

ENVIRONMENTAL ASSESSMENT
FOR SMALL HYDROELECTRIC PROJECT
EXEMPTION

Ice House Power Project

FERC Project No. 12769-000

Massachusetts

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, D.C. 20426

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SUMMARY

On January 22, 2007, Ice House Partners, Inc. (Ice House Partners) filed an application for an exemption from licensing for its proposed 280-kilowatt Ice House Power Project. The project would utilize the existing Ice House dam, reservoir, power canal, and powerhouse located on the Nashua River, in the Town of Ayer, Middlesex County, Massachusetts. The project would occupy about 133 acres within the 1,667-acre Oxbow National Wildlife Refuge managed by the U.S. Fish and Wildlife Service.

Ice House Partners proposes to operate two Kaplan turbines at the project, the operation of which would bypass about a 300-foot-long reach of the Nashua River.

This Environmental Assessment (EA) analyzes the effects of Ice House Partner's proposed action to operate and maintain the Ice House Project, the proposed action with additional staff-recommended measures, and a no-action alternative. The primary issues with this project are: (1) project operation and spillway flows in the bypassed reach; (2) fish passage; and (3) recreation access.

To address these issues, Ice House Partners proposes to: (1) operate the project in a run-of-river mode; (2) spill one-million-gallons-per-day (1 mgd) (about 1.55 cfs) into the bypassed reach through a notched flashboard; (3) install a real time water level recording device to match turbine discharge with river inflow for run-of-river operation; (4) provide fish and eel passage when requested by the U.S. Fish and Wildlife Service; and (5) continue to provide a designated canoe portage with signage and access for fishermen.

Pursuant to section 30(c) of the Federal Power Act, the U.S. Department of Interior and the Massachusetts Department of Fish and Wildlife filed mandatory conditions for the project that would require Ice House Partners to: (1) operate the project in a run-of-river mode; (2) provide an interim flow of 1 mgd in the bypassed reach; (3) pass 90 percent of inflow downstream during impoundment refilling after any drawdown; (4) construct, operate, maintain and evaluate upstream and downstream fish and American eel passage facilities; (5) prepare plans for: maintaining and monitoring run-of-river operation and spillway flows at the project; sediment removal; and evaluating fishway effectiveness; and (6) conduct a bypassed reach flow study to be used to establish a permanent minimum flow.

Based on our analysis, we recommend that any exemption issued for the project include the measures proposed by Ice House Partners, with the conditions filed by the U.S. Fish and Wildlife Service and most of the conditions filed by the Massachusetts Department of Fish and Wildlife. We also recommend two additional staff measures: an historic properties management plan, and revised Exhibit G drawings that enclose the

project impoundment.

Regarding the Massachusetts Department of Fish and Wildlife conditions, because Ice House Partners is not proposing any routine vegetation management and because vegetation management at the project would likely be negligible the need for the condition that would require filing for approval of such activities prior to project operation is unclear. We also do not recommend the condition that would require Ice House Partners to have eel passage facilities operational when the project commences operation because eel access to the project appears to be blocked by the downstream Pepperell Paper Mill dam. Similarly, we do not recommend the condition that would require the filing, prior to project operation, of plans and schedules for the operation, maintenance, monitoring, and evaluation of fish and eel passage facilities because fish passage is not currently needed and fishways have not yet been prescribed.

The staff-recommended measures along with the standard articles that would be included in any exemption issued for the project, would protect or enhance environmental resources, and mitigate any adverse effects. In addition, the proposed project would generate on average 2,500 megawatt-hours of electricity per year from a renewable resource reducing the use of fossil-fuels, conserving nonrenewable energy resources, and reducing atmospheric pollution.

On the basis of our independent analysis, we conclude that issuing an exemption from licensing for the project as proposed by Ice House Partners, with the agency conditions and the additional staff-recommended environmental measure, would not be a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
Washington, D.C.

ICE HOUSE POWER PROJECT
FERC No. 12769-000, Massachusetts

I. APPLICATION

On January 22, 2007, Ice House Partners, Inc. (Ice House Partners) filed an application with the Federal Energy Regulatory Commission (Commission) for an exemption from licensing for its proposed 280-kilowatt (kW) Ice House Power Project. The project would be located on the Nashua River, in the Town of Ayer, Middlesex County, Massachusetts (figure 1). The project would occupy about 133 acres of federal land within the 1,667-acre Oxbow National Wildlife Refuge managed by the U.S. Fish and Wildlife Service.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

The Commission must decide whether to grant Ice House Partners an exemption from licensing for the project, and what, if any, conditions should be included in any exemption issued. Issuing an exemption from licensing would allow Ice House Partners to generate electricity, making electric power from a renewable resource available to the area. In this Environmental Assessment (EA), we assess the effects of rehabilitating and operating the project as proposed by Ice House Partners, alternatives to the proposed project, and a no-action alternative, and recommend conditions to become a part of any exemption from licensing issued.

B. Need for Power

Under section 213 of the Public Utility Regulatory Policies Act (PURPA), the authority of the Commission to grant an exemption from licensing is not limited by a determination of the need for power. See Briggs Hydroelectric, 32 FERC ¶ 61,399 (1985). See also David Cereghino, 35 FERC ¶ 61,067 (1986).

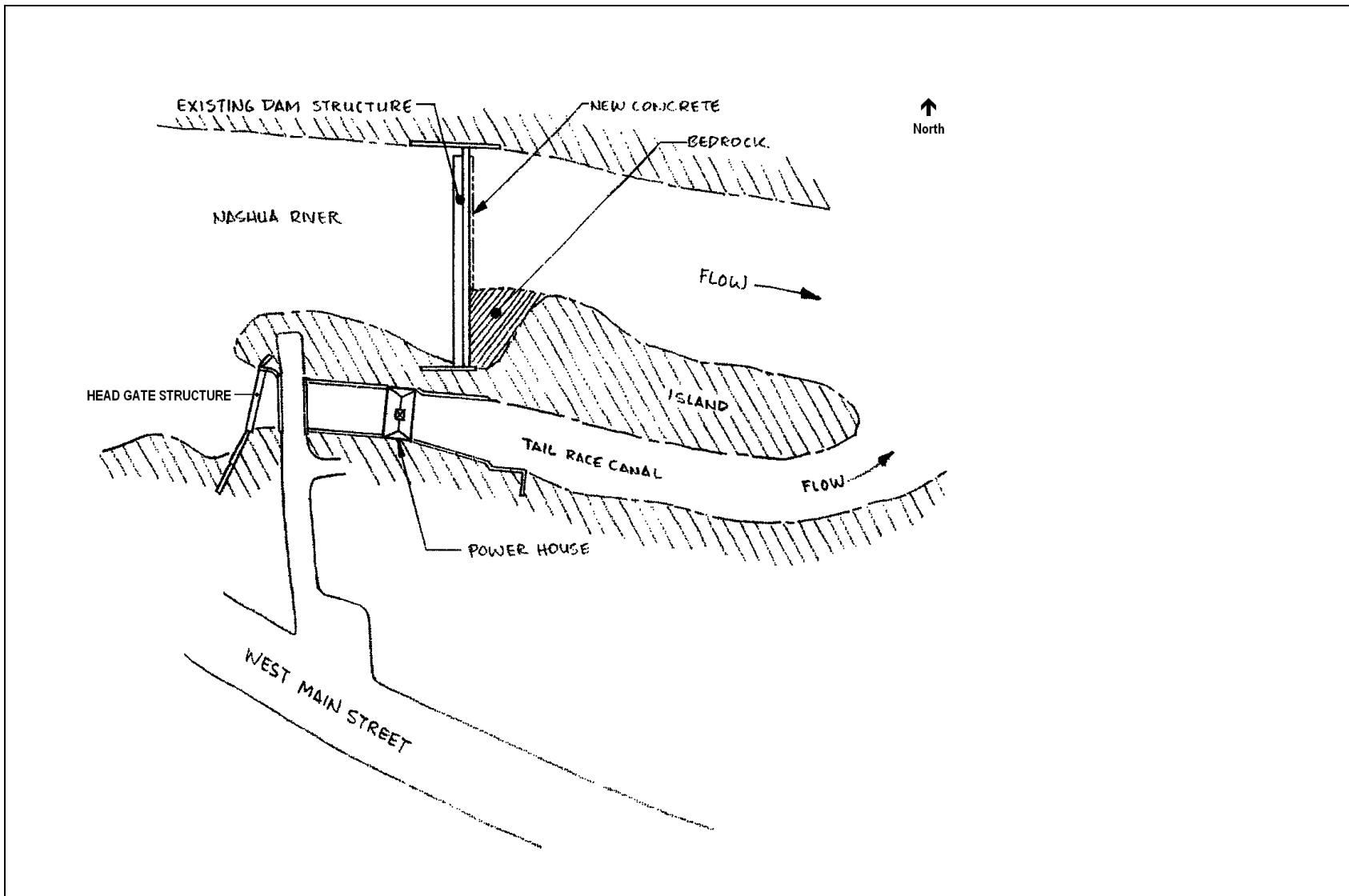


Figure 1. Ice House Project Site Plan (Source: Ice House Partners, modified by staff)

III. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

1. Project Description

The Ice House Project would consist of: (1) the existing 190-foot-long, 12-foot-high Ice House dam and spillway topped with existing 24-inch-high flashboards impounding; (2) an existing 137-acre,¹ 965-acre-foot reservoir with a normal full pond elevation of 216.45 feet National Geodetic Vertical Datum; (3) an existing headgate structure equipped with four 8-foot-high, 10-foot-wide gates of which two are operational and two are stationary leading to; (4) an existing 50-foot-wide, 109-foot-long power canal connected to; (5) a restored powerhouse containing two Kaplan turbine generating units with a total installed capacity of 280 kilowatts discharging flow to; (6) an existing 50-foot-wide, 200-foot-long tailrace; (7) an existing 480-volt, 100-foot-long underground transmission cable; and (8) appurtenant facilities. The Nashua River reach that would be bypassed by operating the project (from the headgate structure to the tailrace outlet) is about 300-foot-long. Currently, all river inflow is spilled over the dam.

The exemption from licensing application and subsequent filed project boundary drawings do not delineate a project boundary line enclosing all of the above-listed existing facilities. The project boundary issue is discussed further in Section VI.

2. Proposed Project Operation

Ice House would operate the project in a run-of-river mode, and maintain 1 mgd (about 1.55 cfs) of water through a notch in the flashboards year-round. The project would be equipped with a real time water level recording device to match turbine discharge with river inflow. When flow in the Nashua River is equal to or less than the minimum hydraulic capacity of the two turbine units (160 cfs each), the units would drop off-line, and all river inflow would spill over the flashboards. When flow exceeds 160cfs, one turbine unit would begin generating and the excess would be spilled over the flashboards until such inflow exceeds another 160 cfs or 320 cfs (the maximum hydraulic capacity of two units), at which time the second turbine unit would begin generating, with all flows over 320 cfs spilled over the flashboards.

In addition to the operational measures identified above, Ice House Partners proposes to: (1) provide fish and eel passage when requested by the U.S. Fish and

¹ The reservoir acreage is noted in the U.S. Army Corps of Engineers Dam Safety Inspection Report dated January 1998, and included with the exemption application.

Wildlife Service (FWS); and (2) continue to provide designated canoe portage locations with signage and access for fishermen.

B. Section 30(c) Conditions

Pursuant to section 30(c) of the FPA, 16 U.S.C. § 823a(c), federal and state fish and wildlife agencies have mandatory conditioning authority on exempted projects. The U.S. Department of Interior (Interior) and the Massachusetts Department of Fish and Wildlife (Massachusetts DFW) filed such conditions on October 10 and 11, 2007, respectively (see appendices A and B). The conditions are summarized below and the filing agencies identified.

- Operate the project in a run-of-river mode (Interior, Massachusetts DFW).
- Discharge a minimum flow over the project spillway to be determined in consultation with the agencies (Interior), and provide an interim flow of 1mgd in the bypassed reach (Massachusetts DFW).
- Prepare and file a plan for maintaining and monitoring run-of-river operation and spillway flows at the project (Interior, Massachusetts DFW), and conduct a bypassed reach flow study to be used to establish a permanent minimum flow (Massachusetts DFW).
- During impoundment refilling after drawdowns for maintenance (including flashboard repair/replacement) or emergency purposes, pass 90 percent of inflow downstream (Massachusetts DFW).
- If necessary, develop a sediment removal plan for periodic removal of accumulated sediment from the project (Massachusetts DFW).
- Construct, operate, maintain and evaluate upstream and downstream fish passage facilities at this project when notified by the agencies (Interior, Massachusetts DFW).
- Construct, operate, maintain and evaluate upstream and downstream passage for American eels by the time the project is operational (Massachusetts DFW).
- Prepare and file plans and schedules for operation, maintenance, monitoring, and evaluation of the fishways (Massachusetts DFW).

- File for approval for routine vegetation management associated with the project (Massachusetts DFW).
- Notify the agencies when the project commences operation, and provide a set of as-built drawings (Interior, Massachusetts DFW).
- Allow the agencies to inspect the project area at any time while the project operates under an exemption from licensing to monitor compliance with their terms and conditions (Interior, Massachusetts DFW).
- Reserves the right to add to and alter terms and conditions of this exemption to carry out its responsibilities with respect to fish and wildlife resources (Interior, Massachusetts DFW).
- Include the above terms and conditions in any conveyance by lease, sale, or otherwise (Interior, Massachusetts DFW).

Interior and Massachusetts DFW also filed one recommendation pursuant to section 10(a) of the FPA to permit access to the project area wherever possible to allow for public utilization of fish and wildlife resources, taking into consideration any necessary restrictions to maintain public safety, and protect project civil works.

C. Additional Staff-Recommended Measures

In addition to Ice House Partners' proposed measures and the conditions filed by Interior and the Massachusetts DFW (except for the vegetation management approval, fish passage plans and schedules, and eel passage conditions), we recommend Ice House Partners develop and implement a historic properties management plan, and revised Exhibit G drawings enclosing the project impoundment.

D. No-Action Alternative

Under the no-action alternative (denial of the application), the project would not be permitted to generate an estimated average annual generation of 2,500 MWh, and environmental resources in the project area would not be affected.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The Commission's regulations require that applicants consult with appropriate state and federal agencies, tribes, and the public before filing an exemption application. This consultation is required to comply 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 Commission regulations.

B. Interventions

On April 27, 2007, the Commission issued a public notice accepting the application and soliciting motions to intervene, with a filing deadline of May 29, 2007. On February 28, 2007, the Massachusetts DFW filed a motion to intervene.

C. Scoping

Before preparing this EA, we conducted scoping to determine the issues and alternatives that should be addressed. We issued a Scoping Document (SD) on May 1, 2007, and a notice soliciting written scoping comments on issues to be addressed in the EA on May 2, 2007. We distributed the SD to all entities on the project's mailing list and published the notice in a local newspaper and the Federal Register. On May 17, 2007, the Massachusetts DFW filed scoping comments.

D. Comments and Recommendations

On August 14, 2007, the Commission issued a public notice stating the application was ready for environmental analysis and requesting final comments, recommendations, prescriptions, and terms and conditions. The filing deadline was October 15, 2007. The following entities filed comments:

<u>Commenting Entity</u>	<u>Date Filed</u>
Interior	October 10, 2007
Massachusetts DFW	October 11, 2007

E. Compliance

1. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. In a letter dated November 3, 2006, included with the exemption application, FWS indicated that no federally listed or proposed, threatened or endangered species or critical habitat is known to occur within the project area.

V. ENVIRONMENTAL ANALYSIS

In this section, the general environmental setting in the project area and the scope of our cumulative effects analysis are described. An analysis of the environmental effects of the proposed action and action alternatives is also included. Sections are organized by resource area (aquatics, terrestrial, etc.). Under each resource area, historic and/or current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section VI of the EA.

Unless noted otherwise, the sources of our information are the exemption from licensing application (Ice House Partners, 2007) and additional information filed by Ice House Partners (Ice House Partners, 2007).

A. General Description of the Area

The Nashua River is the largest tributary of the Merrimack River with a watershed of about 538 square miles. Land use within the Nashua River Basin consists of forested (64 percent), residential (13 percent), and open space land, some used as agriculture (23 percent).

The area around the project was historically comprised of industrial and urban development. The Town of Ayer, home to the historic mill village of Mitchellville, continues to be a small industrial node surrounding the Nashua River and the proposed project site. Elements of the historic mill village remain in the project vicinity.

B. Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing NEPA (40 CFR, section 1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of Ice House Partners' exemption from licensing application and agency and public comments, we have not identified any resources that would be cumulatively affected by rehabilitating and operating the project. Therefore cumulative effects are not assessed in the EA.

C. Proposed Action and Action Alternatives

Only resources that would be affected, or about which comments have been received, are addressed in detail in this EA and discussed in this section. We have not identified any substantive issues related to geology, soils, and socioeconomics associated with the proposed action, and therefore, these resources are not assessed.

1. Aquatic Resources

Affected Environment

Water Quantity

The Nashua River flows south to north and is the largest tributary to the Merrimack River Watershed. As noted, the Nashua River Watershed encompasses 538 square miles, with the upstream drainage area of the river at the proposed project being approximately 304 square miles. The main stem of the Nashua River is formed by two branches, the north branch, which originates west of the town of Fitchburg, and the south branch, which flows out of the Wachusett Reservoir, a water supply reservoir. The confluence of these branches occurs approximately 15 miles upstream of the proposed project. Along with upstream drainage area, the other main contributor to river flow into the proposed project is the release of water from the upstream Wachusett Dam, owned and operated by the Massachusetts Water Resources Authority, which can vary from a minimum flow of 1.6 cfs to over 154 cfs. The estimated average annual flow of the

Nashua River at the project is approximately 366 cfs, with a minimum annual flow of 166 cfs (1985) and a maximum annual flow of 566 cfs (2006).²

The project reservoir includes a 965-acre-foot natural wetlands area located approximately 3 miles upstream of the proposed project dam. The wetland area is part of the 1,667-acre Oxbow National Wildlife Refuge (Oxbow NWR).

All inflow to the project currently spills over Ice House dam. The area downstream of the powerhouse currently remains inundated from backwater caused by downstream constrictions in the river morphology.

Water Quality

The Massachusetts Department of Environmental Protection (Massachusetts DEP), Division of Water Pollution Control has designated the Nashua River as Class B Warmwater Fishery and Recreation water. Class B waters are designated as habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated, Class B waters should have good aesthetic value as well as be suitable for public water supply with appropriate treatment, irrigation, other agricultural uses, as well as for compatible industrial cooling and processing uses (Massachusetts DEP 1998).

Although it has improved, the Nashua River has had a long history of water quality degradation. Through the 1960s and early 1970s, paper manufacturing facilities in the towns of Fitchburg and Pepperell, inadequately treated municipal wastewater in the towns of Fitchburg, Leominster, Clinton, and Ayer, and combined sewer overflows in Fitchburg and Leominster contributed to severe pollution of the river. While the water quality of the river has improved dramatically with the closing of some of these facilities and the institution of advanced waste water treatment at others, impacts on aquatic biota and elevated bacteria levels remain problematic. The mainstem of the Nashua in its reach through the refuge is included in the Massachusetts list of impaired waters due to organic enrichment and low dissolved oxygen levels (FWS 2005).

In relevant part, water quality standards for Class B waters include: (1) minimum dissolved oxygen (DO) levels of no less than 5.0 milligrams per liter (mg/l); (2) a maximum temperature of 83 degrees Fahrenheit (°F) (28.3 degrees Celsius (°C)) with the rise in temperature due to a discharge not to exceed 5°F (2.8°C); and (3) an acceptable pH range of 6.5 to 8.3 (Massachusetts DEP 1998).

The Nashua River Watershed Association (NRWA) has collected water quality

² The annual flow is derived from U.S. Geological Survey (USGS) gaging station number 01096500, located downstream of the Ice House Project near the town of East Pepperell, and adjusted for drainage area and water supply diversions.

data at stations both upstream and downstream of the proposed project. Data from the route 117 station, located approximately 15 miles upstream, has been collected from 1997 to the present. Data from the Bishop Road station, located approximately 3 miles downstream, has been collected from 2005 to the present. The results of the water quality monitoring are presented in table 1.

Table 1. Range of DO, temperature, and pH collected monthly, from April through October in the Nashua River, both upstream (1997-present) and downstream (2005-present) of the proposed project by the NRWA (Source: Ice House Partners, as modified by staff).

Site	Range	DO (mg/l)	Temperature (°C)	pH
Route 117 (upstream)	Min	2.6	6	6.1
	Max	12.5	25	7.4
	Mean	7.4	16.6	6.8
Bishop Road (downstream)	Min	5.9	8	6.5
	Max	12.6	26	7.1
	Mean	8.0	16.9	6.9

DO at the upstream Route 117 site was measured to be below the state standard (5.0 mg/l) on three sampling dates; July (3.9 mg/l) and August (2.6 mg/l) of 1999, and August of 2003 (4.0 mg/l). The measured pH at the upstream site was outside of the state standard range (between 6.5 and 8.3) on five sampling dates; May of 1998 (6.1), May (6.4) and October (6.4) of 2002, August of 2003 (6.4), and April of 2007 (6.4). All of the samples collected from the downstream Bishop Road site met the state water quality standards.

Fishery Resources

The Nashua River supports a warm water fishery. A list of resident fish species known to occur in the project vicinity is provided in table 2. The list is based on survey information provided by the Massachusetts DFW.

Table 2. Resident fish species known to occur in the vicinity of the Ice House Project (Source: Ice House Partners, as modified by staff).

Bluegill	Blacknose dace	Banded sunfish
Chain pickerel	Common shiner	Fallfish
Golden shiner	Largemouth bass	Longnose dace
Pumpkinseed	Spottail shiner	Tessellated darter
White sucker	Yellow bullhead	Yellow perch

In addition to the species listed above, the Squannacook River, which flows into the main stem of the Nashua River just north of the Oxbow NWR, supports wild brook and brown trout populations, and also gets stocked with brook, brown, rainbow, and tiger trout (FWS 2005). It is likely that some of these trout find their way into the main stem of the Nashua River.

Anadromous fish restoration in the Merrimack River Watershed (river herring, American shad, and American eel) is a cooperative effort among state agencies including the Massachusetts Division of Marine Resources, Massachusetts DFW, and federal agencies including the FWS, National Marine Fisheries Service, and U.S. Forest Service (FWS 2005). As part of this large scale effort, the FWS have been stocking adult river herring in the Nashua River in the impoundment above the East Pepperell dam, the next dam downstream of the Ice House dam³, located approximately 11.5 miles downstream of Ice House dam. FWS has documented juvenile production from this stocked fishery and plan to continue the stocking efforts. The East Pepperell dam does not currently have any upstream fish/eel passage facilities.

Environmental Impacts and Recommendations

Mode of Operation

Ice House Partners proposes to operate the project in a run-of-river mode, with inflow equaling outflow on an instantaneous basis, and install a real time water level recording device. Ice House Partners also proposes to provide a flow of 1mgd, about 1.55 cfs, to the bypassed reach through a notch on the spillway flashboards at all times.

Massachusetts DFW and FWS would require Ice House Partners to operate the project in a run-of-river mode to maintain existing habitat and water quality (condition 1). Massachusetts DFW and FWS would also require Ice House Partners to prepare a plan for maintaining and monitoring run-of-river operation (conditions 2 and 3, respectively). FWS would require Ice House Partners to discharge a minimum flow over the spillway determined after consultation, and notes that a series of demonstration flows may be needed to establish the required flow (condition 2). Massachusetts DFW would require, during the first field season after commencement of project operation, that Ice House Partners conduct a flow study to determine a suitable bypassed reach discharge sufficient to maintain water quality and habitat in the bypassed reach. Based on the study results, Massachusetts DFW may require a continuous minimum bypassed flow for the project (condition 4). Massachusetts DFW would notify Ice House Partners of any required

³ See order finding licensing required for the East Pepperell dam, 116 FERC ¶ 62,140 (2006), and order issuing permit for the East Pepperell Project No. 12721, 118 FERC ¶ 62,201 (2007).

permanent bypass flow and would require that a plan be prepared to maintain and monitor the permanent bypass flow (condition 6). In the interim, Massachusetts DFW would require a flow of 1 mgd at the dam to protect habitat in the bypassed reach (condition 5).

Staff Analysis

Operating the project in a run-of-river mode would minimize the time water is retained behind the dam, and protect aquatic biota in the free-flowing section of river downstream of the dam. The run-of-river mode would also minimize water level fluctuations in the impoundment, which are known to strongly influence the reproduction of fishes that spawn in near-shore areas (Sammons and Bettoli, 2000).

Downstream of the proposed project, the river has numerous choke points where its width considerably narrows. These choke points, in conjunction with the low slope of the river in the proposed 300-foot bypassed reach, keep the bypassed reach inundated with water at all times, even submerging the project dam during high flows due to the significant rise in the river height below the dam. Although this backwater effect would help to inundate the bypassed reach, a minimum flow release would provide additional protection of water quality and aquatic habitat in the bypassed reach during periods of low flow. The Ice House Partners' proposal and Massachusetts DFW's interim spill flow condition would be effective in maintaining the river's water quality and habitat in the bypassed reach until the required flow evaluation is conducted. The interim minimum flow over the spillway would specifically protect DO levels in the bypassed reach through the aeration of water that is being spilled. Information is not currently available to determine which combination of generation flows and spills is most effective in maintaining water quality and habitat downstream of the dam. Conducting water quality and spillway flow monitoring after the project is operating as required by Massachusetts DFW and FWS would help determine the most effective combination of spill and generation. The effects on fish and other aquatic organisms should therefore be minimal due to project operation and diversion of stream flows through the powerhouse.

Drawdown Management

Hydro project impoundments may need to be periodically drawn down due to scheduled and unscheduled maintenance as well as emergencies beyond the control of the operator. Ice House Partners does not propose an impoundment refill protocol. Massachusetts DFW would require Ice House Partners to implement a refill procedure after drawdowns for maintenance or emergencies whereby 90 percent of inflow is passed downstream of the dam to protect downstream resources, and the headpond is refilled with the remaining 10 percent of inflow to the project (condition 3).

Staff Analysis

Releasing 90 percent of the impoundment's inflow during impoundment refilling would ensure downstream flows are kept at near natural flow levels, which would help maximize water turbulence and aeration, and in turn help maintain the river's water quality. In addition, releasing 90 percent of impoundment inflow downstream of the dam after the pool is drawdown for maintenance activities would ensure that aquatic habitat downstream would quickly be returned to normal conditions with minimal impacts to aquatic resources.

Sedimentation Management

The periodic removal of accumulated sediment around intake structures at hydroelectric projects is often required to maintain necessary flows for operation. Ice House Partners does not propose any sedimentation control measures. Massachusetts DFW would require Ice House Partners to develop, if necessary, within 90 days of exemption issuance, a sediment removal plan in consultation with the Massachusetts DFW, FWS, and the Massachusetts DEP, for approval by the Massachusetts DFW and FWS prior to commencement of project operation (condition 7). The purpose of the plan would be to develop a protocol for the periodic removal of accumulated sediment from the project that minimizes impacts to aquatic resources.

Staff Analysis

The process of removing sediment can result in water turbidity and siltation of aquatic habitat. In addition to covering habitat, siltation may clog the gills of aquatic species, smother eggs, reduce the availability of spawning sites, reduce light transmission needed for photosynthesis, food production, and the capture of prey by sight feeding predators, and expose aquatic life to contaminants that readily bind to sediments (EPA 1986, Schueler 1987). Although Ice House Partners does not propose any sediment removal for the rehabilitation of the project, the periodic removal of accumulated sediment around intake structures at hydroelectric projects is often required to maintain necessary flows for operation. The development of a sediment removal plan prior to any planned sediment removal at the project, however, would help ensure that impacts on the aquatic environment are minimized.

Fish Passage

Surveys conducted by the Massachusetts DFW in 2003 found no anadromous fish in the project vicinity. Federal and state resource agencies, however, are actively pursuing planning and implementing anadromous fish restoration programs in the Merrimack River Watershed, including the Nashua River. FWS has been stocking adult river herring in the impoundment above the East Pepperell dam,⁴ the next dam located downstream of Ice House dam.

Ice House Partners proposes to provide fish passage facilities when required by the FWS and Massachusetts DFW. Interior and Massachusetts DFW would require Ice House Partners to construct, operate, maintain, and evaluate upstream and downstream fish passage facilities at this project when notified by FWS and Massachusetts DFW that such fishways are needed (conditions 4 and 8, respectively). Further, Massachusetts DFW would require Ice House Partners to file for approval, plans and schedules for the operation, maintenance, monitoring, and evaluation of fishways specified in conditions 8 and 9⁵ no later than three months prior to commencement of project operation (condition 10).

Staff Analysis

Although no anadromous fish are currently found in the project area, the management goal of fishery agencies throughout the basin is to rehabilitate and restore certain anadromous fish populations, including river herring and American shad. To restore the anadromous fish populations, new and/or improved fish passage facilities may be needed along the migratory corridor of the Nashua River, which would allow adult and juvenile anadromous fish to access spawning and rearing areas upstream of the Ice House dam. In addition, without downstream passage facilities, some fish moving downstream may be entrained or impinged by intake structures thereby adversely affecting restoration efforts. Although no anadromous fish are currently found in the project area, the ongoing rehabilitation and restoration efforts may result in the future need for upstream and downstream fish passage facilities at the Ice House Project once passage facilities are installed at the next downstream dam, East Pepperell. However, filing plans and schedules for the operation, maintenance, monitoring, and evaluation of fishways three months prior to commencement of project operation appears to be

⁴ See order finding licensing required for the East Pepperell dam, 116 FERC ¶ 62,140 (2006), and order issuing permit for the East Pepperell Project No. 12721, 118 FERC ¶ 62,201 (2007).

⁵ Condition 9 is a recommendation for passage of American eel which is addressed below.

premature because the Massachusetts DFW condition only requires fish passage facilities at this project when notified by the agencies that such fishways are needed. Fish passage facilities have not yet been prescribed for the Ice House Project. In addition, the ability to evaluate the effectiveness of fish passage facilities at the Ice House dam would appear to be problematic without passage facilities at the downstream East Pepperell dam.

Eel Passage

Surveys conducted by the Massachusetts DFW in 2003 documented the occurrence of American eel in the Nissitissit River, located approximately 12.5 miles downstream of the Ice House dam and approximately 1 mile downstream of the East Pepperell dam. In addition, federal and state resource agencies are actively pursuing the planning and implementation of migratory fish restoration programs in the Nashua Watershed.

Ice House Partners proposes to provide eel passage facilities when required by the FWS and Massachusetts DFW. Massachusetts DFW would require Ice House Partners to construct, operate, maintain, and evaluate an upstream and downstream passage for American eel and make that passage operational concurrent with commencement of project operation (condition 9).

Staff Analysis

Research on the American eel has been conducted for decades. However, there are little data available on the exact habitat requirements, behavior, and migratory patterns of this species. In the past 10 years there has been an increased focus on American eel for two main reasons: (1) significant declines in elver⁶ recruitment to the St. Lawrence and other rivers in the eastern United States (Castonguay *et al.* 1994a, 1994b; Lary *et al.* 1998; Haro *et al.* 2000); and (2) large increases in demand for all eel lifestages (except for the leptocephalus stage⁷) as grow-out stock for aquaculture, food, or bait (CAEMM 1996).

The factors most often cited for the decline in populations include anthropogenic

⁶ Elver is a lifestage of the American eel during which they migrate into estuaries along the Atlantic coast. Some elvers remain in the estuaries, but others migrate varying distances upstream, often for several hundred kilometers, overcoming seemingly impassible obstacles such as spillways, dams, falls, and rapids.

⁷ Leptocephalus is the pelagic larvae lifestage of the American eel during which they drift with the ocean currents for 9 to 12 months before entering coastal waters.

effects such as: (1) loss of available habitat from the construction of dams; (2) entrainment or impingement at hydroelectric facilities; (3) water quality or toxicity issues; (4) fishing pressure; and (5) commercial harvesting of sargassum, which affects the larval life stage. In addition, oceanographic influences, such as changes in Gulf Stream current patterns or other climate changes, have been cited as reasons for the decline in American eel populations.

The success rate of upstream migration over or past dams without eel passage facilities is unknown. Dam height, roughness of the spillway material, angle of the spillway surface, flashboard height, flow levels, and potential pathways around a dam are all confounding factors in determining success rates for migrating elvers and yellow eels. With upstream eel passage facilities in place, however, upstream passage efficiency has proven to significantly improve (Dumont *et al.* 2000, Verdon 1998).

Outmigrating sexually mature American eels, known as silver eels, are particularly vulnerable to direct effects at hydroelectric facilities such as migration delays, impingement, and turbine-induced mortality.⁸ Impingement on trash racks can also affect downstream migrating eels and can ultimately lead to entrainment as eels force themselves through the bar racks.

The proposed operation of the project could negatively affect downstream migration of any future eel migration by reducing the amount of spill over the dam and introducing a level of turbine-induced mortality. Due to this, the documented occurrence of American eels just downstream of the East Pepperell dam, and the high likelihood of future construction of eel passage facilities at it,⁹ the construction of eel passage facilities at the Ice House dam would benefit American eel populations by providing access to upstream tributary habitat and provide protection from operational impacts during downstream passage. However, constructing such facilities at the Ice House dam before eel passage is provided at the downstream Pepperell Paper Mill dam, appears to be premature. In addition, the ability to evaluate the effectiveness of eel passage facilities at the Ice House Dam would appear to be lacking without the presence of American eels whose movement upstream beyond the Pepperell Paper Mill dam is blocked.

Unavoidable Adverse Impacts

⁸ Sexually immature “yellow eels” exhibiting general downstream movements not associated with spawning outmigrations would also be susceptible.

⁹ The high likelihood is based on the restoration efforts targeting American eels in the Nashua River and the upcoming Commission licensing proceeding for the East Pepperell Project.

None.

2. Land Use and Terrestrial Resources

Affected Environment

The proposed project is located approximately 35 miles northwest of Boston, Massachusetts. The area around the project was historically comprised of industrial and urban development. The Town of Ayer, home to the historic mill village of Mitchellville, continues to be a small industrial node surrounding the Nashua River and the proposed project site. Elements of the historic mill village remain in the project vicinity.

The river's drainage basin is sparsely developed, with 64 percent forested, 13 percent residential, and 7 percent open space land use, some of which is agriculture. Over 3,610 acres of the subwatershed are permanently protected and 1,324 acres have limited protection.

Oxbow National Wildlife Refuge

The existing impoundment is located primarily within the Oxbow NWR, which is managed by the FWS. This 1,667-acre refuge is located within the towns of Ayer, Shirley, Harvard, and Lancaster. As indicated by figure 2, the refuge is divided into three parcels (northern, middle, and southern parcels), with the Nashua River flowing in a northerly direction. The Ice House dam and powerhouse are located between the northern and middle parcels, outside of the Oxbow NWR. The project impoundment is located within the middle parcel (beginning about 1,200 feet upstream of Ice House dam) and extending into the southern parcel of the Oxbow NWR.

The Oxbow NWR is particularly valuable as habitat for migrating birds. The refuge consists of wetlands, forested upland, and old field habitats, which support a diverse mix of migratory birds such as waterfowl, wading birds, raptors, shorebirds, and passerines. As noted in the Final Comprehensive Conservation Plan (Conservation Plan) for the refuge, the wetlands occurring on and adjacent to the refuge have been listed as a priority for protection under both the North American Waterfowl Management Plan and the Emergency Wetlands Resources Act of 1986 (FWS, 2005). The refuge also supports resident mammals, reptiles, amphibians, fish, and invertebrates. Birds of particular concern that are identified in various plans or programs¹⁰ include:

¹⁰ These plans and programs include: Partners in Flight, Birds of Conservation Concern within the FWS' Bird Conservation Region 30, North Atlantic Regional Shorebird Plan; and the U.S. Shorebird Conservation Plan.

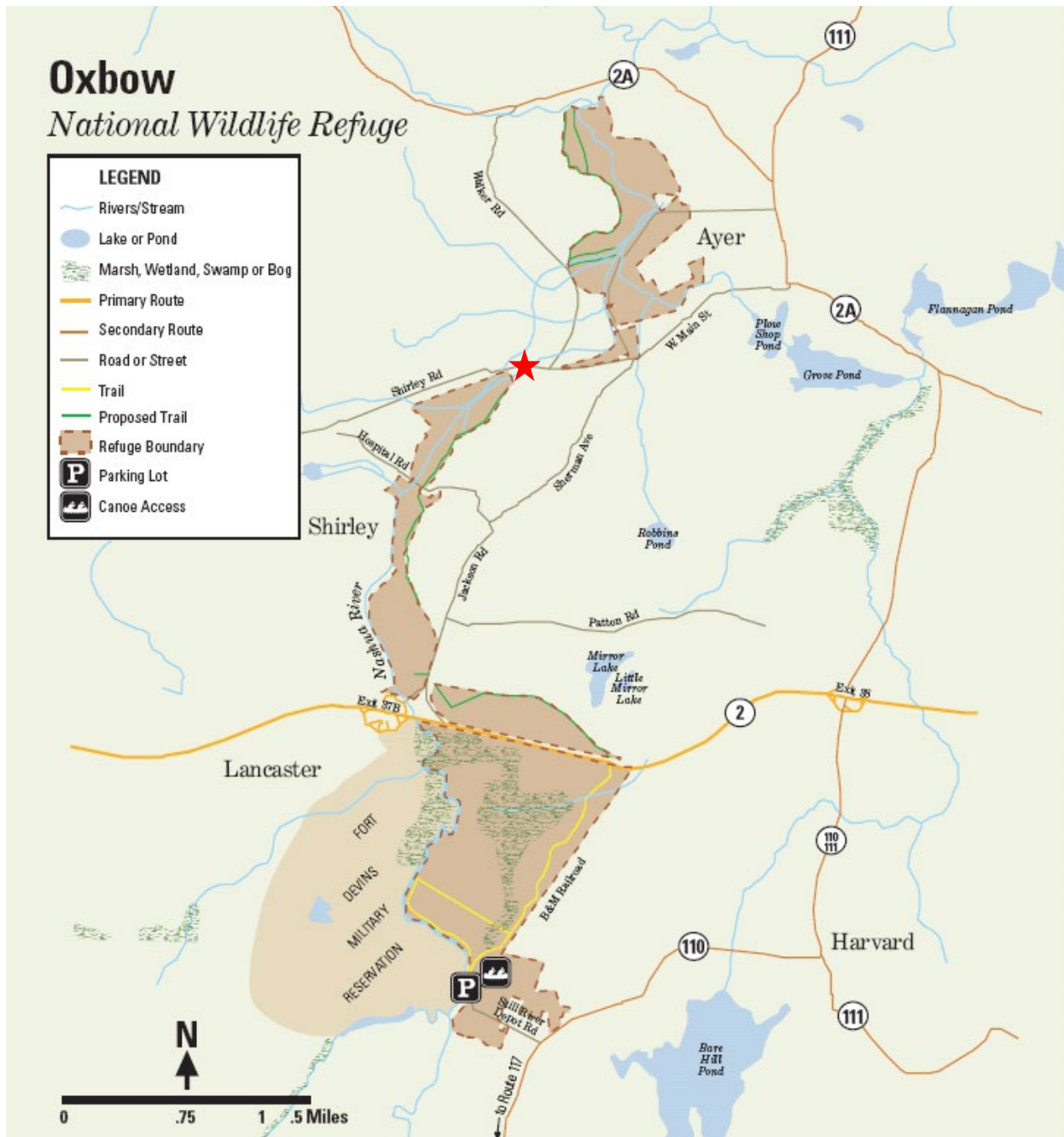


Figure 2. Map of Oxbow National Wildlife Refuge. Ice House dam location is indicated by the star (Source: FWS, 2007, modified by staff).

rose-breasted grosbeck, chimney swift, eastern wood pewee, blue-winged warbler, wood thrush, Baltimore oriole, killdeer, spotted sandpiper, least sandpiper, American woodcock, and solitary sandpiper.

Priorities for wildlife management at the refuge include:

- Recover populations and habitats of endangered and threatened species.
- Protect, enhance, and restore coastal habitats for trust resources of concern.
- Protect, enhance, and restore populations of migratory bird species of special concern and their habitats.
- Manage lands to protect, enhance, and restore habitats to maintain biodiversity (FWS, 2005).

Project Vegetation and Wetlands

Vegetation types upstream (south) and downstream (north) of the impoundment are primarily mixed coniferous/deciduous forested upland, with small patches of natural and man-made grass fields and meadows. The area immediately adjacent to the tailrace at the diversion is lawn, with a stone wall defining the edge of the diversion.

The river channel in the 300-foot bypassed reach is generally exposed bedrock and boulder rubble, with some edge vegetation.

There are also small patches of emergent wetland, primarily shallow marsh upstream on both sides with some scrub/shrub marsh on the downstream left side of the river on the near side of the train tracks. The left bank also has unvegetated patches of sand and large stones as part of a railroad bed as well as along paths leading to the downstream left bank. The island formed by the diversion is mostly forested upland with freshwater emergent vegetation along the edges where water level permits growth.

The Conservation Plan for the Oxbow NWR identifies that invasive species, such as the common reed and purple loosestrife, are a concern within the refuge. FWS implements efforts to control known invasive species within the refuge. Invasive species, therefore, may occur at the project, but have not been documented to date.

Upland Wildlife Resources

Common species in this vicinity of the Nashua River area include white-tailed deer, woodcock, ruffed grouse, pheasant, turkey, rabbit, and gray squirrel. Upstream of the impoundment in the Devnes South Post, Oxbow NWR and Bolton Flats areas there are 19 state-listed species. State listed species of special concern include: spotted turtle (*Clemmys guttata*), wood turtle (*Glyptemys insculpta*), eastern box turtle (*Terrapene carolina*), and blue-spotted salamander (*Ambystoma laterale*). The Blanding's turtle (*Emydoidea blandingii*) is listed as state threatened, and the pied-billed grebe

(*Podilymbus podiceps*) is state endangered (FWS, 2005). The presence of these species has not been documented in the area of the impoundment and its tailrace.

Environmental Effects and Recommendations

Massachusetts DFW and Interior would require Ice House Partners to operate the project in a run-or-river mode to maintain existing habitat and water quality (condition 1). Massachusetts DFW and Interior would also require Ice House Partners to prepare a plan for maintaining and monitoring run-of-river operation (conditions 2 and 3, respectively). Ice House would maintain 1 mgd (about 1.55 cfs) flow of water through a notch in the flashboards year-round.

Massachusetts DFW (condition 3) would require Ice House Partners to implement a refill procedure after drawdowns for maintenance or emergencies whereby 90 percent of inflow is passed downstream of the dam, and the reservoir is refilled with the remaining 10 percent of inflow to the project. Massachusetts DFW would also require Ice House Partners to file for approval for routine vegetation management no later than three months prior to commencement of project operation (condition 11).

Staff Analysis

Operating the project in run-of-river mode would protect existing downstream riparian habitat at the project and ensure a relatively stable impoundment¹¹ and associated riparian vegetation, thereby protecting wildlife habitat.

It is unclear if invasive plant species are an issue in the immediate project vicinity, but approval from Massachusetts DFW for vegetation management should ensure consistency with any state goals concerning exotic or invasive vegetation management, as well as with any goals of the Massachusetts Natural Heritage and Endangered Species Program.

Drawdowns are a necessary component of project maintenance in many cases and can also be a means of dealing with certain emergencies beyond the control of the exemptee. Wildlife and vegetation may be negatively affected for a short time during any drawdowns for maintenance or due to emergencies. However, these events would be temporary and would not cause long lasting effects. The refill procedure required by Massachusetts DFW's condition 3 would ensure continuity of flow in the Nashua River downstream of the project, benefiting riparian vegetation during impoundment refilling.

¹¹ The existing project facilities create a 137-acre impoundment of which about 133 acres is located within the Oxbow NWR. The revised Exhibit G drawings do not enclose the entire project impoundment within the project boundary.

Ice House Partners does not propose any routine vegetation management for the rehabilitation of the project and due to the small size and location of the project in a developed area, the need for vegetation management would appear to be negligible. Therefore, the rationale for the need to seek approval from the Massachusetts DFW three months prior to project operation for such activities is not clear.

Unavoidable Adverse Effects

None.

3. Rare, Threatened, and Endangered Species

Affected Environment

In a letter dated November 3, 2006, included with the exemption application, FWS indicated that no federally listed or proposed, threatened or endangered species or critical habitat is known to occur within the project area. FWS concludes that no further Endangered Species Act coordination is necessary unless additional information on listed species or proposed species becomes available.

Environmental Impacts and Recommendations

Issuing an exemption from licensing to operate and maintain the Ice House Project would not affect federally listed threatened or endangered species or critical habitat. We, therefore conclude that Ice House Partners proposal would have no effect on federally listed threatened or endangered species or critical habitat and that no further consultation with FWS is required.

Unavoidable Adverse Effects

None.

4. Recreation

Affected Environment

The Massachusetts Landscape Inventory classifies a large portion of the Nashua River's drainage basin as distinctive or noteworthy due to its orchards and rolling farmland scenery. The river is very popular with paddlers, as it is relatively calm and passes through primarily greenway areas (areas with riparian corridor protection), including protected areas such as the Oxbow NWR. The refuge also attracts wildlife-

related recreation and hosted an estimated 70,000 visitors in 2003 (FWS, 2005).

The main local recreation-related concerns for this proposed project involve fishing access and safe canoe portage, as noted by a representative of Massachusetts DFW (July 12, 2006 pre-filing meeting notes in Appendix VII of application) and the Nashua River Watershed Association (letter dated January 3, 2006, in response to the draft application), respectively. Ice House Partners currently provides portage around the dam, designates the access with signage, and keeps the passage open and free of vegetation. In addition, Ice House Partners has provided trash receptacles and access for fishermen and canoe enthusiasts at several points.

As demonstrated in figure 3, the Oxbow NWR offers several wildlife trails, including two in the middle parcel of the refuge that includes the Ice House dam's impoundment. In addition, FWS has proposed future construction of a canoe landing at the upstream end of this parcel, approximately two miles upstream from the project dam (FWS, 2005).

Environmental Impacts and Recommendations

Ice House Partners proposes to continue to provide designated canoe portage locations with signage and access for fishermen to enhance recreation in the vicinity of the proposed project.

Massachusetts DFW and Interior recommend that Ice House Partners permit access to the project area wherever possible to allow for public utilization of fish and wildlife resources, taking into consideration any necessary restrictions to maintain public safety and protect project civil works.

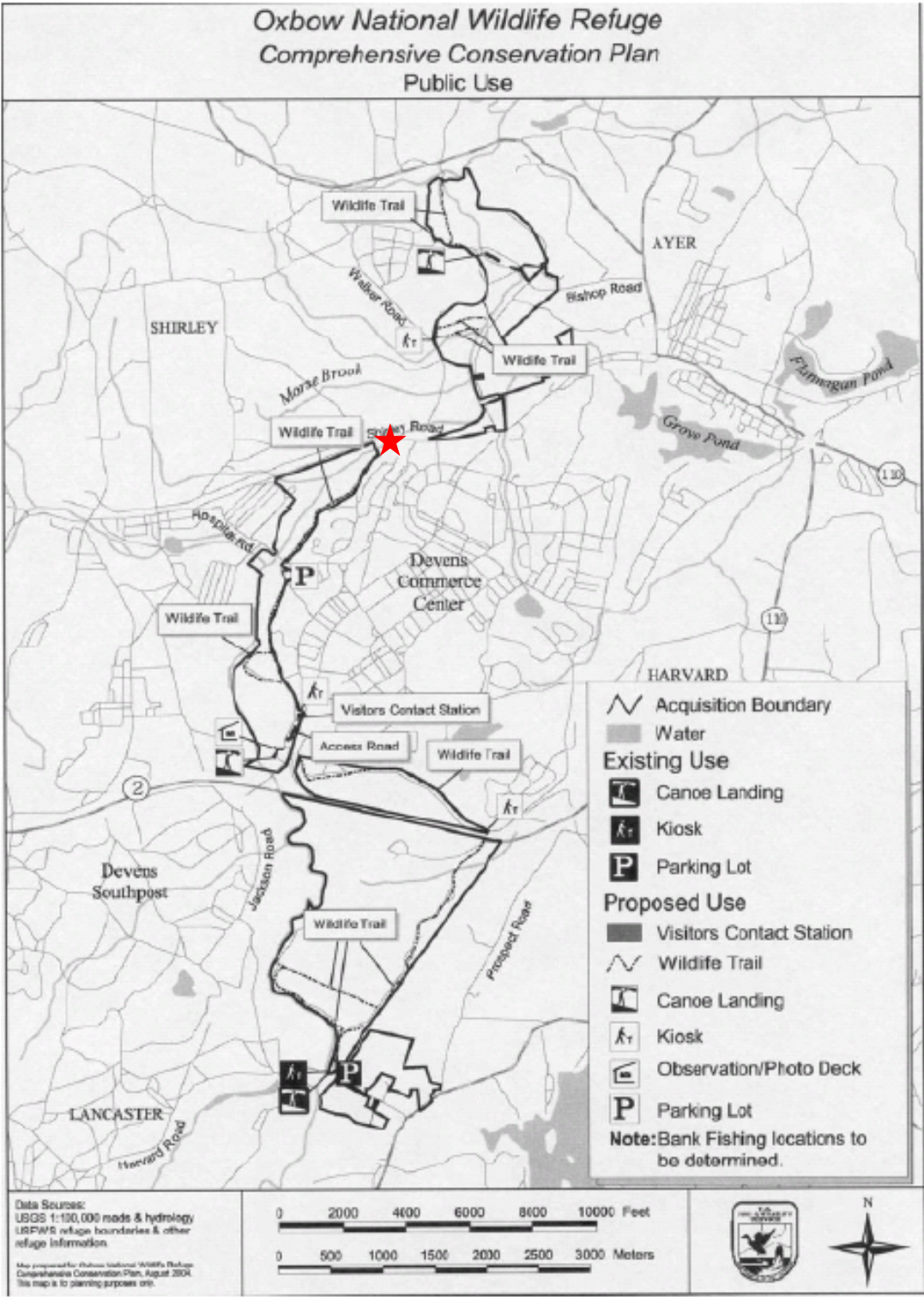


Figure 3. Public use at the Oxbow National Wildlife Refuge. Ice House dam location is indicated by the star (Source: FWS, 2005).

Currently, boaters using this portion of the Nashua River are able to use an existing portage, as indicated in figure 4.

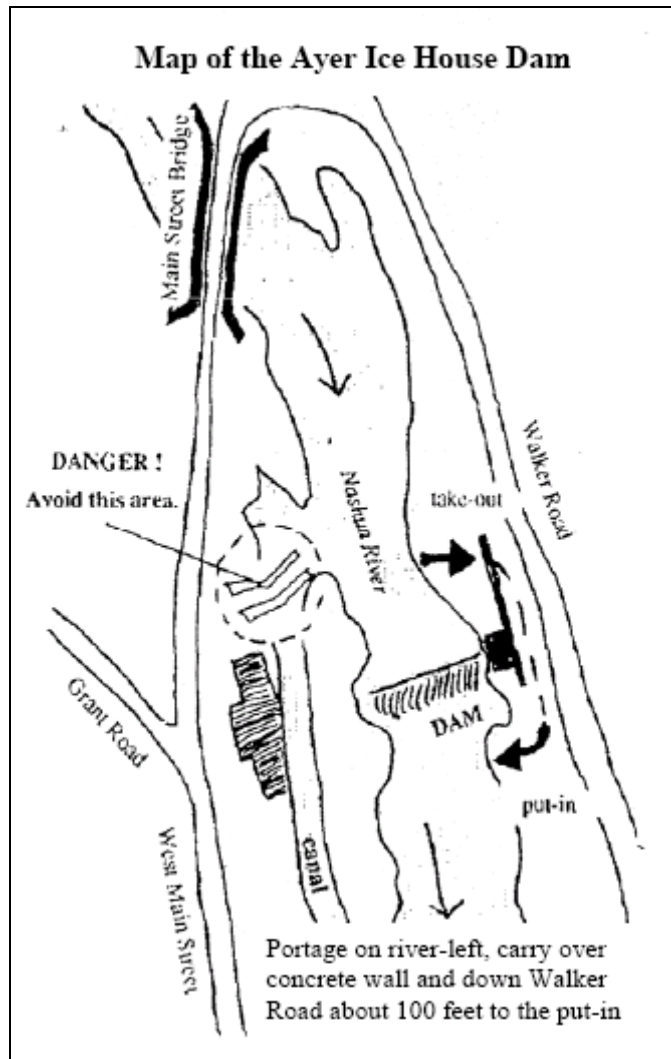


Figure 4. River Portage Map included in Ice House Partners' July 27, 2007 filing (Source: Nashua River watershed Association, 2001).

Staff Analysis

The existing portage allows boaters using this portion of the Nashua River to move throughout different segments of the Oxbow NWR. The signage benefits boaters by clarifying the access and egress points and making clear the need to avoid the power canal (figure 4). Vegetation management at the portage maintains a clear access and also provides additional fishing access. Continuing to maintain these access points, as

proposed by Ice House Partners, would help ensure that recreation users at the project continue enjoy these benefits.

Unavoidable Adverse Impacts

None.

5. Cultural Resources

Affected Environment

The dam at the project has been in use since at least the 1790s, and was used as a reference marker in laying out the towns of Ayer, Harvard, and Shirley as it sits at the intersection of the three towns. The location was probably chosen due to availability of a rock outcrop in the river bed, allowing a solid anchorage for a dam.

A succession of mills occupied the site until approximately 1900, at which time a group from the Fitchburg and Leominster Street Railway purchased the facility. In 1907, they installed a new electrical powerhouse and used the electricity to operate trolley cars along a dedicated single track from Ayer, through Shirley and Lunenburg to Leominster at Whalom Park, with further connection on to Fitchburg. It appears from the remains that the trolley line generation facility stored water overnight and used the turbines during peak load periods. The trolley business died out in the 1920s with the arrival of the automobile.

Around 1930, a new group purchased the facility and installed ice-making machinery. The ice-making industry continued until the 1950s, with the primary customer being the Fort Devens military facility. With the general use of refrigerators in the post-war period, the ice business ceased. The location was used as a storage and transfer area for fuel oil and oil truck loading for some time. The hydroelectric site was abandoned at some point in the 1950s or 1960s and the dam fell into disrepair; the turbines and other parts were sold for scrap. In the 1970s, the original trolley repair/ice house mill building caught fire and was destroyed.

For almost 30 years the site remained abandoned due to a known oil spill problem from the years of use as a fuel oil depot. One effort to clean the area failed. The Massachusetts DEP initiated legal actions since the site was within the water quality impact zone of several wells, including a Shirley town well, and the nearby groundwater continued to test positive for petroleum contamination.

Due to the passage of the “Brownfields Act” in Massachusetts, and allowances made under the “Rivers Act” with respect to restoration of older mill sites, it became

possible to consider rehabilitation of the site. Ice House Partners purchased the site in 1999 and began to clean up the problems described. Ice House Partners repaired the powerhouse, canal, and dam, using historically accurate materials and designs. Where a one-story brick building (formerly used as the dye house, dynamo room, and for ice making, burned down in 2000) once existed, Ice House Partners built a modern three-story brick office building that runs on the reconstructed dam and powerhouse. Grady Research, owned by Ice House Partners, currently occupies this office building, which is located at 323 West Main Street.

As described in the Historical Area and Structure Inventory Reports (historical reports), filed by Ice House Partners on August 6, 2007, the West Main Street Ice House Industrial Area, including the power canal, dam, and power house, and associated modern office building, are potentially eligible for listing in the National Register of Historic Places for their association with the events and activities surrounding the development of the industrial component of the town's economy. The reports indicate the site continues to bear a strong connection through its surviving historic structures to the industrial trends and activities established in Ayer in the mid 19th century.

Environmental Effects and Recommendations

In a letter filed June 6, 2007, the SHPO notes that the project does not involve any new construction or modifications of the existing facilities, and because of the nature of the existing hydropower facilities and the undertaking, the project is not likely to have any effect on historic or archaeological resources. At that time, the SHPO requested that a Massachusetts Historical Commission historic properties inventory form be completed for the project facilities. Ice House Partners prepared and filed these forms on August 6, 2007, the results of which are described above. The SHPO has not commented on the reports or the potential National Register eligibility of the West Main Street Ice House Industrial Area.

Staff Analysis

Proposed project operation is not likely to have an effect on the identified historic resources because the proposed project would not involve any new construction or modifications to the existing facilities. However, future actions involving any necessary project maintenance or construction may impact the eligibility of the industrial complex. A memorandum of agreement (MOA) with the SHPO would ensure that any future modifications or new construction do not adversely affect known and potential historic properties, as well as any as-yet unidentified archaeological resources. An MOA could require that Ice House Partners develop and implement an historic properties management plan.

Unavoidable Adverse Effects

None.

6. Aesthetics

Affected Environment

The viewshed at the proposed project site includes primarily riparian and upland forest with some patches of emergent wetlands along the shoreline, as well as project facilities and a partial view of the upstream West Main Street Bridge. The downstream, left bank has unvegetated patches of sand and large stones as part of a railroad bed. Historically, spillage at the dam is highly variable, due to a combination of seasonal changes in terms of river flow volume and the variability of in flow from the upstream Wachusett Dam.

Environmental Impacts and Recommendations

Ice House Partners proposes to operate the project in a run-of-river mode, and to provide a 1 mgd (about 1.55 cfs) continuous spill.

Staff Analysis

Because the power canal, dam, and power house are potentially eligible for listing in the National Register of Historic Places (described above), an HPMP would address appropriate measures for ensuring that any future construction at the project, including any fish or eel passage facilities, would not impair the historic features of these facilities. This would benefit aesthetics at the project by helping to ensure that the historic qualities of the project facilities' appearance are protected. In addition, maintaining the project impoundment in a stable condition would help increase vegetative growth along the newly inundated shoreline. Run-of-river operation would prevent drawdowns from occurring on a regular basis and exposing the shoreline.

Maintaining a year-round water flow over the dam would maintain the aesthetic attribute of the dam structure.

Unavoidable Adverse Impacts

With project operation, a portion of the flow that currently spills over the dam would be routed through the turbines around the dam. This could detract from the area's aesthetics, but would at least be partially mitigated by the required spill flow.

D. No-Action Alternative

Under the no-action alternative, the project would not be issued an exemption, and the project would not provide annual generation.

VI. RECOMMENDED ALTERNATIVE

Based on our independent review and evaluation of the environmental effects of the proposed action, the section 30(c) conditions filed by Interior and the Massachusetts DFW, and a no action alternative, we recommend the proposed action, including the section 30(c) conditions, with additional staff-recommended measures as the preferred alternative.

We recommend this alternative because: (1) issuing an exemption from licensing would allow Ice House Partners to rehabilitate and operate the project as a beneficial and dependable source of electric energy; (2) the project, with a total installed capacity of 280-kW, would eliminate the need for an equivalent amount of fossil-fuel-produced energy and capacity, which would help conserve these nonrenewable resources and limit atmospheric pollution; and (3) the recommended environmental measures would protect water quality, enhance fish and wildlife resources, and recreational opportunities.

We discuss the basis for our recommended measures below.

Run of River Operation

Ice House Partners proposes to operate the project in a run-of-river mode, with inflow equaling outflow on an instantaneous basis. Massachusetts DFW and FWS would also require Ice House Partners to operate the project in a run-of-river mode. We recommend this mode of operation because operating the project in a run-of-river mode would protect the water quality and aquatic life in the project vicinity by maintaining a natural flow regime through the project and minimizing water level fluctuations in the impoundment.

Operation Compliance Monitoring Plan

Ice House Partners proposes to install a real time water level device to match turbine discharge with river inflow for run-of-river operation. FWS and Massachusetts DFW would require that Ice House Partners prepare a plan for maintaining and monitoring run-of-river operation and spillway flows. In addition, Massachusetts DFW would require that Ice House Partners implement a refill procedure, whereby, during impoundment refilling after drawdowns for maintenance or emergency purposes, 90 percent of the inflow is passed downstream and the headpond is refilled with the remaining 10 percent of inflow to the project. We recommend these measures because an operation compliance monitoring plan would help the agencies and Commission verify that the project is operating in a run-of-river mode and providing spill flows as required, and the refill protocol would protect downstream aquatic resources when the impoundment is being refilled.

Bypassed Flow Evaluation

Ice House Partners proposes to provide a flow of about 1.55 cfs through a notch on the spillway flashboards at all times. The proposed flow release is based on the historical 1.6 cfs minimum flow release of water from the upstream Wachusett Dam. Downstream of the proposed project, the river has numerous choke points where its width considerably narrows. These choke points, in conjunction with the low slope of the river in the proposed 300-foot bypassed reach, keep the bypassed reach inundated with water year-round, even submerging the project dam during high flows due to the significant rise in the river height below the dam. Although this backwater effect would help to inundate the bypassed reach, a minimum flow release would provide additional protection of DO levels and aquatic habitat in the bypassed reach during periods of low flow. Massachusetts DFW would require that Ice House Partners conduct a flow study to determine a suitable bypassed reach discharge sufficient to maintain water quality and habitat in the river downstream of the dam the first field season after commencement of project operation. FWS noted that a series of demonstration flows may be needed for the agencies to establish the required flow. Based on the results of the flow study, Massachusetts DFW may prescribe a minimum bypass flow to be permanently and continuously released over the dam. Massachusetts DFW would require a plan be prepared to maintain and monitor any permanent bypass flow. In the interim, Massachusetts DFW would require a flow of 1 mgd (about 1.55 cfs) at the dam to protect habitat in the bypassed reach.

Because there is uncertainty regarding the need for and efficacy of the proposed spill flow in maintaining water quality and habitat in the bypassed reach, we recommend that a plan be prepared for the required flow evaluation in consultation with FWS and

Massachusetts DFW. A modification of the interim spill flow requirement at the project may be reasonable based on the flow study results.

Drawdown Management

Massachusetts DFW would require Ice House Partners to implement a refill procedure after drawdowns for maintenance or emergencies whereby 90 percent of inflow is passed downstream of the dam, and the headpond is refilled with the remaining 10 percent of inflow to the project. Drawdowns are a necessary component of project maintenance in many cases and can also be a means of dealing with certain emergencies beyond the control of the exemptee. We recommend that Ice House Partners implement the refill procedure specified by Massachusetts DFW after drawdowns of the impoundment to provide continuity of flow in the Nashua River downstream of the project and ensure the protection of aquatic resources during impoundment refilling.

Sedimentation Removal Plan

Massachusetts DFW would require Ice House Partners to develop, if needed, within 90 days of exemption issuance, a sediment removal plan in consultation with the Massachusetts DFW, FWS, and the Massachusetts DEP, for approval by the Massachusetts DFW and FWS prior to commencement of project operation. Siltation caused by sediment removal can cover habitat, clog the gills of aquatic species, smother eggs, reduce the availability of spawning sites, reduce light transmission needed for photosynthesis, food production, and the capture of prey by sight feeding predators, and expose aquatic life to contaminants that readily bind to sediments. While this condition seems reasonable in order to avoid the potential effects of sediment removal, we are not aware that Ice House Partners plans any sediment removal activities prior to project operation.

Future Fish Passage Facilities

Ice House Partners proposes to provide fish passage facilities when requested by the FWS and Massachusetts DFW. Interior and Massachusetts DFW would require Ice House Partners to construct, operate, maintain, and evaluate upstream and downstream fish passage facilities at this project when notified by FWS and Massachusetts DFW that such fishways are needed. Although no anadromous fish are currently found in the project area and downstream passage facilities are not yet in-place at the next downstream dam, the management goal of fishery agencies throughout the basin is to rehabilitate and restore certain anadromous fish populations, including river herring and American shad. These ongoing rehabilitation and restoration efforts may result in the future need for upstream and downstream fish passage facilities at the Ice House Project. Therefore, having a provision in the exemption for the project for future fish passage

facilities seems reasonable. However, while we recommend that fish passage facilities be constructed at the project when anadromous fish can access the project site, we do not recommend the Massachusetts DFW condition that would require filing plans and schedules for the operation, maintenance, monitoring, and evaluation of the fishways prior to the commencement of project operation. Plans for operation, maintenance, monitoring and evaluation would only be needed when the passage facilities are needed and have been required.

American Eel Passage Facilities

The operation of the Ice House Project could negatively affect future upstream and downstream eel migration by reducing the amount of spill over the dam and introducing a level of turbine-induced mortality. Ice House Partners proposes to provide eel passage facilities when requested by the FWS, and Massachusetts DFW. Massachusetts DFW would require Ice House Partners to construct, operate, maintain, and evaluate upstream and downstream passage for American eel and make the passage operational concurrent with commencement of project operation. Providing passage facilities would enhance and protect American eel populations by providing access to upstream tributary habitat and safe downstream passage. However, while we recommend that eel passage facilities be constructed at the project when needed, we do not recommend that they be constructed until eel passage facilities have been constructed at the downstream Pepperell Paper Mill dam. In addition, evaluating the effectiveness of such facilities now would be problematic without the presence of American eels whose movement upstream to the project dam appears to currently be blocked.

Vegetation Management

Massachusetts DFW would require Ice House Partners to file for approval for routine vegetation management no later than three months prior to commencement of project operation. We do not recommend this measure because Ice House Partners does not propose any routine vegetation management for the rehabilitation of the project and due to the small size of the project and its location in a developed area, the need for vegetation management would appear to be negligible.

Recreation and Public Access

Ice House Partners proposes to continue to provide designated canoe portage locations with signage and access for fishermen to enhance recreation in the vicinity of the proposed project. Interior and Massachusetts DFW recommend providing access to project waters and lands to allow for public use of fish and wildlife resources where consistent with maintaining public safety and protecting project civil works. Any exemption from licensing order issued for the project would include a standard article

that requires Ice House Partners to allow year-round recreational access, and inform the public of the availability of recreational opportunities at the project, such as posting signs at points of access.

Cultural Resources

The West Main Street Ice House Industrial Area, including the project power canal, project dam, powerhouse, and an adjacent office building, are potentially eligible for listing in the National Register of Historic Places for their association with the events and activities surrounding the development of the industrial component of the town's economy.

In order to mitigate the effects of any future modifications or new construction on this potentially eligible site, we recommend that Ice House Partners prepare an historic properties management plan (HPMP). The HPMP would be included as a provision of a memorandum of agreement (MOA) that would be executed between the Commission and the SHPO. The HPMP would include measures to protect historic properties, and should be prepared and implemented in consultation with the SHPO and FWS. This plan would ensure that any modification to project facilities that are listed on or are eligible to be listed on the National Register of Historic Places would be protected.

Exhibit G Drawings

The existing project facilities create a 137-acre impoundment of which about 133 acres is located within the Oxbow NWR. The revised Exhibit G drawings filed March 28, 2007, show the Ice House dam and the land parcels of Oxbow NWR, but do not show or enclose the entire project impoundment within the project boundary. The proposed project would include the project impoundment as a principal project feature. Therefore, we recommend revised Exhibit G drawings that enclose all project works, including the dam, impoundment (up to the height of the existing flashboards), headgate structure, powerhouse power canal and tailrace, and transmission line within a project boundary line.

VII. FINDING OF NO SIGNIFICANT IMPACT

If the Ice House Power Project is exempted from licensing as proposed with the additional staff-recommended measures, the project would be rehabilitated and operated while providing enhancements to fish and wildlife resources, improvements to recreation facilities, and protection of cultural resources in the project area.

Based on our independent analysis, issuance of an exemption from licensing for the Ice House Power Project, as proposed with the additional staff-recommended

measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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IX. LIST OF PREPARERS

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APPENDIX A

U.S. DEPARTMENT OF THE INTERIOR SECTION 30(C) CONDITIONS OF THE FEDERAL POWER ACT FILED ON OCTOBER 10, 2007

1. The Exemptee shall operate the project in a run-of-river mode, whereby inflow to the project will equal outflow from the project and water levels above the dam are not drawn down for the purpose of generating power. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Exemptee, or for short periods upon mutual agreement between the Exemptee, the U.S. Fish and Wildlife Service, and the Massachusetts Division of Fisheries and Wildlife.
2. The Exemptee shall discharge a minimum flow over the project spillway. The flow shall be determined after additional consultation with the Massachusetts Division of Fisheries and Wildlife and the U.S. Fish and Wildlife Service. A series of demonstration flows may be needed for the agencies to establish the required flow.
3. The Exemptee shall, within three (3) months of the date of issuance of an exemption from licensing, prepare and file for approval by the U.S. Fish and Wildlife Service, a plan for maintaining and monitoring run-of-river operation and spillway flows at the project. The plan shall include a description of the mechanisms and structures that will be used, the level of manual and automatic operation, the methods to be used for recording data on run-of-river operation and spillway flows, an implementation schedule, and a plan for maintaining the data for inspection by the U.S. Fish and Wildlife Service, the Federal Energy Regulatory Commission, and the Massachusetts Division of Fisheries and Wildlife.
4. The Exemptee shall be responsible for constructing, operating, maintaining, and evaluating upstream and downstream fish passage facilities at this project when notified by the U.S. Fish and Wildlife Service and/or the Massachusetts Division of Fisheries and Wildlife that such fishways are needed. The fishways shall be constructed and operational in accordance with the schedule identified by the agencies. Any fishways prescribed by the aforementioned agencies shall be designed in consultation with, and the designs shall require approval by, the U.S. Fish and Wildlife Service.
5. The Exemptee shall notify the U.S. Fish and Wildlife Service in writing when the project commences operation. A set of as-built drawings shall be furnished with the notification. Such notice shall be sent within thirty (30) days of start-up to Supervisor, New England Field Office, 70 Commercial Street, Suite 300, Concord, New Hampshire 03301.

6. The Exemptee shall allow the U.S. Fish and Wildlife Service to inspect the project area at any time while the project operates under an exemption from licensing to monitor compliance with their terms and conditions.

7. The U.S. Fish and Wildlife Service is reserving the right to add to and alter terms and conditions for this exemption as appropriate to carry out its responsibilities with respect to fish and wildlife resources. The Exemptee shall, within thirty (30) days of receipt, file with the Federal Energy Regulatory Commission any additional terms and conditions imposed by the U.S. Fish and Wildlife Service.

8. The Exemptee shall incorporate the aforementioned terms and conditions in any conveyance - by lease, sale or otherwise - of its interests so as to legally assure compliance with said conditions for as long as the project operates under an exemption from licensing.

APPENDIX B

MASSACHUSETTS DIVISION OF FISHERIES & WILDLIFE SECTION 30(C) CONDITIONS OF THE FEDERAL POWER ACT FILED ON OCTOBER 11, 2007

1. The Exemptee shall operate the project in a run-of-river mode, whereby inflow to the project will equal outflow from the project on an instantaneous basis and water levels above the dam are not drawn down for the purpose of generating power. Instantaneous run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Exemptee, or for short periods upon mutual agreement between the Exemptee, the Massachusetts Division of Fisheries and Wildlife (Division), and the U.S. Fish and Wildlife Service.
2. The Exemptee shall, within three (3) months of the date of issuance of an exemption from licensing, prepare and file for approval by the Division, and the U.S. Fish and Wildlife Service, a plan for maintaining and monitoring run-of-river operation at the project. The plan shall include a description of the mechanisms and structures that will be used, the level of automatic operation, the methods to be used for recording data on run-of-river operation, an implementation schedule, and a plan for maintaining the data for inspection by the Division, the Federal Energy Regulatory Commission, and the U.S. Fish and Wildlife Service.
3. The Exemptee shall implement a refill procedure whereby, during impoundment refilling after drawdowns for maintenance (including flashboard repair/replacement) or emergency purposes, 90 percent of inflow is passed downstream and the headpond is refilled on the remaining 10 percent of inflow to the project. This refill procedure may be modified on a case-by-case basis with the prior approval of both the Division and the U.S. Fish and Wildlife Service.
4. The first field season following commencement of project operation, the Exemptee shall conduct a flow study to determine a suitable bypass discharge sufficient to maintain water quality and habitat in the bypass reach. The study plan shall be developed in consultation with the Division and the U.S. Fish and Wildlife Service, and shall require approval by the Division and the U.S. Fish and Wildlife Service prior to implementation. Based on study results, the Division and the U.S. Fish and Wildlife Service, may mandate a continuous minimum bypass flow for the project.
5. Until a permanent bypass flow has been mandated by the U.S. Fish and Wildlife Service, the Exemptee shall provide an interim conservation flow of 1 mgd (as suggested by the exemptee) at the dam to protect habitat in the bypass reach. This flow shall be released upon commencement of project operation, and shall continue until the agencies

notify the Exemptee of a permanent bypass flow requirement (to be determined via condition 4 above). The specific location and mechanism of flow release shall be determined in consultation with the Division and the U.S. Fish and Wildlife Service, and shall require the approval by the Division and the U.S. Fish and Wildlife Service prior to the project commencing operation.

6. The Exemptee shall, within three (3) months of receiving notification of a permanent bypass flow requirement by the agencies, prepare and file for review and approval by the Division, and the U.S. Fish and Wildlife Service a plan for maintaining and monitoring the bypass discharge. The plan shall include a description of the mechanisms and structures that will be used to provide the flow, the level of automatic operation, the methods to be used for recording data on bypass flow, an implementation schedule, and a plan for maintaining the data for inspection by the U.S. Fish and Wildlife Service, the Federal Energy Regulatory Commission, and the Division.

7. The Exemptee shall, if necessary, within ninety (90) days of exemption issuance, develop a Sediment Removal Plan in consultation with the U.S. Fish and Wildlife Service, the Division, and the Massachusetts Department of Environmental Protection. The purpose of the plan is to develop a protocol for the periodic removal of accumulated sediment from the project that minimizes impacts to aquatic resources. The project shall not commence operation until the Division and the U.S. Fish and Wildlife Service has approved the Plan.

8. The Exemptee shall be responsible for constructing, operating, maintaining, and evaluating upstream and downstream anadromous fish passage facilities at this project when notified by the U.S. Fish and Wildlife Service and/or the Division. The fishway(s) shall be designed in consultation with, and the designs shall require approval by, the U.S. Fish and Wildlife Service and the Division.

9. The Exemptee shall be responsible for constructing, operating, maintaining, and evaluating upstream and downstream passage for American eels. The fishways shall be designed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Division prior to the start of fishway construction. The eelways shall be operational concurrent with the commencement of project operation.

10. No later than three (3) months prior to the commencement of project operation, the Exemptee shall file for approval by the U.S. Fish and Wildlife Service and the Division, plans and schedules for the operation, maintenance and monitoring, and evaluation of the fishways specified in Conditions 8 and 9. All plans related to fish passage require approval from the U.S. Fish and Wildlife Service and the Division prior to implementation by the Exemptee.

11. No later than three (3) months prior to the commencement of the project operation, the Exemptee shall file for approval by the Division for the routine vegetation management associated with the project.
12. The Exemptee shall notify the Division and the U.S. Fish and Wildlife Service in writing when the project commences operation. A set of as-built drawings shall be furnished with the notification. Such notice shall be sent within 30 days of start-up to Anadromous Fish Project Leader, MADFW Field HQ, 1 Rabbit Hill Road, Westborough, MA, 01581.
13. The Exemptee shall allow the Division to inspect the project area at any time while the project operates under an exemption from licensing to monitor compliance with their terms and conditions.
14. The Division is reserving the right to add to and alter terms and conditions for this exemption as appropriate to carry out its responsibilities with respect to fish and wildlife resources. The Exemptee shall, within thirty (30) days of receipt, file with the Federal Energy Regulatory Commission any additional terms and conditions imposed by the Division.
15. The Exemptee shall incorporate the aforementioned terms and conditions in any conveyance -- by lease, sale or otherwise -- of its interests so as to legally assure compliance with said conditions for as long as the project operates under an exemption from licensing.