143 FERC ¶ 61,048
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Boott Hydropower, Inc., and
Eldred L. Field Hydroelectric Facility Trust

Project No. 2790-055

ORDER AMENDING LICENSE

(Issued April 18, 2013)

1. On July 6, 2010, Boott Hydropower, Inc., and Eldred L. Field Hydroelectric Facility Trust (Boott or the licensees) filed an application to amend the license for the Lowell Hydroelectric Project No. 2790, located on the Merrimack River in the City of Lowell in Middlesex County, Massachusetts. The project does not occupy any federal land but is located within the administrative boundary of the Lowell National Historical Park (Lowell Park). The licensees request authorization to replace the existing Pawtucket Dam's wooden flashboards with a pneumatic crest gate system, and to change the configuration of the wooden flashboard system while the new crest gate system is being constructed.

2. The application is contested. Among other things, Pawtucket Dam is listed on the National Register of Historic Places as part of the Lowell Park and two historic districts, one of which is a National Historic Landmark. Participants disagree about whether it is acceptable to alter the crest control structure on top of the dam and whether the effects of doing so can be adequately mitigated. They also disagree about whether and how well the various options considered would help alleviate upstream flooding during times of high flows. As discussed below, we find that the proposed pneumatic crest gate system can be installed without unacceptably altering the dam or adversely affecting the park and historic districts. The crest gate system will also provide important benefits to recreation, fish passage, dam and worker safety, and project generation, and will help alleviate upstream backwater and flooding effects to the maximum extent possible. We therefore grant the licensees' amendment request, subject to additional conditions as discussed in this order.

Background

3. On April 13, 1983, the Commission issued an original license to Boott Mills and Proprietors of the Locks and Canals on Merrimack River to construct, operate, and

maintain the Lowell Hydroelectric Project.[1] The Commission approved a transfer of the license to the current licensees on April 1, 2005.[2]

4. The Lowell Project as licensed consists of: (1) the 1,093-foot-long and 15-foot-high Pawtucket Dam; (2) a reservoir with a storage capacity of 3,960 acre-feet; (3) the 5.5-mile-long Northern and Pawtucket Canal System comprised of several small dams and gatehouses; (4) four existing power plants with a total installed capacity of 7,515 kilowatts (kW) housed in nineteenth century mill buildings along the canal system; and (5) a new power station with an installed capacity of 17,308 kW drawing water from the Northern Canal, (6) a new tailrace channel; (7) fishway facilities at the dam and new powerhouse, and (8) a new transmission line.[3] The dam includes 5-foot-high flashboards, which are designed to collapse when water levels in the reservoir overtop the flashboards. The collapse of the flashboards allows additional water to spill over the dam, reducing pressure on the dam and also reducing upstream flooding.

5. This amendment proceeding had its origins in August 2007, when the Commission received a number of complaints from homeowners along Clay Pit Brook, a tributary to the Merrimack River, concerning flooding that occurred in May 2006 and April 2007.[4] The homeowners asserted that the flooding was caused by flashboards on Pawtucket Dam and requested the Commission to reduce the height of flashboards from 5 feet to 4 feet. In response to these concerns, Commission staff requested in a January 22, 2008 letter that Boott provide information on project operation from January 1, 2004, through

---

[1] *Boott Mills and Proprietors of the Locks and Canals on Merrimack River*, 23 FERC ¶ 62,043 (1983) *(Boott Mills)*. On December 15, 1983, the Commission approved a transfer of the license to Boott Hydropower, Inc. and General Electric Credit Corporation. *Boott Mills and Proprietors of the Locks and Canals on Merrimack River*, 25 FERC ¶ 61,386 (1983).

[2] *Boott Hydropower, Inc.*, 111 FERC ¶ 62,001 (2005).

[3] The above figures for the project's authorized installed capacity reflect corrections and changes made in 1991. *See Boott Hydropower, Inc.*, 55 FERC ¶ 62,233 (1991).

[4] Both the flooding issue and the proposal to replace flashboards with a crest control system had arisen earlier. The Commission first received a complaint about flooding in the area in December 2003. *See* letter to Skip Medford, Boott, from Mohammad Fayyad, Commission staff (Jan. 15, 2004). The Park Service had objected to Boott's two previous proposals to install an inflatable crest control system in 1999 and 2006. *See* letter to Ian Bowles, Massachusetts Executive Office of Energy & Environmental Affairs, from Michael Creasy, Lowell Park (filed June 16, 2010).

December 31, 2007, as well as information on the design failure mode of the flashboards, the frequency of failure, and its effect on upstream flooding during that period.

6. Boott filed the requested information on February 26, 2008. Based on that information, staff requested Boott to conduct a backwater analysis to determine the effect of flashboards on flooding upstream of the Pawtucket Dam along Clay Pit Brook.[5]

7. During its review of the flooding complaints, staff found a discrepancy between the flashboards as authorized and as built. The license authorized 5-foot-high collapsible flashboards on the Pawtucket Dam supported by 5-foot-high pins, set in the dam's granite capstones on 20-inch (average) centers.[6] According to Boott's February 26, 2008 filing, the flashboards then installed on the Pawtucket Dam consisted of 4 foot-high sheets of plywood laid on edge, with an additional one-foot of boards (top boards) nailed to the plywood to make up the 5 foot authorized height, and supporting pins with an effective pin height of 4.5 feet. Boott stated that the flashboards were designed to fail when overtopped by 2 feet of water, which can occur at a spill flow of 10,000 cubic feet per second (cfs) or a total river flow of 20,000 cfs if all of the Lowell Project's units are operating.

8. Staff found that the flashboards did not fail when the Merrimack River flows were in the range of 20,000 to 37,000 cfs during the months of March and April 2008, so that they did not meet their design specifications. By a May 28, 2008 letter, staff ordered Boott to remove the flashboards and provide a new design for supporting pins that would fail as originally designed.

9. In a May 30, 2008 filing, Boott proposed a flashboard system with corrective measures that included reducing the number of pins and installing longer pins, which were expected to allow the flashboards to fail properly. By a June 4, 2008 letter, staff authorized Boott to reinstall the flashboards with those measures.

10. In a July 21, 2008 filing, Boott provided details on the reinstalled flashboard system. The current design consists of steel bars supporting 8-foot-long, 5-foot-high flashboards. The bars are 5.5 feet long, are set 0.5 feet in the dam crest, and extend 5 feet to the top of the boards. The bars are spaced at an average of about 20 inches (varying

---

[5] *See* letter to Kevin Webb, Boott, from Mohamad Fayaad, Commission staff (April 8, 2008).

[6] The license order describes the project works as including the Pawtucket Dam with 5-foot-high collapsible flashboards. *Boott Mills*, 23 FERC at 63,067. The height, diameter, composition (mild steel), and average spacing of the pins are specified in the approved Exhibit F-6 drawing, which is part of the license. The strength of the pins is established by design calculations.

from 10 to 48 inches due to limitations with existing capstones), with no more than 6 bars per flashboard. Boott removed some of the flashboard pins to achieve this average spacing. The flashboard panels are the same as they were in the 4+1 configuration; that is, they consist of 4-foot-high by 8-foot-long sheets of ¾ inch thick plywood laid on edge, with additional 16-inch-wide ¾ inch thick plywood top boards nailed on top of the plywood sheets with 4 inches of overlap, to make up the 5-foot authorized flashboard height. The main difference is the 5-foot-long pins, which support the entire height of the flashboards. With the longer pins, the flashboard system is designed to begin to fail when overtopped by less than one foot of water.

11. On August 13, 2008, Boott filed the required backwater analysis report. Staff's review of the report found that both 4-foot-high and 5-foot-high flashboards can contribute to flooding along the Clay Pit neighborhood during high flows if the boards do not fail completely. However, the reinstalled flashboard system with the longer pins had not been in use long enough to determine if it would fail appropriately during high flows. Therefore, in a September 25, 2008 letter, staff asked Boott to discuss the results of the backwater analysis with the National Park Service (Park Service) and other stakeholders to determine options for implementing a flashboard system that can be ensured to be completely down during high flows in the Merrimack River.

12. Beginning in November 2008, Boott held a series of meetings with various stakeholders, including the City of Lowell, the Park Service, Congressional representatives, and citizens from the affected areas, to determine the spillway crest control options for the Pawtucket Dam to alleviate flooding. On September 18, 2009, Boott filed a technical assessment report evaluating what it regarded as the three most likely alternatives for spillway crest control for the Pawtucket Dam.

13. As described in the report, Option A is the flashboard system that was in use historically and until May 30, 2008 (also referred to as 4+1). The flashboards would be 4-foot-high by 8-foot long panels with one-foot top boards as described above. The pins would be 5-feet long by 1.75-inch diameter steel, set in the capstones at an average depth of approximately 0.5 feet, resulting in an effective pin height of 4.5 feet. Option B is the existing flashboard system. This is identical to Option A except that the flashboard pins are 5.5 feet long with an effective height of 5 feet, fully supporting the top of the boards. Option C is a 5-foot-high pneumatic crest gate system (a rubber membrane installed in four panels on top of the dam that can be raised and lowered mechanically by inflating it with pressurized air).

14. The report found that the pneumatic crest control system would enhance project operational control and generation and would provide significant advantages for other resources that are dependent on water levels, including flood control, recreation, and fish passage.

15. Before filing the amendment application with the Commission, the licensees consulted with federal and state resource agencies, Indian tribes, and Lowell Park.[7] The Massachusetts Division of Fisheries and Wildlife (Massachusetts DFW) in a May 14, 2010 letter strongly endorsed Boott's proposal to replace the wooden flashboards with an inflatable crest control system. In a June 23, 2010 letter, the National Marine Fisheries Service (NMFS) stated that installing the proposed crest gate system would maintain more consistent water levels, reduce water leakage from the dam, and minimize the need for impoundment drawdowns, all contributing to improved fish passage to spawning habitat. The Park Service opposed the proposal in a June 15, 2010 letter, asserting that the crest gate would substantially and adversely affect the historic appearance of the dam, and that construction of the crest gates would shut down for two or more years boat tours that it conducts on the Pawtucket Canal.

16. The licensees filed their amendment application on July 6, 2010. They request authorization to replace the existing 5-foot-high wooden flashboards on the Pawtucket Dam with a pneumatic crest control system identical in height. There would be no change in the authorized normal pool elevation of 92.2 feet mean sea level (msl) (National Geodetic Vertical Datum 1929). Also, during the interim period after the amendment is approved and before construction of the pneumatic crest control system is completed, the licensees request permission to operate the wooden flashboard system with a 4+1 configuration of 4-foot high panels with 1-foot-high top boards and 4.5-foot-high support pins (Option A). The licensees state that this configuration would allow the top 1-foot boards to collapse when overtopped by 1 foot of water, and that the remaining 4-foot-high boards would fail when overtopped by 2 feet of water.

17. On August 10, 2010, the Commission issued a Notice of Application for Amendment of License and Soliciting Comments, Motions to Intervene, and Protests. The City of Lowell, Lowell Flood Owners Group, Town of Tyngsboro, and the U.S.

[7] The licensees consulted with the following entities: U.S. Department of Agriculture, Forest Service; National Marine Fisheries Service; U.S. Fish and Wildlife Service; Lowell National Historical Park; U.S. Environmental Protection Agency, Region 1; Massachusetts Division of Fisheries and Wildlife; Massachusetts Division of Marine Fisheries; Massachusetts Department of Environmental Protection; Massachusetts Department of Conservation and Recreation; New Hampshire Department of Fish and Game; New Hampshire Department of Environmental Services; Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts; Mashpee Wampanoag Tribal Council; and Massachusetts Historical Commission.

Department of the Interior (Interior) filed motions to intervene.[8] Numerous entities filed comments.[9] Commission staff requested additional information about the amendment application on September 10, 2010, which Boott provided on October 12, 2010.

18. As discussed in more detail later in this order, those who oppose the amendment are primarily concerned with flooding issues and effects on historic properties. The City of Lowell, town of Chelmsford, Williamsburg Condo Trust, Lowell Flood Owners Group, and others expressed concerns that the proposed crest gate system would pose a greater risk of flooding to homes and properties in the floodplain along the river, including the Clay Pit Brook area. A number of federal and state agencies expressed concerns about the effect of the proposed crest gate system on the historic integrity of Pawtucket Dam, including the Park Service, Massachusetts State Historic Preservation Officer (Massachusetts SHPO), Lowell Park, and Advisory Council on Historic Preservation (Advisory Council). In particular, Lowell Park commented that three intermediate concrete piers proposed as part of the project were not visually compatible with the dam. The Massachusetts Department of Conservation and Recreation supported the amendment with recommendations for improvements to recreational opportunities.

19. In response to these latter concerns, Boott modified its proposal on March 21, 2011, to include additional measures intended to mitigate the potential effects of the proposed amendment on historic properties. Boott proposed to eliminate the intermediate piers, change the color of the inflatable bladders from black to brown, and install additional black retaining straps on the panels at 20-inch centers, stating that these changes would make the crest gate system appear more similar to the existing flashboards.

20. On April 26, 2011, Commission staff wrote to the Massachusetts SHPO, Park Service, Lowell Park, and Advisory Council, requesting comments on the proposed amendment pursuant to section 106 of the National Historic Preservation Act (NHPA). Staff found that Pawtucket Dam was not individually eligible for listing in the National Register and that installing the pneumatic crest gate would not have an adverse effect on historic properties.

21. On May 16, 2011, the Massachusetts SHPO filed a response disagreeing with Commission staff's determinations of eligibility and effect, stating that the dam was

---

[8] Because their motions to intervene were timely and no one filed an answer in opposition, these entities became parties to the proceeding 15 days after their motions were filed. *See* 18 C.F.R. § 385.214(c) (2012).

[9] A complete list of agencies and organizations who filed comments and their filing dates appears on page 12 of the final Environmental Assessment (EA), issued on Dec. 19, 2011. A list of individual commenters appears in Appendix A to the EA.

individually eligible and that the proposed action would adversely affect the dam's historic fabric and integrity. On May 25, 2011, Lowell Park filed a letter objecting to staff's finding of no adverse effect and disagreeing with staff's determination of the area of potential effect for the proposed amendment. On June 7, 2011, the Advisory Council filed comments for staff's consideration in the section 106 process.

22. On August 8, 2011, Commission staff requested documentation of the dam's eligibility for listing in the National Register from the Massachusetts SHPO, Park Service, and Advisory Council. On August 19, 2011, the Advisory Council informed staff that it would participate in the consultation process for the proposed amendment. On September 1, 2011, the Advisory Council requested that the Commission seek an eligibility determination for the dam from the Keeper of the National Register. The Massachusetts SHPO and the U.S. Department of the Interior on behalf of Lowell Park filed further comments in opposition to staff's determinations on September 6 and 7, 2011, respectively.

23. On September 19, 2011, Commission staff requested a determination of eligibility for Pawtucket Dam from the Keeper of the National Register. The Keeper requested photographs of the dam on October 18, 2011, which staff provided on October 20, 2011. On October 26, 2011, the Keeper of the National Register determined that Pawtucket Dam is individually eligible for listing because of its historic and engineering significance.

24. As a result of the Keeper's determination, staff found that the proposed amendment would have an adverse effect on Pawtucket Dam, because it would alter the dam's architecture. Consistent with NHPA procedures, staff prepared a draft Memorandum of Agreement (MOA) to address this adverse effect, and sent it for comment to the Advisory Council, Massachusetts SHPO, Lowell Park, and City of Lowell on December 8, 2011. Staff proposed in the MOA that Boott be required to develop two interpretive exhibits at the project, one with a replica of a portion of the original flashboard system and one with the new crest gate system, to enhance visitors' understanding of the history of the dam and the Lowell Project. To mimic the existing dam's appearance, the MOA would require that Boott use a brown-colored bladder, paint the downstream side of the crest gate panels brown, and install black retaining straps at an average of 20 inches on center. The MOA would also require that Boott design and construct the compressor house associated with the crest gate with materials that are compatible with the historic fabric of the adjacent architecture, to ensure that the building resembles the nearby Northern Canal Gatehouse and other nineteenth century buildings in Lowell.

25. Meanwhile, Commission staff had issued a draft Environmental Assessment (EA) on June 10, 2011, finding that approval of the licensees' proposal would have long-term beneficial effects for recreational resources, fish passage efficiency, and controlling water

levels. Staff issued a final EA, which addressed numerous comments made on the draft EA, on December 19, 2011. The EA stated:

> The licensee's proposed pneumatic crest gate system would reduce upstream backwater and flooding effects associated with the operation of the project by allowing the crest of the proposed system to be lowered in anticipation of and during high flows and flooding events. As compared to the wooden flashboard system and the interim modification, the proposed pneumatic crest gate system would maintain more stable water level elevations at 92.2 feet during normal operations.
>
> The proposed pneumatic crest gate system likely would reduce the false attraction for upstream migrating fish by reducing the amount of leakage from the dam and would improve upstream passage efficiencies. Resident fish upstream of the project would benefit from the reduced frequency of sudden and extended drawdowns because the river would behave more like an unregulated river and nearshore spawning and nursery habitat would remain submerged.
>
> . . . .
>
> The crest gate system would modify a dam that has undergone numerous modifications since its original construction. The alteration, however, would not adversely affect the qualities of the historic district, of which the dam is a part, that make the district eligible for the National Register of Historic Places. The licensee's proposal to construct two exhibits, one of wooden flashboards that would replicate the historic flashboard system and one of the crest gate system, at a location suitable for viewing by Lowell National Historic Park visitors and area residents alike, would ensure that the visiting public can see how the dam looked and operated prior to the installation of the crest gate system.[10]

26. Staff recommended approval of Boott's proposed amendment, with staff-recommended changes and additional measures, including an erosion and soil control plan; consultation with the Park Service regarding the staging area locations (including barge use), site restoration, and construction schedule; signs to inform the public about the need for the construction; access for tours below the dam, if safety permits, and a gate and access point for these tours; coordination with the tenant at the gatekeeper's house to minimize disruption; and a debris monitoring and removal plan.

---

[10] EA at vii-viii.

27. After issuing the final EA, staff continued to attempt to resolve historic preservation issues with the consulting parties. In response to staff's December 8, 2011 letter transmitting the draft MOA, Lowell Park issued a letter on December 13, 2011, declining to participate in the proposed MOA, because the proposed alterations would substantially and adversely change the historical appearance and functionality of the dam as a National Historic Landmark. On January 5, 2012, the Advisory Council informed Commission staff that, given Lowell Park's position, pursuing development of an MOA was not appropriate. That same day, the Massachusetts Historical Commission (which includes the Massachusetts SHPO) informed staff that, because of Lowell Park's comments, it was concerned that the proposed MOA would be inconsistent with applicable federal law and regulations.[11]

28. On February 2, 2012, Boott filed a letter proposing additional measures to mitigate the adverse effects of installing the pneumatic crest system on Pawtucket Dam. Boott proposed an alternative way to install the crest gates that would eliminate the fixed steel piers and avoid the need to cover the dam capstones with concrete, thus avoiding irreversible changes to the dam. Boott stated that this method would also allow the work to be done without lowering the impoundment, thus avoiding adverse effects on the Lowell Park's boating program.

29. By letter dated February 7, 2012, the Advisory Council informed Commission staff, among other things, that Boott's February 2, 2012 letter presented an alternative for installing the crest gates that had not yet been considered and that might serve as the basis for further consultation on alternatives. By letter dated February 15, 2012, Interior filed comments concurring in the Advisory Council's comments. Interior suggested that Boott's revised proposal might warrant further consideration, and stated that the Park Service would be willing to consult concerning a range of possible alternatives to avoid or minimize impacts to historic properties.

30. On March 22, 2012, staff responded to the Advisory Council's letter with copies to the Massachusetts SHPO, Lowell Park, and Interior's Office of the Solicitor. Staff also outlined its view that the proposed action could proceed without adversely affecting the historic district and Lowell Park. Staff addressed arguments regarding whether a supplement to the EA would be required and whether the legislation establishing Lowell Park would prohibit the Commission from approving the proposed amendment. Staff explained that, to date, no one had suggested any alternatives to the crest gate system that would mitigate the backwatering effects of the dam during high water conditions to the maximum extent possible, and would protect the long-term integrity of the dam by

[11] Based on these letters, Commission staff initially determined by letter dated January 19, 2012, that further consultation would not be productive, but then continued consulting based on Boott's February 2, 2012 proposal.

eliminating damage to the capstones caused by the existing flashboard pins. Staff stated that it would consult further on Boott's revised proposal if all parties agreed that there was a reasonable basis for doing so, and requested the parties' comments on whether there was any basis for further consultation on proposed changes to the Lowell Hydroelectric Project.

31. On April 19, 2012, Interior responded that it and the Park Service were willing to consult further based on Boott's new proposal. Interior offered to convene a consultation meeting in Lowell, Massachusetts for Commission staff, Boott, the Massachusetts SHPO, and the Advisory Council to meet with Park Service staff to consult concerning the applicant's revised design. By letter dated April 24, 2012, the Advisory Council reiterated its view that Boott's revised design proposal might serve as the basis for continuing consultation and indicated its support for the proposed consultation meeting. That same day, the Massachusetts SHPO sent a letter agreeing that a consultation meeting would be productive.[12]

32. On May 24, 2012, the consulting parties participated in a section 106 consultation meeting in Lowell to discuss options and provide an opportunity for Boott to answer any technical questions about the proposals. At the meeting, Boott described the benefits of the crest gate system and discussed details of its proposed installation techniques and mitigation measures, and responded to questions from Park Service staff. At the meeting's end, Boott and the Park Service agreed to meet again to resolve outstanding issues and explore several other alternatives that participants had suggested at the meeting.

33. Boott and the Park Service met on July 26, 2012, to discuss design issues and mitigation, as well as a hybrid system of part flashboards and part inflatable crest gates. As discussed in their subsequent letters to Commission staff, they did not resolve the issues at that meeting and did not schedule any further meetings.

34. On October 11, 2012, Commission staff requested that the consulting parties provide a written progress report on consultation and a schedule of any further meetings to resolve outstanding issues. On October 18, 2012, the Park Service provided a summary of the July 26 meeting and stated that in the interest of a final attempt at settlement, it would be willing to accept a hybrid system that would allow crest gates on

[12] Only the City of Lowell disagreed, stating in a letter dated April 25, 2012, that it was unable to concur with any proposed MOA unless Boott agreed to follow certain restrictions regarding the use of flashboards on Pawtucket Dam, as set forth in a 1980 agreement regarding flashboard operation (the Wang Agreement). We discuss the Wang Agreement below in connection with Boott's request for interim modifications to the flashboard system while the crest gate system is being constructed.

about 40 percent of the dam beyond the fish ladder and would retain flashboards on the rest of the dam. The Park Service added that mitigation would have to include restoring the historic individual flashboard system and discontinuing the use of plywood in that area of the dam.

35. On October 31, 2012, Boott filed its response, stating that the Park Service's summary was generally accurate but incomplete. Boott added that it could not support the Park Service's preferred alternative because the hybrid system would not fully attenuate typical spring run-off flows.

36. The Park Service responded on December 3, 2012, stating that Boott had rejected the Park Service's proposals and had proposed no new alternatives. The Park Service stated that it and others continued to question the effectiveness of the crest gate system to accomplish flood mitigation. The Park Service also reiterated its view that the crest gate system was not justified against the loss of essential features of the National Historic Landmark dam, and that the Commission could not approve the amendment without violating the legislation establishing Lowell Park.

37. By letter dated December 28, 2012, the Advisory Council provided comments on a number of issues raised in the parties' letters concerning the status of consultation. Among other things, the Advisory Council stated that it remained unconvinced that there are no viable alternatives to replacing the flashboards with a crest gate system across the entire dam. The Council requested that the Commission work with the applicant to consider alternatives or modifications that would minimize adverse effects to historic properties.

38. On January 8, 2013, Commission staff determined that despite numerous attempts to resolve differences among the consulting parties, including renewed efforts to consider alternatives during the past year, participants had failed to identify any viable alternatives or mitigation for the proposal that would be acceptable to all parties. As a result, staff found that further consultation would not be productive and provided notice to the Advisory Council that it was terminating consultation.[13] Staff requested that the Advisory Council provide its comments within 45 days, as provided in the Council's regulations.

39. By letter dated February 4, 2013, Boott provided comments in response to the Advisory Council's December 28, 2012 letter, explaining areas of disagreement with the Park Service and outlining limitations of the various alternatives considered. Boott stated that it supported Commission staff's decision to terminate consultation.

---

[13] This is the appropriate procedure under the Advisory Council's regulations. *See* 36 C.F.R. Part 800 (2012).

40. On February 5, 2013, the Advisory Council held a site visit and public meeting in Lowell and received comments from consulting parties, public officials, organizations, and members of the public. Commission staff and Boott provided comments for the record dated February 4 and 5, respectively.

41. On February 15, 2013, the National Trust for Historic Preservation (National Trust) filed comments in response to Commission staff's January 8, 2013 letter terminating consultation. On February 26, 2013, the Advisory Council filed its final comments on the proposed amendment. That same day, Interior also filed comments.

42. Since then, participants have continued to file comments regarding the proposed amendment. On March 4, 2013, Professor Patrick Malone of Brown University filed a copy of a letter he wrote to the Advisory Council, expressing his objections to the proposal. On March 11, 2013, John Kurland, Chairman of the Chelmsford Board of Selectmen, filed a letter in support of the Advisory Council's comments and expressing concerns about the effects of flooding on the Williamsburg Condominiums upstream, in the Town of Chelmsford. On March 15, 2013, Jean Whiting, a resident of the Condominiums, expressed similar concerns. That same day, Interior's Office of the Secretary reiterated the department's concerns about adverse effects on the Historic District, Lowell Park, and the Preservation District, and attached a May 2012 article about the history of Pawtucket Dam published in Industrial Archaeology Review, written by Professor Malone.

43. We have carefully considered all of the comments filed in this proceeding. We address the Advisory Council's comments in detail below, together with related comments of the National Trust and Interior, in the section of this order on historic resources. We also address the flooding issue, as well as the effects of the amendment on other resources, such as fisheries, dam and worker safety, and recreation.

Water Quality Certification

44. Under section 401(a)(1) of the Clean Water Act (CWA), the Commission may not authorize a license amendment for an activity that may result in a discharge at a hydroelectric project unless the state water quality certifying agency either has issued water quality certification for the proposed amendment or has waived certification by failing to act on a request for certification within a reasonable period of time, not to exceed one year. Section 401(d) of the CWA provides that the certification shall become a condition of any federal license that authorizes construction or operation of the project.

45. By letter dated September 30, 2011, staff requested that Boott submit documentation that it had applied for water quality certification from the Massachusetts Department of Environmental Protection (Massachusetts DEP), or documentation that the Massachusetts DEP had waived certification for this amendment. On October 6, 2011, Boott filed documentation indicating that the Massachusetts DEP waived water quality certification.

Threatened and Endangered Species

46. Section 7 of the Endangered Species Act 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 their critical habitat. There are no known federally listed threatened or endangered species or critical habitat for listed species in the project area.

Project Economics

47. The licensees' proposal to install an inflatable crest gate system has an estimated capital cost of $5,980,000. This capital cost results in an average, annualized cost of $956,000.[14] We estimate that the annual cost to operate the system would be minimal.

48. Operation of an inflatable crest gate system instead of flashboards could enable the project to generate more power, because the gates could be reinflated relatively soon after high flows. In contrast, the flashboards would be washed out for an estimated three months. The licensees estimate that project operation with the inflatable crest gates would result in an increase in annual generation of approximately 8,000 megwatt hours (MWh). Using a regional estimated alternative energy value of $38.74/MWh, as determined from the Energy Information Administration, Annual Energy Outlook for 2012, this additional generation would be valued at $310,000 annually. Therefore, the net cost of the licensee's proposed action, including total capital costs and generation benefits, would be approximately $646,000 annually.

49. Although our analysis shows that the cost of installing the crest gates would exceed the value of the increased generation, it is the applicant who must decide whether to accept this license amendment and any financial risk that entails.

Design and Operation of the Proposed Crest Gate System

A. Crest Gate Design

50. The purpose of flashboards is to increase the height of the dam, thus increasing head to allow more generation than what would be possible without flashboards. However, if flashboards are too rigid they can aggravate flooding during high river flows. Therefore, they are designed to fail when overtopped by a sufficient amount of water. If the flashboards fail prematurely, valuable generation is lost, but if they remain up when the pool rises above the specified failure elevation, they can exacerbate flooding. Although flashboards can be designed to fail at a specified elevation, their actual

[14] Capital cost was annualized over a 10-year period, which is the remaining term of the project license, using an interest rate of 6 percent.

performance during high flows is uncertain. An inflatable crest gate system is mechanically controlled, can be programmed to deflate when a particular flow is reached, and can quickly be raised or lowered, as conditions dictate. For this reason, a crest gate system provides the most reliable and complete attenuation of the backwater effect that results from high flows. It is the preferred technology where there is a need for precise control of reservoir elevations and the licensee can afford the cost.

51. In addition, in order to replace flashboards, the licensee must draw down the reservoir or wait for water levels to recede sufficiently. Workers must approach the dam in boats, often during high flow periods, a relatively dangerous operation. An inflatable crest gate can be controlled remotely, with no worker risk.

52. The pneumatic crest control system that Boott proposes to install on the Pawtucket Dam consists of four independently-controllable zones. Each zone would contain multiple 20-ft-long hinged steel panel sections supported on the downstream side by tubular rubber air bladders. Restraining straps attached to each gate panel would prevent the panels from being raised more than 5 feet above the dam crest, thereby ensuring that the pool elevation would be maintained at the authorized elevation of 92.2 feet when the gates are fully raised.

53. The crest gate system that Boott originally proposed in the amendment application would require several modifications to the Pawtucket Dam. They consist of: (a) placing a concrete cap on top of the sloping granite capstones on the upstream face of the dam to provide a smooth and level surface for mounting and anchoring the crest gate system; (b) constructing three 5-foot-high piers at each major angle in dam alignment to provide a flat perpendicular bearing surface for adjoining panels; and (c) constructing end blocks at the dam's abutments to connect the crest gate with the curved wall of the Northern Canal gatehouse and fish ladder. Additionally, Boott would construct a new structure to house the air compressors that inflate and deflate the crest gate bladder system.

54. To address the Park Service's concerns that the proposed crest gate system would alter the historic character and appearance of the Pawtucket Dam, Boott proposed in a March 21, 2011 filing to modify the crest gate system by: (a) eliminating the intermediate piers and thereby preserving the unobstructed alignment of the dam crest and also achieving the same spillway discharge capacity as the wooden flashboard system; (b) painting the downstream side of the crest gate panels brown instead of black; and (c) installing black retaining straps on the panels at 20-inch centers.

55. To further address Park Service concerns, in a February 2, 2012 filing Boott proposed an alternative process for installing the crest gate system that would not require large volumes of concrete or other materials to be irreversibly installed on the Pawtucket Dam. The crest gate system would be attached to a steel crest anchorage assembly, which in turn would be attached by rock anchors through the dam and into the underlying

bedrock. This installation method would avoid pouring a concrete slab on top of the uneven dam capstones.

B. Crest Gate Operation and Effects on Impoundment Levels and Flooding

56. Under the proposed pneumatic crest gate system, the objectives for operating the project would remain the same as they have been under the wooden flashboard system. The pneumatic crest gate system would operate with a Programmable Logic Controller that would work in conjunction with the powerhouse automatic pond level control system to maintain a consistent impoundment elevation, which cannot be achieved with flashboards. The position of the crest gate system could vary with varying river flows, as shown in Figure 1 below.

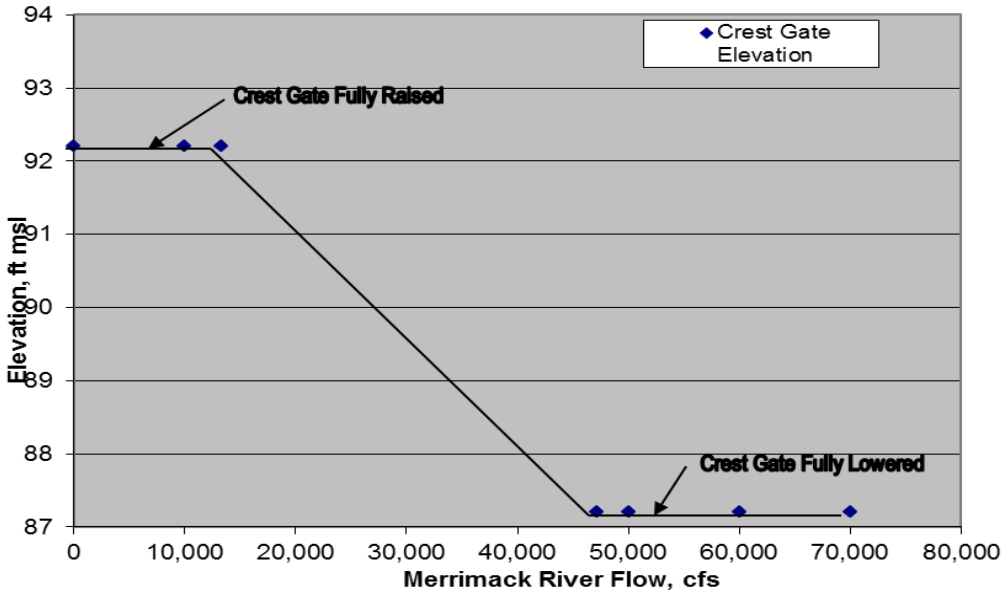

Figure 1. Lowell Hydroelectric Project Operation of Pneumatic Crest Gate System

57. Under the proposed crest gate system, for river flows up to 10,000 cfs (the maximum hydraulic capacity of the project units), the crest gate system elevation and the impoundment elevation would be at 92.2 feet msl. As the river flow increases from 10,000 cfs to 13,250 cfs, the crest gate would remain at elevation 92.2 ft msl, while the pond elevation would gradually rise to elevation 93.2 ft msl. As the river flow continues to rise above 13,250 cfs, the pond elevation would be maintained at 93.2 ft msl by lowering the crest gate and when the river flow reaches 47,200 cfs, the crest gates would be completely deflated down to elevation 87.7 ft msl, which is the top of Pawtucket Dam. As noted, the position of the crest gate system could vary with varying river flows. In

order to determine the exact position of the crest gate with varying river flows, ordering paragraph (G) requires the licensee to file a detailed plan for the operation of the crest gate system with specific details on the position of the crest gate system with varying river flows.

58. Many local residents have opposed the crest gate system, in part because of historic preservation concerns but primarily because of concerns about the dam's backwater effects and flooding. Many of these residents believe that the crest gate system will allow the licensees to maintain consistently higher reservoir levels that will exacerbate flooding.

59. Based on the backwater analysis, at river flows of about 50,000 cfs the projected impoundment levels with the proposed crest gate system would be about one-half foot lower than the levels that would occur with the wooden flashboard system in place. However, during major flood events such as those that occurred in 2006 and 2007, when river flows were in the range of about 86,000 to 93,000 cfs, there would be no significant difference in flood levels along the Clay Pit Brook area between the two systems. This is due to spillway submergence (i.e., where tailwater elevation and headwater elevation are equal) caused by backwater from the rocky bed below the dam, channel restrictions, and the School Street bridge piers, which are located in the river.

60. By letter dated September 9, 2010, staff requested that Boott provide an updated backwater analysis based on the proposed design change and operation, to show the potential impacts on flooding along the Clay Pit Brook neighborhood under different flow conditions. Boott examined the effect of various combinations of unbent flashboard configurations and the proposed crest gate system and river flows on flooding along the Clay Pit Brook neighborhood. The study used unbent flashboards as a worst case, as partially bent flashboards would reduce the backwater effect by allowing more water to pass over and through the partially bent boards. The study showed that the Pawtucket Dam impoundment elevation has only a minor effect on flooding in the Clay Pit Brook neighborhood, and flooding is caused primarily by flows in Clay Pit Brook and limitations on flow through the culverts.

61. As shown in the table below, water levels (msl) along the Clay Pit Brook neighborhood during 100-year flows in the brook would be considerably lower with the proposed crest gate system in place as compared to unbent 5-foot high flashboards.

Table 1. Comparison of water levels at various locations with flashboards and with proposed crest gate system.

Location	Water Surface Control Method	Merrimack River Flow, cfs				
		20,000	30,000	40,000	50,000	60,000
Pawtucket Dam Spillway	Unbent 5-ft High Flash Boards	94.3	95.5	96.5	97.3	98.0
	Proposed Crest Gate System	93.2	93.2	93.2	93.4	94.2
	Difference	**-1.1**	**-2.3**	**-3.3**	**-3.9**	**-3.8**
Confluence of Merrimack River & Clay Pit Brook	Unbent 5-ft High Flash Boards	94.3	95.6	96.6	97.5	98.3
	Proposed Crest Gate System	93.2	93.3	93.4	93.7	94.6
	Difference	**-1.1**	**-2.3**	**-3.2**	**-3.8**	**-3.7**
Upstream of Magnolia Avenue	Unbent 5-ft High Flash Boards	94.5	95.8	96.8	97.6	98.4
	Proposed Crest Gate System	93.7	93.6	93.7	93.9	94.8
	Difference	**-0.8**	**-2.2**	**-3.1**	**-3.7**	**-3.6**
Upstream of Dunbar Avenue	Unbent 5-ft High Flash Boards	94.7	95.9	96.9	97.7	98.4
	Proposed Crest Gate System	93.7	93.7	93.8	94.1	94.9
	Difference	**-1.0**	**-2.2**	**-3.1**	**-3.6**	**-3.5**
Upstream of Lexington Avenue	Unbent 5-ft High Flash Boards	95.0	96.1	97.1	97.9	98.5
	Proposed Crest Gate System	94.3	94.3	94.4	94.5	95.2
	Difference	**-0.7**	**-1.8**	**-2.7**	**-3.4**	**-3.3**
Upstream of Townsend Avenue	Unbent 5-ft High Flash Boards	95.4	96.4	97.3	98.0	98.6
	Proposed Crest Gate System	95.0	95.0	95.1	95.1	95.6
	Difference	**-0.4**	**-1.4**	**-2.2**	**-2.9**	**-3**

62. The proposed pneumatic crest gate system would reduce impoundment levels during high flow events but would allow the level to remain at the authorized normal pool elevation of 92.2 feet msl during normal flow conditions; it would avoid the drawdowns needed for replacing wooden flashboards. Maintaining a consistent impoundment level would benefit two utilities that use the impoundment as a source for water supply, the Pennichuck Water Works and Lowell Regional Water Utility.

63. Operation of the pneumatic crest gates would likely attenuate flooding as compared to the wooden flashboard system. Even if they are designed to fail under specific criteria, flashboard systems under actual conditions are uncontrollable, react unpredictably under water pressure, and may not fail as designed. It is difficult to design and construct an uncontrolled flashboard system that will collapse at once. More than likely, flashboard systems will fail locally at a weaker section. This relieves some of the pressure across the dam and can require a greater load or higher reservoir elevation before the remainder of the system fails.

64. In contrast, a pneumatic crest gate system can be controlled by a human operator or a computer. Sensors can be installed in the reservoir and when the water reaches a pre-defined level, air can be released from the bladders to lower the gates and keep the water level from going any higher, within a specific flood band. Once the flood event has passed, the bladders can be re-inflated to bring the water levels back to what they were before the flood event. This can be accomplished safely, and soon after the flood. The hydro operator does not need to draw down the reservoir or wait until flows in the river are low enough to allow workers to safely replace the flashboards. Because the water level returns to normal more quickly, this benefits the reservoir's use for water supply, recreation, and fish passage.

65. The Williamsburg Condominium Association (Association) has also expressed concerns about increased flood zones and associated insurance costs, erosion of the river bank that occurred during the 2006 and 2007 floods, and the increase in erosion that they believe will occur as a result of heightened water levels with the proposed crest gate system.[15] The Association states that, since its inception in 1984, its community has never experienced flooding until the 2006 and 2007 floods. The Association adds that, after the floods in June 2010, the Federal Emergency Management Agency (FEMA) issued new flood maps, resulting in increased costs for flood insurance.

66. The two floods that occurred in 2006 and 2007 were 100-year magnitude floods; that is, they had a one per cent chance of occurring each year. Any erosion that occurred was not due to operation of the Pawtucket Dam with flashboards. Rather, it occurred because of the magnitude of the flows.

67. Under the proposed crest gate system, for river flows up to 10,000 cfs, both the crest gate system elevation and the impoundment elevation would be at 92.2 feet msl, which is the same as under the flashboard system. As the river flow increases from 10,000 cfs to 13,250 cfs, the crest gate would remain at elevation 92.2 ft msl, while the water surface elevation would gradually rise to elevation 93.2 ft msl, the elevation at which the flashboards were designed to fail. As the river flow continues to rise above 13,250 cfs, the pond elevation would not rise above 93.2 ft msl, because the licensees would be required to begin to lower the crest. When the river flow reaches 47,200 cfs, the crest gates would be required to be completely deflated down to elevation 87.7 ft msl, at the crest of Pawtucket Dam. Accordingly, the licensee would not be permitted to raise the water levels with the proposed crest gate system, as the Association alleges.

68. FEMA administers the National Flood Insurance Program. FEMA periodically reviews flood zones, especially after large floods, and revises them as needed. Based on

---

[15] *See* Letter from Williamsburg Condominium Association I to Kimberly Bose, Commission Secretary (filed July 10, 2011).

the 2006 and 2007 floods, FEMA revised the flood zone maps for the area. Any increases in flood insurance premiums were thus caused by the magnitude of the 2006 and 2007 floods, and are not attributable to the Lowell Hydroelectric Project or the licensees' operation of Pawtucket Dam.

C. Interim Operation and the Wang Agreement

69. The City of Lowell and some area residents have raised concerns in this proceeding about the licensees' compliance with a 1980 agreement between Proprietors of Locks and Canals on Merrimack River (the original owner of the Pawtucket Dam) and Wang Laboratories, which formerly owned land and facilities upstream of the dam. This is commonly referred to as the Wang Agreement.[16] The agreement provides that flashboards on the dam will not be maintained above a height of 4 feet from March through June of each year and will be no higher than 5 feet for the rest of the year.

70. The Wang Agreement is not a part of the license and Boott is not a party to it.[17] Boott has asserted, however, that the historically used variable height 4+1 flashboard system with 4.5-foot high pins "materially complies" with the intent of the Wang Agreement.[18] Boott's technical assessment indicates that the historical system typically required that the reservoir be drawn down to replace the flashboards 2-3 times annually, as compared to the currently installed flashboard system with 5-foot pins, which typically requires a drawdown for flashboard replacement 4-5 times annually. Boott's assessment also found that the historic system allowed the project to generate more power, because the flashboards failed less frequently than the existing flashboards.[19] Boott states that although the crest gate system is the only option that could literally meet the terms of the Wang agreement, many participants questioned its reliability and preferred the historical 4+1 flashboards, at least for the near term.[20]

---

[16] *See* Attachment A to Opposition of the City of Lowell (filed Sept. 10, 2010).

[17] The City of Lowell was unsuccessful in its attempt to enforce the agreement against Boott. In response to the city's complaint, the U.S. District Court for the District of Massachusetts issued an order on March 8, 2011, dismissing the complaint and holding that the Wang Agreement is preempted by the FERC license and the FPA. *See* attachment to letter from Kevin Webb, Boott, to Commission Secretary (filed May 4, 2011).

[18] *See* Boott's Technical Assessment of Spillway Crest Control Alternatives for the Pawtucket Dam at 11 (filed Sept. 18, 2008).

[19] *Id.* at 5.

[20] *Id.* at 5, 12.

71. For these reasons, the licensees request that the Commission allow them to temporarily reinstall the historic 4+1 flashboards with 4.5 feet high pins during the interim period between approval of the amendment and completion of the pneumatic crest gate system. The licensees state that this temporary change will minimize impacts to upstream land owners and the Park Service's summer boat tours, while optimally maintaining a normal head pond elevation to benefit natural river resources and water safety during construction.

72. When staff found that the historically used flashboard system did not fail during the months of March and April 2008 with river flows in the range of 20,000 cfs to 37,000 cfs, staff ordered the licensees to submit a revised design that would allow the flashboards to fail as designed. In 2009, after the licensees changed the flashboard design, the flashboards failed five times during the period from May through October. Therefore, we now know the failure frequency of the post-2008 flashboards with support pins of 5 feet exposed. We do not know the failure frequency of the pre-2008 flashboards with support pins of 4.5 feet exposed. Given this uncertainty, we deny the licensees' request to modify the flashboards on an interim basis while the crest gate system is constructed. Accordingly, ordering paragraph (J) requires that the licensees maintain the flashboard configuration that has been in place since July 2008.

Historic Preservation

A. Historic Properties and Applicable Statutes

73. Pawtucket Dam is a masonry dam that was built in sections in 1847 and 1875 and replaced the earlier masonry and wood dams of 1826 and 1833. The foundation of the dam consists of granite blocks laid in a trench. The face of the dam is constructed of quarry-faced granite blocks, and the interior is granite rubble set in hydraulic cement. A fishway was built adjacent to the dam in 1921; this fishway was later reconstructed in 1985-1986 and expanded to include a fish ladder. According to Lowell Park, the dam was fitted with 2-foot flashboards in 1838; these were extended to 3 feet in 1883 and to 5 feet in 1896.[21]

74. Pawtucket Dam is listed as a contributing element of the Lowell Locks and Canals Historic District (Historic District). The Historic District was listed in the National Register of Historic Places on August 13, 1976. The Historic District was listed as a National Historic Landmark on December 22, 1977. The dam is also located within the boundaries of the Lowell National Historical Park (Lowell Park) and the adjacent Lowell Historic Preservation District (Preservation District). Lowell Park was authorized by

[21] *See* Letter from Michael Creasy, Lowell Park, to Ian Bowles, Massachusetts Executive Office of Energy and Environmental Affairs (filed June 16, 2010).

Congress on June 5, 1978. Lowell Park was listed in the National Register on October 18, 1985, and the Preservation District was listed in the National Register on January 19, 2001.[22]

75. There are two historic preservation statutes that apply to this proposed action. One is the National Historic Preservation Act of 1966 (NHPA).[23] The other is the Lowell Act, which established the Lowell Park and Preservation District in 1978.[24]

76. Under section 106 of the NHPA, the Commission must take into account the effects of its actions on historic properties and must afford the Advisory Council a reasonable opportunity to comment on the proposal.[25] Under section 110(f) of the NHPA, the Commission must to the maximum extent possible undertake such actions as may be necessary to minimize harm to a National Historic Landmark.[26] Under the Lowell Act, the Commission may not issue a license or permit to conduct an activity within the park or preservation district unless it determines that the proposed activity will be conducted in a manner consistent with the standards and criteria established pursuant to that act and will not have an adverse effect on the resources of the park or preservation district.

B. The Advisory Council's Comments and Our Response

77. The Advisory Council's regulations implementing section 106 of the NHPA generally require a federal agency to consult with the SHPO to determine the area of potential effect for a proposed action and to apply the criteria of effect. The Advisory Council may elect to participate in the consultation and has done so in this case. If the federal agency determines that the proposed action will have an adverse effect on historic properties, the parties should consult to seek ways to avoid, minimize, or mitigate the adverse effect and enter into a Memorandum of Agreement if possible. The goal is to seek agreement on how to resolve adverse effects. However, agreement is not always possible, and the NHPA does not require that all adverse effects be avoided or mitigated. If the parties are unable to reach an agreement on how to resolve adverse effects, the federal agency may find that further consultation would not be productive and may

---

[22] *See* Determination of Eligibility Notification, Park Service, at 1 (filed Oct. 26, 2011).

[23] 16 U.S.C. § 470 (2006).

[24] 16 U.S.C.§ 410cc (2006).

[25] 16 U.S.C. § 470f (2006).

[26] 16 U.S.C. § 470h-2(f) (2006).

terminate consultation. The agency must then request the Advisory Council's comments and must take them into account in reaching a final decision on the proposed action.[27]

78. Under section 110(l) of the NHPA, if an undertaking will adversely affect a historic property and the federal agency has not entered into an agreement, the head of the agency must document the agency's decision and may not delegate this responsibility.[28] Under section 800.7(c)(4) of the Advisory Council's regulations, the agency head must prepare a summary of the decision that contains the rationale and evidence that the agency considered the Advisory Council's comments, and must provide it to the Advisory Council before approving the proposal.[29] We are unable to comply with this latter requirement to provide our rationale and response to the Advisory Council before issuing our decision. Under section 3c.2 of our regulations, the nature and timing of any proposed Commission action are confidential and may not be disclosed to anyone outside the Commission. For this reason, we provide in this order the rationale for our decision and evidence that we have considered the Advisory Council's comments. We also address Interior's and the National Trust's comments as they relate to those of the Advisory Council.

79. The Advisory Council's comments set forth a number of findings, as well as project specific recommendations and agency recommendations. The Advisory Council recommends that the Commission not approve the proposal to replace the existing flashboard system with a crest gate system. Interior and the National Trust concur in that recommendation. Although the Advisory Council, Interior, and the National Trust find fault with some aspects of the section 106 consultation process, they do not argue that the Commission has violated section 106 of the NHPA. They argue that the Commission has failed to minimize harm to a National Historic Landmark to the maximum extent possible, as required by section 110(f) of the NHPA. They also argue that the Lowell Act precludes the Commission from approving the proposed license amendment. We address these arguments in turn.

1. Importance of the Historic Properties Affected

80. The Advisory Council finds that the historic properties affected by the proposed action are extremely significant and unique. The Council states that Pawtucket Dam is a nationally significant historic engineering resource listed on the National Register and designated as a National Historic Landmark within the Historic District. The Historic District is nationally significant as it represents one of America's first great industrial

[27] *See* 36 C.F.R. Part 800 (2012).

[28] 16 U.S.C. § 470h-2(l) (2006).

[29] 36 C.F.R. § 800.7(c)(4) (2012).

cities and encompasses the most historically significant extant aggregation of early 19th century industrial structures and artifacts in the United States. The Advisory Council adds that Pawtucket Dam is included as a nationally significant structure in the Lowell Preservation District and the Park Service's list of classified structures for Lowell Park, both of which are listed on the National Register. The Advisory Council states that Pawtucket Dam is accordingly an element of Lowell Park. The Advisory Council also points out that the Keeper of the National Register found that the dam is eligible for and listed in the National Register for its historic and engineering significance under Criteria A and C as a contributing structure in the nationally significant Historic District and that no distinction is made between properties determined individually eligible for the National Register and those determined eligible as contributing to a historic district. The Council quotes the Keeper's admonition that the dam should not be evaluated individually apart from its functioning as a highly significant and integral component of a larger nationally important historic district.

81. We acknowledge and appreciate the national significance of the historic properties at issue. However, Pawtucket Dam is an essential part of a licensed, operating hydroelectric project. Because the Lowell Hydroelectric Project is located on the navigable Merrimack River, the FPA requires that Boott may not continue to operate the project to generate hydroelectric power except in accordance with its Commission-issued license.[30]

82. When the Commission licensed the project in 1983, the adverse effect of adding a modern fishway structure could not be avoided but was adequately mitigated by recording the dam's historic and engineering characteristics, together with other measures that allowed the Commission to conclude that the proposed project would result in no adverse effect on the Historic District.[31] The same approach is warranted here, particularly in light of the fact that the dam has been modified to accommodate a modern fishway and its historic and engineering characteristics have been fully documented. The obligation to operate and maintain the project in compliance with a Commission license necessarily requires recognition of the Commission's authority to specify the terms of the project's continued operation.

83. We appreciate the value of historic preservation. This is one of the public interest factors that we are required to consider under the FPA. However, we cannot elevate historic preservation above all other considerations, but must strike an appropriate balance among competing resource needs. While the dam is currently safe, continued use of a flashboard system presents a risk of increased damage to the granite capstones over

[30] *See* section 23(b)(1) of the FPA, 16 U.S.C. § 817(1) (2006).

[31] *See Boott Mills*, 23 FERC at 63,063.

time, and replacing all or a major portion of the capstones is prohibitively expensive. In addition, flooding is a concern, and only the crest gate system can fully attenuate higher spring flows that typically occur in the Merrimack River. The leaking flashboards and extended drawdowns of the reservoir can present problems for fish passage, and both NMFS and the Massachusetts DFW support the crest gate system because it will improve fish passage. Eliminating the need to replace the flashboards multiple times each year after they have failed will result in more safe conditions for workers. Maintaining a more consistent reservoir elevation will allow the project to generate more clean energy. It will also benefit recreation, fish and wildlife resources, and those who use the reservoir as a source of water supply. In short, the crest gate system represents the best balance of resources in the public interest under the FPA, and we do not believe that historic preservation concerns should prevent us from authorizing it in this case.

2. Effects on Pawtucket Dam and the Historic Districts

84. The Advisory Council finds that the proposed action will have an adverse effect on Pawtucket Dam and the historic districts to which it is a contributing element. The Advisory Council states that the proposed permanent removal of the flashboard system, installation of a pneumatic crest gate, and alteration of the granite dam to accommodate the crest gate system will substantially and irreversibly change the historical appearance, historic fabric, physical form, and functionality of Pawtucket Dam.

85. The Advisory Council notes that under its regulations, an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.[32] The Council adds that adverse effects can include: (1) physical destruction of or damage to all or part of the property; (2) alteration of a property, including restoration, rehabilitation, repair, maintenance, or stabilization, that is not consistent with the Secretary's standards for treatment of historic properties and applicable guidelines; (3) change of the character of the property's use or physical features within the property's setting that contribute to its historic significance; and (4) introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features. The Council states that the proposed alteration of the dam from installing the crest gate system would result in direct adverse effects in all of the cited examples.

86. Flashboards are not an integral part of a dam. Rather, they are a temporary crest control structure placed on the top of a dam to increase the reservoir level and thus allow increased generation. They are designed to fail under the pressure of high flows to allow

[32] 36 C.F.R. § 800.5(a)(1) (2012).

the flows to safely pass over the crest of the dam. Replacing the flashboards on Pawtucket Dam with a pneumatic crest control system would not alter or destroy all or part of the dam, would not change the character of the dam's use, and would not introduce visual or audible elements that would diminish the integrity of the dam's significant historic features. For this reason, Commission staff initially found that replacing the flashboards on Pawtucket Dam with a pneumatic crest control system would not adversely affect the dam.

87. In response to the SHPO's objection to staff's finding, as well as the Keeper's determination that the dam was individually eligible for listing in the National Register because of its historic and engineering significance, staff changed its determination and found that installing the pneumatic crest gate system would adversely affect the dam because it would alter the dam's architecture. Staff nevertheless found that the proposed measures were adequate to mitigate this adverse effect. We agree that these mitigation measures are adequate.

88. The Advisory Council argues that the historic design of Pawtucket Dam includes the flashboard system and that the adverse effect of installing a pneumatic crest gate system cannot be adequately mitigated. The Council states that the historic flashboard system encourages passive and informal water control, whereas the crest gate system would significantly change the character of the dam by establishing it as a mechanically controlled structure, drastically altering the dam's view corridors, destroying its historic functionality, eliminating ambient water sounds, and diminishing the unique engineering design association with its designer.

89. This might be true if the flashboards were considered an integral part of the dam. In our view, however, this is not the case. Flashboards are a temporary and removable structure that is placed on top of a dam. In any event, staff found that the measures that Boott proposed were adequate to mitigate the adverse effect, and we agree. As noted, the historic and engineering features of the dam have already been documented. Although the ambient sounds and visual effects of water leaking through the partially-failed flashboards will be removed with a crest gate system, the sound and sight of water overtopping the dam will still be present during times of high flows. The dam's historic and engineering significance stems not from its particular means of crest control but from its association with the locks, canals, and mills that developed in Lowell between 1796 and 1848, making it one of America's first industrial cities. Moreover, there is nothing in the NHPA that requires a federal agency to avoid or mitigate all adverse effects on historic properties. If the consulting parties are unable to agree on proposed mitigation measures, the Advisory Council's regulations permit a federal agency to terminate consultation and request the Council's comments, as Commission staff has done here. Nothing further is required in this case.

90. The Advisory Council states that the undertaking as currently proposed will adversely affect the Historic District, Lowell Park, and Lowell Preservation District, in

which Pawtucket Dam is a contributing element. The Council asserts that when there is an adverse effect on a contributing element, a federal agency must consider the historic district in its assessment of effects, and argues that the Historic District, Lowell Park, and the Preservation District are more than just collections of related structures and buildings; they recognize an urban industrial historical landscape that developed around water power provided by the Pawtucket Dam and its associated canals.

91. The 1976 nomination form for the Historic District lists commerce, engineering, industry, and transportation as the district's areas of significance. Commerce, industry, and transportation are associated with National Register Criterion A. According to the Keeper, Criterion B also applies for the district's association with the lives of individuals significant in the development of Lowell. The 1977 nomination form for the Historic District as a National Historic Landmark lists the district's areas of significance as engineering and industry. Engineering is associated with National Register Criterion C, which encompasses both architecture and engineering significance. Architecture is not listed on either form.[33]

92. The descriptions included in the 1976 nomination form are primarily concerned with the locks, canals, and mill buildings. Regarding Pawtucket Dam, the form includes only two sentences. These simply state that the dam was built between 1826 and 1830 at Pawtucket Falls and created a mill pond on the Merrimack River eighteen miles long, and that the dam has been continually modified throughout the nineteenth century.

93. Like the 1976 form, the 1977 nomination form is primarily concerned with the locks, canals, mill yards, and work shops, but it also provides more detail about these structures. It includes only one paragraph about Pawtucket Dam. It briefly describes the dam's construction in 1847 and 1875, replacing the earlier masonry and wood dams of 1826 and 1833. It states that the dam follows the outline of the natural ledge of the Falls, and includes a few sentences about its composition and method of construction. It states that with its flashboards in place, the dam is capable of ponding the river for a distance of about 18 miles. It also states that the dam is 1,093.5 feet in length and that the fishway was built in 1921.

94. Neither form discusses the historic significance of Pawtucket Dam in relation to the other components of the district. The 1978 form includes a statement of significance and a history of the district. Together, these two sections of the nomination form comprise over eight pages. Pawtucket Dam is not specifically discussed in either the statement of significance or the history of the district.

---

[33] *See* Attachments 12 and 13 to letter from Robert Fletcher, FERC, to Carol Shull, Keeper of the National Register (Sept. 19, 2011).

95. The 1985 nomination form for Lowell Park states that the Park includes within its boundaries the 5.6 mile power canal system. It states that there are 895 properties within the Park and Preservation District and lists them by their classification as various types of structures. The list does not include any dams. It states that the Park and the Preservation District's most important historical resources are the canal system, the remaining major mill complexes, and the central business district's nineteenth century commercial buildings. The statement of significance does not mention Pawtucket Dam. Similarly, the 2001 nomination form for the Lowell Preservation District does not mention the dam.[34]

96. In light of the limited discussion of Pawtucket Dam in the 1976 and 1977 nomination forms for the Historic District, as well as the complete absence of any mention of the dam in the 1985 and 2001 nomination forms for the Lowell Park and Preservation District, we question whether installing a pneumatic crest gate system on the dam could have any effect at all on the Historic District, the district as a National Historic Landmark, or the Lowell Park and Preservation District. The dam's significance stems from its association with the power system and canals that drove the waterwheels of the mill buildings. This association would continue, and changing the dam's crest control system would have no effect on this historic association. Nor would there be any effect on the dam's engineering. In short, the proposed action would not affect the characteristics that qualify the Historic District, Lowell Park, and the Preservation District for listing on the National Register.

97. The Advisory Council states that the proposed project is inconsistent with the Secretary of the Interior's standards for historic preservation in 36 C.F.R. Part 68, and thus will constitute an adverse effect on Pawtucket Dam, the Historic District, and Lowell Park and the Preservation District. The Advisory Council asserts that conformance with these standards would preclude the major alterations of the dam and removal of the flashboard system that would be required for installing a crest gate system. Specifically, the Advisory Council states that the proposed work violates the standards because the distinctive materials and physical appearance of the flashboard system will not be retained; the essential historic characteristics of the often bent, leaking line of flashboards will be lost, allowing no random passage of water over its top or through its face, and eliminating the character-defining passage of some water through or over the system and over the rocky rapids below the dam during the summer and early fall.

98. This is simply a description of the appearance of the flashboard system. As we have acknowledged, the crest gate system will change the appearance of the dam crest. Although it will eliminate the sight and sound of water passing through gaps in the flashboards, it will still allow water to flow over the dam crest onto the rocks below the

[34] *Id.* at Attachments 14 and 15.

dam during times of high flows. The distinctive materials and physical appearance of the dam itself will not be altered. Only the crest control structure will be changed.

99. The Advisory Council states that the Secretary's standards will be violated because removing the entire flashboard system eliminates an essential engineering feature characterizing the historic dam. Similarly, the Advisory Council states that the distinctive materials and features of the flashboard system and the top of the angled and hand-finished sloping granite capstones will be lost.

100. As we have stated, the engineering of the dam will not change. Only the crest control system will be altered. The flashboards are not an essential engineering feature of the dam. Rather, they are a separate system for crest control that is placed on top of the dam and can be removed without affecting the dam's engineering. The distinctive materials and features of the flashboard system are not an integral part of the dam. The granite capstones will not be lost. Rather, they will remain on the dam. The angled slope of the capstones is below the ordinary low water level of the reservoir, and thus is not currently visible upstream of the dam with the flashboards in place. This will not change; the slope of the capstones will likewise not be visible from upstream with the crest gate system in place. The capstones will still be visible from downstream of the dam, except when flows are high enough to spill over the lowered crest gates.

101. The Advisory Council states that the crest gate system will violate the Secretary's standards because it will alter the historic character of the dam; the new concrete, steel crest gates, and inflatable bladders are inconsistent with the historic fabric; and any intermediate piers that may have to be used are not visually compatible with the historic dam.

102. As described in the National Register nomination forms, the dam's historic character results from its historic association with the locks, canals, buildings, and mills of the Historic District and the Lowell Park and Preservation District. Similarly, the dam's historic fabric will not be altered. Adding a modern crest control structure to this historic dam is no different from adding a modern fish passage structure, which all participants agreed would not adversely affect the dam when the Commission licensed the project in 1983. Boott's modified design for the crest gate system has eliminated the need for intermediate concrete piers.

103. The Advisory Council states that Boott's proposed measures to minimize and mitigate potential adverse effects are insufficient, given the significance and importance of the numerous resources that will be affected. The Advisory Council lists these measures as eliminating the intermediate piers, reducing the amount of concrete used as a base, placement of the gate on the capstones, anchoring systems, painting the bladders to reduce their visibility, designing the compressor building to resemble 19th century buildings in Lowell, and constructing two exhibits with examples of the historic flashboard system and the new crest gate system for display near the dam. The Advisory

Council states that these measures "would appear cosmetic and are totally inadequate given the impacts of the proposed project." [35]

104. We disagree. These measures are adequate to minimize and mitigate the potential adverse effects of replacing the flashboards with a crest control system on Pawtucket Dam. Moreover, because the proposed action will not affect the dam's historic association with other significant historic properties, the proposed changes to the dam's crest control structure will not adversely affect the Historic District, Lowell Park, or the Preservation District. In any event, the NHPA does not require that all adverse effects be avoided or fully mitigated.

3. Compliance with the Advisory Council's Regulations

105. The Advisory Council finds that there have been flaws in the Commission's compliance with the section 106 regulations for this undertaking. The Council states that the consulting parties have had ongoing concerns about identifying the area of potential effect, identifying historic properties and their significance, determining the nature and scope of effects, considering alternatives, and resolving adverse effects.

106. The Advisory Council states that Boott's use of a consultant to study effects on historic resources "caused concern among stakeholders because they were unclear about the status of the Section 106 review." [36] The Council acknowledges that the regulations allow a federal agency to delegate an applicant to begin a section 106 review but require prior notification to the SHPO, as specified in section 800.2(c)(5) of the Advisory Council's regulations. The Council states that, because Commission staff had not yet formally initiated consultation with the SHPO at that point, the SHPO was not consulted in determining the area of potential effect before historic properties were identified, as required by section 800.4(a)(1).

107. As the Advisory Council acknowledges, applicants often begin the section 106 review process. Indeed, Commission regulations require applicants to consult with federal and state resource agencies on a wide range of resource concerns, including historic preservation, before filing an application with the Commission. The Advisory Council and SHPOs are familiar with this aspect of our regulations and it does not typically cause uncertainty or concern. In many cases, Commission staff provides notice to the SHPO in the form of a letter designating the applicant as the Commission's non-federal representative to begin the section 106 review. However, the Commission remains responsible for initiating consultation under section 106 and making the required findings, which Commission staff did in this case.

---

[35] Advisory Council's Comments at 4 (filed Feb. 26, 2013).

[36] *Id.*

108. The Advisory Council maintains that when Commission staff issued its April 26, 2011 letter initiating section 106 consultation, it addressed multiple steps at once without first obtaining the SHPO's agreement. The Council acknowledges that its regulations allow a federal agency to address multiple steps at one time. Commission staff uses this approach in nearly all of its consultations under section 106 of the NHPA. In this case, the SHPO noted its disagreement with staff's letter not by complaining about multiple steps, but rather by declining to concur in staff's finding of no adverse effect to historic properties. In response, staff continued to consult for nearly two years with Lowell Park, the SHPO, the City of Lowell, and the Advisory Council on ways to avoid, minimize, or mitigate any adverse effects to historic properties. In these circumstances, staff's initial attempt to address multiple steps of the consultation process in a single letter was superseded by the subsequent consultation and had no bearing on the outcome.

109. The Advisory Council contends that the consultation was characterized by limited interaction with consulting parties and the public. The Council also notes that a number of individuals and entities that might have been appropriately recognized as consulting parties were not invited into the consultation, and that their absence "undermined the effectiveness of the consultation." [37]

110. As the Advisory Council recognizes, its regulations allow a federal agency to determine which entities and individuals should participate as consulting parties for purposes of section 106. The Commission allows many opportunities for public participation in its review process for hydroelectric licenses and amendments. In this case, the Commission received and considered comments on multiple occasions from numerous local residents, associations, representatives of historic preservation organizations, and representatives of local governments with jurisdiction over residential areas affected by backwater effects and flooding. In these circumstances, including these individuals and entities as consulting parties would not have materially affected the consultation. Moreover, staff must follow our regulations governing ex parte communications, and therefore may not engage in informal interactions with anyone outside the Commission who has an interest in the issues and outcome of a contested proceeding.

111. The Advisory Council avers that staff's delineation of the area of potential effect for the proposed action does not follow the definition in the section 106 regulations. The Council points out that, in its April 26, 2011 letter, Commission staff identified the area of potential effect as the Pawtucket Dam and areas where construction would take place, but did not include the Historic District, Lowell Park, or the Preservation District. The Advisory Council argues that, under guidance provided by the Park Service and the Keeper of the National Register, an adverse effect to a contributing element of a historic

[37] *Id.* at 5.

district is an adverse effect to the district as a whole, and that the area of potential effect for the proposed action should therefore include the areas encompassed by the Historic District, Lowell Park, and the Preservation District.

112. The area of potential effect is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties."[38] Commission staff was aware of the guidance that the Park Service and the Keeper provided regarding the need to consider the historic districts and the park, and took this guidance into account during the subsequent consultation. Therefore, staff's initial description of a more limited area of potential effect than was later suggested did not affect the consultation.

113. The Advisory Council argues that staff's assessment of effects in its April 26, 2011 letter was compromised by its failure to recognize that under section 106, contributing elements in eligible or listed historic districts are treated the same as individual properties. The Advisory Council points out that both the SHPO and Lowell Park objected to staff's finding of no adverse effect and requested that it submit to the Keeper a request for clarification of the Dam's eligibility and integrity.

114. As noted, Commission staff followed this advice and requested a determination of eligibility for Pawtucket Dam from the Keeper of the National Register. Staff then took the Keeper's determination into account and found that the proposed action would have an adverse effect on Pawtucket Dam.

115. The Advisory Council states that, in light of its initial finding of no adverse effect, staff should not have proposed the development of an MOA to address the effects of the proposed action. The Council admonishes that, under the regulations, an MOA is only developed when there is a need to resolve adverse effects.

116. This ignores the fact that staff was aware of the views of other consulting parties that modifying the flashboards would constitute an adverse effect. In an effort to be responsive to those concerns and to foster consultation on proposed measures to avoid or mitigate the effects of the proposed action, staff reasonably offered a draft MOA for the consulting parties' consideration.

117. The Advisory Council contends that, after receiving the Keeper's determination, staff "misinterpreted [it] to mean that Pawtucket Dam was individually eligible for inclusion on the National Register because of its historic and engineering significance." Staff then changed its effect finding and offered a draft MOA with the same proposed measures to address the adverse effects, without considering the effects of the proposed action on the Historic District, Lowell Park, and the Preservation District.

---

[38] 36 C.F.R. § 800.16(d) (2012).

118. As the Advisory Council recognizes, the Keeper's letter states that under federal law and regulations, "no distinction is made between properties determined individually eligible for the national Register and those determined eligible as contributing to a historic district."[39] In light of that statement, we fail to understand why or how staff's finding "misinterpreted" the Keeper's determination. Staff reasonably found that replacing the flashboards would adversely affect the dam. The Advisory Council seems to suggest that, as a result, staff was necessarily compelled to find an adverse effect on the Historic District, Lowell Park, and the Preservation District. As we have seen, however, this proposition, while strongly argued by the consulting parties, is by no means self evident.

119. We agree with staff that any minor adverse effect of replacing the flashboards on Pawtucket Dam with a crest control system can be adequately minimized and mitigated by the measures proposed in the draft MOA. Moreover, because the Dam's historic and engineering significance stems from its association with other historic resources in the districts and the park, and replacing the flashboards will not affect that association, the proposed action will not adversely affect the Historic District, Lowell Park, or the Preservation District.

4. Compliance with Section 110(f) of the NHPA

120. The Advisory Council finds that the Commission has failed to address the effects of the undertaking on a National Historic Landmark and the requirements of section 110(f) of the NHPA. Interior and the National Trust make similar arguments. The Council reiterates that Pawtucket Dam is a contributing element of the Historic District, which has been designated a Landmark. The Council adds that Landmarks are nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States.

121. The Advisory Council states that there is "no question" that the effects to Pawtucket Dam are "direct and adverse," and that the Commission "has refused to acknowledge the status of Pawtucket Dam as a contributing element" of a Landmark Historic District, or "to seriously consider the nature and extent of the adverse effects" to the Dam, the Landmark Historic District, Lowell Park, and the Preservation District. The Council maintains that there is "no evidence in the administrative record" of the section 106 consultation that the Commission "seriously considered alternatives" that might minimize harm to the Landmark. The Council concludes that the Commission has failed to meet the statutory standard.

[39] Park Service, Determination of Eligibility Notification at 2 (filed Oct. 26, 2012).

122. We disagree. Consulting parties pointed out the Historic District's Landmark status even before the amendment application was filed.[40] Commission staff acknowledged and discussed the Historic District's Landmark status in its draft and final EA[41] and engaged in nearly two years of consultation on ways to avoid, minimize, or mitigate any adverse effects. Under section 110(f) of the NHPA, federal agencies are required "to the maximum extent possible" to "undertake such planning and actions as may be necessary to minimize harm" to Landmarks that may result from their proposed actions. Because the only identified adverse effect is that of replacing the flashboards, and the consulting parties argue that an adverse effect on the dam is, by definition, an adverse effect on the Landmark district, staff's consultation on ways to avoid, minimize, or mitigate adverse effects to the dam must, by extension, be recognized as applying to the Landmark district as well. Therefore, there is no basis for the Advisory Council's assertion that the Commission has failed to meet the statutory standard.[42]

123. The Advisory Council also asserts, without elaboration, that the Commission has failed to comply with the requirements of section 800.10 of the Council's regulations.[43] A brief review of the requirements of that section reveals that staff met them in this case.

124. Section 800.10(a) simply reiterates the statutory requirement discussed above. Section 800.10(b) provides that the agency official shall request the Advisory Council's participation in any consultation to resolve adverse effects on Landmarks conducted under the Council's regulations. As noted, the Advisory Council requested to participate in the consultation by letter dated August 19, 2011. Therefore, staff was not required to request the Advisory Council's participation. Section 800.10(c) provides that the agency official shall notify the Secretary of the Interior of any consultation involving a Landmark and invite the Secretary to participate if there may be an adverse effect. As noted, Interior has participated in this consultation from the outset, even before the application was filed, through its Lowell Park, Park Service, and Office of the Solicitor.

---

[40] *See, e.g.*, Lowell Park's letter of June 11, 2010 at 3 (commenting on Boott's draft application).

[41] *See* draft EA at 9, 13-15, 65 (June 10, 2011); final EA at 8, 15-16, 68 (Dec. 19, 2011).

[42] The National Trust maintains that the Commission failed to meet section 110(f) of the NHPA by not considering the alternative of restoring the flashboard pins to their historic strength and spacing. This is not correct. Commission staff required Boott to redesign the flashboard pins and spacing to ensure that they would fail as designed, thus approximating the historic configuration of the flashboard system. Staff examined this option as the no-action alternative in the EA.

[43] 36 C.F.R. § 800.10 (2012).

Therefore, there was no need for staff to inform the Secretary of the consultation and request the Secretary's participation. Finally, section 800.10(d) does not impose any obligations on the federal agency that is considering a proposed action. Rather, it requires the Advisory Council to report the outcome of the section 106 process to the federal agency and the Secretary. We assume that the Council's comments filed with the Commission on February 26, 2013, satisfy this requirement.

5. Compliance with the Lowell Act

125. The Advisory Council finds that the Commission has not adequately addressed the ramifications of the Lowell Act, which established Lowell Park. The Advisory Council notes that the purpose of the Lowell Act was "to preserve and interpret the nationally significant historical and cultural sites, structures, and districts in Lowell, Massachusetts, for the benefit and inspiration of present and future generations."[44] The Council adds that, among other things, Congress found that "certain sites and structures in Lowell, Massachusetts, historically and culturally the most significant planned industrial city in the United States, symbolize in physical form the Industrial Revolution."[45]

126. The Council maintains that the Lowell Act specifically prevents federal entities from issuing "any license or permit to any person to conduct an activity within the park or preservation district unless such entity determines that the proposed activity will be conducted in a manner consistent with the standards and criteria established pursuant to Section 302(e) of this Act and will not have an adverse effect on the resources of the park or preservation district." [46] The Advisory Council acknowledges that the Lowell Act does not define the term "adverse effect" but states that "Section 106 of the NHPA, the preeminent federal statute in pari materia, supplies its intended definition."[47] However, section 106 of the NHPA does not use the term "adverse effect," and it is not included among the terms that are defined for purposes of that act in section 301 of the NHPA.[48] Thus, it is not clear that we should look to the regulations implementing section 106 for purposes of defining an "adverse effect" under the Lowell Act.

127. The NHPA was enacted in 1966. Advisory Council states that the term "adverse effect" had a well-established meaning in federal historic preservation practice and law

---

[44] 16 U.S.C. § 410cc-12(b) (2006).

[45] *Id.* at § 410cc-11(a)(1).

[46] *Id.* at § 410cc-12(b).

[47] Advisory Council's comments at 7 (filed Feb. 26, 2013).

[48] *See* section 301 of the NHPA, 16 U.S.C. § 470w (2006).

by the time Congress passed the Lowell Act in 1978. The Advisory Council points out that the procedures for implementing section 106 published in the Federal Register in 1969 and 1970, and then in the Code of Federal Regulations in 1975, defined an "adverse effect" to include "(a) destruction or alteration of all or part of a property; . . .[and] (c) introduction of visual, audible, or atmospheric elements that are out of character with the property and its setting."[49] The Advisory Council states that the proposed action would result in such adverse effects to Pawtucket Dam, the Historic District, Lowell Park, and the Preservation District. As a result, the Council states that it is unclear how the Commission could issue a license for the proposed action consistent with the Lowell Act.

128. The Advisory Council asserts that the crest gate proposal is "a fundamental change in the character, appearance, and mode of functioning of a central feature" of Lowell Park, the Preservation District, and the Landmark Historic District.[50] In the Council's view, it is "not just a modern addition to the vicinity of the Park and associated historic districts, but rather a direct adverse effect to the resource itself."[51] The Advisory Council states that it concurs in the opinion of Lowell Park and Interior that the Commission will not be able to make a finding that the proposed action will not have an adverse effect on the resources of Lowell Park and the Preservation District.

129. Interior makes a similar argument, maintaining that a finding of "no adverse effect" under the Lowell Act would be inconsistent with Commission staff's finding of adverse effect under the NHPA. Interior states that it is "indisputable" that the dam is a resource of the park and preservation district and that, given staff's finding under the NHPA, the Department cannot see how the Commission can make the findings required of it under the Lowell Act.

130. While both Interior and the Advisory Council state that Pawtucket Dam is a resource of not only Lowell Park but also the Preservation District, it is not clear that this is true. By its terms, the Lowell Act requires a finding that the proposed action "will not have an adverse effect on the resources of the park *or* the preservation district."[52] Pawtucket Dam is listed as a contributing element to Lowell Park and is located within the park's external boundaries (although it is not located on federal land within the park). However, the Preservation District is an adjacent area that is distinct from the park, and

---

[49] 36 C.F.R. § 800.9 (1975).

[50] Advisory Council's comments at 7.

[51] *Id.*

[52] Section 102(b) of the Lowell Act, 16 U.S.C. § 410cc-12(b) (2006) (emphasis added).

the statute's use of the word "or" suggests that our finding need only pertain to the resources of Lowell Park.

131. Nor is it clear that Pawtucket Dam is a "resource" of Lowell Park. As noted earlier, the dam is not mentioned at all in the 1985 National Register nomination form for the park.[53] Moreover, the dam is not mentioned anywhere in the Lowell Act. Under section 202 of the Act, the Secretary of the Interior is authorized to acquire certain designated properties, as well as other properties that meet certain standards.[54] We find it significant that Pawtucket Dam is not among the listed properties that the Secretary was authorized to acquire. Similarly, we find it significant that the Secretary made no effort to acquire the dam between 1978, when Lowell Park was established, and 1983, when the Commission issued a license for the Lowell Hydroelectric Project that included Pawtucket Dam.

132. As Interior acknowledges, the NHPA is procedural rather than substantive; that is, a federal agency may authorize a proposed action despite its having an adverse effect on historic properties. Under the NHPA, an action that might have an adverse effect can be avoided, minimized, or mitigated through appropriate treatment measures to the point that the effect is no longer considered adverse. If the term "adverse effect" is to have the same meaning in the Lowell Act as it is understood to have in the NHPA, presumably an initial finding of an adverse effect under the NHPA would not stand as an absolute bar to a proposed action under the Lowell Act. With appropriate measures to avoid, minimize, or mitigate the adverse effect, the proposed action would not be considered adverse and could proceed as planned.

133. This is exactly what happened when the Lowell Hydroelectric Project was licensed in 1983. The adverse effect of introducing a modern fishway on Pawtucket Dam was mitigated through recording the historic and engineering features of the dam and other appropriate measures, thus permitting a finding of no adverse effect on the resources of the Landmark Historic District. The Park Service and the Massachusetts SHPO concurred in the mitigation measures and the finding of no adverse effect. The only difference in this case is the lack of concurrence on the part of the Park Service and the SHPO.

134. We find nothing in the Lowell Act that requires us to obtain that concurrence. Rather, under the Lowell Act it is the federal entity that must make a finding of no adverse effect before authorizing an activity within the park or preservation district. To hold otherwise would, in effect, amend the statute. We find that the measures that we

[53] Similarly, as discussed earlier in this order, there is no mention of the dam in the 2001 National Register nomination form for the Preservation District.

[54] Section 202 of the Lowell Act, 16 U.S.C. §410cc-22 (2006).

require in this order to mitigate the adverse effect of replacing the flashboards on Pawtucket Dam with a crest control system are adequate, and we need not obtain any other agency's concurrence in that finding. We therefore find that the proposed action, with those mitigation measures, will not have an adverse effect on Pawtucket Dam or the resources of Lowell Park.

135. The Advisory Council also questions whether the Commission can approve the amendment request under the Lowell Act because the proposed action may not be consistent with the standards and criteria established pursuant to section 302(e) of that Act. The Council notes that the Lowell Historic Board has been informally involved with Boott's proposal and has advised that it may not meet the Board's design guidelines issued under section 302(e) of the Lowell Act. The Council adds that, without an application and plans submitted as part of the review process, the Board cannot make any formal determination regarding appropriateness and effect.

136. We question whether the proposed action, which requires our approval under the FPA and is subject to the requirements of the NHPA and the Lowell Act, would also need to be submitted to the Lowell Historic Board for approval. In any event, the Lowell Act requires us to determine whether the proposed activity will be conducted in a manner consistent with the standards and criteria established pursuant to that Act.

137. Interior argues that we cannot make that finding, because the proposed action is inconsistent with the preservation standards for the park.[55] Interior asserts that the Commission must analyze consistency with all of the standards, and not restrict itself to only those that Interior has discussed in its comments. We disagree, as most of the standards would appear to be inapplicable to the dam.

138. Interior published preservation standards for Lowell Park and the Preservation District under section 302(e) of the Lowell Act on April 29, 1981.[56] They are specific to the park and preservation district, and apply to the construction, preservation, restoration, alteration, and use of properties within the park and the district. They do not contain any specific references to dams in general or to Pawtucket Dam in particular. Many of these standards concern mill buildings and thus would not apply to the dam. Others concern features of buildings that are not present on the dam, such as windows, roofs, interior spaces, and doors. We need not analyze the proposed action's consistency with standards that are clearly inapplicable.

---

[55] 16 U.S.C. § 410cc-32(e) (2006).

[56] 46 Fed. Reg. 24,000 (1981).

139. Interior argues that the proposed action violates Preservation Standard E-2. This standard concerns historic architectural features, and states that historic buildings "owe their character to the particular blend of their architectural features: scale, rhythm, form, massing, and proportion." [57] It provides that "original building features should whenever feasible be preserved rather than replaced.[58] Interior maintains that the flashboards constitute an original feature of the dam and the power system, despite the fact that individual pins and boards are continually replaced, as this replacement is part of the historic pattern of use. Interior argues that it is feasible to preserve this feature because the licensees have continued to use the flashboard system for years and make no showing that they cannot continue to do so. Because preservation is feasible, Interior concludes that the flashboards should be preserved. Interior adds that it is feasible to accomplish the Commission's flood control purpose with a flashboard system.

140. The architecture of the masonry dam would not be altered, thus preserving the dam's scale, rhythm, form, massing, and proportion. Only the flashboards, which are an original crest control feature of the dam, would be replaced. As we have seen, because of flooding concerns there is a need for a crest control system that would collapse completely during high flows. Although Interior asserts that flashboards could be designed to meet this purpose, the record suggests otherwise. By their very nature, flashboard systems fail incompletely and unpredictably in response to high flows. For this reason, it is not feasible to preserve the existing flashboards. Only an inflatable crest gate system can attenuate the backwater effect of the dam during high flows to the maximum extent practicable.

141. The existing granite capstones would not be altered, and would still be visible from the downstream side of the dam. To mimic the appearance of the existing flashboards, Boott would use a brown-colored bladder, paint the downstream side of the crest gate panels brown, and install black retaining straps an average of 20 inches on center. This will help ensure that the crest gate system is similar in appearance to the existing wooden flashboards. Upstream of the dam, the anchoring assembly for the new crest control structure would be below the ordinary low water elevation and would not be visible. With the crest gate down and water going over the dam, the crest control structure would not be visible. Boott would also develop two interpretive exhibits, one featuring a replica of a portion of the original flashboard system and one featuring the new crest gate system, to be located at the project to enhance visitors' understanding of the history of Pawtucket Dam and the Lowell Hydroelectric Project. In light of all of these measures, as well as the fact that preserving the existing flashboard system is not

[57] *Id.* at 24,001.

[58] *Id.*

feasible given the need to provide maximum flood attenuation, we find that the proposed action is consistent with this standard.

142. Interior argues that the proposed action is inconsistent with Preservation Standard E-3. This standard concerns historic materials, and states that "historic character also comes from the use and design of construction materials." [59] Interior argues that the proposed action would completely remove the wood and metal flashboard system and replace it with a pneumatic crest gate supported by a steel frame anchored in bedrock through the dam. Interior asserts that the capstones would be lost to view, and the view would be dominated by the steel crest gates. Interior concludes that the materials used would be very different from those used historically and would radically change the historic character of the dam.

143. We disagree. The original materials, design, and use of the masonry dam would not be altered. Although the wood and metal flashboard system would be replaced, these materials have been continually replaced and are not original. In light of the need for a crest control system that is completely down during high flows, this is a limited but necessary change in the materials used for crest control. We find that the proposed action is consistent with this standard.

144. Interior argues that the proposed action is inconsistent with Preservation Standard E-16. This standard states that "hardware relating to the original industrial power system and manufacturing processes may be historically significant and should be preserved."[60] It further states: "Determine significance of hardware by its role in original manufacturing, its completeness, and its potential for interpreting the history of Lowell. Retain elements with such significance."[61] Interior argues that the flashboard system has been in use since 1834, continuously since 1838, and on the dam in its current configuration since 1875. Interior maintains that the flashboard system is an essential part of the original industrial power system and remains essentially complete, and that the Park Service uses it as part of its interpretation of the history of Lowell. Interior therefore concludes that the flashboard system should be retained.

145. Standard E-16 concerns the industrial hardware of mill buildings, so we question whether it is applicable to the dam. We agree that the dam is part of the original system of dams, locks, and canals that powered the mills. This historic aspect and association of the dam will not change. To the extent that the flashboard system would be considered "hardware" relating to the original industrial power system, its role in original

---

[59] *Id.*

[60] *Id.* at 24,006.

[61] *Id.*

manufacturing would be the same as that of the dam itself, to provide head for the system that powered the mills. Only the dam's crest control structure will be altered, to address a present-day need for a more effective means of alleviating backwater effects during high flows. In addition, Boott will provide interpretive exhibits to assist visitors and the Park Service in interpreting the role of the dam as part of the history of Lowell. We find that the proposed action is consistent with this standard.

146. Although Interior addresses only those three standards in its comments, we note that Preservation Standard N-1, which concerns new construction, would presumably apply to the new compressor building. This standard states that "new buildings and activities are important for economic revitalization."[62] It adds that new buildings should be designed "using a contemporary vocabulary that adds to the richness and compactness of existing 19th century buildings."[63] In previous comments submitted with its motion to intervene, Interior stated that, without any design details, there is no information sufficient to permit the Commission to determine whether the new compressor building will be consistent with this standard.

147. This standard clearly encourages new construction, and does not require that historical elements be copied. Rather, it suggests using "naturally textured materials and subdued colors related to the historic materials of the District," and interpreting into contemporary architecture the "scale, rhythms, proportions, and level of animation found in the historic buildings of Lowell."[64] In this order, we require Boott to design and construct the compressor house with materials that are compatible with the historic fabric of the adjacent architecture, to ensure that the building will resemble 19th century buildings in Lowell, specifically the nearby Northern Canal Gatehouse. We therefore find that the proposed action is consistent with this standard.

148. In short, we find that the proposed action will be conducted in a manner consistent with the preservation standards established pursuant to the Lowell Act, and will not have an adverse effect on the resources of the park or preservation district. We therefore may authorize the proposed amendment consistent with the Lowell Act.

6. Consideration of Alternatives and the Public Interest

149. The Advisory Council finds that the Commission's consideration of alternatives and specification of requirements for the project fail to take into account the need to balance the agency's mission, the purpose and need for the undertaking, effects on

---

[62] *Id.* at 24,008.

[63] *Id.*

[64] *Id.*

significant historic properties, and the public interest. The Advisory Council points out that the Commission's mission, as summarized in its Strategic Plan for Fiscal Years 2009 – 2014, is to assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means. The Council notes that one of the major ways the Commission does this is by promoting the development of safe, reliable, and efficient energy infrastructure that serves the public interest. The Council then cites the goals of an interagency memorandum of understanding (MOU) among Interior, the Army Corps of Engineers, and the Department of Energy (March 24, 2010) that expresses the Administration's interest in maintaining and optimizing hydropower generation in a sustainable manner that recognizes the need to preserve biological diversity, ecosystem function, our natural and cultural heritage, and recreational opportunities, and recognizes that some geographic locations are not appropriate for new hydropower development.

150. The Advisory Council states that the environmentally responsible approach promoted in the MOU is not demonstrated in the administrative record for the section 106 consultation in this case. The Council adds that it does not appear that the Commission "engaged in a forthright consideration of alternatives" in light of the goals of the proposed action, balanced by "consideration of the real significance of the dam as a central component in multiple overlapping historic districts," including a Landmark Historic District and a National Historical Park.

151. We disagree. The Commission is not a party to the MOU. However, the MOU recognizes that hydropower can be developed in a sustainable manner that recognizes the importance of a broad range of public interest factors, including fish and wildlife resources and their habitat, endangered species, historic preservation, and recreation. These are the same public interest factors that we are required to balance, along with developmental interests, under the comprehensive development standard of the FPA. What the Advisory Council would have us do in this case is to give more weight to historic preservation than to all other aspects of the public interest, including fish passage benefits, improvements to recreation, attenuation of backwater flooding during high flows, dam and worker safety, water supply, and increased hydropower generation. In our view, this would not represent the best balance of developmental and environmental resources in the public interest.

152. The Advisory Council states that the justification for the project has varied over the decade or more that it has been in development. The Advisory Council notes that correspondence from Boott and the Commission references benefits to fisheries, minimizing backwater flooding effects, maintaining the project, continual failure of the flashboards, addressing concerns about workers' safety, and preservation of Pawtucket Dam. The Council adds, however, that in Boott's 2010 amendment and earlier discussions of the project, there seems to be at least an equal emphasis on increasing the average annual elevation of the head pond and the increased efficiency and productivity of the hydro facility that would result. The Advisory Council maintains that, following

significant floods in 2006 and 2007 and throughout the section 106 consultation process, there has been an emphasis on justifying the proposed action primarily as an effort to address local residents' flooding concerns related to Pawtucket Dam operations. The Council states that this is in contrast with Boott's backwater analysis and technical assessment of crest control alternatives that suggest Boott believes that the dam's flashboards have little or no impact on upstream flooding conditions.

153. We disagree with this assessment. Throughout this proceeding, there has been a focus on multiple interests and concerns and the justification for the project has not varied. Flooding has been a concern of local residents at least since 2003, when the Commission first received a local resident's complaint about the dam's operation and requested the licensee's response. However, the Commission was also aware of complaints about the adverse effects of flashboard failure and repair on fish passage as a result of high water events in 2005 and 2006.[65] Complaints about flooding increased and flooding concerns received increased attention after the significant floods that occurred in 2006 and 2007. This prompted Commission staff to require Boott to consider flashboard and other crest control options with the objective of designing a system that could be fully down during high flow events. However, Boott and Commission staff acknowledged from the outset that the proposed crest gate system would allow increased generation. It would also benefit recreation and fish and wildlife resources by providing a more stable reservoir elevation.

154. Boott's statements regarding the impact of the dam's flashboards on flooding simply reflect the fact that, while a crest gate system provides the maximum attenuation of the dam's backwater effect during high flows, no system, whether flashboards or a crest gate, can provide any meaningful flood relief during major flood events such as those that occurred in 2006 and 2007, when river flows were in the range of about 86,000 to 93,000 cfs. During such major flood events, there would be no significant difference in flood levels along the Clay Pit Brook area between the two systems. In the EA, staff analyzed the environmental impacts of the proposed crest gate system and alternatives on the full range of developmental and non-developmental resources and recommended the crest gate system as providing the best balance of costs and benefits for these resources. The justification for the proposed action has not varied, but has always reflected consideration of all of the relevant factors.

155. The Advisory Council states that the record lacks data on the benefits of the crest gate system in reducing flood damage, and that therefore, a more rigorous analysis of costs and benefits appears warranted. The Advisory Council adds that such an analysis should include adverse effects to historic properties as well as impacts to other cultural

[65] *See, e.g.*, letter from Paul Diodati, Massachusetts Division of Marine Fisheries, to Skip Medford, Boott (filed Dec. 28, 2006).

and natural resources and recreational and educational opportunities. The Council concludes that, without such an analysis, the consideration of alternatives does not provide a realistic appraisal of costs and benefits for options which preserve historic resources.

156. The Advisory Council overlooks the fact that staff presented a full evaluation of costs and benefits on all relevant resources in the EA. Among other things, staff analyzed the no-action alternative, defined as retaining the existing flashboard system without changing it. This is the only option in the EA that would fully preserve historic resources without affecting them in any way. However, staff did not recommend it because it would not provide all of the benefits of the crest gate system; that is, it would not attenuate the dam's backwater effect to the maximum extent possible, it would not provide fish passage benefits, it would not benefit fish and wildlife and recreation by providing a more constant reservoir elevation, it would not provide benefits to dam and workers safety, and it would not allow increased power generation. There is no requirement in the FPA, the NHPA, or the Lowell Act to consider only those alternatives that would have no impact on historic resources.

157. The Advisory Council states that the Commission must actively consider and balance the goals of the project and needs of the licensees with the effects of the project on the general environment, the significance of affected historic properties, their preservation value for the community and the nation, and concerns of the local community. The Advisory Council maintains that all of these factors should inform a decision about the project in the public interest.

158. This is precisely what the FPA requires, and what we have done in this case. The Advisory Council disagrees with our balancing and would have us give greater weight to historic resources. However, we fully considered the costs and benefits of the proposed action and its effects on all relevant resources, and believe the crest gate system represents the best balance of effects on all of those resources.

159. The Advisory Council states that staff's requirement that the licensee must ensure that any flashboard system be completely down during high flows appears to be related to addressing concerns about backwater flooding, but does not appear to take into account all associated costs of a crest gate system, and suggests an apparent lack of sensitivity to the significance of the dam, its associated historic districts, and the park. The Advisory Council concludes that the tradeoffs inherent in implementing the proposed project have not been adequately explored or represented to the public, and that impacts on historic properties have been understated or dismissed.

160. We disagree. Staff imposed this requirement for the flashboard system because of numerous complaints about backwater flooding. We agree with staff's assessment that, in actual conditions, flashboards fail incompletely and unpredictably and thus cannot attenuate backwater flooding to the maximum extent possible. This does not mean,

however, that impacts to historic properties have been understated or dismissed. Rather staff fully considered them in the EA, and we have fully considered them in this order. We approve the crest gate system because it is the option that would provide the best means of attenuating backwater flooding while also benefiting project generation, fish passage, fish and wildlife resources, recreation, and dam and worker safety, with minor effects on historic properties that are adequately mitigated. This does not mean that we have failed to consider effects to historic properties, or have understated or dismissed those effects.

7. Appropriateness of Modifying this Historic Dam

161. The Advisory Council reiterates and specifically finds that replacement of the flashboard system is not an appropriate treatment for this historic dam. The Advisory Council recognizes that traditional flashboards have been replaced at other locations to provide operational benefits. However, the Council maintains that Pawtucket Dam with its flashboards should be maintained, because it is a central component of a Landmark Historic District and a unit of Lowell Park, which is focused in part on the history of American waterpower development. In essence, the Advisory Council maintains that the dam with its flashboards should be preserved as "an elegant, functioning artifact." [66]

162. We do not share this view. As we have seen, it elevates historic preservation above all other resources, and does not represent the best balance among competing resources for the Lowell Hydroelectric Project.

8. Purpose and Need for the Proposed Action

163. The Advisory Council finds that the purpose and need for the project are questionable to consulting parties and members of the public, including residents who have suffered from the effects of backwater flooding. The Advisory Council notes that consulting parties and members of the local community have suggested that the main purpose of the project is to increase the average annual elevation of the head pond, thus increasing the efficiency and productivity of the hydro facility that relies on the dam by up to 10 percent. The Advisory Council concurs with Lowell Park's view that the historic and visual value of the traditional flashboard system on Pawtucket Dam outweighs any marginal increase in the licensee's generating capacity or ease of operations.

164. This ignores the fact that, under the FPA, we are not engaged in a simple balance between historic preservation and increased generation. Rather, as we have seen, the crest gate system offers numerous benefits, not only to increased generation and operational efficiency, but also to attenuating backwater flooding to the maximum extent

[66] Advisory Council's Comments at 9.

possible, as well as benefits to fish and wildlife resources, fish passage, recreation, and dam and worker safety. That being the case, it represents the best balance of all relevant resources.

9. The Dam's Importance to Lowell's Historical and Cultural Landscape

165. The Advisory Council finds that, as the source of waterpower control that allowed the growth of the textile industry at this bend in the Merrimack River in the 19th century, the physical form of Lowell's intact historical and cultural landscape begins with Pawtucket Dam. The Advisory Council states that the historic design of Pawtucket Dam encourages passive and informal water control to provide hydropower to the canals and help to prevent flooding upstream, as suggested by the naturalistic edges and open areas in the originally designed 1875 flashboards. The Council contends that the proposed action would significantly change the character of Pawtucket Dam by establishing it as a crest gate mechanically controlled waterway, would affect its historic presence, alter the dam's view corridors, destroy its historic functionality, eliminate water sound contributions, and diminish its engineering association with James B. Francis, its designer and chief engineer. The Council adds that the proposed action is out of character with the existing surroundings, and would significantly compromise historic visual and spatial relationships, both from the dam side and down river.

166. The flashboards are no longer present on the dam in their originally designed 1875 configuration. Nor was preservation of the flashboards made a condition of the license for the Lowell Project in 1983. The interpretive exhibits that Boott will be required to install will mitigate the effects of changing the crest control system from informal to mechanical, and will preserve information about the dam's historic functionality. The dam's engineering association with James B. Francis will be preserved, and its historic association with the locks, canals, and mills will not be altered. The design and color of the crest gate system will mimic the appearance of the flashboard system. The sight and sound of water falling over the crest of the dam will still be present during times of high flows. The Advisory Council's assessment does not recognize the mitigation measures that will be required.

10. The Advisory Council's Project-Specific Recommendations

167. The Advisory Council makes five project-specific recommendations. Most of these have already been addressed in our response to the Advisory Council's comments. We discuss them briefly below.

168. First, the Advisory Council strongly recommends that the Commission not approve the proposed amendment. We believe it represents the best balance of all affected resources.

169. Second, the Advisory Council recommends that, before considering any modifications to the dam, the Commission should re-examine the purpose and need used to justify the project and any resulting requirements, and fully consider the significance of the historic properties affected. We have done this, and do not believe that any further analysis is warranted.

170. Third, the Advisory Council recommends that the Commission require Boott to focus on an alternative that relies on rehabilitating the historic flashboard system as originally designed across the entire length of the dam. The Advisory Council notes that the Massachusetts SHPO made a similar recommendation early in the section 106 process. The Advisory Council recommends that the Commission evaluate claims that the historical flashboard system worked appropriately as designed in response to high water events and also facilitated drain-down and dry out of the river system soils during the time required to refurbish flashboards after failure. The Advisory Council further recommends that the Commission should take into account the damage to the dam and compromise of the original functionality of the flashboard system that resulted from Boott's changes to the flashboards since receiving its license in order to increase the average elevation of the head pond. According to the Council, these changes include increasing pin diameter and strength, reducing the spacing between pins, using plywood instead of flashboards, and increasing the height of flashboards to five feet above the capstones.

171. We disagree with this recommendation. The no-action alternative that staff considered in the EA is essentially the same as the historic flashboard system. Moreover, the license does not specify the type of flashboards that can be used. Rather, it only specifies the height of the boards and the strength, diameter, and height of the pins. We could not require Boott to reinstall a replica of the historic flashboard system without reopening and amending the license. Nor do we find any basis for doing so. In 2008, Commission staff required Boott to make changes to the pin strength and height to ensure that the flashboards would fail as designed. Since that time, the flashboads have operated in essentially the same manner as they did historically. The information in the record about the functionality of the historic flashboard system is anecdotal. Even if Boot were to attempt to re-create the historic flashboard system, it would not necessarily function in the same manner. Moreover, the increased frequency of major flood events such as those that occurred in 2006 and 2007 would override any benefits that might otherwise be thought possible. We find no basis for requiring any further analysis of the historic flashboard system.

172. Fourth, the Advisory Council recommends that the Commission evaluate Pawtucket Dam, the Historic District, Lowell Park, and the Preservation District as encompassing a historic landmark and traditional cultural landscape. The Advisory Council further recommends that the Commission should select only alternatives that are consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, the Park Service's Preservation Brief 36: Protecting Cultural Landscapes

(1994), and the Park Service's Guidelines for the Treatment of Cultural Landscapes (1996).

173. We disagree with this recommendation, as it would elevate historic preservation concerns above all other resource considerations. Pawtucket Dam is a licensed project work of an operating hydroelectric project, and the FPA requires us to consider all aspects of the public interest in determining whether and under what conditions to amend the project's license.

174. Fifth, the Advisory Council recommends that, given the significance of the resources affected, the Commission should require Boott to prepare a master plan for that portion of the Merrimack River system affected by operation of the Lowell Project. The Council recommends that this plan should be developed in collaboration with Lowell Park, the City of Lowell, and municipalities with jurisdiction over the river and riverbanks, and should identify opportunities and alternatives for restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and handicapped access required for continuous use. The Council adds that the plan should address appropriate measures to modify aspects of the hydro facility operation that affect significant visual, atmospheric, or audible elements associated with significant features of Pawtucket Dam, the Historic District, Lowell Park, and the Preservation District.

175. We disagree with this recommendation. It reaches far beyond the effects of the Lowell Hydroelectric Project and is not needed.

11. The Advisory Council's General Agency Recommendations

176. The Advisory Council makes six general agency recommendations based on its review of this project, which it states has highlighted the need for the Commission to review and update its protocols for compliance with section 106 to better reflect the consultative nature of the process and the responsibility to explore a full range of alternatives. We address these general agency recommendations briefly below.

177. First, the Advisory Council recommends that the Commission should follow the section 106 regulations and formally notify the SHPO regarding delegating the applicant to initiate the section 106 process. The Council states that informal delegation or the applicant's efforts to identify historic properties and assess effects before the federal agency is formally involved can often create confusion.

178. We already do this. We designate the applicant as our non-federal representative to gather information and initiate the section 106 process, but retain the responsibility to make all of the necessary findings under section 106.

179. Second, the Advisory Council recommends that, in accordance with its regulations, the Commission should be more expansive in identifying and inviting potential consulting parties into the section 106 consultation. Specifically, the Council

recommends that individuals and organizations with a demonstrated interest in an undertaking may participate as consulting parties due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with effects to historic properties. The Advisory Council states that it interprets these characteristics broadly and encourages agencies to do likewise.

180. The Commission involves interested individuals and organizations in its proceedings though opportunities for public comment and involvement in its environmental review process, as well as its section 106 review process. However, because of the quasi-judicial nature of its licensing and amendment proceedings, the Commission is limited in its ability to invite numerous individuals and organizations to participate as consulting parties for purposes of its section 106 review. Our practice reflects the nature of our licensing and amendment proceedings and the many opportunities for public involvement that they provide.

181. Third, the Advisory Council states that the Commission's rules regarding ex parte communications can create an impediment to open and inclusive consultation. The Council recommends that we review them to determine if there are ways to make our compliance procedures more compatible with section 106 policies and goals.

182. We recognize that our ex parte rules can make consultation more formal than might otherwise be possible. However, these rules protect the integrity of our quasi-judicial decision making. Over the years, the Commission has considered numerous requests to change these rules but has concluded that it would not be appropriate to do so. We do not believe that it is unduly burdensome to ensure that consultation occurs on the record, with an opportunity for all interested persons to be present to observe the consultation.

183. Fourth, the Advisory Council states that the Commission must give serious consideration to the impact of its actions on historic properties and cultural heritage as it considers the technical aspects and program goals of its undertakings.

184. We agree. The Commission is required to do this in all of its licensing and amendment proceedings for which historic preservation is an issue, and we did so in this case.

185. Fifth, the Advisory Council states that the Commission has an obligation under section 106 to actively explore a full range of alternatives that can avoid, minimize, or mitigate the adverse effects of its proposed actions. The Advisory Council adds that the development of alternatives should not be left exclusively to the applicant, or imposed on consulting parties.

186. We agree that the Commission is required to explore a full range of alternatives to the proposed action, and that, to the extent possible, alternatives should include those that will also avoid, minimize, or mitigate adverse effects to historic properties. Commission

staff and the consulting parties made every effort to identify and develop such alternatives in this case. The fact that they were unable to agree on mitigation measures does not mean that the Commission did not explore a full range of alternatives.

187. Sixth, the Advisory Council recommends that the Commission develop procedures to comply with section 110(f) of the NHPA when an undertaking may affect a National Historic Landmark.

188. We disagree that specific procedures for Landmark properties are needed. The statutory requirement that federal agencies "to the maximum extent possible" must undertake such planning and actions as may be necessary to minimize harm to Landmark properties can be addressed through the section 106 process. The Advisory Council already has specific regulations regarding Landmark properties, which the Commission followed in this case. There is no need for the Commission to develop specific regulations that would duplicate those of the Advisory Council.

12. Structural and Dam Safety Concerns

189. As noted earlier, Boott's original design required capping the dam with concrete and placing piers at the ends of the dam and at each angle in its crest. Boott proposed an alternative design on February 2, 2012, that would place the crest gate on a steel frame anchored through the dam into bedrock, to avoid capping the dam with concrete and eliminating the piers. The drawings include cross section and profile views of the general design for the pneumatic gate system. The conceptual design relies on a steel crest gate anchorage assembly which would be attached by rock anchors through the dam and into the underlying bedrock. Boott explained that this installation method would avoid placing a concrete slab on top of the uneven dam capstones to provide a level surface for the crest gate system. Boott did not specify materials or dimensions, and did not include supporting design calculations. During consultation, Boott further refined the design with concept drawings on July 18, 2012, combining structural steel and rock anchors with reinforced concrete infill in order to address some technical comments raised by staff of Interior's Bureau of Reclamation (Reclamation).[67]

190. The Advisory Council states, without elaboration, that the proposed action may diminish the long term physical integrity of the dam. The Council states that this may occur as a result of potential changes in the flow and fall of water as it impacts the capstones, as well as the methods of anchoring the crest gates that may damage the

[67] *See* letter from Celeste Bernardo, Lowell Park, to Victor Engel, Boott (filed Oct. 18, 2012), with July 18, 2012 concept drawings attached.

capstones or compromise the dam's ability to achieve natural movement in response to changing flows. Interior raises similar concerns and attaches Reclamation's analysis.[68]

191. Reclamation states that, regardless of the final technical details, attaching the proposed crest gate system to the historic masonry dam would cause stress-related deformation and thermally-induced differential movement within the granite stonework, resulting from the stronger, rigidly anchored longitudinal reinforced concrete and steel structure. The highly localized differential movement would cause excessive joint opening and mortar cracking, well beyond what the dam has experienced historically. This differential movement and joint opening would lead to a substantial decrease of the dam's water penetration resistance and lead to greater freeze-thaw and erosion damage to the masonry joints. The gates would allow overtopping water to impinge on the cap stone's open mortared joints, which could induce higher than normal hydrostatic pressures within the joints/structure creating overall instability. Reclamation concludes that these factors would structurally compromise and reduce the longevity of the structure.

192. Based on a review of the February 2, 2012 and July 18, 2012 designs by the Commission's Division of Dam Safety and Inspections (D2SI), we find that further analysis and design refinement are needed for the anchoring system. The licensee must provide calculations to show the anchoring system is integrated to the reinforced concrete infill in order to distribute the load over the structure. Also, additional details are needed to ensure that water overtopping the gate would not impinge and degrade mortar joints or seep into the joint between the concrete infill and existing dam causing freeze thaw/damage. Although more information and refinement are needed on the design, we find no reason why a pneumatic crest gate system cannot be designed to adequately address the above technical comments.

193. Before the Commission authorizes construction for any project, D2SI performs a detailed review of the design calculations and plans and specifications. The licensee typically submits its plans and specifications and supporting design report after the Commission has authorized the proposed modifications and at least 60 days before the proposed start of construction. As part of its pre-construction review, D2SI will consider issues concerning the distribution of anchor load over the structure and prevention of flows impinging and collecting on the dam crest, as well as any other issues that might arise from the division's review, before authorizing the licensee to start construction.

---

[68] *See* letter from John Trojanowski, Interior, to Wayne Donaldson, Advisory Council (dated Feb. 15, 2013), attached to Interior's February 26, 2013 letter to the Commission Secretary.

13. Consideration of Alternatives under NEPA

194. Interior argues that the Commission has failed to consider a reasonable range of alternatives under the National Environmental Policy Act (NEPA). Interior maintains that the EA defined the purpose of the proposed action as "to address concerns expressed by residents about flooding caused by Pawtucket Dam operations." [69] Interior concludes that the alternatives analyzed in the EA were intended to serve this purpose, but the Commission failed to consider and develop other alternatives that could also serve this purpose. Although Interior contends that the range of alternatives considered in the EA was inadequate, the only alternative that Interior mentions as warranting further consideration is re-installation of the historic flashboard system.

195. Interior misunderstands the purpose of the proposed action. The EA states that the applicant filed its amendment request in an effort to address residents' concerns about flooding. However, that was not the only purpose of the proposed amendment. The proposed crest gate system affects multiple resources and can serve a number of different purposes, including increased generation, attenuation of upstream flooding, improved dam and worker safety, and benefits to recreation, fish and wildlife resources, and fish passage. The purpose of this proposed action is to determine whether or under what conditions to approve Boott's request to install a pneumatic crest gate system.

196. In Commission practice, a proposed action results from a specific license or amendment application. This requires the Commission to determine whether to approve the request, and if so, under what conditions. Thus, an appropriate range of alternatives typically includes the applicant's proposal, the applicant's proposal with additional or different mitigation measures, and denial of the application (the no-action alternative).

197. The EA examined the effects of Boott's proposal and two alternatives: Boott's proposal with additional staff-recommended measures, and the no-action alternative of retaining the existing flashboards. As we have seen, the existing flashboards approximate the historic flashboard system. This is a reasonable range of alternatives for an EA.[70]

14. The Need for a Supplemental EA

198. Interior argues that, because the applicant's proposed design changes to the crest gate system were not analyzed in the EA, the Commission's finding of no significant impact is inapplicable and there is a need to supplement the EA.

---

[69] EA at 3.

[70] *See Richard Balagur*, 57 FERC ¶ 61,315, at 62,018 (1991), *aff'd sub nom. Friends of the Ompompanoosuc v. FERC*, 968 F.2d 1549, 1556-56 (2nd Cir. 1992).

199. This is incorrect. The EA analyzed the environmental effects of installing the crest gate system on the full range of affected resources. Boott's subsequent design changes are minor adjustments that do not require a supplemental EA

200. Under the Council of Environmental Quality's regulations, a supplement to an environmental impact statement is required if an agency makes substantial changes in the proposed action that are relevant to environmental concerns, or there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.[71] There are no regulations concerning supplements to an EA. In any event, Boott's proposed design changes to the pneumatic crest system are not substantial, and would not constitute significant new circumstances or information within the meaning of the rule. Rather, they are minor design changes made in response to comments from interested resource agencies. Applicants, agencies, and Commission staff frequently suggest these types of changes in response to comments made during consultation under section 106 of the NHPA. There is no need to supplement the EA to consider them.

Aquatic and Fish Resources

A. Anadromous Fish and Fish Passage

201. The Merrimack River supports an anadromous fish community including Atlantic salmon, American shad, alewife, and blueback herring.[72] The Lowell Project is the second hydroelectric dam encountered by anadromous fish during their upstream migration, and has a fish lift and a modified Ice Harbor fish ladder to provide upstream passage. Though surveys indicate that the habitat upstream of the Pawtucket Dam could support a run of one million shad annually, a 2002 study concluded that few shad are able to access this habitat even if they enter the project's tailrace area.

202. The preferred method for upstream passage at the Lowell Project is the fish lift at the powerhouse. Despite adjustments made to improve the performance of the fish lift during the 2010 season (including increasing the attraction flow to 125 cfs), recent counts indicate that only 8 percent of the river herring and 5 percent of the American shad that successfully pass the Essex dam (the first dam on the Merrimack River) are also able to successfully pass the Lowell project. These data suggest that further modifications to the facility may be warranted. Additionally, the Pawtucket Dam fish ladder is normally operated only when excess water is spilled at Pawtucket Dam. Flows through the fish ladder during operation are 200 cfs, including attraction flows; the ladder is designed to

[71] *See* 40 C.F.R. §1502.9(c)(1) (2012).

[72] Alewife and blueback herring are collectively referred to as "river herring."

operate at river flows up to 25,000 cfs. Because fish counts are not performed at the ladder, the passage efficiency of the Pawtucket Dam ladder has not been established.

203. As designed and in actual operation, the existing flashboard system that the Commission approved in 2008 has a higher frequency of failure compared to the pre-June 2008 system. During the migratory season, flashboard failures require impoundment drawdowns to facilitate repairs, which can delay the start of or interrupt ongoing fish passage measures by reducing the net head (and thus flow) in passage structures. In addition, flashboard system leaks or failure may introduce uncontrollable spillage at the dam, creating a false attraction for migrating fish and resulting in a greater period of time during which fish ladder operations are required. If the leakage or failure occurs at the eastern end of the dam, flows on the opposite side of the bypassed reach channel could exceed the fish ladder's 200-cfs attraction flow releases, creating a false attraction which may draw migrating fish away from the fish ladder approach channel. Fish attracted to the bypassed reach instead of the fish lift would be subject to passage delays if the fish ladder is not operating or subject to passage with an unknown efficiency if the fish ladder is operating.

204. In the EA, staff concluded that the proposed pneumatic crest gate system would minimize upstream passage delay or inefficiency at both the fish lift and the fish ladder, by eliminating false attraction flows that originate from wooden flashboard leaks or failures. This could result in greater use of upstream habitat for spawning and rearing by American shad and river herring, a beneficial cumulative effect. Federal and state fishery agencies on the Technical Committee from both New Hampshire and Massachusetts strongly support the proposed pneumatic crest gate to enhance upstream anadromous fish passage at the Lowell Project. As river herring are currently under review to determine if they warrant a "threatened" listing on the endangered species list,[73] ensuring expedient upstream migration to spawning grounds would benefit both species. Additionally, improved upstream passage would help with the establishment of a viable American shad fishery upstream of Lowell, thus enhancing fishing opportunities, increasing fishing license sales, and benefiting the local economy.

205. In order to protect upstream and downstream migrating fish during crest gate construction, staff recommended in the EA that the licensees follow time-of-year in-water restrictions. Therefore, the licensees should not perform in-water silt-producing work or work that would obstruct the waterway from April 1 to July 15 to protect upstream migrating fish, and the licensees' construction plans should allow for passage of downstream migrating fish from September 1 to November 15.

---

[73] "Listing Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List Alewife and Blueback herring as Threatened Under the Endangered Species Act," 76 Fed. Reg. 67,652-67,656 (Nov. 2, 2011).

B. Resident Fish

206. The Merrimack River main stem supports a warm water resident fish community including smallmouth bass, largemouth bass, yellow perch, brown bullhead, chain pickerel, and various species of sunfish, minnows, and suckers. Most resident fish in the project impoundment are likely to spawn during June and July. Depending on the species, fish may either deposit eggs in nests built in shallow water habitats, or deposit eggs in habitats with appropriate submerged aquatic vegetation. Upon hatching, the young fry often remain closely associated with those habitats.

207. The current wooden flashboard system can cause both high impoundment levels, as the flashboards may not fail predictably, and low impoundment levels, because flashboard repair may require lowering the impoundment for work to occur. Fluctuations in the impoundment may have a detrimental impact on resident fish during spawning and early life stages, as habitats used during those life stages could be dewatered during drawdowns.

208. In the EA, staff concluded that the proposed pneumatic crest gate system would reduce the frequency of impoundment drawdowns from June through July, thus reducing the potential for shoreline-spawning, nest-building fish to have their nests dewatered during egg incubation. Additionally, staff found that reducing the number of drawdowns during August and September could also minimize stranding of fish fry that may either still be in shoreline nests or using shoreline submerged vegetation for cover. Consequently, up to 46 miles of near shore aquatic habitat could benefit from installing the proposed pneumatic crest gate system (the effect of drawdowns would attenuate with distance upstream from the dam). Resident fish upstream of the project would benefit from the reduced frequency of sudden and extended drawdowns, because the river would behave more like an unregulated river and nearshore spawning and nursery habitat would remain submerged.

C. Erosion and Sediment Control

209. The licensee's revised method for installing the proposed pneumatic gate crest system, filed with the Commission on February 2, 2012, is expected to result in little need for impoundment fluctuations during construction. However, it will still be necessary to draw down the impoundment to facilitate installing the cofferdam upstream of the dam, which could lead to release of silt and other sediment to the Merrimack River. If upstream migrating anadromous fish encounter substantial suspended sediment plumes, there may be delays in upstream passage until more natural conditions return. To ensure that construction activities have a minimal and temporary effect on sediment transport, and to minimize the potential for sedimentation to impact migratory fish passage, staff recommended in the EA and we agree that the licensee should develop an erosion and sediment control plan in consultation with the appropriate agencies and for Commission

approval. The plan should specify the best management practices it would implement to control erosion during construction, including details as to how work would be sequenced, how work areas would be dewatered, and how fines in the work area would be managed.

Administrative Conditions

210. The licensees included in their amendment application an Exhibit A project description and Exhibit F drawings reflecting the proposed project modifications. They did not file any Exhibit G drawings, because there would be no change in the project boundary. Ordering paragraph (E) approves the submitted Exhibit A. Ordering paragraph (C) approves the revised Exhibit F drawings as described in that paragraph. Ordering paragraph (D) requires filing of the approved exhibit drawings in specific aperture card and electronic formats.

211. Additionally, Article 304 requires the licensees to file as-built exhibit drawings within 90 days of the completion of construction authorized by this order.

Conclusion

212. As discussed above, we find that the proposed amendment will provide substantial benefits in the form of improved flood control, recreation, fish passage, dam and worker safety and renewable generation, without unacceptably altering or affecting historical properties. We therefore approve it.

The Commission orders:

(A) Boott Hydropower, Inc.'s and Eldred L. Field Hydroelectric Facility Trust's (licensees') application for amendment of license for the Lowell Hydroelectric Project filed on July 6, 2010, and supplemented on March 21, 2011, and February 2, 2012, is approved as provided in this order, effective the day this order is issued.

(B) The project description in ordering paragraph (B)(2) of the April 13, 1983 order issuing a license for the Lowell Project is revised to read in part:

> (2) Project works consisting of: (1) the 1,093-foot-long and 15-foot-high Pawtucket Dam with a 5-foot-high pneumatic crest gate system; (2) a reservoir with a storage capacity of 3,960 acre-feet; (3) the 5.5-mile-long Northern and Pawtucket Canal System; (4) four power stations with a total installed capacity of 7,515 kilowatts (kW) housed in nineteenth century mill buildings along the canal system; and (5) a new power station with an installed capacity of 17,308 kW drawing water from the Northern Canal.

(C) The following exhibit F drawings filed on March 21, 2011, conform to Commission's rules and regulations are approved and are approved and made part of the

license, as labeled and numbered below:

Exhibit	FERC Drawing No.	Title	Superseding
F-6	2790-51	Pawtucket Dam Pan, Elevation and Sections	2790-10
F-51	2790-52	Pawtucket Dam Proposed Crest Gate System	-
F-52	2790-53	Pawtucket Dam Proposed Crest Gate System	-
F-53	2790-54	Pawtucket Dam Proposed Crest Gate System	-
F-54	2790-54	Pawtucket Dam Proposed Crest Gate System	-
F-55	2790-55	Pawtucket Dam Proposed Crest Gate System	-

Superseded Drawing 2790-10 is eliminated from the license.

(D) Within 45 days of the date of issuance of this order, the licensee shall file the exhibit drawings approved in ordering paragraph (C) in aperture card and electronic file formats. (a) Three sets of the approved exhibit drawings shall be reproduced on silver or gelatin 35mm microfilm. All microfilm shall be mounted on type D (3-1/4" X 7-3/8") aperture cards. Prior to microfilming, the FERC Project-Drawing Number (i.e., P- 2790-51) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (i.e., F-6), Drawing Title, and date of this order shall be typed on the upper left corner of each aperture card. See Figure 2.

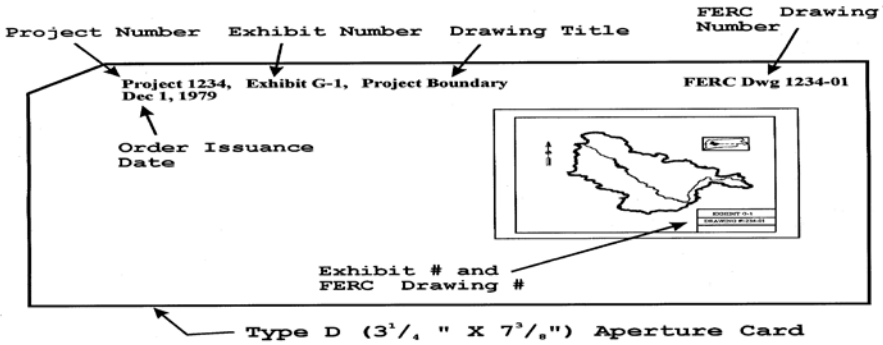

Figure 2.

Two of the sets of aperture cards shall be filed with the Secretary of the Commission, ATTN: OEP/DHAC. The third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office.

(b) The licensee shall file two separate sets of exhibit drawings in electronic raster format with the Secretary of the Commission, ATTN: OEP/DHAC. A third set shall be filed with the Commission's Division of Dam Safety and Inspections New York Regional Office. Exhibit F drawings must be identified as (CEII) material under 18 CFR §388.113(c). Each drawing must be a separate electronic file, and the file name shall include: FERC Project-Drawing Number, FERC Exhibit, Drawing Title, date of this order, and file extension in the following format [P-2790-51, F-6, Pawtucket Dam Pan, Elevation and Sections, MM-DD-YYYY.TIF]. Electronic drawings shall meet the following format specification:

IMAGERY - black & white raster file
FILE TYPE – Tagged Image File Format, (TIFF) CCITT Group 4
RESOLUTION – 300 dpi desired, (200 dpi min)
DRAWING SIZE FORMAT – 24” X 36” (min), 28” X 40” (max)
FILE SIZE – less than 1 MB desired

(E) Pages A-1 through A-9 of the Exhibit A filed with the amendment application are approved.

(F) The licensees shall follow time-of-year in-water restrictions for the protection upstream and downstream migrating fish. The licensees shall not perform in-water silt-producing work or work that would obstruct the waterway from April 1 to July 15, and the licensee’s construction plans shall allow for passage of downstream migrating fish from September 1 to November 15.

(G) Within 90 days from the order of this order, the licensees shall submit for Commission approval a detailed plan for the operation of the crest gate system with specific details on the position of the system with corresponding pool elevations at varying river flows.

(H) To mitigate any adverse effects on historic properties of installing the pneumatic crest gate system, the licensees shall consult with the Massachusetts State Historic Preservation Officer and the Lowell National Historical Park to the extent possible, and shall implement the following measures:

(a) The licensees shall design and install two interpretive exhibits, one featuring a replica of the original flashboard system and one featuring the new crest gate system, to be located at the Project to enhance visitor understanding of the history of Pawtucket Dam and the Lowell

Hydroelectric Project. To the extent possible, the licensees will develop the interpretive displays and determine their location in consultation with the National Park Service.

(b) The licensees shall design the compressor house with materials and colors that are compatible with the historic fabric of the adjacent architecture, to ensure that the compressor house resembles nineteenth century buildings in Lowell, particularly the nearby Northern Canal Gatehouse.

(c) To mimic the existing dam's appearance, the licensees shall use a brown-colored bladder, paint the downstream side of the crest gate panels brown, and install black retaining straps an average of 20 inches on center, to ensure that the crest gate system is similar in appearance to the existing wooden flashboards.

(d) These activities shall be carried out under the authority of the Commission by or under the direct supervision of a person or persons meeting at a minimum the Secretary of Interior's Professional Qualifications Standards (48 Fed. Reg. 44738-39) in the appropriate discipline. However, nothing in this requirement may be interpreted to preclude the Commission or any agent or contractor thereof from using the properly supervised services of persons who do not meet the Professional Qualifications Standards.

(I) The licensee is also subject to the following additional articles:

Article 301. Start of Construction. The licensees shall commence construction of the project works authorized by this order within 2 years from the issuance date of this order and shall complete construction within 4 years from the issuance date of this order.

Article 302. Commission's Review of Contract Plans and Specifications. At least 60 days prior to the start of any construction, the licensees shall submit one copy of its plans and specifications and a supporting design document to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer, and two copies to the Commission (one of these shall be a courtesy copy to the Director, D2SI). The submittal to the D2SI-New York Regional Engineer must also include as part of pre-construction requirements: a Quality Control and Inspection Program, Temporary Construction Emergency Action Plan, and Soil Erosion and Sediment Control Plan. The licensees may not begin any land-disturbing activities until the D2SI – New York Regional Engineer has reviewed and commented on the plans and specifications, determined that all preconstruction requirements have been satisfied, and authorized the start of construction.

The Soil Erosion and Sediment Control Plan shall specify the best management practices the licensee will implement to control erosion during construction, including, at

a minimum, details as to how work would be sequenced, how work areas would be dewatered, and how fines in the work area would be managed. The plan shall be developed in consultation with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, National Park Service, Massachusetts Division of Fisheries and Wildlife, Massachusetts Division of Marine Fisheries, Massachusetts Department of Environmental Protection, and New Hampshire Department of Fish and Game, and the plan shall be provided to the agencies for a minimum 30 day comment period. The plan must include agency comments and the licensee's response to agency comments.

Article 303. Cofferdam Construction. The licensees shall review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction and shall ensure that construction of cofferdams and deep excavations are consistent with the approved design. At least 30 days before starting construction of any cofferdams or deep excavations, the licensees shall submit one copy to the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer and two copies to the Commission (one of these copies shall be a courtesy copy to the Commission's Director, D2SI), of the approved cofferdam and deep excavation construction drawings and specifications, and the letters of approval.

Article 304. As-built Exhibits. Within 90 days of completion of construction of the facilities authorized by this order, the licensees shall file for Commission approval, revised Exhibits A, F, and G, as applicable, to describe and show those project facilities as built. A courtesy copy shall be filed with the Commission's Division of Dam Safety and Inspections (D2SI) – New York Regional Engineer; the Director, D2SI; and the Director, Division of Hydropower Administration and Compliance.

(J) The licensees' request to modify the flashboard design during interim period between the approval of the amendment and completion of construction of the crest gate system is denied. The flashboard configuration shall remain the same as it has been in place since July 2008.

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

(L) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the FPA, 16 U.S.C. § 825*l* (2006), and section 385.713 of the

Commission's regulations, 18 C.F.R. § 385.713 (2012). The filing of a request for rehearing does not operate as a stay of the effective date of this amendment or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.