentrate flows closer to the fishway, and therefore, provide better attraction flows for fish guidance. We believe this condition does not constitute a fishway prescription because the Second-Street powerhouse tailrace is far removed (about 3,200 feet) from the fishway at Greenville dam. Rather, we consider the measure as a recommendation related to the protection of fish and wildlife under section 10(j). 6/

We agree that project operation at Greenville dam should be evaluated for possible changes to assist fish passage. We do not agree with setting operational procedures without first determining a need. Norwich's minimum flow proposal of 250 cfs meets or exceeds all criteria for fish passage and attraction. A postconstruction evaluation of the fishways, combined with monitoring in the bypass reach to assess the effectiveness of fish passage should be used to determine an effective operational plan. An appraisal covering all aspects surrounding fish passage would give a clear picture of the effectiveness of the measures at the project and the need for any changes. A discussion of postconstruction evaluation plans follow.

b. Postconstruction Evaluation and Monitoring

The FWS and CDEP recommend post-construction evaluation plans to ensure that fish passage facilities at Greenville are effective.

We agree that a postconstruction evaluation plan to assess the passage efficiency of the upstream ladder and lift, and another evaluation plan to monitor effectiveness of downstream fish passage would be needed. Therefore, after consulting with the agencies, Norwich should file, for Commission approval, post-

5/ For starting construction of fish lift, see section V.3.a. Upstream Fishways.

6/ Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

construction evaluation plans for both the upstream and downstream fishways.

The FWS also recommends monitoring the effectiveness of the 250-cfs minimum flow in providing sufficient attraction and passage to upstream fishways.

According to the minimum flow analysis, all standard stream depth and width criteria needed for passage is met or exceeded at 250 cfs at all transects.

The FWS guidelines say flows of 2 to 4 percent of the maximum generation flow are needed for attraction to a fishway. Based on these specifications, the minimum attraction flow requirement would be 40 cfs.

Under Norwich's proposed flows, the fishway would maintain an attraction flow of up to 100 cfs. Additionally, the remainder of the minimum flow of 250 cfs, would be released from a gate adjacent to the fishway and would provide an effective attraction flow to fish in the vicinity of the fishway.

Although all fish passage criteria is met or exceeded, we agree with FWS, that the actual effectiveness of the flow at the Greenville dam is unknown. Monitoring the instream flow is needed to determine its effectiveness. Norwich proposes to construct a lead channel to help guide fish from the Tenth Street tailrace to the fishway. While it does not appear that a lead channel is needed, monitoring the fishway effectiveness would ascertain its need. Therefore, Norwich in consultation with the FWS and the CDEP should file, for Commission approval, a fish passage monitoring plan.

c. Operation and Maintenance of Fishways

The CDEP recommends operating Greenville and Tenth Street in a manner that does not delay fish in finding the fishways. We agree with the CDEP, that Greenville and Tenth Street should operate to prevent the gathering of fish at the project tailraces, and to ensure fish are efficiently moved through the fish passage facilities. For example, periodic shut-downs could be used to keep fish from being delayed at one of the tailraces.

Therefore, after consulting with the FWS and CDEP, Norwich should file, for Commission approval, an operational plan that accounts for changes to assist fish passage through the project. To complete this plan, the findings of the fish passage monitoring plan would need to be incorporated. The plan should describe all plant operating procedures for Greenville and Tenth Street as they relate to fish passage, and disclose any triggering mechanisms to control these procedures.

The FWS recommends Norwich develop a maintenance plan for the fishways. The plan would include a description of facility management and should identify back-up equipment and supplies that would be maintained to ensure fast repairs in the event of equipment failure. We agree that these measures would enhance the likelihood of continuous, effective operation of the fish passage facilities.

Therefore, after consulting with the resource agencies, Norwich should file, for Commission approval, a maintenance plan for the fishways.

Unavoidable Adverse Impacts: None

4. Terrestrial Resources

a. Vegetation and Wildlife

Affected Environment: The terrestrial resources at the project are typical of the southern New England region. Middle-aged to mature oaks, American chestnut, yellow poplar trees, maples, American beech, and sycamore represent the characteristic tree type of the general area along the Shetucket River. Many shrubs which occupy the 1 to 10 feet strata, such as mountain laurel, are also present near the project site. Natural vegetation to the west and downstream of the project is limited by industrial and urban development by the city of Norwich, Connecticut. Ground level vegetation at the immediate project site is largely represented by native grasses and herbaceous growth. A minimal amount of bare ground (exposed soil) is present.

Naturally occurring fringe wetlands have developed at the interface between the Shetucket River with its banks. According to Cowardin et al. (1979), wetlands below the dam are classified as riverine, tidal, unconsolidated shore. Above the dam, the narrow band of wetlands are classified as riverine, lower perennial, unconsolidated shore. Representative hydrophytic plants include arrowhead, various ferns, and rushes.

Wildlife resources at the project site include species which are typically associated with developed areas. Some of the more common wildlife are raccoon, striped skunk, eastern cottontail, mink, eastern gray squirrel, opossum, robins, and finches. Migrating ducks and white-tailed deer also occasionally use the area.

Environmental Impacts and Recommendations: Virtually all new work would occur in areas that have previously been disturbed. Construction of the proposed fishways may cause some birds and mammals to temporarily relocate to other areas, but this localized displacement would be short-lived.

Transporting materials and equipment would be restricted to existing roads; therefore, no vegetation disturbance or ground surface habitat alteration are expected. Exhaust emissions from combustion engine equipment and vehicles are not expected to create adverse effects on wildlife of the area.

The U.S. Army Corps of Engineers, by letter dated September 18, 1991, says continued operation of the project would have no adverse impact on wetlands. Since minimal adverse overall impacts on wildlife resources are expected, federal or state agencies did not recommend any environmental measures. We conclude that the proposed construction and operation is not likely to result in adverse impacts on existing wetlands, vegetation, or wildlife resources.

Unavoidable Adverse Impacts: There would be minor, short-term disturbance of some wildlife during construction activities.

b. Threatened and Endangered Species

Affected Environment: In a letter dated July 10, 1992, the FWS said no federally listed or proposed threatened or endangered fish species are known to occur in the project areas. However, a transient bald eagle and peregrine falcon may occasionally pass through the area. Both of these species are federally listed as endangered (50 CFR 17.11 & 17.12, April 15, 1990).

No State of Connecticut listed threatened, endangered, or rare species of special concern are identified at or in the proximity of the project. 7/

Environmental Impacts and Recommendations: Since there are no known threatened or endangered fish or wildlife at the project, no adverse impacts are anticipated. The project is not expected to affect any occasional use of the area by the bald eagle and peregrine falcon. Hence, no Section 7 consultation under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) is necessary.

Unavoidable Adverse Impacts: None.

5. Aesthetic Resources

Affected Environment: On the east side of the Shetucket River, the landscape is formed by industrial, commercial, and some residential areas; on the west side of the river, the

7/ Personal communication, Nancy Murray, Coordinator, Connecticut Natural Diversity Database Program, Hartford, Connecticut, August 5, 1992.

landscape consists of lowland hills with limited development. Tenth Street and Greenville are located in an area Norwich designates as a historic industrial district. The Greenville impoundment borders residential zoned areas on the west and heavy industry zoned areas on the east side of the river.

Environmental Impacts and Recommendations: No resource agencies have made specific recommendations on visual resources.

We believe that the proposed changes at Greenville dam would be consistent with the developed industrial character of the landscape and there would be no change in visual resources.

Unavoidable Adverse Impacts: None.

6. Cultural Resources

Affected Environment: The SHPO says, and we concur, that construction of the proposed fish passage facilities at Greenville would have an adverse effect on Greenville dam, a component of the Greenville Industrial National Register Historic District (Maddox 1988, 1991a). No other historic or archeological sites would be affected at Greenville.

The SHPO says, and we concur, that Tenth Street would not affect any archeological or historic sites eligible for inclusion in the National Register of Historic Places (Maddox 1989, 1991b).

The District is located in the immediate vicinity of the project. The District consists of early nineteenth to early twentieth century mill buildings and mill ruins, the Greenville dam, an associated gate structure and canal spillway, and a canal for providing water and power to mills.

We agree with the SHPO (Maddox 1988) that the District is eligible for inclusion in the National Register of Historic Places. The District is significant because (1) its components are intact for most part and continue to operate in generally similar industrial capacities as before, and therefore retain physical and historical integrity, and (2) the District provides a history of significant economic developments in eastern Connecticut. The District has been inventoried by the Historic American Engineering Record of the Department of the Interior (Roth 1980).

The mills were constructed between the 1820's and 1920's, to produce textiles, paper, and flour, and are located along a canal in the community of Greenville. The mills extend for a distance of about 3,500 feet from Greenville dam to the Second Street Station powerhouse, and are located along both sides of the canal. Initially, in the late 1820's, a dam was constructed about 1200 feet upstream of the Greenville dam to divert water

into the canal. The Greenville dam was constructed in the early 1880's to replace this dam. The pool behind Greenville dam inundated the remains of the earlier dam.

None of the companies who built the mills operate here anymore. The existing mill buildings currently house various manufacturing firms.

Environmental Impacts and Recommendations: The western end of Greenville dam and a portion of the associated canal spillway would be altered by construction of the proposed fish passage facilities.

The SHPO states that the impacts of the proposed fishway construction on Greenville dam can be mitigated by: (1) recording the affected area of the Greenville dam in accordance with the documentation standards of the HAER; and (2) implementing measures to ensure that other construction activities would not affect the historical integrity of the dam. The SHPO also states that no other alternatives appear feasible to minimize or avoid impacts to the dam (Maddox 1988).

Norwich has agreed to document and protect Greenville dam as recommended by the SHPO. We agree with the recommendations of the SHPO.

We have initiated consultation with the Advisory Council on Historic Preservation on the adverse effect of the project on Greenville dam (Shumway, 1992).

The SHPO's comments, and our concurrence, on the proposed project are based on the premise that the project would require no new construction (except for the earlier discussed environmental measures) and would be operated as described in the application without significant changes. Changes to the project are occasionally found to be necessary after a license has been issued. Under these circumstances, whether or not an application for amendment of license is required, the SHPO's comments and our concurrence would no longer reliably depict the cultural resources impacts that would result from operating the project.

Therefore, we recommend the following measures:

- Before starting any future land-clearing or land-disturbing activities associated with the project, other than activities authorized by the project license, Norwich should consult with the SHPO about the need to conduct a cultural resources survey and to implement avoidance or mitigative measures, and conduct any necessary survey. Norwich should file for Commission approval a report containing the results of any survey work and a cultural resources management

plan for avoiding or mitigating impacts to inventoried cultural resources, along with copies of the SHPO's written comments on the report. The survey and the report should be based on the recommendations of the SHPO and adhere to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.

- If Norwich discovers any previously unidentified archeological or historic sites during the course of constructing, developing, or operating project works or other facilities at the project, Norwich should stop all land-clearing or land-disturbing activities in the vicinity of the site, consult with the SHPO, and file for Commission approval a cultural resources management plan to avoid or mitigate impacts to significant resources, together with the written comments of the SHPO on the plan.
- Norwich should not implement any cultural resources management plan or begin any land-clearing, land-disturbing, or spoil-producing activities until informed by the Commission that the requirements discussed above have been fulfilled.

Unavoidable Adverse Impacts: The historical integrity of Greenville dam would be affected.

7. Recreation and other Land and Water uses

Affected Environment: The primary recreational activity along the Shetucket River and diversion canal is fishing with some boating. The existing diversion canal, powerhouses, and project areas are zoned for heavy industry. There is some dispersed fishing in the project area. No recreational facilities are located within or adjacent to project boundaries.

Environmental Impacts and Recommendations: At the Tenth Street powerhouse area, Norwich restricts public access for public safety and security reasons.

At the Greenville development, Norwich proposes to implement a recreation plan. The plan would serve the existing recreational demand and provide for six parking spaces, a trail system to project waters for fisherman, and portage facilities for car-top boaters and canoeists. These recreational facilities would be open during daylight hours between April 1 and November 30. Norwich estimates the construction costs for the recreation improvements would be \$7,500 for the pedestrian access trail to project waters and parking and \$2,500 for the portage facilities.

For Greenville, the CDEP and the FWS recommend parking, portage, and recreational access for fishing. Norwich has agreed to these measures, including constructing the portage facility concurrent with other enhancements. No resource agencies made specific recommendations for Tenth Street.

We agree that the proposed recreational developments would be adequate at this time and would enhance public use of the area. However, the recreation plan is only conceptual and not site specific. Therefore, we recommend that Norwich consult with CDEP's Bureau of Parks and Forests and the city of Norwich's Planning Department before prior developing design criteria and construction plans.

With the addition of recreation facilities, fish passage facilities, and increased minimum flows, new recreational demand may develop in the future during the term of the license. We, therefore, recommend Norwich monitor the recreational activities in the project area, and file periodic reports and recommendations to accommodate any increased use.

Unavoidable Adverse Impacts: None.

C. Alternative of No-Action

Under the no-action alternative, there would be no changes to the existing physical, biological, or cultural resources of the area. The enhancements that Norwich proposes would not occur.

VI. DEVELOPMENTAL RESOURCES

From our review of the economic benefit study Norwich made and our study of the project's economic benefits, we conclude the project, with the enhancements Norwich proposes, wouldn't benefit the city's ratepayers over a 30-year license term. But, if licensed with 40-year or 50-year terms, the project would give the city's ratepayers benefits.

To look at the effect the proposed enhancement measures would have on economics, both Norwich's and our study treat Greenville and Tenth Street as one project.

As we've said, Norwich proposes the following enhancement measures to Greenville : (1) installing a flashboard on the west end of the dam to control minimum flows; (2) building an upstream fishway and fish counting window; (3) releasing a continuous minimum flow of 250 cfs; (4) building a downstream fishway in the power canal; (5) building a fish-attraction water pipe, mechanical fish crowder, and a fish lift; and (6) making recreational improvements.

We'll first discuss Norwich's and our economic benefit studies. Then, we'll look at the cost of each proposed enhancement measure and the cost of changing the operation of the two powerhouses to operate Tenth Street powerhouse in a first-on, last-off mode as FWS proposes.

A. Economic Benefit Studies

Norwich's Analysis

To study the economic benefits of the project, Norwich compared the cost of project power with the avoided cost of buying power from the Connecticut Municipal Electric Energy Cooperative over license terms of 30, 40, and 50 years.

In its study, Norwich finds that the project wouldn't have economic benefits with license terms of 30 or 40 years, but would have benefits with a license term of 50 years. Their results, on an annual basis, show: a loss of \$106,000 with a 30-year term, a loss of \$60,000 with a 40-year term, and a benefit of \$4,600 with a 50-year license term.

After examining Norwich's study, we find three problems with their analysis: (1) the analysis presented was with a minimum flow of 300 cfs; (2) the analysis doesn't include a cost for the proposed recreational measures; and (3) the analysis adds an annual interest charge on the cumulative deficit.

Staff's Analysis

Because Norwich now proposes a continuous minimum flow of 250 cfs and recreational measures, we corrected Norwich's economic study by changing the project's generation to reflect a minimum flow of 250 cfs and adding the cost of the recreational measures.

Looking at how Norwich calculated the added interest charge in its study, we conclude that the charge for added annual interest on the cumulative deficit isn't appropriate. Norwich adds this charge in years the project would cost more than the avoided cost of buying power.

However, because Norwich is a utility, the city's ratepayers would pay any project costs greater than avoided costs in early years. In later years, when the project power costs less than the avoided costs, the ratepayers would start to benefit from the project.

Because we find no basis for this interest charge, we dropped the charge in our study.

As we've said, with our study, we also show an annual loss over a 30-year license term: \$44,286. But over 40 or 50 year license terms our study shows the project would have net annual benefits: \$10,953 over a 40-year term, and \$77,010 over a 50-year term.

Though the project would benefit the city's ratepayers if the Commission issues a 40-year license, that annual benefit--\$10,953--is small and sensitive to changes in costs. A small increase in the cost of Norwich's proposed enhancements, or a small decrease in the avoided cost of power, could cause the project's power to cost more than the avoided cost of buying power.

For example, a 10-percent cost over-run on the proposed fish ladder would cause the \$10,953 annual ratepayer benefit to become a \$2,700 annual ratepayer loss. If the project was licensed with a 50-year term, the project would still have savings of about \$64,000 with this overrun.

So, to give the city's ratepayers a greater chance to get benefits from the project over the term of a new license, we recommend the Commission license the project for 50 years.

B. Cost of Proposed Enhancement Measures

In table 2, we show the effect that each proposed enhancement measure has on the project's benefits. Requiring all these measures in the new license would reduce the project's annual benefits by \$168,750 for a 40-year term and \$175,720 for a 50-year term.

Table 2. Cost of proposed enhancement measures, based on 40-year and 50-year license periods (Source: staff)

Enhancement measure	Annual cost	
	40-year	50-year
Releasing a continuous minimum flow of 250 cfs	\$31,000	\$43,000
Building a fish ladder and associated facilities	\$137,000	\$132,000
Making recreational improvements	\$750	\$720

C. Changing Project Operations

We also looked at the possible effect the FWS's recommendation that the Tenth Street powerhouse be operated in a first-on and last-off mode would have on the project's economics. We conclude that operating in this manner would reduce the project's annual generation by 0.225 GWh: this operation would cost the city's ratepayers annually an additional \$4,200 based on a 40-year license term and an additional \$6,100 based on a 50-year license term.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

We have considered the proposed project and the alternatives under sections 4(e) and 10(a) of the Federal Power Act (Act). From our evaluation of the environmental and economic effects of the project and the alternatives, we conclude that the proposed project, with our recommended enhancement measures, would offer the greatest public benefits from the waterway.

Measures we recommend to protect and enhance environmental conditions include:

- Operating the project run-of-river to minimize water level fluctuations and protect aquatic resources
- Releasing a 250-cfs minimum flow to improve water quality, protect resident fish habitat, and provide a zone-of-passage for anadromous fish species
- Filing and implementing a streamflow gaging plan to verify run-of-river operations and the 250-cfs minimum flow
- Constructing upstream and downstream fish passage facilities and doing the following:
 - a. Evaluating the effectiveness of the fishways in passing fish and the effectiveness of the minimum flow in providing sufficient fish attraction and passage to the upstream fishway
 - b. Filing and implementing an operation and maintenance plan for the fishways to assist fish passage and ensure continuous, effective operation of the facilities
 - c. Filing and implementing an erosion and sediment control plan to minimize erosion and sedimentation during construction of the fish passage facilities

- Documenting and protecting the portion of the historic Greenville dam that is affected by construction of the fish passage facilities
- Constructing a parking area, access trail, and canoe portage and monitoring recreational use at the project

Installation of fish passage facilities and release of minimum flows at the Greenville dam would greatly improve the opportunity for upstream and downstream fish movement in the Shetucket River. This is consistent with the CDEP and the FWS plan to reestablish a recreational fishery for Atlantic salmon and American shad in the Shetucket drainage. We expect eastern Connecticut would receive significant economic benefits from this restoration effort. In addition, the minimum flow release would greatly improve water quality and associated aquatic resources in the 3,200-foot-long bypass reach.

Construction of the recreation facilities would enhance existing informal recreation opportunities in the project areas. Also, monitoring recreational activities would ensure that we identify the need for other facilities that could result from increased use due to the addition of the fish passage facilities and minimum flow releases.

As discussed in section II.B, the minimum flow release would reduce current generation from the project by 1.6 GWh to 7.6 GWh, and would result in annual losses of \$31,000 or \$43,000, based on 40-year or 50-year license terms, respectively. We believe the benefits to water quality and fishery resources warrant this loss. Norwich would continue to use this load to serve local needs. The clean energy that would be produced by the project would continue to displace fossil-fueled power generation, thereby conserving nonrenewable energy resources and reducing the emission of noxious gases that contribute to atmospheric pollution and global warming.

As discussed in section VI, the cost of the enhancement measures has a major effect on the project's economics, that is, a loss of \$44,286 annually for a 30-year license, and an annual benefit of \$10,953 for a 40-year license or \$77,010 for a 50-year license. We are recommending 50-year licenses to give Norwich's ratepayers a greater chance of receiving benefits from the project.

Section 10(a)(2) of the Federal Power Act requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed five plans that address various resources in

Connecticut. Of these, we identified two plans relevant to the development. 8/ No conflicts were found.

Therefore, we conclude that issuing a 50-year license for the project with our environmental recommendations would be best adapted to a comprehensive plan for developing the Shetucket River.

VIII. CONSISTENCY OF FISH AND WILDLIFE RECOMMENDATIONS WITH THE FEDERAL POWER ACT AND APPLICABLE LAW

Under the provisions of the Federal Power Act, as amended by the Electric Consumers Protection Act of 1986, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of such resources affected by the project. Section 10(j) of the Act states that whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the Act or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, given due weight to the recommendations, expertise, and statutory responsibilities of such agency.

Under section 10(j) of the Act, we are making a determination that one of the recommendations of the federal and state fish and wildlife agencies is inconsistent with the purpose and requirements of Part 1 of the Act or other applicable law.

As we discussed in section V.B.3.a, we do not recommend adopting FWS's recommendation 9/ that during the upstream passage season, the Tenth Street powerhouse be operated in a first-on, last-off mode to facilitate upstream fish passage. The proposed flow release at Greenville dam goes beyond FWS's criteria for attraction flows and is more than adequate to facilitate anadromous fish passage in the bypass reach. Additionally, as discussed earlier, such a measure would result in unwarranted costs to the rate payers. Thus, we believe the

8/ (1) Connecticut's statewide comprehensive outdoor recreation plan, 1987-1992, Connecticut Department of Environmental Protection, Hartford, Connecticut; (2) Connecticut's preliminary plan for the restoration of anadromous fish to the Thames River Basin, 1985, Connecticut Department of Environmental Protection, Bureau of Fisheries, Hartford, Connecticut.

9/ Proposed under section 18 of the Act, but determined by staff to be outside the scope of section 18.

agencies' recommendation is inconsistent with the comprehensive planning standard of section 10(a) of the Act.

In addition, we have determined that the recommendations of FWS 10/ and CDEP, prescribing specific time frames for completing construction and starting operation of the fishways, are outside the scope of section 10(j) recommendations because they are not specifically designed for the protection of fish or wildlife resources.

We have, however, considered this recommendation under section 10(a) of the Act. We disagree with this recommendation. As we discussed in section V.B.3.d, Norwich says it remains committed to completing the fish passage facilities and meeting the agencies' deadlines, but the process needs to take into consideration (a) the Commission issuing a license promptly, (b) placing the bond issue on a November ballot, and (3) issuing bonds. We believe these factors are not fully under Norwich's control. We recommend that Norwich move forward expeditiously to construct the fish passage facilities and begin construction within 2 years from the issuance date of the new license and begin operation within 3 years from the issuance date of the license.

IX. FINDING OF NO SIGNIFICANT IMPACT

Modification of the project would cause localized erosion and sedimentation. Implementing the mitigative measures described in this environmental assessment would ensure that the environmental effects of project modification and continued operation would be insignificant.

In accordance with the National Environmental Policy Act of 1969, we prepared this environmental assessment for the Greenville Dam and the Tenth Street Hydro Station developments. On the basis of this independent environmental analysis, issuance of a license for the project consisting of the two developments would not constitute a major federal action significantly affecting the quality of human environment.

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