ENVIRONMENTAL ASSESSMENT FOR SMALL HYDROELECTRIC PROJECT EXEMPTION

Albion Dam Hydroelectric Project FERC Project No. 14633-001 Rhode Island

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

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ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission Office of Energy Projects Division of Hydropower Licensing Washington, DC

Albion Dam Hydroelectric Project FERC Project No. 14633-001, Rhode Island

1.0. APPLICATION

On October 1, 2018, New England Hydropower Company, LLC (NEHC) filed an application with the Federal Energy Regulatory Commission (Commission) for a small hydroelectric [10 megawatt (MW or less)] exemption from licensing for its proposed 420-kilowatt (kW) Albion Dam Hydroelectric Project No. 14633 (Albion Project). The project would be located on the Blackstone River, near the towns of Cumberland and Lincoln, Providence County, Rhode Island (Figure 1). The project would not occupy any federal lands.

2.0. PURPOSE OF ACTION AND NEED FOR POWER

2.1. Purpose of Action

The Commission must decide whether to grant NEHC an exemption from licensing for the Albion Project and what conditions, if any, should be included in any exemption issued. Issuing an exemption from licensing for the Albion Project would allow NEHC to generate electricity, making about 2,034 megawatt-hours (MWh) of electric power from a renewable resource available to the region annually.

In this Environmental Assessment (EA), we assess the effects of constructing and operating the project as proposed by NEHC, and alternatives to the proposed project, including a no-action alternative; and recommend conditions to become a part of any exemption from licensing that may be issued.

2.2. Need for Power

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



Figure 1. Location of the proposed Albion Project and other hydroelectric projects in the Blackstone River Basin (Source: staff).

3.0. PROPOSED ACTION AND ALTERNATIVES

3.1. Proposed Action

3.1.1. Project Description

The proposed Albion Project (Figure 2) would consist of: (1) an existing 266foot-long concrete gravity dam, known as the Albion Dam, with an ogee spillway and a crest elevation of 86.7 feet North American Vertical Datum of 1988 (NAVD88); (2) an existing 18-acre impoundment with a storage capacity of 235 acre-feet at an elevation of approximately 87.0 NAVD88; (3) a new 51-foot-long, 45.75-foot-wide intake canal; (4) two new 14-foot-wide, 10.4-foot-high hydraulically-powered sluice gates, each equipped with a 15-foot-wide, 9.7-foot-high steel trashrack with 9-inch clear-bar spacing; (5) two new 30-foot-long, 15-foot-wide, 9.7-foot-high concrete penstocks; (6) a new 50foot-long, 24-foot-wide, 18-foot-high concrete powerhouse containing two 210-kilowatt (kW) Archimedes Screw Turbine (AST) generating units, for a total installed capacity of 420 kW; (7) a new 50-foot-long concrete tailrace; (8) a new step-up transformer and 500foot-long, above-ground transmission line connecting the project to the distribution system owned by the Narragansett Electric Company; (9) a new access road; (10) a parking area that would accommodate approximately six cars; and (11) appurtenant facilities.

During operation, water would pass from the impoundment to the intake canal and sluice gates, and then into the penstocks before reaching the powerhouse. After passing through the AST-generator units, water would be discharged through the tailrace to the downstream reach of the Blackstone River. The proposed project would bypass approximately 100 feet of the Blackstone River. Power would be transmitted to the regional distribution grid. The proposed project would annually generate approximately 2,034 megawatt-hours.



Figure 2. Proposed Albion Project Site Plan (Source: staff).

3.1.2 Project Boundary

NEHC proposes a project boundary for the Albion Project that encompasses approximately 22.8 acres of land and water, including: (1) the impoundment (approximately 18 acres); and (2) the land underlying project structures. The proposed project boundary does not include federal land.

3.1.3 Project Operation

NEHC proposes to operate the project in a run-of-river mode, such that outflow approximates inflow at all times, and water levels in the impoundment are not drawn down for electric generation. NEHC proposes to maintain run-of-river operation using water-level sensors to remotely monitor the impoundment and downstream reach, and an automatic controller to operate the ASTs and sluice gates.

NEHC proposes to maintain a "conservation" flow release of 100 cubic feet per second (cfs) from the impoundment to the bypassed reach at all times. The two ASTs would have a minimum hydraulic capacity of 30 cfs each and a maximum hydraulic capacity of 611 cfs. At flows less than 130 cfs (the minimum operating capacity of the project plus the proposed 100-cfs conservation flow), the project would not operate, and all flow would be passed over the dam. At flows between 130 cfs and 711 cfs, the project would operate and the 100-cfs conservation flow would be passed over the dam. At flows greater than 711 cfs, the project would operate at its maximum hydraulic capacity and all remaining flow would pass over the dam.

3.1.4 Proposed Measures

In addition to operating the project in a run-of-river mode and releasing a 100-cfs conservation flow, as described above, NEHC proposes the following environmental measures:

Implement the following measures to minimize project effects on fish: (1) install turbines that utilize the AST technology to reduce project effects on fish seeking passage downstream of the project; (2) install a rubber bumper on the leading edge of the turbine screws to minimize/avoid injury to fish; (3) remove sharp edges and pinch points on the ASTs to minimize/avoid injury to fish; (4) construct the outlet works to minimize obstructions, including smoothing the concrete channel to allow uniform passage around the turbines and through the tailrace; and (5) construct the end of the tailrace to disperse the water at the point of discharge to the Blackstone River to reduce the potential for effects of false attraction on upstream migrating fish;

- Install a trashrack with clear bar spacing of no less than 9 inches to allow resident and migratory fish to use the ASTs for downstream passage when the project is operating;
- Limit in-water construction to periods of low flow (July 1 to September 30);
- To protect water quality and habitat in the bypassed reach, release an interim conservation flow of 100 cfs, or inflow (if less), uniformly across the dam as spill until a permanent conservation flow has been determined;
- Develop an operation compliance monitoring plan for run-of-river operation and the minimum flow release;
- Develop a bypassed reach flow study plan that includes provisions for conducting a study after the project commences operation to determine whether the 100-cfs conservation flow is sufficient to protect aquatic resources in the bypassed reach, or if a higher flow is warranted;
- Implement an impoundment refill procedure following drawdowns for maintenance or emergency purposes, whereby 90 percent of inflow is passed downstream and the impoundment is refilled by the remaining 10 percent of inflow to the project;
- Implement best management practices (BMPs) for minimizing impacts to water quality associated with soil erosion and sedimentation during project construction, including the installation of erosion control barriers for ground disturbance in upland areas and sediment control barriers for in-water construction activities;
- Conduct water quality monitoring during the low-flow season (July 1 October 31) for 3 years after the project commences operation to verify that project operation does not adversely affect water temperature or dissolved oxygen levels in the Blackstone River;
- Provide upstream passage for anadromous fish within 3 years of notification by the U.S. Fish and Wildlife Service (FWS) or the Rhode Island Department of Environment Management (DEM) that the fishway is needed;
- Within 3 years of receiving notification from the FWS or the Rhode Island DEM that upstream anadromous fish passage facilities are needed, develop a fish passage facilities effectiveness study plan;
- Conduct an upstream eel passage facility siting survey during the first passage season after the project commences operation, and construct the eel passage facility within three years of commencing project operation;

- Conduct a study to determine the effects of the ASTs on fish during the first downstream fish passage season after the project commences operation, and develop protective measures at the project if the study indicates that the project does not provide safe, timely, and effective downstream fish passage;
- Develop a fish passage facilities operation and maintenance plan detailing how and when the fishways will be operated and maintained;
- Conduct a pre-construction freshwater mussel survey to identify the location of any mussels in the project area, and, if the survey indicates that construction activities would affect mussels, then develop and implement a freshwater mussel monitoring and relocation protocol that includes measures for monitoring specific locations in the Blackstone River during construction and relocating exposed mussels to wetted areas;
- Develop an invasive plant species monitoring and control plan that includes provisions for identifying and mapping existing invasive plant species within the project boundary, monitoring the area periodically for invasive plant species, and initiating an early detection, rapid response protocol for infestations;
- Implement a tree cutting restriction between April 1 and October 31 during project construction to protect the northern long-eared bat;
- Construct a parking lot to accommodate approximately six cars to provide walking and fishing access at the project;
- Install a floating safety boom across the intake channel that includes signage to warn boaters of the turbines; and
- Implement the following measures to minimize the effect of the project on known historic properties that are eligible for or listed on the National Register: (1) install interpretive signage to educate the public about the historic nature of hydropower and the significance of the National Register-eligible Albion Dam and Mill; (2) design the project (including the powerhouse, concrete retaining walls, and riprap) in a manner that minimizes the visual impacts of the project on the historical setting, in consultation with the Rhode Island State Historic Preservation Officer (SHPO); and (3) prior to construction, provide a record of the Albion Dam in the Rhode Island Historic Resources Archive (including photographs and a written narrative of the Albion Dam).

3.2 Section 30(c) Conditions

Pursuant to section 30(c) of the FPA, 16 U.S.C. § 823a(c), federal and state fish and wildlife agencies have mandatory conditioning authority on exempted projects. The

U.S. Department of the Interior (Interior) filed such conditions on August 7, 2019. (*see* Appendix A). The conditions are summarized below. Rhode Island DEM did not file any section 30(c) conditions.

- Operate the project in a run-of river mode, whereby outflow to the project approximates inflow at all times;
- Release an interim conservation flow of 100 cfs, or inflow (if less), uniformly across the dam as spill until a permanent conservation flow has been determined to protect water quality and habitat in the Blackstone River in the bypassed reach;
- Prepare and implement a bypassed reach flow study plan that includes provisions for conducting a bypassed reach flow study after the project commences operation to determine whether the 100-cfs conservation flow regime is sufficient to protect aquatic resources in the bypassed reach, or if a higher flow is warranted;
- Develop and implement an operation compliance monitoring plan for run-of-river operation and the minimum flow release;
- Implement an impoundment refill procedure whereby, during impoundment refilling after drawdowns for maintenance or emergency purposes, 90 percent of inflow is passed downstream and the headpond is refilled on the remaining 10 percent of inflow to the project;
- Install a trashrack with clear spacing of no less than 9 inches;
- Conduct a water quality monitoring survey 3 years after the project commences operation to verify that project operation does not adversely affect water temperature or dissolved oxygen levels in the Blackstone River;
- Conduct an upstream eel passage facility siting survey during the first passage season after the project commences operation, and construct an upstream eel passage facility that provides eel passage within three years of the commencing project operation;
- Provide upstream passage for anadromous fish within 3 years of notification by the FWS or Rhode Island DEM that such fishways are needed;
- Within 3 years of receiving notification from the FWS or the Rhode Island DEM that upstream anadromous fish passage facilities are needed, develop a fish passage facilities effectiveness study plan;
- Conduct a study to determine the effects of the ASTs on fish during the first downstream fish passage season after the project commences operation, and

develop protective measures at the project if the study indicates that the project does not provide safe, timely, and effective downstream fish passage;

- Develop a fish passage facilities operation and maintenance plan detailing how and when the fishways will be operated and maintained;
- Conduct a pre-construction freshwater mussel survey to identify the location of any mussels in the project area, and, if the survey indicates that construction activities would affect mussels, then develop and implement a freshwater mussel monitoring and relocation protocol that includes measures for monitoring specific locations in the Blackstone River during construction and relocating exposed mussels to wetted areas;
- Develop an invasive plant species monitoring and control plan that includes provisions for identifying and mapping existing invasive plant species, monitoring the area periodically for invasive plant species, and initiating an early detection, rapid response protocol for infestations;
- Notify FWS and Rhode Island DEM when the project commences commercial operation, and provide them with a set of as-built drawings;
- Allow the FWS and Rhode Island DEM to inspect the project area at any time while the project operates to monitor compliance with their terms and conditions;
- Reservation of authority to revise and add terms and conditions to the exemption to carry out its responsibilities with respect to fish and wildlife resources; and
- Include the section 30(c) conditions in any conveyance (by lease, sale or otherwise) of the exemptee's interests.

3.3 Additional Staff-Recommended Measures

The staff alternative includes NEHC's proposed measures, the section 30(c) conditions filed by FWS, and the following additional staff-recommended measures and modifications:

- Develop and implement a soil erosion and sedimentation control plan that includes specific BMPs for minimizing soil erosion and sedimentation during project construction;
- Prior to construction, develop and implement a contaminated soil and sediment test and disposal plan that includes measures for handling and properly disposing of any contaminated soils and sediments disturbed during construction activities, including: (1) a description of the methods to be employed in testing disturbed

soil and sediments during construction; (2) a description of the mitigation measures proposed to minimize inputs of contaminated soil and sediment into the water column during construction and other sediment-disturbing activities; and (3) an implementation schedule;

- Prior to providing upstream passage for anadromous fish within 3 years of notification by the FWS or Rhode Island DEM that such fishways are needed, file a plan for the upstream passage for Commission approval;
- Prior to implementing any upstream passage facilities effectiveness plan, file the plan with the Commission for review and approval;
- When conducting project maintenance activities, avoid cutting trees greater than 3 inches in width at breast height, between April 1 and October 31, to protect the northern long-eared bat; and
- Develop a Historic Properties Management Plan (HPMP) in consultation with the Rhode Island SHPO to protect historic properties that are eligible for or listed on the National Register, including the Albion Dam.

3.4 No-Action Alternative

Under the no-action alternative (*i.e.*, denial of the application), the project would not be constructed. The project would not annually generate an estimated average of 2,034 MWh and environmental resources in the project area would not be affected. This is the baseline against which the action alternatives are compared.

4.0. CONSULTATION AND COMPLIANCE

4.1 Agency Consultation

The Commission's regulations require that applicants consult with appropriate state and federal agencies, tribes, and the public before filing an exemption application. This consultation is required to comply with the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing (or initial) consultation must be completed and documented in accordance with Commission regulations.

4.2 Public Outreach and Scoping

On June 6, 2017, NEHC conducted a pre-filing meeting and site visit at the project location. NEHC invited federal, state, and local agencies and the general public to participate in the meetings and site visit. The Blackstone River Watershed Council, Friends of the Blackstone River, and Rhode Island DEM attended the on-site meeting.

NEHC filed its application for exemption from licensing on October 1, 2018. On October 11, 2018, the Commission issued a public notice tendering the final application for exemption from licensing and soliciting additional study requests. No study requests were filed.

On April 10, 2019, the Commission issued a public notice accepting the exemption application and soliciting motions to intervene and protests by June 9, 2019. None were filed.

On June 11, 2019, the Commission issued a public notice stating the Commission's intent to waive scoping, stating that the application was ready for environmental analysis, and requesting comments, recommendations, and terms and conditions by August 10, 2019. Rhode Island DEM filed comments on August 2, 2019, and Interior submitted comments, recommendations, and terms and conditions on August 7, 2019. No comments were filed on the notice of intent to waive scoping.

4.3 Endangered Species Act

Section 7 of the ESA, 16 U.S.C. § 1536, requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. On January 10, 2020, we accessed FWS's Information for Planning and Consultation (IPaC) database to determine whether any federally listed species could occur in the project vicinity. According to the IPaC database, the federally threatened northern long-eared bat (NLEB) (*Myotis septentrionalis*) could occur in the vicinity of the project.¹ No critical habitat has been designated for the NLEB.

Our analysis of the project impacts on the NLEB is presented in section 5.3.4, *Threatened and Endangered Species*. We conclude that issuing an exemption from licensing for the Albion Project, as proposed with the staff-recommended measures, would not be likely to adversely affect the NLEB.

4.4 National Historic Preservation Act

Section 106 of the NHPA, 54 U.S.C. § 306108, requires that a federal agency "take into account" how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and

¹ See Interior's official list of threatened and endangered species, accessed by staff using the IPaC database (<u>https://ecos.fws.gov/ipac/</u>) on January 10, 2020, and placed into the record for Docket No. P-14633-001 on January 10, 2020.

objects significant in American History, architecture, engineering, and culture that are eligible for inclusion in the National Register.

NEHC initiated consultation with the Rhode Island Historical Preservation and Heritage Commission (*i.e.*, the SHPO) and federally recognized tribes on May 5, 2017, to identify historic properties, determine the eligibility of cultural resources for listing on the National Register, and assess potential adverse effects on historic properties within the area of potential effect (APE) for the project. In a letter dated October 31, 2018,² the Rhode Island SHPO indicated that the construction of the new powerhouse and installation of turbines would have an adverse effect on the Albion Dam, which is a contributing resource to the National Register-listed Albion Historic District. In a letter filed on December 6, 2018, the Mashantucket Pequot Tribe stated that the project does not appear to directly impact any potentially significant religious or cultural resources.

Our analysis of project effects on cultural resources is presented in section 5.3.6., *Cultural Resources, Environmental Effects.* We conclude that constructing the project could have an adverse effect on contributing resources of the Albion Historic District, a listed property on the National Register. Adverse effects related to the construction, operation, and maintenance of project facilities could occur. To meet the requirements of section 106 of the NHPA, we intend to execute a Programmatic Agreement with the Rhode Island SHPO for the protection of historic properties from the effects of construction, operation, and maintenance of the Albion Project. The terms of the Programmatic Agreement would ensure that NEHC protects all historic properties identified within the project's APE from the adverse effects of the project through the development and implementation of an HPMP.

5.0. ENVIRONMENTAL ANALYSIS

This section includes: (1) a general description of the project's vicinity, (2) an explanation of the scope of our cumulative effects analysis, and (3) our analysis of the proposed action and proposed and recommended environmental measures. Sections are organized by resource area (aquatic, recreation, *etc.*). Current conditions are described under each resource area. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed protection, mitigation, and enhancement measures, and any cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 6.0, *Recommended Alternative.*³

² The letter from the Rhode Island SHPO was filed as part of NEHC's revised exemption application on May 9, 2019.

³ NEHC submitted additional information for its exemption application in several

5.1 General Description of the Area

The Albion Project would be located at approximately river mile (RM) 8.2 on the Blackstone River at the site of the existing Albion Dam (Figure 1). The Blackstone River has a total drainage area of 478 square miles with a total length of 48 miles. The river flows from Worcester, Massachusetts, to the Pawtucket No. 2 Hydroelectric Project in Pawtucket, Rhode Island, where it enters the Seekonk River. The Seekonk River is a tidal estuary that extends for approximately 7 miles to the south before combining with the Providence River at India Point. The Blackstone River is the second largest source of freshwater to Narragansett Bay. The Blackstone River drops 438 feet over 48 miles from its headwaters to where it empties into Narragansett Bay (RIDEM, 2008).

Approximately 75 percent of the Blackstone River Basin is located within Massachusetts, with the remainder located in Rhode Island. The proposed project is located in Providence County, Rhode Island in the lower portion of the basin. In Rhode Island, the basin encompasses a portion of the following cities and towns: Burrillville, Glocester, North Smithfield, Smithfield, Woonsocket, Cumberland, Lincoln, Central Falls, and Pawtucket. Primary tributaries to the Blackstone River in Rhode Island are the Branch River, Mill River, Peters River, and Abbot Run Brook. The drainage area at the project is characterized by medium to medium high residential development with highdensity urban development in the City of Woonsocket (RIDEM, 2008).

The topography of the Blackstone River Basin is largely rolling hills. Climate varies by season, with a strong annual temperature cycle, which includes cold winters and warm summers. The average air temperature is approximately 48 degrees Fahrenheit (°F). On average, monthly summer air temperatures are approximately 80°F and winter air temperatures are less than 33°F. Precipitation is greatest in the winter and spring months. Land in the immediate project vicinity is largely residential.

The Blackstone River has not had a natural flow for over two centuries. At one time, 45 dams existed on the Blackstone River along its length through Massachusetts and Rhode Island. According to the U.S. Army Corps of Engineers' *National Inventory of Dams*, there are currently 16 dams on the Blackstone River, some of which are used for hydropower generation (U.S. Army Corps of Engineers, 2019). There are four hydropower projects that operate under a FERC license and one hydropower project that operates under a FERC small hydroelectric power project exemption (see Table 1 and

filings between February 1, 2019 and May 7, 2019. On May 9, 2019, NEHC filed a revised exemption application that incorporated all information filed between February 1, 2019 and May 7, 2019.

Figure 1). The other dams on the Blackstone River are primarily used for flood control, water supply, and recreation.

Dam / Project Name	FERC Project Number	FERC Project Type	Capacity (MW)	Approximate River Mile
Main Street Dam / Pawtucket No. 2	3689	Exemption	1.68	0.0
Slater Mill	NA	NA	NA	0.2
Elizabeth Webbing	NA	NA	NA	0.8
Central Falls	3063	License	0.82	2.0
Ashton	NA	NA	NA	6.8
Albion	NA	NA	NA	8.2
Manville	NA	NA	NA	9.9
Woonsocket Falls	2972	License	1.10	14.0
Saranac Mill	NA	NA	NA	16.2
Blackstone	3023	License	2.00	17.5
Rice City Pond	NA	NA	NA	26.0
Riverdale Mills	9100	License	0.15	30.0
Fisherville Pond	NA	NA	NA	35.0
Blackstone River	NA	NA	NA	36.5
Pleasant Falls Mill	NA	NA	NA	41.5
Quinsigamond Pond	NA	NA	NA	47.0

Table 1. Dams on the Blackstone River.

(Source: staff)

5.2 Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act, a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions (40 C.F.R. § 1508.7). Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the application, we have identified water quality and migratory fish as resources that could be cumulatively affected by construction,

operation, and maintenance of the Albion Project in combination with other activities in the basin, such as the operation of hydroelectric dams, wastewater discharges from agricultural activities, industrial and commercial manufacturing, domestic sewage treatment plants, and subsurface septic tank discharges.

5.2.1 Geographic Scope

The geographic scope of the cumulative effects analysis defines the physical limits or boundaries of the proposed action's effect on the resources, and contributing effects from other hydropower and non-hydropower activities within the Blackstone River Basin. We have identified the Blackstone River Basin from Worcester, Massachusetts to the confluence of the Blackstone River with the Seekonk River in Pawtucket, Rhode Island. as our geographic scope of analysis for water quality, water quantity, and migratory fish.⁴ We chose this geographic scope because the construction, operation, and maintenance of the Albion Project, in combination with other dams and activities in the Blackstone River Basin may affect water quality, and movements of migratory fish⁵ from Worcester, Massachusetts to Narragansett Bay.

5.2.2 Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and future actions and their effects on aquatic resources. Because exemptions are issued in perpetuity, and because it would be unrealistic to predict all future actions in the Blackstone River, we have focused on reasonably foreseeable future actions over the next 30 years. The historical discussion is limited, by necessity, to the amount of available information. We identified the present resource conditions based on the application, agency comments, and comprehensive plans.

⁴ The name of the Blackstone River changes at Pawtucket, Rhode Island. The segment of the river from Pawtucket, Rhode Island to Providence, Rhode Island is called the Seekonk River. The segment of the river from Providence to Warwick, Rhode Island is called the Providence River. The Providence River flows into the Narragansett Bay. The river, although named several different ways, is contiguous from Narragansett Bay to Worcester, Massachusetts.

⁵ Diadromous fish migrate between fresh and saltwater, and include catadromous fish, such as the American eel, which migrate downstream to spawn in saltwater and upstream to feed, grow, and mature in freshwater; and anadromous fish, such as American shad and river herring, which migrate upstream to spawn in freshwater and downstream to feed, grow, and mature in saltwater.

5.3 **Proposed Action and Action Alternatives**

Only resources that would be affected, or about which comments have been received, are addressed in detail in this EA and discussed in this section. Commission staff has not identified any substantive aesthetic or socioeconomic issues associated with the proposed action; therefore, we do not assess effects on these resources in this EA.

5.3.1 Geology and Soils

5.3.1.1 Affected Environment

Physiographic Province

The Blackstone River is located on the border of the New England Upland Province and Seaboard Lowland section (USGS, 2019). The New England Upland Province extends from Canada through New England, and is characterized by undulating hilly topography with streams running in well-graded valleys, and elevations ranging from below 1,000 feet to above 2,000 feet. The Seaboard Lowland section is lower in elevation and less hilly than the New England Upland Province, with small streams and rivers flowing toward the coast, and elevations less than 200 feet in most places. The boundary between these two sections is between 400 and 500 feet in elevation in most places (USGS, 2019).

Geology

The bedrock formation in the project area is the Rhode Island Formation, which is a near-surface Pennsylvanian-age sandstone and siltstone complex. Field observations by NEHC did not identify any exposed bedrock at the project sites and several soil borings at depths of nearly 50 feet did not encounter bedrock.

Soil and Sediment

Overlying soils in the project area are glacial outwash deposits containing quartzite and fine-grained epidote and biotite schist that were deposited by glacial meltwater as the water flowed toward the Atlantic Ocean. The project is located at a site that was previously developed for a textile mill, and soils within the project area are heavily disturbed and largely consist of fill material, which is not consistent with typical soil profiles for the region.

Rhode Island was the birthplace of the American Industrial Revolution and has a lengthy history of industrial pollution from textile manufacturing, wire manufacturing, metal plating, and iron smelting mills that have utilized the Blackstone River since the late 1700's. The waste from these facilities was often buried on-site or was discharged untreated into the Blackstone River. The improper disposal of textile dyes, heavy metals, varnish, solvents, and paints contaminated the surrounding soil and sediments.

To assess the potential for soil and sediment contamination at the project, NEHC conducted a desktop assessment of the Albion Project site and did not identify any listed releases of oil or hazardous materials that could pose an environmental threat to water quality and aquatic life at the site and surrounding areas. Seven sediment samples were collected at the Albion Project site at depths ranging from 10 to 72 inches below grade surface. The samples were collected in the approximate location of the proposed project intake. Following collection, one composite sample was prepared from the seven sediment samples for laboratory analysis. A second, discrete sample was collected in the same location for laboratory analysis. The two samples were analyzed for total petroleum hydrocarbons (TPH), 13 total priority pollutant metals, polychlorinated biphenyls (PCBs), chlorinated herbicides, pesticides, cyanide, sulfide, specific conductance, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Concentrations of some metals (antimony, arsenic, and lead), TPH, SVOCs, and Arochlors were detected in the samples at concentrations that exceeded the Rhode Island DEM Residential Direct Exposure Criteria (exposure criteria) for soil and the Environmental Protection Agency (EPA) Region 4 Sediment Screening Values.⁶ Rhode Island DEM uses the exposure criteria as a benchmark for cleanup and disposal.

5.3.1.2 Environmental Effects

NEHC proposes new construction that includes: (1) constructing a new powerhouse; (2) excavating the intake canal and tailrace; (3) installing new sluicegates and penstocks; (4) constructing a new upstream eel passage facility; (5) constructing a new access road; (6) constructing a new parking lot that would accommodate approximately six cars; and (7) installing a new above-ground transmission line and step-up transformer.

To minimize erosion and re-suspension of river sediments during project construction, NEHC proposes to use BMPs including: (1) placing erosion control barriers around upland work areas prior to the start of ground disturbing activities; (2) installing sediment control barriers (*e.g.*, temporary coffer dams) in the Blackstone River to contain disturbed sediments during in-water construction activities; (3) dewatering construction areas from groundwater infiltration when necessary; and

⁶ Rhode Island DEM Residential Direct Exposure Criteria are concentrations of hazardous materials and/or petroleum byproducts in excess of applicable residential or industrial/commercial direct exposure criteria that would require remediation. The EPA sediment screening values are benchmark levels of contaminants that may require additional sampling and remediation.

(4) employing environmental oversite during construction to monitor compliance with BMPs.

NEHC states that constructing the Albion Project would result in the excavation of approximately 1,430 cubic yards of material. NEHC indicates that any excavated soils would be reused on-site when appropriate or disposed of in an appropriate manner.

Staff Analysis

Project construction, including in-water and upland construction and excavation, has the potential to cause localized erosion, slope instability, and sedimentation if control measures are not put into place around work areas. Uncontrolled surface runoff could introduce suspended soil particles into the river that could degrade water quality by causing turbidity and eutrophication. The sediment in the project area is also potentially contaminated with heavy metals, and volatile and semi-volatile organic compounds from improper waste disposal, which would adversely affect water quality if resuspended during excavation and discharged into the Blackstone River.

Installing sediment control barriers around in-water construction activities would minimize sedimentation, disturbance of riverbed material, and re-suspension of sediments in the Blackstone River during project construction. In addition, placing erosion control barriers around upland work areas prior to the start of ground-disturbing activities would reduce erosion during construction of the new access road, intake and tailrace, parking area, and transmission line. However, NEHC's proposal lacks detail regarding the actual measures that would be used to control erosion, revegetate the area, and monitor for compliance.

Developing and implementing a soil erosion and sediment control plan that contains NEHC's proposed BMPs would minimize project-related erosion and sedimentation, and would minimize adverse effects on aquatic resources. Such a plan should be based on site-specific conditions and final project designs. With effective erosion control measures in place, sediment from construction activities would not likely enter the Blackstone River. Once in operation, the project should have little or no effect on geology and soils.

Disturbance of soil and sediment during project construction has the potential to release on-site contaminants into the environment. Although NEHC collected a composite test sample of the sediment at the project intake, additional discrete testing would be needed to distinguish whether any excavated soil and sediment could be reused on site, as proposed by NEHC. A contaminated soil and sediment test and disposal plan that includes measures for testing and disposing of soils and sediments would reduce the potential for hazardous materials to enter the Blackstone River during project construction and operation. Specifically, the plan could include the following measures:

(1) a description of the methods to be employed in testing disturbed soil and sediments during construction; (2) a description of the mitigation measures proposed to minimize inputs of contaminated soil and sediment into the water column during construction and other sediment-disturbing activities; and (3) an implementation schedule. Implementing this plan would ensure that contaminated soil and sediment in the project area would be handled and disposed of properly, and would serve to reduce the impact of contaminated materials to aquatic resources during in-water construction and land-disturbing activities.

5.3.2 Aquatic Resources

5.3.2.1 Affected Environment

Water Quantity

The impoundment created by the Albion Project has a surface area of 18 acres and a storage capacity of 235 acre-feet at an elevation of approximately 87.0 feet NAVD88.

The closest United States Geological Survey (USGS) stream gage to the Albion Project is located approximately 5 miles upstream in Woonsocket, Rhode Island (USGS Gage No. 01112500). Monthly average flows range from a low of 308 cfs in August to a high of 1,500 cfs in March, with an annual average flow of 790 cfs. A maximum flow of 32,900 cfs was recorded at the Woonsocket USGS gage on August 19, 1955 (the flood of record) and a record minimum flow of 48 cfs occurred on September 4, 1999. During the 2017 low flow season (the most recent year of complete data), the average flow in the Blackstone River from June through September 2017 was 414.5 cfs. Historically, low flows have occurred between June and September, and high flows have occurred between November and May.

Currently, all flows at the project pass over the dam's spillway. When the project is constructed and operational, flows would be diverted to the powerhouse, and 100 feet of the Blackstone River would by bypassed by the project. NEHC proposes an interim minimum flow of 100 cfs for the bypassed reach, which would be released as spill over the dam. The project would generate using flows from 130 cfs (the combined minimum hydraulic capacity of the turbines (30 cfs) plus the proposed 100-cfs minimum bypassed reach flow) to 711 cfs (the maximum hydraulic capacity of the project's turbines (611 cfs) plus the proposed 100-cfs minimum bypassed reach flow). Flows less than 130 cfs or greater than 711 cfs would be spilled over the dam into the bypassed reach.

Aquatic Habitat

The Albion Dam impounds 18 acres of riverine habitat that extends approximately 8,918 feet upstream. The shoreline surrounding the impoundment is moderately forested and slopes along the impoundment are gentle to moderate.

In 2017, NEHC conducted an aquatic mesohabitat survey to identify and quantify the distribution and extent of aquatic mesohabitats downstream of the Albion Dam to assist in determining the appropriate minimum flows necessary to protect aquatic resources. The aquatic mesohabitat survey was conducted at flows of 135 to 154 cfs. Aquatic habitat in the reach of the Blackstone River downstream of the Albion Dam is dominated by runs and rapids, which covered nearly half (49.8 percent of the total area) of the study area (24.9 percent of the total area each), followed by pools (19.5 percent of the total area), riffles (12.9 percent of the total area), and glides (6.0 percent of the total area) (Figure 3, Table 2). The total wetted area within the study area downstream of the Albion Dam encompassed 21,742 square feet (Table 2). The area of the proposed bypassed reach consists of 2,897 square feet of exposed areas (11.8 percent of the total area). The predominant substrate in riffles, glides, and exposed areas was cobble, while substrates in pools, runs, and rapids consisted of a mix of small boulders, large boulders, and cobble (Table 3). Measured depths within the study area ranged from 0.8 to 3.1 feet (Table 4) and all pools within the study had a maximum depth of 5 feet. Average measured velocities within the study area ranged from 0.07 to 0.96 feet per second (fps) at flows between 135 and 154 cfs.



Figure 3. Albion Project Mesohabitats (Source: NEHC, 2017).

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	Area	Percent of				
Mesohabitat	(Square Feet)	Total Area				
Glide	1,489	6.0%				
Pool	4,807	19.5%				
Rapid	6,134	24.9%				
Riffle	3,188	12.9%				

6,124

21,742

2,897

24,639

Table 2. Aquatic Mesohabitats Below Albion Dam.

Run

Wetted Habitat

Exposed Habitat

Total Habitat

(Source: NEHC, 2017, as modified by staff)

24.9%

88.2%

11.8%

100%

	Area	
Mesohabitat ID	(Square Feet)	Substrate Composition
Exposed Area 1	1,746	Cobble 100%
Exposed Area 2	1,151	Cobble 100%
Glide 1	450	Cobble 100%
Glide 2	489	Cobble 100%
Glide 3	550	Cobble 100%
Pool 1	4,807	Small Boulder 100%
Rapid 1	1,805	Small Boulder 80%, Large Boulder
		20%
Rapid 2	3,191	Large Boulder 100%
Rapid 3	1,138	Small Boulder 70%, Large Boulder
		30%
Riffle 1	1,934	Cobble 100%
Riffle 2	1,254	Cobble 100%
Run 1	1,069	Large Boulder 85%; Small Boulder
		15%
Run 2	2,197	Small Boulder 50%, Cobble 45%,
		Large Boulder 5%
Run 3	2,859	Small Boulder 100%

Table 3. Area and Substrate Composition of each Mesohabitat Unit Below Albion Dam.

(Source: NEHC, 2017)

 Table 4. Depth and Velocity Measurements for Each Mesohabitat Type Below Albion Dam.

Point	Mesohabitat Unit Identification	Depth (feet)	Average Velocity (fps)	Substrate
V1	Run 3	2.4	0.07	Small Boulder
V2	Run 3	3.1	0.46	Small Boulder
V3	Rapid 3	1.2	0.96	Small Boulder
V4	Run 3	2.1	0.68	Cobble
V5	Pool 1	2.4	0.03	Small Boulder
V6	Riffle 2	0.8	0.73	Cobble
V7	Riffle 1	1	0.28	Cobble
V8	Run 2	2.4	0.17	Small Boulder/Cobble
4				

(Source: NEHC, 2017)

Water Quality

The Albion Project is located on a reach of the Blackstone River that is classified as a Class B1 waterway by the state of Rhode Island (Rhode Island DEM, 2010). Class B1 waters must be of such quality that they are suitable for the designated uses of recreation, industrial processes and cooling, hydroelectric power generation, aquaculture, navigation, irrigation, and agriculture. According to the Rhode Island state water quality regulations, the dissolved oxygen (DO) content of Class B1 waters may not be less than 5.0 milligrams per liter (mg/L) on an instantaneous basis and not less than an average of 6.0 mg/L over 7 days for warm water fish habitat. The percent saturation of dissolved oxygen must not be less than 60 percent, based on a daily average. Thermal discharges to Class B1 receiving waters shall not raise the temperature of the receiving waters by more than 4 degrees and no higher than 28.3 degrees Celsius (°C) (83°F). Thermal discharges to Class B1 waters also should not cause the growth of undesirable or nuisance species of biota, according to the state regulations.

The segment of the Blackstone River where the project would be located (an 18.1mile-long stretch referred to by Rhode Island DEM as segment RI0001003R-01A) is listed on the Clean Water Act section 303(d) list of impaired waters (Rhode Island DEM, 2016). This segment is listed as not supporting fish and wildlife habitat due to unacceptable levels of cadmium, iron, lead, non-native aquatic plants, dissolved oxygen, and phosphorus. This segment of the Blackstone River also does not support fish consumption because of mercury and polychlorinated biphenyls (PCBs) in fish tissue. Primary and secondary contact recreation are also not supported due to unacceptable levels of fecal coliform and enterococcus bacteria.

NEHC conducted a water quality monitoring study to evaluate baseline water quality conditions at the project. In 2016, 2017, and 2018, NEHC measured water temperature and dissolved oxygen upstream of the dam, just below the dam, and at a point downstream of the confluence of the tailrace and the bypassed reach approximately once per week during the warm low-flow summer period (July through September).

The results for all sampled parameters met Class B1 water criteria (Table 5). In the project impoundment, water temperature ranged from 18°C to 27°C with an average temperature of 23°C. Dissolved oxygen in the impoundment ranged from 6.2 mg/L to 9.47 mg/L with an average dissolved oxygen level of 7.62 mg/L. Just below the project dam, water temperature ranged from 18°C to 27°C with an average of 22.8°C. Dissolved oxygen levels just below the project dam ranged from 6.47 mg/L to 9.47 mg/L. The average dissolved oxygen level just below the Albion Dam was 7.8 mg/L. In the reach of the Blackstone River downstream of the confluence, water temperature ranged from 18°C to 27°C and dissolved oxygen ranged from 6.7 to 9.47 mg/L. The average water temperature was 23.0 °C and the average dissolved oxygen level was 7.75 mg/L.

Average river flow for the monitoring period was 249 cfs, which is representative of a period of low flow.

			Impoundment		Below Dam		Downstream	
	Precipitation	Flow	Temperature	DO	Temperature	DO	Temperature	DO
Date	(inches)	(cfs)	(°C)	(mg/L)	(°C)	(mg/L)	(°C)	(mg/L)
7/2/2016	-	164.3	20	9.09	21	8.6	21	8.6
7/10/2016	-	223.95	20	9.09	20	9.09	21	8.92
7/24/2016	-	95.00	20	8.92	20	9.09	21	8.92
8/6/2016	-	88.48	22	8.74	23	8.58	23	8.58
8/13/2016	-	157.58	24	8.42	23	8.58	23	8.58
8/21/2016	-	133.41	20	9.09	20	9.09	23	8.58
8/28/2016	-	116.60	22	8.74	21	8.61	21	8.62
9/11/2016	-	60.36	20	9.09	18	9.47	18	9.48
9/18/2016	-	78.88	23	8.58	23	8.58	-	-
9/25/2016	-	115.06	23	8.58	22	8.74	23	8.58
7/7/2017	0	281.22	24.4	6.6	24.3	7.0	24.1	7.1
7/13/2017	1.30	491.45	24.2	6.9	24.2	7.2	24.3	7.2
7/20/2017	0	424.23	25.5	6.8	25.4	7.1	25.5	7.1
7/27/2017	0.55	485.27	20.8	7.6	20.4	7.9	20.7	7.8
8/3/2017	0	337.12	23.5	7.1	23.4	7.4	23.4	7.4
8/9/2017	0.06	393.36	21.7	7.6	21.4	7.8	21.7	7.7
8/16/2017	0.05	188.96	23.3	6.9	23.1	7.3	23.1	7.3
8/23/2017	0	145.75	24.7	6.7	24.4	7.2	24.6	7.1
8/31/2017	0.26	92.94	20.3	7.8	20.0	7.9	20.2	7.8
9/7/2017	0.60	140.95	20.7	7.4	20.6	7.6	20.5	7.7
9/13/2017	0	193.08	19.8	7.5	19.7	7.8	19.6	7.7
9/21/2017	0.27	137.87	21.3	7.2	21.2	7.3	21.2	7.5
9/28/2017	0	133.75	23.4	6.8	23.3	7.0	23.2	7.2
7/3/2018	0	281	26.4	6.4	26.8	6.8	26.8	6.9
7/10/2018	0	176	25.6	7.1	25.4	7.1	25.0	6.0

 Table 5. Results of Water Quality Monitoring at Albion Project.

			Impoundn	nent	Below Dam		Downstream	
	Precipitation	Flow	Temperature	DO	Temperature	DO	Temperature	DO
Date	(inches)	(cfs)	(°C)	(mg/L)	(°C)	(mg/L)	(°C)	(mg/L)
7/18/2018	1.59	295	23.7	7.3	25.2	7.2	25.2	7.2
8/10/2018	0.20	337	27.0	6.6	27.4	6.7	27.0	7.0
8/15/2018	0.59	1,220	23.8	7.3	24.1	7.6	24.0	7.4
	Average	249.48	23.0	7.62	22.8	7.8	22.95	7.75
	Minimum	60.36	18.0	6.20	18.0	6.7	18.0	6.7
	Maximum	1,220	27.0	9.47	27.0	9.47	27.0	9.47

"-" = missing data.

(Source: NEHC 2019a, as modified by staff)

Sediment Quality

NHEC analyzed the soil and sediment in the Albion Project intake to assess the potential for environmental contamination and to support: (1) preliminary construction planning; and (2) an evaluation of sediment removal and potential disposal methods. Based on NEHC's analysis, the sediment in the Albion Project area has concentrations of heavy metals (antimony, arsenic and lead), SVOCs (specifically, polycyclic aromatic hydrocarbons (PAHs)), and TPHs at levels exceeding the Rhode Island DEM Residential Direct Exposure Criteria (exposure criteria) for soil and the EPA Region 4 Sediment Screening Values. Rhode Island DEM uses the exposure criteria as a benchmark for cleanup and disposal. Concentrations of polychlorinated biphenyls (PCBs), VOCs, pesticides, and chlorinated herbicides were below the thresholds used by Rhode Island DEM for cleanup and disposal; however, concentrations of some PCBs exceeded the EPA Sediment Screening Values. Concentrations of PCBs that exceed EPA sediment screening values indicate there is potential for sediment to be of such quality that it does not support aquatic biota and that levels of PCBs in sediment have the potential to be recirculated back into the water column.

Fishery Resources

Resident Fish

The Blackstone River provides habitat for a variety of warm-water riverine fish. A comprehensive fisheries survey of the Blackstone River Basin was conducted by the Rhode Island Division of Fish and Wildlife in 1975. The study indicated that the water quality of the mainstem Blackstone River was unsuitable for most game fish and panfish species and consequently supported populations of fish undesirable for sport fishing. White suckers dominated the Blackstone River catch; the only other species collected were, in rank order: brown bullhead, bluegill, and fallfish. The Branch River, which is the largest tributary of the Blackstone River, showed higher diversity, including warm water gamefish and panfish (*e.g.*, largemouth bass, yellow perch, and chain pickerel) (USACE, 1997).

In 1987, a baseline fisheries survey was conducted in the Blackstone River by Rhode Island in Woonsocket, Rhode Island. When compared to the 1975 fisheries survey, there was greater species richness (ten species), and the species present included several that have recreational value as sport fish (*i.e.*, largemouth bass, bluegill, pumpkinseed, yellow perch, and chain pickerel). However, similar to the 1975 study, the most abundant species collected was the white sucker. Although different sampling methods were used during the two surveys, making direct comparisons of the overall

abundance of fish populations difficult, it appears that in addition to an increase in species richness, the overall abundance of fish populations had increased. In addition, the presence of large numbers of juveniles of some species during the survey (*e.g.*, largemouth bass) indicated that the Blackstone River provided suitable spawning habitat for these species (USACE, 1997).

More recent surveys show fish species that are less tolerant of pollution, indicating that water quality conditions have improved in the Blackstone River (Ecology and Environment, 1987). The list of resident species in the Blackstone River (Table 6), is consistent with the warm-water fishery designation under the water quality standards. This species assemblage is best characterized as habitat generalists, and some are considered pollution tolerant, such as common carp and white sucker. Additionally, with the exception of white sucker, which prefers faster water, these species tend to occur in slower, impounded sections of a river, as is the case in this section of the Blackstone River.

Common name	Scientific Name
American Eel	Anguilla rostrate
American Brook Lamprey	Lethenteron appendix
Black Crappie	Pomoxis nigromaculatus
Blacknose Dace	Rhinichthys cataractae
Bluegill	Lepomis macrochirus
Brown Bullhead	Ameiurus nebulosus
Chain Pickerel	Esox niger
Common Carp	Cyprinus carpio
Common Shiner	Luxilus cornutus
Fallfish	Semotilus corporalis
Golden Shiner	Notemigonus crysoleucas
Largemouth Bass	Micropterus salmoides
Longnose Dace	Rhinichthys cataractae
Northern Pike	Esox Lucius
Pumpkinseed	Lepomis gibbosus
Smallmouth Bass	Micropterus dolomieu
Tessellated Darter	Etheostoma olmstedi
White Perch	Morone Americana
White Sucker	Catostomus commersonii
Yellow Bullhead	Ameiurus natalis
Yellow Perch	Perca flavescens

Table 6. Fish Species Inhabiting the Blackstone River.

The Fisheries Division of Rhode Island DEM annually stocks trout in over 100 ponds, streams, and rivers, including the Blackstone River at Cumberland and Lincoln (upstream and downstream of the project, respectively). Trout stocked in the spring do not hold over until the next spring because of warm water temperatures in the summer.

Migratory Fish

The Blackstone River historically supported runs of diadromous fish, including river herring, American shad, Atlantic salmon, and American eel. The extensive construction of dams for water power in the late 1700's and 1800's in the Blackstone River prevented these migratory fish from returning to historical spawning and nursery areas. Consequently, these fish runs were eliminated in the Blackstone River Basin (RIDEM, 2002).

⁽Source: NEHC, 2019a)

In 2002, Rhode Island published a Blackstone River Fisheries Restoration Plan (restoration plan), which includes a phased approach for restoring self-sustaining populations of shad and river herring to the Blackstone River Basin. The program would be implemented in four phases involving fish passage in the following areas of the Blackstone River Basin: (1) head of tide (Main Street, Pawtucket, Rhode Island) to Ashton, Rhode Island; (2) Ashton to the Rhode Island/Massachusetts Border; (3) Branch River; and (4) Blackstone River in Massachusetts (RIDEM, 2002). Atlantic salmon was excluded from the plan as a target species for restoration to the Blackstone River because it was uncertain that there is enough suitable habitat in the river to sustain a viable population. Rhode Island DEM states in the restoration plan that Atlantic salmon are capable of climbing ladders designed for herring and shad; therefore, restoration of Atlantic salmon in the future would be feasible if habitat for Atlantic salmon becomes available.

Rhode Island DEM's restoration plan emphasizes the restoration of habitat from head of tide (Main Street, Pawtucket, Rhode Island) to Ashton Dam in Phase I. Four existing dams in this 4-mile section of the river currently block upstream fish migration: Pawtucket No. 2 Project dam (FERC Project No. 3689), Slater's Mill Dam, Elizabeth Webbing Dam, and the Central Falls Hydroelectric Project dam (FERC Project No. 3063).⁷ Rhode Island DEM identified 80 percent of the total available spawning habitat in the Blackstone River in this reach of the Blackstone River. This reach of the Blackstone River includes the remnants of Pratt Dam, which has been breached and is passable by anadromous fish under most flow conditions. Rhode Island estimates there is 206 acres of habitat in this 4-mile section of the river that can support 202,000 river herring per year and 9,900 shad per year. The restoration strategy for Phase I focuses primarily on providing upstream passage for adult fish, but also seeks to minimize downstream mortality of juvenile fish. Upstream passage would be accomplished through the construction of permanent passage facilities such as fish ladders and by-pass channels at the four existing dams (RIDEM, 2002).

Phase I of the restoration plan was scheduled to be completed by 2013. To date, however, none of the four dams identified in Phase I have fish passage. Rhode Island DEM indicates that despite the lack of passage at the lower dams on the Blackstone River, anadromous fish restoration efforts are still planned, but delayed indefinitely due to funding.

⁷ The Elizabeth Webbing and Slaters Mill dams are nonpowered and unlicensed.

Catadromous Fish

American eel is the only catadromous fish species that occurs at the project. The American eel spends most of its life in fresh or brackish water before migrating to the Sargasso Sea to spawn. It occurs throughout warm and cold waters of the Atlantic Ocean and Atlantic coastal drainages in North America (Boschung and Mayden, 2004). Within its range, it is most abundant throughout the Atlantic coastal states (ASMFC, 1999).

Spawning likely occurs from February through April in the Sargasso Sea, although the act of spawning has never been observed (Boschung and Mayden, 2004). Fertilized eggs and larvae, known as the planktonic phase, drift with the Gulf Stream currents along the east coast of the United States (Jenkins and Burkhead, 1993). Following this phase, the planktonic leptocephali, ribbon-like eel larvae, metamorphose (or transform) into what is termed a "glass" eel as it approaches coastal waters. Glass eels are completely transparent and make their way into brackish waters by the use of flood tides. Once skin pigments develop in glass eels, they are considered "elvers."⁸ In Rhode Island, glass eels begin their upstream migration in early spring. Upstream migration ends in early July (RIDEM, 2008).

As eels mature, elvers become juvenile, or "yellow" eel. The majority of eels collected in freshwater rivers are typically yellow eel, which is considered the primary growth phase of its life cycle (Ross *et al.*, 2001). Yellow eel are typically sedentary during the day, often burying in mud or silt, and becoming active at night to feed (Jenkins and Burkhead, 1993). They associate with pools or backwater habitats, and often have relatively small home ranges (Gunning and Shoop, 1962). The juvenile stage can last from 5 to 40 years before finally maturing into silver eel and out-migrating in the fall and mid-winter months to spawning grounds (*i.e.*, Sargasso Sea) (Boschung and Mayden, 2004). In Rhode Island, adult eels out-migrate from September to December (FWS, 2015). Adult eels are presumed to die after spawning (Boschung and Mayden, 2004; Jenkins and Burkhead, 1993).

When migrating upstream, juvenile eels must climb over or around dams downstream. Climbing over or around dams is a well-documented behavior for juvenile eels (Gulf of Maine Council on the Marine Environment (GMCME), 2007). When migrating downstream in the fall, eels can pass over dams and spillways, but could be

⁸ Elvers often serve as important forage fish for striped bass and other large piscivores.

susceptible to injury depending on the height of the dam and depth of the water below the dam.

Freshwater mussels

Freshwater mussels are found in the waters of Rhode Island. A multi-year survey conducted from 1980 to 2006 by Rhode Island DEM found eight indigenous freshwater mussel species in Rhode Island (Table 7). None of the species that occur in Rhode Island are federally-listed under the Endangered Species Act, but several of the species are highly localized and listed as "Species of Greatest Conservation Need" by Rhode Island.

Species	Rhode Island Status	Habitat	Range
Eastern Elliptio (Elliptio complanata)	Not listed	Variety of river and pond habitats, including modified rivers and lakes with poor water quality	Most widespread species in Rhode Island
Eastern Floater (<i>Pygnodon cataracta</i>)	Not listed	Ponds, slow rivers, and modified habitats, such as reservoirs	Widespread throughout Rhode Island
Triangle Floater (<i>Alasmidonta undulata</i>)	Species of Greatest Conservation Need	Streams, rivers, lakes with sand or gravel substrate	Fairly widespread, but uncommon in quantity
Alewife Floater (Anodanta implicata)	Species of Greatest Conservation Need	Streams, rivers, lakes, and ponds supportive of anadromous clupeids	Coastal rivers and ponds at upstream limits of anadromous fish
Creeper or Squawfoot (Strophitus undulates)	Species of Greatest Conservation	High quality riffle areas of larger rivers	Localized and uncommon

Species	Rhode Island Status	Habitat	Range
	Need		
Eastern Lampmussel (<i>Lampsilis radiata</i>)	Species of Greatest Conservation Need	Streams, rivers, lakes, and ponds with sand or gravel substrate	Uncommon and localized to Pawtuxet and Pawcatuck River Basins
Eastern Pondmussel (<i>Ligumia nasuta</i>)	Species of Greatest Conservation Need	Lakes and associated rivers	Localized and uncommon. Found only in Pawcatuck River Basin
Eastern Pearlshell (Margaritifera margaritifera)	State-listed Endangered	Streams and rivers	Primarily in headwater streams of the Pawcatuck River Basin
Asiatic Clam (<i>Corbicula sp</i> .)	Invasive	Lakes, ponds, rivers, and streams	Can be found in 11 lakes and 3 rivers, including the Blackstone River

(Source: NEHC, 2019)

5.3.2.2 Environmental Effects

Effects of Construction on Aquatic Habitat and Fisheries Resources

Our Analysis

A proposed powerhouse, intake canal, tailrace, sluicegates, and penstocks would be constructed. Most of the excavation for these project facilities would occur adjacent to (and outside of) the existing river channel and therefore not directly affect aquatic habitat. However, portions of the intake canal and tailrace would extend into the existing river channel, and require modifications to existing aquatic habitat. Specifically, approximately 3,150 square feet of existing aquatic habitat would need to be excavated
for the project intake and approximately 700 square feet of existing habitat would need to be excavated for the tailrace.

The proposed in-water construction activities could result in increased suspended sediment and turbidity, increased substrata disturbance, and equipment and materials located in (or near) the river. High levels of suspended sediment and stream turbidity is known to result in smothering fish eggs and clogging fish gills. High levels of turbidity also can reduce the amount of sunlight necessary for the growth and propagation of aquatic plants that provide necessary habitat for fish. The presence of construction equipment could increase the possibility of fish contacting the equipment, which could injure or kill fish. In addition, substrate disturbance during construction of the powerhouse and excavation of the intake and tailrace could damage or permanently destroy important spawning and rearing sites for resident fish, which would lower the likelihood of successful reproduction and population recruitment in the future.

NEHC proposes to complete construction during low flow periods (July to September) when most warmwater species of fish have completed spawning, which would reduce the risk of turbidity smothering fish eggs. If the larva, juveniles, or adults are present, then construction-related effects could directly or indirectly result in increased injury or mortality of adult and early life stages of fish. Project construction during the low flow period would also coincide with the upstream and downstream passage season for eels. However, flows would be diverted away from construction areas by NEHC's proposed sediment control barriers (e.g., cofferdams), and then continue to pass over the project spillways to provide eels with a way to migrate upstream and downstream. Eels also migrate upstream and downstream mostly at night, a time when there typically would not be any construction activities.

As discussed above in section 5.3.1.2 (*Geology and Soils, Environmental Effects*), installing erosion and sediment control barrier (such as coffer dams) would reduce erosion and minimize sedimentation during project construction, which would protect aquatic habitat. An erosion and sedimentation control plan that includes NEHC's proposed measures for installing erosion and sediment control barriers would minimize adverse effects on aquatic habitat and fish associated with erosion and sedimentation.

The excavation for the intake and tailrace would permanently modify existing aquatic habitat in the Blackstone River. There would be a loss of littoral zone aquatic habitat from the construction of the proposed tailrace at the Albion Project. Upstream of the Albion Dam, excavation of the trough for the powerhouse would modify deep-water aquatic habitat near the littoral zone at the east end of the Albion Dam. The postconstruction modified, deep-water aquatic habitat upstream of the Albion Dam may not

be suitable for fish and aquatic biota, which could permanently displace these organisms from this area of the Blackstone River. For example, excavation of the intake would change the topography of the river bottom and water flow patterns, such that the habitat no longer meets the habitat preferences for some species of deep-water fish. Based on the relatively small size of the excavated area, the loss of aquatic habitat associated with construction of the proposed project facilities would not be expected to have an adverse on fish and aquatic organisms.

Construction of the upstream eel fishway(s) at the project could affect aquatic habitat in the project area; however, the construction footprint for most types of upstream eel passage facilities is relatively small (5 feet or less) and would not affect a substantial amount of aquatic habitat below the project dam.

Mode of Operation

NEHC proposes to operate the Albion Project in an instantaneous run-of-river mode, whereby outflow from the project equals inflow to the project at all times and water levels above the dam are not drawn down for the purpose of generating power. NEHC states that run-of-river operation could be temporarily modified for operating emergencies beyond NEHC's control or for short periods after mutual agreement between NEHC, FWS, and Rhode Island DEM.

Interior's section 30(c) condition 1 requires and Rhode Island DEM recommends the same measures proposed by NEHC to maintain water quality and habitat in the Blackstone River.

Our Analysis

Operating the project in a run-of-river mode would result in no change in the amount, schedule, or duration of flow released to the Blackstone River downstream of the project. Run-of-river operation would also minimize the length of time water is retained in the impoundment and help avoid increasing water temperatures in the upper levels of the impoundment from solar heating. This would also limit water level fluctuations which can influence the reproductive success of fish that spawn in near-shore areas (Sammons and Bettoli, 2000), such as largemouth bass, smallmouth bass, and bluegill. By operating the project in a run-of-river mode, habitat in the project impoundment and habitat in the Blackstone River downstream of the project would remain unchanged from current conditions, and aquatic organisms, including fish and freshwater mussels, would be unaffected.

Minimum Flow Release

NEHC proposes to release an interim minimum flow of 100 cfs or inflow, whichever is less, into the bypassed reach as uniform spill over the dam upon commencement of project operation. NEHC proposes to continue releasing the 100-cfs bypassed reach minimum flow until FWS determines an appropriate flow that would protect aquatic habitat and resources in the bypassed reach. Interior's section 30(c) condition 2 requires and Rhode Island DEM recommends the minimum flow proposed by NEHC to maintain water quality and habitat in the bypassed reach.

NEHC proposes to develop a bypassed reach flow study plan that includes provisions for collecting aquatic habitat data in the bypassed reach under different flows. NEHC states that the results of the study would be used to assess the relationship between habitat and flow in the bypassed reach, and determine what long-term minimum flow would be sufficient to protect aquatic resources in the bypassed reach. NEHC states that the study plan would be developed in consultation with the FWS and Rhode Island DEM, and that the agencies would use the results of the study to determine whether the 100-cfs minimum flow is sufficient, or if a higher flow is warranted. NEHC proposes to complete the study during the first low-flow season (July 1 – October 31) after the project commences operation. Interior's section 30(c) condition 3 requires and Rhode Island DEM recommends the bypassed reach flow study plan proposed by NEHC. Interior preliminarily identified test flows of 100 cfs, 150 cfs, and 200 cfs for the study.

NEHC also proposes to monitor water quality at the project to verify that project operation does not adversely affect water temperature or dissolved oxygen levels in the Blackstone River. NEHC states that the monitoring would be initiated during the first low-flow season (July 1 – October 31) after the project commences operation and that data would be collected for up to 3 years. NEHC states that the survey protocol would be developed in consultation with the FWS and Rhode Island DEM, and that if the results indicated that the project is not meeting water quality standards, then mitigation measures may be required by the agencies. Interior's section 30(c) condition 6 requires and Rhode Island DEM recommends the water quality monitoring proposed by NEHC.

Our Analysis

Aquatic Habitat

The proposed project, when operating, would divert flow from the Blackstone River for generation and bypass approximately 100 feet of the Blackstone River between Albion Dam and the proposed tailrace downstream of the dam. At inflows greater than 130 cfs (*i.e.*, when the project is operating), flow to the bypassed reach would be reduced

relative to existing conditions and the amount of wetted aquatic habitat in the bypassed reach could be reduced. Based on an aquatic mesohabitat survey conducted in 2017, run and rapid habitat near the shoreline of the bypassed reach would have the greatest likelihood of being dewatered at flows less than 100 cfs.

Releasing a continuous flow of 100 cfs over the dam to the bypassed reach, as proposed by NEHC and recommended by the agencies, would ensure that a minimum flow is provided to aquatic habitat in the bypassed reach. NEHC's mesohabitat survey of the bypassed reach identified and quantified the distribution and extent of aquatic mesohabitats at flows of approximately 135 to 154 cfs, which for purposes of our environmental analysis of NEHC's minimum flow release proposal, we find to be a reasonable approximation of mesohabitat at a flow of 100 cfs. Depth, velocity, and substrate data from the survey indicate that habitat would be suitable for warmwater fish species such as smallmouth bass and yellow perch, at flows of 135 to 154 cfs (Kreiger *et. al.*, 1983 and Edward *et. al.*, 1983). Conducting the proposed bypassed reach flow study after the project becomes operational would verify that the amount of aquatic habitat in the bypassed reach (including the depth and velocity of the aquatic habitat) at the proposed minimum flow of 100 cfs would provide suitable bypassed reach fish habitat.

With regard to study methodology, a minimum flow study for the Albion Dam bypassed reach that includes a minimum of three test flows (as suggested by Interior in its comments), and that targets the habitat requirements for fish and aquatic resources found in the proposed bypassed reach, would ensure a sufficient amount of data is acquired to verify that the bypassed reach flows provide suitable fish habitat while the project is generating.

Water Quality

Under current conditions, all water flowing downstream in the Blackstone River passes over the Albion Dam. Data from the water quality monitoring study conducted in 2016, 2017, and 2018 (Table 5), indicate that water quality at the proposed project (including in the impoundment, bypassed reach, and downstream reach) is sufficient to maintain aquatic life under current conditions (*i.e.*, temperature and DO concentrations are consistent with Rhode Island DEM's standards of 28.3°C (83°F) and 5.0 mg/L, respectively).

The proposed project, when operating, would divert flow from the Blackstone River for generation and bypass approximately 100 feet of the Blackstone River between Albion Dam and the proposed tailrace downstream of the dam. Flow over the dam would be reduced relative to existing conditions, which would reduce aeration and could reduce

DO in the water downstream of the dam.

DO is an important indicator of water quality and is required at an adequate concentration to sustain aquatic resources. As discussed above, the river reach that includes the Albion Project is listed on the Clean Water Act section 303(d) list of impaired waters for numerous reasons, including low DO.

Based on data from the water quality monitoring study (Table 5), it appears that NEHC's proposed minimum flow of 100 cfs to the bypassed reach could provide adequate temperatures and DO concentrations to sustain aquatic life in the bypassed reach (*i.e.*, sustain temperatures that are below 28.3°C (83°F) and dissolved oxygen concentrations that are above 5.0 mg/L).⁹

Interior states that it supports a bypassed flow of 100 cfs on an interim basis (pending the results of the bypassed reach flow study), but does not have enough information to confirm that the flow is sufficient to protect water quality. Interior states that inadequate circulation and reaeration could lead to low levels of DO, potentially causing stress or mortality to fish. Therefore, Interior states that water quality monitoring is needed to verify that the proposed 100-cfs minimum bypassed reach flow maintains DO levels sufficient to support the resident riverine fish community.

Monitoring DO and water temperature during the low-flow season (July 1 – October 31) for up to 3 years after the project commences operation would provide the data necessary to ensure the bypassed reach maintains sufficient water quality, including sufficient DO concentrations. If monitoring indicates the project is unable to maintain suitable water quality during project operation, then other measures could be developed and implemented after Commission approval, such as reducing flows to the powerhouse and increasing flow over the dam.

Compliance Monitoring

NEHC proposes to maintain run-of-river operation using water level sensors to remotely monitor water levels in the impoundment and downstream reach, and an automatic controller to operate the ASTs and sluice gates. NEHC also proposes to develop an operation compliance monitoring plan to maintain and monitor run-of-river

⁹ On July 24, 2016, at a flow of 95 cfs, the temperature was 20°C and the DO was 8.92 mg/L. On August 6, 2016, at a flow of about 88 cfs, the temperature was 22°C and the DO was 8.74 mg/L. On August 31, 2017, at a flow of about 93 cfs, the temperature was 20.3°C and the DO was 7.8 mg/L.

operation and the minimum flow release to the bypassed reach. NEHC states that the operation compliance monitoring plan would include a description of the mechanisms and structures that would be used, the level of manual and automatic operation, the methods used for recording data on run-of-river operation and the minimum flow release, an implementation schedule, and a plan for maintaining the data for inspection by the resource agencies Interior's section 30(c) condition 4 requires and Rhode Island DEM recommends the operation compliance monitoring plan proposed by NEHC.

Our Analysis

Although compliance measures do not directly affect environmental resources, they do allow the Commission to ensure that an exemptee complies with the environmental requirements of an exemption.

An operation compliance monitoring plan that incorporates NEHC's proposed measures would help NEHC document its compliance with the operational provisions of any exemption, and provide a mechanism for reporting deviations. An operation compliance monitoring plan would also help the Commission verify that the project is operating in a run-of-river mode and releasing the required minimum flow into the bypassed reach, thereby facilitating administration of the license exemption and assisting with the protection of resources that are sensitive to impoundment fluctuations and deviations from normal operating conditions.

The plan could be developed in consultation with FWS and Rhode Island DEM, and include a description of the mechanisms and structures that would be used, protocols for maintaining and calibrating equipment, and provisions for: (1) monitoring run-of-river operation, minimum flows, and impoundment elevation levels to document compliance with the operational conditions of any exemption or license; (2) standard operating procedures to be implemented (a) outside of normal operating conditions, including during scheduled facility shutdowns, impoundment drawdowns, and impoundment refilling and (b) during emergency conditions such as unscheduled facility shutdowns and maintenance, in order to minimize project effects on environmental resources; (3) reporting deviations to the Commission; and (4) maintaining a log of project operations for inspection.

Impoundment Refill Procedure

Periodically, the project impoundment may need to be drawn down for maintenance or for emergencies. During these times, run-of-river operation would be temporarily interrupted. NEHC proposes that the project impoundment be refilled under

such scenarios by releasing 90 percent of the inflow to the downstream reach and retaining 10 percent of the inflow for the purpose of refilling the impoundment. NEHC states that this procedure could be modified on a case-by-case basis with prior approval from the FWS and Rhode Island DEM. Interior's section 30(c) condition 14 requires and Rhode Island DEM recommends the impoundment refill procedure proposed by NEHC.

Our Analysis

The procedures that are used to refill an impoundment following a drawdown can significantly affect aquatic habitat and organisms in the impoundment and in the downstream reach. Retaining all inflows to refill the impoundment would adversely affect aquatic resources by dewatering aquatic habitat in the downstream reach and stranding fish and other aquatic organisms. On the other hand, releasing all flows to the downstream reach would adversely affect aquatic life in the impoundment by sustaining the dewatered conditions. Releasing 90 percent of the project impoundment's inflow during impoundment refilling would ensure that downstream flows are kept at or near project inflow levels and that the impoundment is refilled in a timely manner. During average annual flows, we estimate that the refill procedure proposed by Interior and Rhode Island DEM would take 33.5 hours to refill the impoundment is drawn down and that flows are reduced downstream would help maintain the existing aquatic habitat for fish and other aquatic species.

Fisheries Resources

Upstream Fish Passage

NEHC proposes to provide safe, timely, and effective upstream passage for anadromous fish at the Albion Project within 3 years of notification by the FWS or Rhode Island DEM that such fishways are needed. Interior's section 30(c) condition 10 requires and Rhode Island DEM recommends construction and operation of upstream anadromous fish passage facilities in accordance with the procedures proposed by NEHC.

NEHC proposes to submit an upstream fish passage effectiveness study plan that detail how the upstream passage facilities would be evaluated for their effectiveness at passing anadromous migrants in a safe, timely and effective manner. NEHC proposes to develop the plan within 3 years of receiving notification from FWS that an upstream

¹⁰ The estimated time to refill the impoundment is calculated using 10 percent of the average annual flow of 850 cfs and an impoundment storage capacity of 235 acre feet (10,236,600 cubic feet).

anadromous fish passage facility is necessary. NEHC states that the plan would be developed in consultation with FWS and Rhode Island DEM, and would be conducted for a maximum of 3 years. In addition, the study would take place during representative environmental conditions of the migratory season (*i.e.* water temperature and flow within the 25th to 75th percentiles for the relevant migration season). Interior's 30(c) condition 11 requires and Rhode Island DEM recommends the development and implementation of the fish passage effectiveness study plan, as proposed by NEHC.

Our Analysis

There are currently no anadromous fish species or upstream fish passage facilities at the project. There are five dams downstream of the project that serve as barriers to upstream fish passage. None of the dams have upstream fish passage facilities. Anadromous fish attempting to migrate upstream to spawn do not have access to the Blackstone River upstream of the Pawtucket No. 2 Project dam (FERC No. 3689) in Pawtucket, Rhode Island, about 8.2 river miles downstream of the project. However, Rhode Island's Blackstone River Fisheries Restoration Plan (restoration plan) calls for the restoration of self-sustaining populations of shad and river herring to the Blackstone River Basin. The Blackstone River once supported runs of shad and river herring up to the Massachusetts border. The restoration plan identifies 1,400 acres of accessible fish habitat in the Blackstone River that can support 1.1 million river herring per year and 22,000 shad per year (RIDEM, 2002). Until such time as passage is available at the dams downstream of the project, there is no need for upstream passage at Albion Dam.¹¹

Upstream Eel Passage

NEHC proposes to provide safe, timely, and effective upstream passage for American eels. Within 6 months of an issuance of an order granting an exemption from licensing for the Albion Project, NEHC proposes to prepare and file for approval a juvenile eel survey study to assess areas where juvenile eels are attempting to migrate upstream of the dam. The study plan would be developed in consultation with FWS and Rhode Island DEM. NEHC proposes to complete the study during the first migratory season after project operation, and provide the results of the study to Rhode Island DEM and FWS by the end of the calendar year follow study completion. NEHC proposes to use the results of the study to develop a plan to design, construct, install, operate, and maintain one or more upstream passage facilities for juvenile eels, in consultation with FWS and Rhode Island DEM. NEHC proposes to operate the upstream eelway within

¹¹ Because no one is recommending fish passage be provided at this time and the need for fish passage in the future is speculative, we are not evaluating the need for fishway effectiveness studies in this EA.

three years of project operation and operate the upstream fishway for juvenile eels when the river water temperature is greater than 10°C. NEHC also proposes to disperse water at the discharge to mitigate for false attraction flows from turbine generation. Interior's section 30(c) condition 9 requires and Rhode Island DEM recommends construction of upstream eel passage facilities in accordance with the procedures proposed by NEHC.

Our Analysis

There are no existing upstream passage facilities at the project for American eel. Migrating juvenile eels can reach the project by scaling the Pawtucket No. 2 Project No. 3689 dam, Slaters Mill Dam, Elizabeth Webbing Dam, Central Falls Project No. 306 dam, and the Ashton Dam, all of which are relatively low in height.

To migrate upstream past the project, juvenile eels must climb over or around the project dam. Climbing over or around dams is a well-documented behavior for juvenile eels (GMCME, 2007). The proposed Albion Project could delay and potentially block juvenile eels from moving further upstream. Currently, there is no information on the location where juvenile eels attempt to move upstream of the Albion Dam, and regardless, construction and operation of the proposed powerhouse could change the location that eels approach and climb the dam. Therefore, the recommended study to assess areas where juvenile eels are attempting to migrate upstream of the dam would best be conducted after the project is constructed and fully operational.

Conducting a survey, which is typically done at night when juvenile eels migrate upstream, would help determine the location best suited for constructing an upstream fishway for juvenile eels. One or more properly sited upstream eel passage facilities would increase upstream passage effectiveness and improve access to upstream habitat.

NEHC proposes and Interior would require operation of the upstream eelway when water temperature is greater than 10°C, which is a significant trigger to initiate upstream migration. Migrations of American eel begin when the water temperature rises above 10°C, with the majority of movement occurring at temperatures greater than 20°C (Greene *et. al.*, 1999, Haro and Krueger 1991). Operating the facility when water temperature is greater than 10°C would coincide with the upstream passage season in Rhode Island and would provide juvenile eels access to safe, effective, and timely upstream passage. Therefore, construction and operation of an upstream eel passage facility when water temperature is greater than 10 °C would reduce project effects on eels by providing eels with additional access to habitat upstream of the project.

After the upstream eelway(s) are constructed, turbine discharge flows could attract eels away from the entrance of the eelway(s), which would could cause a delay in

passage. To mitigate for this effect, NEHC proposes to "fan water at the turbine discharge." Dispersing the turbine discharge would reduce the likelihood of false attraction flows. Properly siting the entrance to the upstream juvenile eel fishway and providing sufficient attraction flow for the upstream fishway would prevent eels from being attracted to the turbine discharge and would minimize the chance of passage delays.

Downstream Fish and Eel Passage

NEHC is proposing to use flow through the proposed project's turbines as the primary route for downstream fish passage from the Albion impoundment. To control the flow entering the turbines, NEHC proposes to install sluice gates at the proposed project's intakes. NEHC proposes the following measures to facilitate the passage of fish downstream of the project: (1) install turbines that utilize the AST technology to reduce project effects on fish seeking passage downstream of the project; (2) install a rubber bumper on the leading edge of the turbine screws; (3) remove sharp edges and pinch points on the ASTs to avoid injury to fish; and (4) construct the outlet works to minimize obstruction, including by smoothing the concrete channel to allow uniform passage around the turbines and through the tailrace. To allow resident and migratory fish to use the ASTs for downstream passage when the project is operating, NEHC proposes to install and maintain a trashrack with clear spacing no less than 9 inches. Interior's section 30(c) condition 5 requires and Rhode Island DEM recommends installing the trashrack as proposed by NEHC.

In addition, NEHC proposes to provide FWS and Rhode Island DEM with data showing the results of previous AST injury/mortality studies. If FWS and Rhode Island DEM determine that the data are insufficient, NEHC proposes to conduct a study to determine the effects of the ASTs on fish at the project during the first downstream fish passage season after the project is operational. If the results of the study indicate that the ASTs do not provide safe, timely and effective passage, NEHC proposes to develop and implement protective measures for fish passage at the project. Interior's section 30(c) condition 8 requires and Rhode Island DEM recommends the AST assessment proposed by NEHC.

Our Analysis

Currently, there are no downstream fish passage facilities or turbines installed at Albion Dam. However, fish could be attracted to water flowing over the existing spillway and utilize spill as a route of passage under existing conditions. Fish passing over the spillway would fall approximately 25 feet over the ogee spillway to substrate that is composed of small and large boulders. Fish passing over the spillway that strike

boulders could potentially be injured or killed upon impact. Therefore, passage over the dam during spill events is not likely a safe means of passage for fish.

During the proposed project's operation, much of the Blackstone River's flow (30 to 611 cfs of the total streamflow) would pass through the proposed project's turbines when flows in the Blackstone River are above 130 cfs. Based on the attraction flows that would be created at the proposed ASTs, resident and migratory fish (such as American eels and alewife, blueback herring, and American shad, once they obtain access to the Albion impoundment above the dam), could attempt to use the ASTs to pass downstream of the project dam.

Several studies (Kibel and Coe, 2011; Spah, 2001; Lucas and Bracken, 2010) reported no mortality of eels, bream, sea lamprey, salmon, and brown trout passing through ASTs; however, these studies did find some minor (*i.e.*, survivable) injury damage to about 1.3 percent of juvenile sea lampreys, 1.4 percent of salmonids, and 0.64 percent of eels. In addition to these studies, NEHC conducted eel and shad mortality studies in 2018 and 2019 to asses survival through the AST at the Hanover Dam Project No. 14550.¹² Results of the studies showed that there was 100 percent survival of adult American eels and shad passing through the ASTs with no reported injuries (NEHC, 2019b and NEHC, 2019c). Eel and shad passage through the turbine at the Hanover Dam Project No. 14550 took approximately 15 seconds.

Based on the results of these studies, it appears that installing the proposed ASTs at the Albion Project and implementing NEHC's proposed measures for removing sharp edges and pinch points of the turbine screws and smoothing areas of the intake and discharge would likely provide a safe, timely, and effective downstream passage route for resident and migratory fish at Albion Dam.¹³ However, as mentioned above, the AST at

¹³ Although the AST at the Hanover Dam Project No. 14550 was not tested for passage survival of alewives and blueback herring, these species have smaller body lengths than shad and would not be expected to be adversely affected during passage

¹² The AST evaluated in the study has three blades with a runner diameter of 139.75 inches that operates at a maximum speed of 24 revolutions per minute (rpm). The AST at the Hanover Dam Project No. 14550 was tested at a speed of approximately 15 rpm. The ASTs proposed for the Albion Project are similar to the one tested at the Hanover Dam Project No. 14550. The ASTs proposed for the Albion Project are slightly larger in diameter (162 inches), but have the same number of blades and operate at 24 rpm.

the Hanover Dam Project No. 14550 was tested at a speed of approximately 15 rpm, which is less than the maximum speed of 24 rpm for the proposed ASTs. Higher turbine rotational speeds were not tested and could pose a risk of injury to fish during passage. Therefore, NEHC's proposal to assess injury/mortality at the project-specific ASTs, following the commencement of project operation, would identify if any injury or mortality is occurring during downstream fish passage at the project, and would provide a basis for additional measures for protecting fish during downstream passage. We would expect such a project-specific study to be limited to no more than one migration season.

Installing a trashrack with no less than 9-inch clear spacing would increase attraction to a safe, effective means of downstream passage and prevent passage delays. NEHC's proposal to install a trashrack with 9-inch clear bar spacing is intended to screen debris from the ASTs while providing a route for downstream passage. However, if debris accumulates on the trashrack, velocities at the trashracks could be uneven and disrupt fish movements or the debris could create narrower passages where the fish could be entangled in or impinged on the debris. Ensuring that the trashrack is free of trash and other debris would reduce the potential for an uneven flow field in front of the intake structure that could discourage fish passage or result in fish impingement on the intake structure. NEHC's proposed study to determine the occurrence of injuries and mortalities during downstream fish passage would identify if any injury or delay is occurring in association with debris accumulation at the trashracks.

Fish Passage Design, Operation, and Maintenance

NEHC proposes to develop and implement a fish passage facilities operation and maintenance plan that details how and when fishways would be operated, and that describes routine maintenance activities that would occur during and after fish passage seasons. NEHC proposes to develop the plan within 6 months after the first passage facilities are operational, and to update the plan as needed when new passage facilities become operational. Interior's 30(c) condition 12 requires and Rhode Island DEM recommends the development and implementation of the fish passage facilities operation and maintenance plan, as proposed by NEHC.

through the AST (once they obtain access to the Albion impoundment). Similarly, resident fish such as bass, perch and minnows are less than the length of a large adult eel, and would not be expected to be significantly injured or killed by passage through the AST.

Our Analysis

To maintain the effectiveness of fish passage facilities, fishways need to be properly operated and maintained. Most fishways require routine maintenance to ensure the fishways operate effectively. An operation and maintenance plan would ensure that routine cleaning and maintenance, including debris removal, are performed so that the fishways operate as intended. In addition, the plan would ensure that any fishways constructed at the project would be operated during the appropriate times of the day and year, and with an appropriate conveyance flow.

Freshwater Mussels

NEHC proposes to conduct a pre-construction freshwater mussel survey at the Albion Project that includes the following objectives: (1) document and identify any mussels living in the project area prior to construction; (2) document the location of mussels; and (3) assess if mussel beds would be affected by construction activities. If construction-related activities would affect mussel beds, NEHC proposes to develop and implement protective measures in consultation with FWS and Rhode Island DEM, including freshwater mussel monitoring and relocation protocols that includes the following objectives: (1) monitor specific locations in the Blackstone River during construction; and (2) relocate exposed mussels from construction areas to areas that will remain wetted during construction. Interior's 30(c) condition 7 requires and Rhode Island DEM.

Our Analysis

The Blackstone River supports several freshwater mussel species. Relic shells of freshwater mussels were observed downstream of the Albion Dam during the mesohabitat survey, and mussels could be located at the proposed project.

Construction activities could negatively affect any mussels that are located in the immediate vicinity of the construction or the downstream reach of the Blackstone River. Turbidity associated with construction activities can interfere with the ability of mussels to feed properly and the high nutrient levels often seen in turbid waters can reduce survival and recruitment (Österling, 2006). Removing substrate that contains mussels would displace and subsequently kill those mussels. Conducting a survey prior to construction but when the final project design is available would identify the specific location of any mussel beds within the project area relative to the footprint of proposed construction activities. Developing a monitoring and relocation protocol for any mussels

that could be affected by construction activities would protect mussels from the effects of project construction.

Cumulative Effects

Water Quality

As described above, the Blackstone River within the reach where the project would be located has numerous water quality impairments on the 303(d) list, including: cadmium, iron, lead, non-native aquatic plants, low dissolved oxygen, phosphorus, mercury, PCBs, fecal coliform, and enterococcus bacteria. The Blackstone River has a legacy of water quality issues dating back to the early 1800's when the river's energy was harnessed for cotton and wool mills (RIDEM, 2013). Water quality in the Blackstone River has been affected by industrial wastewater associated with the manufacturing of textiles; domestic wastewater from wastewater treatment plants; and the construction and operation of hydroelectric facilities for more than 100 years (Shanahan, 1994). The metals and PCBs are associated with past contamination from industrial and agricultural activities, some of which could still be leaching into the river from landfills and contaminated sediments within the river basin. Nutrient-related impairments and bacteria (*i.e.*, phosphorus, fecal coliform, and enterococcus bacteria) are attributed both to point and non-point sources, such as septic and sewer system outflows upstream of the project area, and fertilizer input.

Our Analysis

Baseline water quality data collected in 2016, 2017, and 2018 indicate that under current conditions, water quality at the proposed project (including in the impoundment, bypassed reach, and downstream reach) is sufficient to maintain aquatic life (*i.e.*, temperature and DO concentrations are consistent with Rhode Island DEM's standards of 28.3°C (83°F) and 5.0 mg/L, respectively).

As discussed above, construction and operation of the project could affect water quality if appropriate measures are not implemented. Developing and implementing an erosion and sedimentation control plan that contains NEHC's proposed measures for installing erosion and sediment control barriers during construction would minimize the effects of construction on water quality in the Blackstone River. Also, developing and implementing a contaminated soil and sediment test and disposal plan that includes measures for testing and disposing of soils and sediments excavated from the project area would reduce the potential for hazardous materials to enter the Blackstone River during project construction and operation. Although NEHC tested the soil at the proposed project intake, additional testing would be needed to determine if any excavated material

could be reused at the project site, as proposed by NEHC. If the proposed project is granted an exemption from licensing with conditions that require NEHC to operate the project in a run of river mode and release a minimum flow of 100 cfs to the bypassed reach, then the project would likely maintain adequate dissolved oxygen levels and water temperatures in the impoundment, bypassed reach, and in the Blackstone River downstream of the Albion Dam. With these measures in place, the proposed project would not significantly add to the cumulative effects on water quality associated with domestic and industrial wastewater treatment plant effluents and hydropower operations, or any additional cumulative effects that may occur in the future from any new activities in the basin.

Fisheries

The Blackstone River historically supported migrations of diadromous fish, including river herring, American shad, Atlantic salmon, and American eel. The extensive construction of dams for water power in the late 1700's and 1800's prevented these migratory fish from returning to the river basin's historical spawning and nursery areas, and consequently these fish runs were eliminated in the Blackstone River Basin (RIDEM, 2002; USACE, 1997). Also, other anthropogenic activities, such as the release of waste water effluent from residential and commercial sources, has resulted in low water quality that could affect fish survival and propagation.

In 2002, Rhode Island established a program to restore migratory fish stocks to the Blackstone River. The goal of the Blackstone River Fisheries Restoration Plan (restoration plan) is to restore self-sustaining populations of shad and river herring to the Blackstone River Basin. The restoration strategy focuses primarily on providing upstream passage for adult fish, but also seeks to minimize downstream mortality of juvenile fish. Upstream passage would be accomplished through the construction of permanent passage facilities such as fish ladders and bypass channels (RIDEM, 2002)

Our Analysis

Upstream Passage

American eel

There are no existing upstream fishways for juvenile eels. American eels appear to be able to ascend the Albion Dam under current conditions, but the height of the dam could delay juvenile eels during upstream migration. As discussed in section 5.3.2.2, *Aquatic Resources, Environmental Effects, Upstream Eel Passage*, dedicated upstream

eel passage at the project dam would increase upstream passage effectiveness relative to the existing incidental passage over wetted project structures and potentially decrease predation, and improve access to upstream habitat.

Shad and River Herring

As described in section 5.3.2.2, *Aquatic Resources, Environmental Effects, Upstream Fish Passage*, there are no upstream fish passage facilities at the project and the five dams downstream of the project do not have upstream fish passage facilities. There currently is no need for upstream passage at the Albion Project because no anadromous fish species occur in the stretch of the Blackstone River immediately downstream of the dam. However, if Rhode Island's shad and river herring restoration plan is successful or passage is otherwise provided at the dams downstream of the Albion Dam, then there may be a need to provide upstream passage at the project. Therefore, the proposed project would not increase the ongoing effects discussed above, or otherwise significantly add to the cumulative effects on fisheries in the basin, or that may be caused by new activities in the basin in the future.

Downstream Passage

The Albion Dam does not have any downstream fish passage facilities and currently, the only means of downstream passage is over the spillway. Passage over the project dam is not likely safe and could result in injury or mortality to fish. NEHC is proposing to use flow through the proposed project's ASTs to provide downstream fish passage. Based on previous studies, the AST is known to provide safe, timely, and effective fish passage, without adversely affecting fish through injury or mortality during passage. In addition to providing a new source of hydroelectric generation, installing the proposed ASTs at the project would also improve downstream passage for migratory and resident fish relative to current conditions. Therefore, the proposed project would not increase the ongoing effects discussed above, or otherwise significantly add to the cumulative effects on fisheries that have been historically caused by the project and other activities in the basin, or that may be caused by new activities in the basin in the future.

5.3.3. Terrestrial Resources

5.3.3.1 Affected Environment

The project is located in a suburban area and land within the immediate project vicinity has residential and commercial uses. Upland vegetation common to the project area includes black oak, red oak, sassafras, Norway maple, and white oak. The

understory¹⁴ contains black cherry, maple-leaf viburnum, and poison ivy. Invasive plant species in the project area include burning bush, glossy buckthorn, honeysuckle, multiflora rose, common buckthorn, Virginia creeper, and oriental bittersweet.

A 2016 wetland delineation study identified two palustrine-forested wetlands within the Albion Project vicinity, downstream of the dam. An approximately 0.28-acre wetland is located adjacent to the east side of the Blackstone River; and an approximately 0.05-acre wetland is located immediately east of the first. The larger wetland is sparsely vegetated and contains highly disturbed soils consisting of natural material and debris such as broken glass, bricks, and metal. The smaller wetland is also composed of highly disturbed soil consisting primarily of sand. Wetland vegetation identified during the survey include red maple, green ash, witch hazel, skunk cabbage, sedges, mosses, New York fern, poison ivy, and snakeroot.

A 2016 wildlife habitat evaluation study documented wildlife habitat and species in the project vicinity. Forested uplands were identified south and east of the dam, as well as along the banks of the Blackstone River. These habitats are vegetated with mature trees and dense understories; they contain features such as trees, snags, and fallen logs. Herptiles observed in the proposed project vicinity include the green frog, pickerel frog, and northern water snake. Birds observed include great blue heron, hooded merganser, mallard, Canada goose, mute swan, mourning dove, downy woodpecker, norther flicker, eastern phoebe, blue jay, American crow, black-capped chickadee, redbreasted nuthatch, veery, American robin, and gray catbird. Mammals include gray squirrel, eastern chipmunk, racoon, coyote, raccoon, and white-tailed deer.

An acoustic bat survey conducted in August 2016 identified the presence of several bat species, including the big brown bat and little brown bat. Forested habitat at the project was found to provide potential use for bat roosting based on the presence of large trees and snags that were documented during the 2016 survey.

5.3.3.2 Environmental Effects

Wetlands

Proposed construction of the gravel access road would result in the permanent conversion of about 75 square feet of the 0.05-acre wetland to an impermeable surface.

¹⁴ A layer of shade-tolerant vegetation that grows under the forest canopy, close to the ground.

Our Analysis

The 0.05-acre wetland that would be affected by construction of the access road for the Albion Project contains highly disturbed soils and provides limited habitat for terrestrial species. The 2016 wetland survey identified the principle function of this wetland to be flood-flow alteration. However, due to its size and disturbed nature, this wetland would not be expected to significantly contribute to the absorption and retention of water during high flow or runoff events. Therefore, conversion of about 75 square feet (4 percent) of this wetland to an impermeable surface would not significantly affect habitat for terrestrial species at the project or the existing flood-flow alteration functions of the wetland.

The development and implementation of an erosion and sedimentation control plan, and a contaminated soil and sediment test and disposal plan during construction, as discussed above in section 5.3.1.2 (*Geology and Soils, Environmental Effects*), would minimize the effects of project construction on the remaining wetlands in the immediate vicinity of the project by reducing the potential for erosion and contaminated soil to be introduced to the wetlands.

Invasive Plants

NEHC proposes to construct several new project facilities, including a new powerhouse, penstocks, intake channel and tailrace, 500-foot-long transmission line, a pad-mounted transformer adjacent to the powerhouse, access road, and a parking area.

NEHC proposes to develop and implement an Invasive Species Monitoring and Control Plan to: (1) map existing invasive species at the project; (2) periodically monitor for invasive species at the project; and (3) initiate "an early detection, rapid response protocol for infestations of targeted species." Interior's 30(c) condition 13 requires and Rhode Island DEM recommends the invasive species monitoring and control plan proposed by NEHC.

Our Analysis

Invasive plants have been documented in the immediate vicinity of the proposed project. In addition, the segment of the Blackstone River that includes Albion Dam is listed as impaired on the section 303(d) list due, in part, to the presence of non-native plants. The proposed construction of project facilities would require clearing of vegetation and disturbance of soils and sediment, which could facilitate the spread of the invasive species at the proposed project. After ground-disturbing activities, invasive

plants may recolonize disturbed soils more quickly than native plants, especially if they are established in the seed bank or are introduced when fill is brought in from off-site. Non-native invasive plant species can out-compete and displace native plants. They can spread rapidly and reduce biodiversity, alter normal ecological processes, decrease fish and wildlife habitat, and reduce fish and wildlife forage resources. Monitoring and control plans can be an effective management option after ground-disturbing activities in areas where invasive plants are known to occur.

Developing an Invasive Plant Species Monitoring and Control Plan that provides measures to map existing invasive species, periodically monitor the area for the presence of invasive species, and develop a protocol for controlling infestations of targeted species could reduce the potential for further introduction or spread of invasive species during project construction and operation.

Wildlife

Consistent with Interior's 30(c) conditions 1, 2, and 3 and Rhode Island DEM's recommendations, NEHC proposes to operate the Albion Project in an instantaneous runof-river mode and to release a continuous interim minimum flow of 100 cfs or inflow, whichever is less, into the bypassed reach upon commencement of project operation. NEHC proposes to continue releasing the interim 100-cfs bypassed reach minimum flow until FWS determines an appropriate flow that would protect aquatic habitat and resources in the bypassed reach.

NEHC proposes to construct several new project facilities, including a new powerhouse, penstocks, intake channel and tailrace, 500-foot-long transmission line, a pad-mounted transformer adjacent to the powerhouse, access road, and a parking area.

Our Analysis

Operating the project in a run-of-river mode would maintain stable impoundment levels and minimize effects on terrestrial habitat along the project impoundment. Maintaining a minimum flow to the bypassed reach would minimize effects to riparian habitat along the bypassed reach by providing stable hydrological conditions. A stable hydrology in the bypassed reach would reduce project effects on foraging opportunities for aquatic and semi-aquatic wildlife, including waterfowl and some mammals.

Proposed construction would result in the removal of trees and the loss of some upland habitat with the placement of permanent project facilities. Approximately one acre of upland habitat loss could occur as a result of proposed construction activities.

Wooded upland habitat is abundant along the Blackstone River in the vicinity of the project and the overall reduction in habitat as a result of the project would be relatively small. This habitat is highly disturbed from past activities associated with historic industry and transportation corridors along the Blackstone River. The small amount of habitat that would be affected by the proposed project is unlikely to serve a unique or significant function for wildlife resources and comparable habitat is widely available adjacent to the project area that would be affected by the proposed project, overall effects to wildlife resources are expected to be insignificant. The effects of tree clearing activities on bat roosting habitat is discussed below in section 5.3.4, *Threatened and Endangered Species*.

5.3.4 Threatened and Endangered Species

5.3.4.1 Affected Environment

Commission staff obtained the official list of federally threatened and endangered species from FWS's IPaC system on January 10, 2020 for the Albion Project. FWS's IPaC system indicates that the federally threatened NLEB could occur in the vicinity of the project. No critical habitat has been designated for the NLEB.

The NLEB was listed as a federally threatened species under the ESA on May 4, 2015. In January 2016, the FWS finalized the 4(d) rule for this species, which focuses on preventing effects on bats in hibernacula associated with the spread of white-nose syndrome¹⁵ and effects of tree removal on roosting bats or maternity colonies (FWS, 2016a). As part of the 4(d) rule, FWS proposes that take incidental to certain activities conducted in accordance with the following habitat conservation measures, as applicable, would not be prohibited: (1) occurs more than 0.25 mile from a known, occupied hibernacula; (2) avoids cutting or destroying known, occupied maternity roost trees during the pup season (June 1 – July 31);¹⁶ and (3) avoids cutting or destroying any tree within a 150-foot radius of a known, occupied maternity tree during the pup season. The

¹⁶ Pup season refers to the period when bats birth their young.

¹⁵ A hibernaculum is where a bat hibernates over the winter, such as in a cave. White-nose syndrome is a fungal infection that agitates hibernating bats, causing them to rouse prematurely and burn fat supplies. Mortality results from starvation or, in some cases, exposure.

4(d) rule provides flexibility to landowners, land managers, government agencies, and others as they conduct activities in areas that could be NLEB habitat.

Traditional ranges for the NLEB include most of the central and eastern U.S., as well as the southern and central provinces of Canada, coinciding with the greatest abundance of forested areas. The NLEB, whose habitat includes large tracts of mature, upland forests, typically feeds on moths, flies, and other insects. These bats are flexible in selecting roost sites, choosing roost trees that provide cavities and crevices, and trees with a diameter of 3 inches or greater at breast height.¹⁷ Winter hibernation typically occurs in caves and areas around them that can be used for fall swarming¹⁸ and spring staging.¹⁹ The project is located within the white-nose syndrome buffer zone for this species.²⁰

NEHC conducted an acoustic bat survey in August 2016. Over a period of two nights, 43 bat calls were recorded at the proposed site of the Albion Project. NLEB were not positively identified during the survey; however, NLEB were detected at a second site about 1.5 river miles downstream on the Blackstone River. Based on the presence of upland forested habitat at the proposed project and the close proximity of the survey site where NLEB were positively identified, the NLEB is likely to occur in the project area.

¹⁸ Fall swarming fills the time between summer and winter hibernation. The purpose of swarming behavior may include: introduction of juveniles to potential hibernacula; copulation; and gathering at stop-over sites on migratory pathways between summer and winter regions.

¹⁹ Spring staging is the time period between winter hibernation and migration to summer habitat. During this time, bats begin to gradually emerge from hibernation and exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (*i.e.*, a state of mental or physical inactivity).

²⁰ The white-nose syndrome buffer zone encompasses counties within 150 miles of a U.S. county or Canadian district in which white-nose syndrome or the fungus that causes white-nose syndrome is known to have infected bat hibernacula.

¹⁷ Diameter at breast height refers to the tree diameter as measured about 4 to 4.5 feet above the ground.

5.3.4.2 Environmental Effects

NEHC proposes to construct several new project facilities, including a new powerhouse, penstocks, intake channel, tailrace, 500-foot-long transmission line, pad-mounted transformer adjacent to the powerhouse, access road, and parking area.

NEHC proposes to implement a tree clearing restriction from April 1 through October 31 during construction of the proposed project to avoid tree removal during the period when NLEB are active and may be present in suitable roost trees. Interior supports the time-of-year tree cutting restriction during the construction phase of project development for the Albion Project.

Staff Analysis

Construction and maintenance activities associated with the proposed project could adversely affect bats if tree cutting or thinning were to occur during roosting or other phases in their reproductive life cycle. Ground disturbance and some tree-clearing activities are expected as part of the proposed construction. Activities that could result in the removal of mature trees include construction of the powerhouse, intake channel and tailrace, transmission line, access road, and parking lot. Maintenance activities could also require periodic tree removal that may affect NLEB roosting habitat (*e.g.*, vegetation maintenance along the transmission line).

Avoiding removal of trees with diameters that are equal or greater to three inches at breast height from April 1 through October 31 would reduce the likelihood of disturbing NLEB and their newly born pups in undocumented maternity roosts that could occur within 150 feet of the project. Tree removal in the cooler winter months, specifically November 1 through March 31, would coincide with the period when NLEB are likely hibernating in caves.

However, NEHC does not specifically propose to implement a tree-cutting restriction after the construction phase of the project is completed to protect NLEB. To avoid prohibited incidental take and minimize disturbance to NLEB during project maintenance activities, NEHC could conduct tree removal activities only during the period of November 1 through March 31 when NLEB are not roosting in trees.

With the implementation of the tree-cutting restriction measures for construction and maintenance, we conclude that the Albion Project is not likely to adversely affect NLEB. We will follow FWS's optional streamlined consultation framework that allows

federal agencies to rely on the 4(d) rule to fulfill section 7(a)(2) consultation requirements for NLEB (FWS, 2016b).

5.3.5 Land Use and Recreation

5.3.5.1 Affected Environment

Land Use

The Albion Project is located on the Blackstone River, near the towns of Cumberland and Lincoln, in Providence County, Rhode Island. Land use in the Blackstone River Basin is largely characterized by forest land (52 percent) and residential development (22 percent), with significant industrial development along the Blackstone River in Worcester, Massachusetts, Woonsocket, Rhode Island, Pawtucket, Rhode Island, and Central Falls, Rhode Island. Less than 2 percent of the basin's land use is considered cropland or agricultural lands (Myers, 2018).

The Albion Project is located within the John H. Chafee Blackstone River Valley National Heritage Corridor, which is supervised by the National Park Service. The 400,000-acre corridor was established by Congress in 1986 to preserve and interpret the history of the Blackstone Valley. The corridor extends from Worcester, Massachusetts to Pawtucket, Rhode Island, and covers much of the Blackstone River Basin. The National Park Service does not own the land within the corridor, but rather serves as the lead management agency in a partnership between itself, the governments of Massachusetts and Rhode Island, local municipalities, nonprofit organizations, and other stakeholders (National Park Service, 2015).

Providence County, in which the proposed project would be located, encompasses approximately 132,071 acres. The land use of Providence County is composed of 40.46 percent deciduous forests, 31 percent mixed forests, 12.28 percent softwood forests, 8.76 percent water, 2.57 percent pastures, 1.91 percent wetlands, 1.38 percent brushland, and 1.09 percent landfills, junk yards, and waste disposal lands. The remaining land use is composed of minimal percentages of beaches, idle agricultural lands, mixed barren lands, and non-beach sandy areas.

Land use in the immediate vicinity of the proposed Albion Project is predominantly upland forest with some steep and exposed rock. The proposed project boundary encompasses approximately 22.8 acres of land and water. The project would be constructed on the east side of the Blackstone River, upstream of the School Street bridge in Lincoln.

No federal land exists within or adjacent to the proposed Albion Project boundary. No lands in the immediate vicinity of the project are included in the national trails system, nor are there any designated wilderness lands. The Blackstone River is not on the list of wild and scenic rivers.

Recreation

Statewide Recreation

The 2019 - 2024 Rhode Island State Comprehensive Outdoor Recreation Plan (SCORP) provides planning to guide and direct the efforts of state, municipal, and private agencies to protect the resource base and provide recreational opportunities for present and future generations of Rhode Islanders and visitors to the state (Rhode Island Division of Statewide Planning and Rhode Island Department of Environmental Management, 2019). The SCORP recommends investing in new and improved opportunities for outdoor recreation for the public, and to create economic benefits; strengthening, expanding, and promoting the statewide recreation network, while protecting natural and cultural resources; ensuring sustainable operation, maintenance, and management of the statewide outdoor recreation network; and improving access by removing barriers and enhancing information and communication systems.

Regional Recreation Opportunities

The Albion Project is located on the Blackstone River, in the northeast corner of Rhode Island. The area has a variety of state parks, conservation areas, wildlife refuges, and regional recreation areas within a four-mile radius.

The John H. Chafee Blackstone River Valley Heritage Corridor (Blackstone Heritage Corridor) offers maps and information about the Blackstone River Valley at six visitor centers along the Blackstone River in Massachusetts and Rhode Island. Many recreational activities are available in the Blackstone Heritage Corridor, including selfguided paddling of the Blackstone River and Blackstone Canal, which is largely navigable by kayak or canoe. The lower Blackstone River has nine dams, several of which have accessible portages for boaters to use while exploring the history, wildlife, and recreation opportunities on the lower Blackstone River corridor.

The Blackstone River Bikeway (Bikeway) is a partially completed, 48-mile paved bikeway, with the northern terminus in the Blackstone Heritage Corridor. When completed, the Bikeway will extend from downtown Worcester, Massachusetts to Providence, Rhode Island. In Providence, the Bikeway will connect to the existing East Bay Bikeway and continue to Bristol, Rhode Island. The Bikeway is used for biking,

hiking, running, and walking along the Blackstone River and historic canal (Blackstone Heritage Corridor, 2019).

The Blackstone River State Park is a riverfront park located on a peninsula between the Blackstone River and the Blackstone Canal. The state park provides a visitor center, bikeway, walking trails, pedestrian bridge, canoe portage, and fishing (Rhode Island State Parks, 2012). In addition, the Blackstone River Byway (Byway) is an unpaved road that parallels the Blackstone River, and is occasionally used as an allterrain vehicle (ATV) and hiking trail.

Recreation Use at the Project

Several recreation activities are available in the immediate vicinity of the proposed Albion Project, including: (1) biking, walking, and running on the Bikeway, which is located across the river from the proposed project; (2) hiking and ATV riding on the Byway, which is located immediately east of the proposed project; (3) boating; and (4) fishing and picnicking from the shores of the Blackstone Heritage Corridor (Figure 4). Boat ramps located upstream and downstream of the Albion Project provide boat access to the Blackstone River, and a portage route is located along the western bank of the Blackstone River in the Blackstone River State Park, across from the proposed powerhouse. The egress point for the portage route is located approximately 75 feet upstream of the Albion Dam. After exiting the river upstream of the dam, portage trail users must carry their boats for approximately 250 feet down the Bikeway to stone steps leading down to the river, downstream of the dam (Rhode Island Blueways, 2012).



Figure 4. Recreation in the vicinity of the proposed Albion Project (Source: NEHC, as modified by staff)

5.3.5.2 Environmental Effects

Recreation Use and Access

NEHC proposes new construction that includes: (1) constructing a new powerhouse; (2) excavating the intake canal and tailrace; (3) installing new sluicegates and penstocks; (4) constructing a new eel passage facility; (5) constructing a new access

road; (6) constructing a new parking lot that would accommodate approximately six cars; and (7) installing a new above-ground transmission line and step-up transformer.

NEHC also proposes to (1) install a floating boom across the proposed intake canal of the project that includes signage to warn paddlers of the turbines; and (2) construct a parking lot to accommodate approximately six cars on the eastern bank of the Blackstone River to provide walking and fishing access near the project.

Our Analysis

Construction of the proposed project would involve a minor change to existing land use and the aesthetics of the local area. Approximately 0.48 acres of land would be converted from natural, forested land to land occupied by project facilities. Although the proposed access road and parking lot would be constructed in close proximity to the Byway, the proposed project would not directly conflict with any existing recreational facilities. In addition, the proposed project would not diminish the recreational value of the area or restrict any existing recreation opportunities. The impoundment would remain open to the public and accessible using the existing access/egress points and portage route provided on the west side of the Blackstone River at the Blackstone River State Park. There is no indication that the Blackstone River State Park intends to restrict access to, or discontinue management of, the access/egress points or the canoe portage.

NEHC's proposal to install a safety boom and signage to alert boaters of the proposed project intake would ensure the safety of boaters on the Blackstone River. A safety boom with directional signs to the existing egress site and portage trail in the Blackstone River State Park would help ensure that boaters can easily locate a means of safe egress from the Blackstone River.

The current lack of designated access to Blackstone River may limit boating access and the amount of recreation use and access in the project vicinity. NEHC's proposal to install a parking lot to accommodate up to six cars would improve recreational use and access to the eastern bank of the Blackstone River for fishing, picnicking, and accessing the surrounding trails system.

5.3.6 Cultural Resources

5.3.6.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic

Preservation a reasonable opportunity to comment on the undertaking.²¹ Historic properties are those that are listed or eligible for listing on the National Register. The regulations implementing Section 106 of the NHPA also require that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties, and consult with interested Indian tribes or Native Hawaiian organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term "cultural resources" for properties that have not been determined eligible for listing on the National Register. Cultural Resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

Cultural History Overview

Pre-contact Period

Throughout the Northeast, evidence of Paleoindian period (12,500-10,000 years before present (BP)) sites is extremely rare. Most sites of this period have been identified from isolated diagnostic artifact types. Based on ethnographic analogy, it is assumed that peoples of this time were seasonally nomadic, following the movement of game with the changing weather conditions of the year. Documented Paleoindian cultural materials in Rhode Island are limited to isolated fluted projectiles in the southern regions of the state (Banister and Cherau, 2019).

The period following the Paleoindian occupation, but predating the use of pottery and horticulture, has been designated the archaic period by North American archaeologists. The Archaic Period is further divided into at least three sub periods: Early, Middle, and Late.

In the Northeast region, archaeological sites from the Early Archaic period (10,000-8,000 BP) are rare. The diagnostic artifacts most closely associated with the Early Archaic period are bifurcate-base projectile points (Braun and Braun, 1994). Concentrations of Early Archaic cultural material has been identified in wetland

²¹ An undertaking means "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval." 36 C.F.R. § 800.16 (2019). Here, the undertaking is the potential issuance of an exemption from licensing for the Albion Project.

environments in Rhode Island (Turnbaugh, 1980).

During the Middle Archaic Period (8,000-6,000 BP), environmental conditions in the area began to approach those of present day. Archaeological materials from New England provide evidence of significant local populations at this time, indicating that a substantial degree of population growth had occurred by the end of this period (Mulholland, 1984).

During the Late Archaic Period (6,000-3,000 BP), larger base camps were established along banks of streams, ponds, and interior wetlands (Waller and Leveille, 2002). Modern environmental conditions were present and the wild resources available were the same as those observed by the early European settlers and explorers.

The Woodland Period in the Northeast is defined by the onset of new technologies, such as ceramics, the bow and arrow, and horticulture involving non-native plants, like corn. Based mainly on technological diversification in pottery use and subsistence strategies, archaeologists have divided the Woodland Period into three stages: Early, Middle, and Late.

The Early Woodland Period (3,000-2,000 BP) has generally been considered a period of population decline following a cultural florescence during the Late Archaic. This millennium witnessed the first widespread use of ceramics across the Northeast. Early Woodland occupations in Rhode Island have been identified by the presence of Meadowood, Lagoon, and Rossville type projectile points and grit-tempered, cord-marked ceramics (Banister and Cherau, 2019).

The Middle Woodland Period (2,000-1,000 BP) is characterized as a continuation of trends of the Early Woodland period. Subsistence trends of the Early Woodland continued, and large, semi-permanent or perhaps year-round settlements were used by this time. Middle Woodland site distributions suggest a continued focus on coastal or riverine ecosystems for southern New England Native American (Banister and Cherau, 2019).

The Late Woodland Period dates from approximately 1,000 BP to European contact. During this time, horticulture, including exotic domesticates, such as corn and beans, became a widespread and occasionally important dietary element. More evidence is present of permanent settlements, or at least locations where sites were used for much of the year, especially on the coasts (Carlson, 1986; Yester, 1988). Late Woodland Period sites are common along the coastal margins of southern Rhode Island (Banister and Cherau, 2019).

Post-contact Period

European settlement of Rhode Island began around 1622 and Rhode Island was established as an English colony in 1636. By the 1640s, European settlers were utilizing the Blackstone River Valley for hunting and fishing. Rhode Island was the first of the thirteen colonies to renounce its allegiance to England and was admitted to the union in 1790 (Banister and Cherau, 2019).

The proposed project boundary for the Albion Project includes 22.8 acres of land in the towns of Cumberland and Lincoln, Providence County, Rhode Island. Initial settlement of the areas of Cumberland and Lincoln was slow. During the mid-17th century, the areas was mainly used for hunting, fishing, and small-scale agricultural harvesting. Agriculture was the main industry of the local economy throughout the 18th century (RIHPC, 1982b).

As transportation and industry advanced along the Blackstone River during the 19th century, the population of Cumberland and Lincoln grew and became more concentrated along the Blackstone River. The completion of the Blackstone Canal²² in 1828 and the introduction of the Providence and Worcester Railroad in 1847 transformed the economy of Cumberland and Lincoln. Cumberland and Lincoln attracted large-scale investment, specifically from Providence, and large mills and associated villages along the Blackstone River were established. Lime, granite, coal, copper, and other mineral mining operations also contributed to the economy of the area in the 19th century (RIHPC, 1998).

The first mill built at Albion was a cotton spinning mill that was constructed in 1823. A timber crib dam at Albion was constructed in conjunction with the cotton spinning mill. Due to the success of the cotton spinning mill, two additional mill buildings were constructed during the 1830s.

After the closing of the Blackstone Canal in 1849, the Albion mill complex changed owners several times before being purchased in 1854 by Harvey and Samuel Chace. The mill complex continued the spinning and weaving functions at the mills until the twentieth century (Kennedy and Lynch, 1981; RIHPC, 1982b). The existing stone masonry Albion Dam was originally constructed around 1850 and was reconstructed in 1916. The masonry dam was constructed to replace the timber crib dam.

²² The Blackstone Canal is located on the western side of the Blackstone River and is not located within the project APE.

Cutbacks and closings at the local large mills (*i.e.*, Ashton, Albion, Berkely, and Lonsdale) as a result of competition from Southern textile producers affected Cumberland and Lincoln in the 1930s and 1940s (Banister and Cherau, 2019).

Cultural Resources Investigations

In November 2018, NEHC conducted a Phase I archaeological survey to identify archaeologically sensitive areas and to identify any archaeological sites that may be eligible for listing on the National Register in the project area. The investigation consisted of background research, a walkover survey, and limited subsurface testing of archaeologically sensitive areas. The background research indicated that the Albion Dam is a historic property and a contributing resource to the Albion Historic District, which is listed on the National Register. The Albion Historic District consists of the dam, mill, and adjacent mill village that was built for workers employed at the mill. The district was listed on the National Register in 1984. The district is considered historically significant due to its association with the Blackstone River Valley textile industry. The Albion Dam is the only contributing resource that is located in the immediate vicinity of the proposed project.²³

The background research also indicated that the remnants of a 30-foot-wide timber crib dam are located immediately upstream of the dam in the Blackstone River. The timber crib dam was not identified by NEHC during the 2018 survey, but may have been obscured by high pond water levels from heavy rains in the preceding weeks.²⁴ No archaeological resources were identified during the Phase I survey.

5.3.6.2 Environmental Effects

NEHC proposes new construction that includes: (1) constructing a new powerhouse; (2) excavating the intake canal and tailrace; (3) installing new sluicegates and penstocks; (4) constructing a new eel passage facility; (5) constructing a new access

²³ The mill building and mill village are located on the western side of the Blackstone River, approximately one-tenth of a mile downstream of the project APE.

²⁴ See NEHC's Phase I Site Identification (Intensive) Archaeological Survey, Albion Dam Hydroelectric Project (privileged), filed on February 1, 2019.

road; (6) constructing a new parking lot that would accommodate approximately six cars; and (7) installing a new above-ground transmission line and step-up transformer.

In a letter dated October 25, 2018, the National Park Service (NPS) stated that the construction of the new powerhouse would have an adverse impact on the Albion Dam. In a letter dated October 31, 2018, the Rhode Island SHPO indicated that the construction of the new powerhouse and installation of turbines would have an adverse effect on historic properties. The Rhode Island SHPO further stated that the project would introduce visual elements that are out of character with the Albion Dam and would diminish the property's integrity of setting, design, feeling, and association. The Rhode Island SHPO recommended several measures to mitigate adverse effects on historic properties, including: (1) providing a record of the dam in the Rhode Island Historic Resources Archives Standards; (2) installing interpretive displays that describe the history and significance of the dam and mill; and (3) designing the project (including the powerhouse, concrete retaining walls, and riprap) in a manner that minimizes the visual impacts of the project on the historical setting, in consultation with the Rhode Island SHPO.

In a letter filed on December 6, 2018, the Mashantucket Pequot Tribe commented that the proposed project does not appear to directly impact potentially significant religious and cultural resources. Also, in a letter dated March 25, 2019 (filed on March 27, 2019), the Rhode Island SHPO concurred with the Phase I Site Identification report's conclusions that no further archaeological investigations are warranted in the terrestrial portions of the project area.

Consistent with the Rhode Island SHPO's recommendations, NEHC proposes to provide a record of the Albion Dam in the Rhode Island Historic Resources Archive, including by documenting the Albion Dam with photographs and a written narrative prior to construction. NEHC also proposes the following measures to minimize the effect of the project on historic properties that are eligible for or listed on the National Register: (1) install interpretive signage to educate the public about the historic nature of hydropower and the significance of the Albion Dam and Mill; and (2) design the project (including the powerhouse, concrete retaining walls, and riprap) in a manner that minimizes the visual impacts of the project on the historical setting, in consultation with the Rhode Island State Historic Preservation Officer (SHPO).²⁵

²⁵ See NEHC's revised exemption application filed May 9, 2019.

Our Analysis

The project boundary includes the Albion Dam, which is a contributing resource to the Albion Historic District. Project-related effects on the Albion Dam could result from construction, operation, and maintenance of project facilities, or other project uses. It is also possible that unknown historic resources may be discovered during project construction or other project-related activities that require ground disturbance.

Developing and implementing an HPMP, in consultation with the Rhode Island SHPO and federally recognized tribes, would ensure that measures are in place to protect historic properties in the APE from adverse effects related to the construction, operation, and maintenance of project facilities. To minimize the effects of the project on historic properties, the HPMP could include NEHC's proposed measures for documenting the Albion Dam, installing interpretive signage, and designing the project in a manner that minimizes the visual impacts on the historical setting. The HPMP could also include the following provisions to protect any previously undiscovered archaeological resources within the APE: (1) in the event any unidentified cultural resources are discovered during construction, stop all land-clearing and land-disturbing activities in the vicinity of the resource, and consult with the SHPO to determine the need for any cultural resource studies or measures; and (2) prior to implementing any project modifications not specifically authorized by the exemption, consult with the SHPO to determine the effects of the activities and the need for any additional cultural resource studies or measures.

To meet the requirements of section 106 of the NHPA, the Commission intends to execute a Programmatic Agreement with the Rhode Island SHPO for the proposed project to protect historic properties that could be affected by the construction, operation, and maintenance of the project. The terms of the Programmatic Agreement would require NEHC to develop and implement an HPMP for the project to ensure that construction, operation, and maintenance of the project would have no adverse effect on historic properties within the APE.

5.4. No-Action Alternative

Under the no-action alternative, the project would not be issued an exemption, the project would not generate electricity, and there would be no effects on environmental resources.

6.0. RECOMMENDED ALTERNATIVE

Based on our independent review and evaluation of the environmental effects of the proposed action, section 30(c) conditions filed by Interior, and a no-action alternative, we recommend the proposed action, including all of NEHC's proposed measures, the 30(c) conditions, and additional staff-recommended measures as the preferred alternative. Additional measures recommended by staff include: (1) develop and implement an erosion and sedimentation control plan that includes specific BMPs for minimizing soil erosion and sedimentation during project construction; (2) develop and implement a contaminated soil and sediment test and disposal plan that includes measures for handling and properly disposing of any contaminated soils and sediments during construction activities; (3) avoid cutting trees greater than 3 inches in width at breast height, between April 1 and October 31, to protect NLEB; and (4) develop an HPMP in consultation with the Rhode Island SHPO to protect historic properties that are eligible for or listed on the National Register.

We recommend this alternative because: (1) issuing an exemption from licensing for the Albion Project would allow NEHC to construct and operate its project as a beneficial and dependable source of electrical energy; (2) the 420 kW of electric capacity would come from a renewable resource that does not contribute to atmospheric pollution; and (3) the recommended measures would protect aquatic, fisheries, terrestrial, recreational, and cultural resources.

We recommend the following environmental measures proposed by NEHC for any exemption that would be issued for the proposed project (measures specified in Interior's section 30(c) conditions are noted in parentheses):

• Implement the following measures to minimize project effects on fish: (1) install turbines that utilize the AST technology to reduce project effects on fish seeking passage downstream of the project; (2) install a rubber bumper on the leading edge of the turbine screws to minimize/avoid injury to fish; (3) remove sharp edges and pinch points on the ASTs to minimize/avoid injury to fish; (4) construct the outlet works to minimize obstructions, including by smoothing the concrete channel to allow uniform passage around the turbines and through the tailrace; and (5) construct the end of the tailrace to disperse the water at the point of discharge to the Blackstone River, in order to reduce the potential for effects of false attraction on upstream migrating fish;

- Install a trashrack with clear bar spacing of no less than 9 inches to allow resident and migratory fish to use the ASTs for downstream passage when the project is operating; (Interior)
- Limit in-water construction to periods of low flow (July 1 to September 30);
- Operate the project in a run-of river mode, whereby outflow approximates inflow to the project at all times; (Interior)
- Release an interim conservation flow of 100 cfs, or inflow (if less), uniformly across the dam as spill until a permanent conservation flow has been determined to protect water quality and habitat in the Blackstone River in the bypassed reach; (Interior)
- Develop an operation compliance monitoring plan for run-of-river operation and the minimum flow release; (Interior)
- Develop a bypassed reach flow study plan that includes provisions for conducting a study after the project commences operation to determine whether the 100-cfs conservation flow is sufficient to protect aquatic resources in the bypassed reach, or if a higher flow is warranted; (Interior)
- Implement an impoundment refill procedure following drawdowns for maintenance or emergency purposes, whereby 90 percent of inflow is passed downstream and the impoundment is refilled by the remaining 10 percent of inflow to the project; (Interior)
- Implement best management practices (BMPs) for minimizing impacts to water quality associated with soil erosion and sedimentation during project construction, including the installation of erosion control barriers for ground disturbance in upland areas and sediment control barriers for in-water construction activities;
- Conduct water quality monitoring during the low-flow season (July 1 October 31) for up to 3 years after the project commences operation to verify that project operation does not affect water temperature or dissolved oxygen levels in the Blackstone River; (Interior)
- Provide upstream passage for anadromous fish within 3 years of notification by the U.S. Fish and Wildlife Service (FWS) or the Rhode Island Department of Environment Management (DEM) that the fishway is needed; (Interior)

- Prior to providing upstream passage for anadromous fish within 3 years of notification by the FWS or Rhode Island DEM that such fishways are needed, file a plan for the upstream passage for Commission approval;
- Within 3 years of receiving notification from the FWS or the Rhode Island DEM that upstream anadromous fish passage facilities are needed, develop a fish passage facilities effectiveness study plan; (Interior)
- Prior to implementing any upstream passage facilities effectiveness plan, file the plan with the Commission for review and approval;
- Conduct an upstream eel passage facility siting survey during the first passage season after the project commences operation, and construct the eel passage facility within three years of commencing project operation; (Interior)
- Conduct a study to determine the effects of the ASTs on fish during the first downstream fish passage season after the project commences operation, and develop protective measures at the project if the study indicates that the project does not provide safe, timely, and effective downstream fish passage; (Interior)
- Develop a fish passage facilities operation and maintenance plan detailing how and when the fishways will be operated and maintained; (Interior)
- Conduct a pre-construction freshwater mussel survey to identify the location of any mussels in the project area, and, if the survey indicates that construction activities would affect mussels, then develop and implement a freshwater mussel monitoring and relocation protocol that includes measures for monitoring specific locations in the Blackstone River during construction and relocating exposed mussels to wetted areas; (Interior)
- Develop an invasive plant species monitoring and control plan that includes provisions for identifying and mapping existing invasive plant species within the project boundary, monitoring the area periodically for invasive plant species, and initiating an early detection, rapid response protocol for infestations; (Interior)
- Implement a tree cutting restriction between April 1 and October 31 during project construction to protect NLEB;
- Construct a parking lot to accommodate approximately six cars to provide walking and fishing access at the project;
- Install a floating safety boom across the intake channel that includes signage to warn boaters of the turbines; and
- Implement the following measures to minimize the effect of the project on known historic properties that are eligible for or listed on the National Register: (1) install interpretive signage to educate the public about the historic nature of hydropower and the significance of the National Register-eligible Albion Dam and Mill; (2) design the project (including the powerhouse, concrete retaining walls, and riprap) in a manner that minimizes the visual impacts of the project on the historical setting, in consultation with the Rhode Island State Historic Preservation Officer (SHPO); and (3) prior to construction, provide a record of the Albion Dam in the Rhode Island Historic Resources Archive (including photographs and a written narrative of the Albion Dam).

Erosion and Sedimentation Control Plan

NEHC proposes new construction that includes: (1) constructing a new powerhouse; (2) excavating the intake canal and tailrace; (3) installing new sluicegates and penstocks; (4) constructing a new upstream eel passage facility; (5) constructing a new access road; (6) constructing a new parking lot that would accommodate approximately six cars; and (7) installing a new above-ground transmission line and step-up transformer. Project construction has the potential to cause localized erosion, slope instability, and sedimentation if control measures are not put into place around work areas.

To minimize erosion and re-suspension of river sediments during project construction, NEHC proposes to use BMPs, including: (1) placing erosion control barriers around upland work areas prior to the start of ground disturbing activities; (2) installing sediment control barriers (*e.g.*, temporary coffer dams) in the Blackstone River to contain disturbed sediments during in-water construction activities; (3) dewatering construction areas from groundwater infiltration when necessary; and (4) employing environmental oversite during construction to monitor compliance with BMPs. Installing sediment control barriers around in-water construction activities would minimize sedimentation, disturbance of riverbed material, and re-suspension of sediments in the Blackstone River during project construction. In addition, placing erosion control barriers around upland work areas prior to the start of ground-disturbing activities would reduce erosion during construction of the new access road, intake and tailrace, parking area, and transmission line. However, NEHC's proposal lacks detail regarding the actual measures that would be used to control erosion, revegetate the area, and monitor for compliance. Developing and implementing a soil erosion and sedimentation control plan that contains NEHC's proposed BMPs would minimize project-related erosion and sedimentation, and would minimize any adverse effects to aquatic resources. Such a plan should be based on site-specific conditions and final project designs. With effective erosion control measures in place, sediment from construction activities would not likely enter the Blackstone River. We recommend that prior to project construction, NEHC develop and implement an erosion and sedimentation control plan for Commission approval.

Contaminated Soil and Sediment Test and Disposal Plan

NEHC states that constructing the Albion Project would result in the excavation of approximately 1,430 cubic yards of material. NEHC indicates that any excavated soils would be reused on-site when appropriate or disposed of in an appropriate manner.

Disturbance of soil and sediment during project construction has the potential to release on-site contaminants into the environment. Although NEHC already collected a composite test sample of the sediment at the project intake, additional discrete testing would be needed to distinguish whether any excavated soil and sediment could be reused on site, as proposed by NEHC. A contaminated soil and sediment test and disposal plan that includes measures for testing and disposing of soils and sediments would reduce the potential for hazardous materials to enter the Blackstone River during project construction and operation. Specifically, the plan could include the following measures: (1) a description of the methods to be employed in testing disturbed soil and sediments during construction; (2) a description of the mitigation measures proposed to minimize inputs of contaminated soil and sediment into the water column during construction and other sediment-disturbing activities; and (3) an implementation schedule. Implementing this plan would ensure that contaminated soil and sediment in the project area would be handled and disposed of properly, and would serve to reduce the impact of contaminated materials to aquatic resources during in-water construction and land-disturbing activities.

We recommend that prior to project construction, NEHC develop and implement a contaminated soil and sediment test and disposal plan in consultation with the resource agencies for Commission approval.

Northern Long-Eared Bat Protection

As discussed in section 5.3.4.2, *Threatened and Endangered Species*, *Environmental Effects*, the federally threatened NLEB is likely present in the project area

and maternity roost trees could potentially occur in the project boundary and be affected by project maintenance. Project construction and maintenance activities have the potential to disturb bats if tree cutting or thinning were to occur during roosting or other phases in their reproductive life cycle. Trees provide valuable habitat for NLEB during their roosting reproductive phase, which takes place in the summer months, and tree removal during these months may disturb NLEB. Implementing a seasonal clearing restriction for trees greater than 3 inches in width at breast height, between April 1 and October 31, would avoid the time period when NLEB may be occupying nearby roosting trees, at no additional cost to NEHC. Accordingly, staff recommends this measure to ensure that NLEB is protected from project-related activities.

Cultural Resources

NEHC proposes new construction that includes: (1) constructing a new powerhouse; (2) excavating the intake canal and tailrace; (3) installing new sluicegates and penstocks; (4) constructing a new eel passage facility; (5) constructing a new access road; (6) constructing a new parking lot that would accommodate approximately six cars; and (7) installing a new above-ground transmission line and step-up transformer.

As discussed in section 5.3.6.2, *Cultural Resources*, *Environmental Effects*, NEHC's proposed project construction, operation, and maintenance could have adverse effects on the National Register-eligible Albion Historic District if there are no protective measures in place. It is also possible that unknown historic resources may be discovered during project operation or other project-related activities that require ground disturbance within the APE.

As recommended by the Rhode Island SHPO, NEHC proposes to provide a record of the Albion Dam in the Rhode Island Historic Resources Archive, including documenting the Albion Dam with photographs and a written narrative prior to construction. NEHC also proposes the following measures to minimize the effect of the project on historic properties that are eligible for or listed on the National Register: (1) install interpretive signage to educate the public about the historic nature of hydropower and the significance of the Albion Dam and Mill; and (2) design the project (including the powerhouse, concrete retaining walls, and riprap) in a manner that minimizes the visual impacts of the project on the historical setting, in consultation with the Rhode Island SHPO.

Developing and implementing an HPMP that includes NEHC's proposed measures (*i.e.*, documenting the Albion Dam, installing interpretive signage, and designing the project to minimize the visual impacts on the historical setting), would ensure that measures are in place to protect historic properties in the APE from adverse

effects related to the construction, operation, and maintenance of project facilities. In addition, including the following provisions in the HPMP would ensure that measures are in place to protect any previously undiscovered archaeological resources within the APE: (1) in the event any unidentified cultural resources are discovered during construction, stop all land-clearing and land-disturbing activities in the vicinity of the resource, and consult with the SHPO to determine the need for any cultural resource studies or measures; and (2) prior to implementing any project modifications not specifically authorized by the exemption, consult with the SHPO and determine the effects of the activities and the need for any cultural resource studies or measures. Accordingly, we recommend that NEHC develop and implement an HPMP in consultation with the Rhode Island SHPO and federally recognized tribes to protect the project's historic properties that are eligible for or listed on the National Register.

Unavoidable Adverse Impacts

A short-term increase in traffic, noise, and visual disturbance would occur during construction of the proposed Albion Project. Such activities would be minimized by implementation of control measures consistent with the standard terms and conditions of any exemption from licensing, issued for the project. Other unavoidable adverse effects would include: (1) permanent modification to aquatic habitat near the proposed project intake and downstream of the project dam at the confluence of the tailrace and the Blackstone River; and (2) loss of soil and resuspension of sediment during construction. Developing a soil erosion and sedimentation control plan would minimize adverse impacts to aquatic habitat.

7.0. FINDING OF NO SIGNIFICANT IMPACT

If the Albion Project is exempted from licensing as proposed with the additional staff-recommended measures, the project would be constructed and operated while protecting aquatic resources, terrestrial resources, threatened and endangered species, recreational resources, historic resources, and any previously unidentified cultural resources in the project area.

Based on our independent analysis, issuance of an exemption from licensing for the Albion Project, as proposed with additional staff-recommended measures, would not constitute a major federal action significantly affecting the quality of the human environment.

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- Patrick Crile Geology and Soils, Need for Power, Developmental Resources (Environmental Engineer; B.S. Geology, M.S. Environmental Science and Engineering).
- Amanda Gill Cultural Resources (Archaeologist; B.S., Archaeological Sciences; M.A., Applied Archaeology).
- Robert Haltner Terrestrial Resources, Wetlands, ESA (Wildlife Biologist; B.S. Biological Science).
- Erin Kimsey Recreation, Land Use, and Aesthetics (Outdoor Recreation Planner; B.L.A. Landscape Architecture).

APPENDIX A

U.S. DEPARTMENT OF THE INTERIOR SECTION 30(c) CONDITIONS OF THE FEDERAL POWER ACT FOR THE ALBION DAM HYDROELECTRIC PROJECT FILED ON AUGUST 7, 2019

Pursuant to 18 CFR 4.106(b), any case-specific exemption from licensing granted for a small hydroelectric power project requires inclusion in the exemption of all terms and conditions that are prescribed by state and Federal fish and wildlife agencies to prevent loss of, or damage to, fish and wildlife resources, and to otherwise carry out the purposes of the Fish and Wildlife Coordination Act.

The Department, on behalf of the Service, has determined that the following terms and conditions shall be included in their entirety and apply to any exemption which FERC issues for the Albion Dam Hydroelectric Project.

- The Exemptee shall operate the Project in an instantaneous run-of-river mode, whereby inflow to the Project shall equal outflow from the Project at all times and water levels above the dam are not drawn down for the purpose of generating power. Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the Exemptee, or for short periods upon mutual agreement between the Exemptee, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management.
- 2. The Exemptee shall provide an interim conservation flow of 100 cfs, or inflow (if less) to the bypass reach. This flow shall be released upon commencement of project operation, and shall continue until the Exemptee has been notified by the U.S. Fish and Wildlife Service of a permanent bypass flow requirement (to be determined via Condition #3 below). The Exemptee shall release the flow as uniform spill across the dam.
- 3. Prior to the commencement of construction or alteration activities at the project site, the Exemptee shall prepare and file for Federal Energy Regulatory Commission approval a bypass reach flow study plan. The goal of the study will be to collect data for the agencies to use in determining what conservation flow regime would sufficiently protect aquatic resources in the 100-foot-long stretch of River that would be bypassed by the Project. The objective of the flow evaluation will be to perform a flow study to assess the relationship between habitat and flow in the 100-foot-long stretch of River that would be bypassed by the Project.

The study plan shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The study shall be conducted during the Project's first operational period of low flow (June– October). The Exemptee shall provide the results of the flow study to the agencies within 3 months of concluding the study. The U.S. Fish and Wildlife Service will use the results to determine whether the interim bypass flow of 100 cfs is an adequate permanent bypass flow or if a higher flow is warranted.

- 4. The Exemptee shall, within three (3) months of commencement of project operation, prepare and file for approval by the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management a plan for maintaining and monitoring run-of-river operation and minimum flow releases at the Project. The plan will include a description of the mechanisms and structures that will be used, the level of manual and automatic operation, the methods used for recording data on run-of-river operation and minimum flow releases, an implementation schedule, and a plan for maintaining the data for inspection by the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management.
- 5. The Exemptee shall install a trashrack with clear spacing of no less than 9 inches. The trashrack shall be installed and operational concurrent with project generation. The rack shall be required to be kept free of debris and maintained to design specifications.
- 6. The Exemptee shall conduct a post-operation water quality monitoring survey. The survey protocol shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. Data shall be collected for up to three (3) years and shall be initiated the first low-flow season after Project commences commercial generation. If results indicate that the Project is not meeting water quality standards, mitigation measures may be required.
- 7. The Exemptee shall undertake the following measures and studies related to freshwater mussels:
 - A. Pre-Construction Freshwater Mussel Survey. The study plan shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The objectives of the study will be to:

- (1) document the identity of any mussels living in the project area prior to project construction;
- (2) document the location of identified mussels; and
- (3) determine if any mussel beds would be affected by construction activities. The study shall be completed prior to the initiation of construction activities. If results of the survey indicate that construction-related activities will impact mussel beds, the Exemptee shall implement protective measures as directed by the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management.
- B. If the survey conducted pursuant to Condition 7.A. documents mussels residing in the Blackstone River that would be impacted by construction, the Exemptee shall be required to develop a Freshwater Mussel Monitoring and Relocation Protocol. The protocol shall be developed in consultation with, and require the approval of, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The objectives of the protocol will be to:
 - (1) monitor specific locations within Blackstone River during construction; and
 - (2) relocate exposed mussels from those locations to areas that will remain wetted during construction. If this protocol is required, it shall be submitted for approval prior to construction.
- 8. The Exemptee shall provide the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management with data showing results of previous AST injury/mortality studies. If the U.S. Fish and Wildlife Service or the Rhode Island Department of Environmental Management determine the data are insufficient, the Exemptee shall undertake an additional AST Injury/Mortality Assessment at the project site. The assessment shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The objective of the assessment will be to determine if passage through the AST causes injury or mortality to fish. The assessment will be initiated the first passage season after the Project commences commercial generation. The Project shall not commence commercial generation until the data from previous studies or the additional assessment have been approved by the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. If results of the assessment(s) indicate that the AST system or specific components of the system do not provide safe, timely and effective passage, the Exemptee shall implement mitigation measures as directed by

the U.S. Fish and Wildlife Service and/or the Rhode Island Department of Environmental Management.

9. The Exemptee shall provide safe, timely and effective upstream passage for American eels. Within six (6) months of exemption issuance, the Exemptee shall prepare and file for Federal Energy Regulatory Commission approval a survey protocol to assess the areas of concentration of juvenile eels attempting to move upstream past the Project. The protocol shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The Exemptee shall conduct the surveys during the first post-operational migration season after study plan approval.

Survey results and information shall be submitted to the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management by the end of the calendar year that the study is conducted. Based on the results of those surveys, the Exemptee shall submit a plan for designing, constructing, installing, maintaining, operating, and evaluating one or more upstream eelways at the Project. The plan shall be developed in consultation with and require approval by the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. Depending on the site, these may be eel traps, Delaware-style eel passes, volitional pass-through ladders, or facilities of other appropriate design. All upstream eel passage facilities shall be operational within three (3) years of project start-up and shall operate during times when the River water temperature is 10°C or greater.

- 10. The Exemptee shall be responsible for providing safe, timely and effective upstream passage for anadromous fish at the Project, when notified by the U.S. Fish and Wildlife Service or the Rhode Island Department of Environmental Management that such fishways are needed. All plans and schedules associated with the design, construction, operation, maintenance and evaluation of the prescribed fishways shall be developed by the Exemptee in consultation with, and require approval by, the U.S. Fish and Wildlife Service. Upstream fish passage facilities shall be operational within three (3) years of receiving said notification.
- 11. The Exemptee shall, within three (3) years of receiving notification that upstream anadromous fish passage facilities are needed, prepare and file for Federal Energy Regulatory Commission approval a Fish Passage Facilities Effectiveness Study Plan. The plan shall detail how the upstream passage facilities will be evaluated for their effectiveness at passing anadromous migrants in a safe, timely and effective manner. The effectiveness evaluation shall require a maximum of three (3) years of study,

contingent on the studies: (1) being completed to the satisfaction of the agencies; and (2) taking place during representative environmental conditions (i.e., water temperature and flow within the 25th to 75th percentiles for the relevant sampling season). The plan shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management.

- 12. The Exemptee shall develop and implement a Fish Passage Facilities Operations and Maintenance Plan. The plan shall detail how and when the fishways will be operated and describe routine maintenance activities that will occur both during and outside of the fish passage seasons. The plan shall be developed in consultation with, and require approval by, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management. The plan shall be in place within six (6) months of the first passage facilities coming on-line, and shall be updated as needed as new passage facilities are placed into service and based on information obtained from operation of the facilities.
- 13. The Exemptee shall, within 12 months of the date of issuance of an exemption from licensing by the Federal Energy Regulatory Commission, prepare and file for approval by the U.S. Fish and Wildlife Service an Invasive Species Monitoring and Control Plan. The objectives of the plan will be to map existing invasive species, monitor the area periodically, and initiate an early detection, rapid response protocol for infestations of target species. The plan shall be developed in consultation with, and require approval of, the U.S. Fish and Wildlife Service.
- 14. The Exemptee shall implement an impoundment refill procedure whereby, during impoundment refilling after drawdowns for maintenance or emergency purposes, 90 percent of inflow is passed downstream and the headpond is refilled on the remaining 10 percent of inflow to the Project. This refill procedure may be modified on a case-by-case basis with the prior approval of both the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management.
- 15. The Exemptee shall notify, in writing, the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management when the Project commences commercial generation operation. Such notice shall be sent within 30 days of start-up to:

For the **U.S. Fish and Wildlife Service**: Supervisor, New England Field Office, U.S. Fish and Wildlife Service 70 Commercial Street, Suite 300

Concord, NH 03301

For the **Rhode Island Department of Environmental Management**: Supervising Fisheries Biologist - Freshwater Fisheries & Wildlife Great Swamp Field Headquarters Great Neck Road West Kingston, RI 02892

- 16. The Exemptee shall furnish the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management with a set of as-built drawings concurrent with filing said plans with the Federal Energy Regulatory Commission.
- 17. The Exemptee shall allow the U.S. Fish and Wildlife Service and the Rhode Island Department of Environmental Management to inspect the project area at any time while the Project operates under an exemption from licensing to monitor compliance with their terms and conditions.
- 18. The U.S. Fish and Wildlife Service reserves the right to add to and alter terms and conditions for this exemption as appropriate to carry out its responsibilities with respect to fish and wildlife resources. The Exemptee shall, within 30 days of receipt, file with the Federal Energy Regulatory Commission any additional terms and conditions imposed by the U.S. Fish and Wildlife Service.
- 19. The Exemptee shall incorporate the aforementioned terms and conditions in any conveyance—by lease, sale or otherwise—of its interests so as to legally assure compliance with said conditions for as long as the Project operates under an exemption from licensing.