# ENVIRONMENTAL ASSESSMENT
# FOR
# HYDROPOWER LICENSE

Newbury Hydroelectric Project

FERC Project No. 5261-023

Vermont

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

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| APE | area of potential effect |
| BMP | best management practices |
| °C | degrees Celsius |
| C.F.R. | Code of Federal Regulations |
| cfs | cubic feet per second |
| Commission | Federal Energy Regulatory Commission |
| CWA | Clean Water Act |
| CEQ | Council on Environmental Quality |
| DO | dissolved oxygen |
| EA | environmental assessment |
| EIA | U.S. Energy Information Administration |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| °F | degrees Fahrenheit |
| FERC | Federal Energy Regulatory Commission |
| FPA | Federal Power Act |
| fps | feet per second |
| FWS | U.S. Fish and Wildlife Service |
| GMP | Green Mountain Power Corporation |
| HPMP | Historic Properties Management Plan |
| Interior | U.S. Department of the Interior |
| IPaC | Information for Planning and Consultation |
| kV | kilovolt |
| kWh | kilowatt-hours |
| MW | megawatt |
| MWh | megawatt-hours |
| mg/L | milligrams per liter |
| NEPA | National Environmental Policy Act |
| National Register | National Register of Historic Places |
| Newbury Project | Newbury Hydroelectric Project |
| NHPA | National Historic Preservation Act |
| NPCC-New England | Northeast Power Coordinating Council's New England region |
| NLEB | Northern long-eared bat |
| O&M | operation and maintenance |
| PA | Programmatic Agreement |
| RM | river mile |
| SD1 | Scoping Document 1 |
| USGS | U.S. Geological Survey |
| Vermont ANR | Vermont Agency of Natural Resources |
| Vermont DEC | Vermont Department of Environmental Conservation |
| Vermont DHP | Vermont Division for Historic Preservation |
| Vermont FWD | Vermont Fish and Wildlife Department |
| Vermont SHPO | Vermont State Historic Preservation Office |
| WQC | Clean Water Act section 401 water quality certification |

**ENVIRONMENTAL ASSESSMENT**

**Federal Energy Regulatory Commission**
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**Washington, DC**

**NEWBURY HYDROELECTRIC PROJECT**
**Project No. 5261-023–Vermont**

# 1.0 INTRODUCTION

## 1.1 APPLICATION

On August 27, 2021, Green Mountain Power Corporation (GMP) filed an application for a subsequent license with the Federal Energy Regulatory Commission (Commission) to continue to operate and maintain the Newbury Hydroelectric Project No. 5261-023 (Newbury Project or project).[1] The 0.365-megawatt (MW) project is located on the Wells River, in Orange County, Vermont (figure 1). The project does not occupy federal land. The project generates 1,076 megawatt-hours (MWh) annually. GMP proposes no changes to the project's capacity.

## 1.2 PURPOSE OF ACTION AND NEED FOR POWER

### 1.2.1 Purpose of Action

The purpose of the Newbury Project is to provide hydroelectric power. Therefore, under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a subsequent license to GMP for the Newbury Project and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued (such as flood control, irrigation, or water supply), the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection of, mitigation of damage to, and enhancement of fish and wildlife resources; (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

Issuing a subsequent license for the project would allow GMP to continue to generate electricity at the project for the term of the license, making electric power from a renewable resource available to the regional electric grid.

[1] The current license for the project was issued on September 8, 1983, for a term of 40 years, and will expire August 31, 2023. *See* 24 FERC ¶ 62,275 (1983).

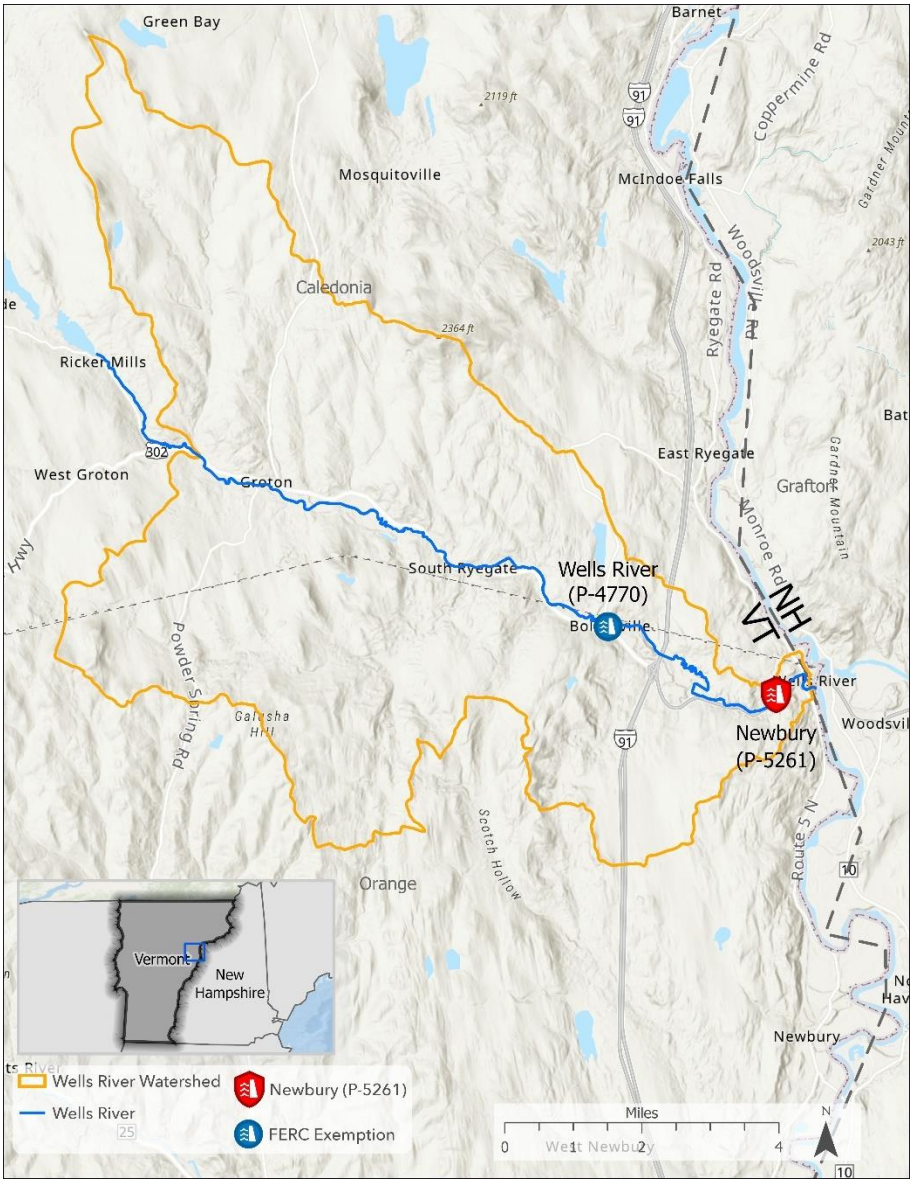

Figure 1. Newbury Project location (Source: Staff).

This environmental assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA)[2] of 1969 to assess the environmental and economic effects associated with continued operation of the project and identified alternatives. The EA includes recommendations to the Commission on whether to issue a subsequent license, and if so, recommends terms and conditions to become a part of any license issued.

In this EA, we assess the environmental and economic effects of the following alternatives: (1) operating and maintaining the project as proposed by GMP; (2) operating and maintaining the project as proposed by GMP, with additional staff recommended measures (staff alternative); and (3) the staff alternative including any mandatory conditions that have been filed to date. We also consider the effects of no action. Under the no-action alternative, the project would continue to operate as it does under the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented. The primary issues associated with relicensing the project are the effects of project operation and maintenance on: (1) water quality; (2) fish passage; and (3) recreation access.

### 1.2.2 Need for Power

The Newbury Project provides hydroelectric generation to meet part of the region's power requirements, resource diversity, and capacity needs. The project has an authorized installed capacity of 0.365 megawatt (MW) and generates approximately 1,076 megawatt-hours (MWh) per year.

To assess the need for power, we looked at the needs in the operating region in which the project is located. The North American Electric Reliability Corporation (NERC) annually forecasts electric supply and demand nationally and regionally for a 10-year period. The Newbury Project is located within the Northeast Power Coordinating Council's New England region (NPCC-New England) of the NERC. According to NERC's 2022 Long-Term Reliability Assessment, the net internal demand for this region is projected to increase by about 0.1% from 2022 to 2031.

Power generated at the Newbury Project would continue to help meet the power demand in the NPCC region in the short- and long-term. The project provides power that can displace non-renewable, fossil fuel-fired generation and contributes to a diversified generation mix. Displacing the operation of non-renewable facilities may avoid some power plant emissions and create an environmental benefit.

[2] The Council on Environmental Quality (CEQ) issued a final rule on April 20, 2022, revising its regulations for implementing NEPA (see National Environmental Policy Act Implementing Regulations Revisions, 87 Fed. Reg. 23,453-70). The rule became effective on May 20, 2022. This EA was prepared in accordance with CEQ's 2022 regulations.

## 1.3 STATUTORY AND REGULATORY REQUIREMENTS

The licensing process for the project is subject to numerous requirements under the FPA and other applicable statutes. The major regulatory and statutory requirements are described in Appendix A.

## 1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 CFR § 16.8) require applicants to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, Endangered Species Act (ESA), National Historic Preservation Act (NHPA), and other federal statutes. Pre-filing consultation must be completed and documented according to the Commission's regulations.

### 1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. We distributed a scoping document to interested agencies and others on December 8, 2021, which was noticed in the *Federal Register* on December 15, 2021.[3] GMP filed comments on January 6, 2022.

### 1.4.2 Interventions

On November 10, 2021, the Commission issued a public notice accepting the license application and setting January 9, 2022, as the deadline for filing protests and motions to intervene. The notice was published in the *Federal Register* on November 17, 2021.[4] The Vermont Agency of Natural Resources (Vermont ANR) filed a motion of intervention on January 7, 2022. The Connecticut River Conservancy filed a late motion to intervene on January 11, 2022, which was granted.[5] American Whitewater filed a late motion to intervene on June 3, 2022, which was also granted.[6] None of the interventions oppose the relicensing of the project.

### 1.4.3 Comments on the Application

On April 6, 2022, the Commission issued a ready for environmental analysis notice setting June 5, 2022, as the deadline for filing comments, recommendations, terms and conditions, and fishway prescriptions. The notice also established a deadline of July 20, 2022, for GMP to file reply comments. The U.S. Department of Interior, Vermont State Historic Preservation Office (Vermont SHPO), and American Whitewater filed comments on June 3,

[3] 86 Fed. Reg. 71,262 (December 15, 2021).

[4] 86 Fed. Reg. 64,193-64,194 (November 17, 2021).

[5] *See* January 31, 2022, Notice Granting Late Motion to Intervene.

[6] *See* August 4, 2022, Notice Granting Late Motion to Intervene.

2022. Vermont ANR filed comments on June 6, 2022. GMP filed reply comments on June 29, 2022.

# 2.0 PROPOSED ACTION AND ALTERNATIVES

## 2.1 NO ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the current license, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives, and to judge the benefits and costs of any measures that might be required under a new license.

### 2.1.1 Current Project Facilities

The Newbury Project includes an 11.4-acre impoundment at a normal water surface elevation of 463.9 feet National Geodetic Vertical Datum of 1929 (NGVD 29). The impoundment is formed by a 26-foot-high by 90-foot-long concrete gravity dam that includes a 73.3-foot-long spillway with a crest elevation of 458.9 feet, topped with two 5-foot-high pneumatic crest gates with a top elevation of 463.9 feet. A 4-foot-wide, 8-foot-long steel sluice box, on the south side of the spillway and adjacent to the crest gates, provides seasonal flows for downstream fish passage past the project dam. Water from the spillway and sluice box passes into a 590-foot-long bypassed reach, which then connects to the project tailrace, and finally the Wells River.

Water can be released from the impoundment via the spillway, sluice box, or an 11.2-foot-wide, 9-foot-long intake structure, located on the south end of the dam. In front of the intake structure is an 18-foot-wide, 6-foot-deep baffle and a 10-foot-wide, 18.5-foot-high angled trash rack with 1-inch clear bar spacing. The intake leads to a 5-foot diameter, 435-foot-long underground penstock. Flows through the penstock are regulated by a 6-foot-wide by 6-foot-high slide gate which is automatically operated based on the impoundment elevation. Water in the penstock passes to a 0.05-MW minimum flow turbine, located about 75 feet downstream of the dam, and to a powerhouse, located about 435 feet downstream of the dam. The minimum flow turbine is manually[7] operated full-on or full-off and passes 30 cubic feet per second (cfs) into the bypassed reach. When flows in the penstock exceed 30 cfs, water in the penstock passes to a 0.315-MW horizontal Ossberger turbine (main turbine), located in the brick-masonry

[7] In a letter filed on June 22, 2023, GMP indicated that the minimum flow unit is primarily put on- and taken off-line manually, but it can be taken off-line automatically if the impoundment surface elevation drops to about 2.4 inches below the normal impoundment elevation of 463.9 feet.

powerhouse.[8,9] The main turbine has a minimum hydraulic capacity of 20 cfs and a maximum hydraulic capacity of 134 cfs. Flows from the main turbine are passed to a 125-foot-long tailrace canal which then joins the downstream end of the bypassed reach of the Wells River.

The project also includes a 410-foot-long, 480-volt underground transmission line extending from the minimum flow turbine unit to a pole-mounted step-up transformer bank located adjacent to the main turbine unit powerhouse. A 130-foot-long, 480-volt underground line extends from the main powerhouse to the pole-mounted transformer bank. A 7-foot-long, above-ground line extends from the transformer bank to a utility pole, and the grid.

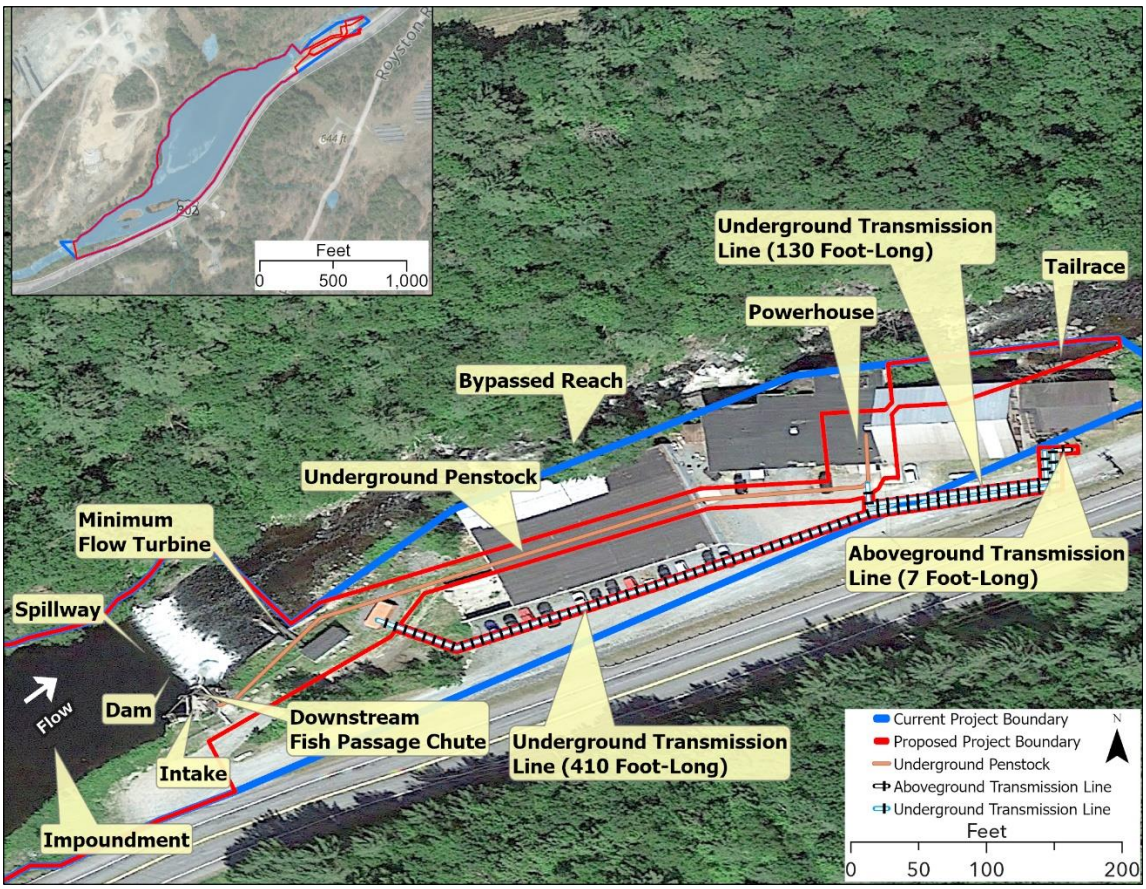

Figure 2. Newbury Project facilities and the approximate current and proposed project boundaries (Source: staff).

[8] The project powerhouse is located on the lower level of the non-project former Adams Paper Company Mill building. GMP leases a 32-foot by 36-foot section of the lower level of the mill building to house the main turbine unit, and a 32-foot by 36-foot section of the upper level to house switch gear for the main turbine unit and provide office space.

[9] The controls for the minimum flow turbine switchgear and for the pneumatic crest gates on the dam are located in an 8-foot by 24-foot building adjacent to the minimum flow turbine and owned by GMP. A 5-foot by-4-foot gatehouse building, also adjacent to the minimum flow unit, houses controls for the minimum flow turbine gate.

### 2.1.2 Project Boundary

The current project boundary includes a total of 14.44 acres and follows a contour elevation of 464 feet NGVD 29. [10] The current boundary encloses the project works, impoundment, tailrace, and most of the transmission lines (figure 2). GMP leases from GRE, LLC, the project land, dam, and a mill building that encloses generating equipment.

### 2.1.3 Project Safety

The Newbury Project has been operating under the existing license that was issued in 1983. During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance.

As part of the relicensing process, Commission staff evaluate the continued adequacy of the project's facilities under a subsequent license. Special articles are included in any license issued, as appropriate. Commission staff will continue to inspect the project during the term of any subsequent license to ensure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

### 2.1.4 Current Project Operation and Environmental Measures

The project operates in run-of-river mode such that outflow from the project approximates inflow on a continuous basis.[11] GMP meets this requirement by maintaining a stable impoundment elevation at about 463.9 feet. During normal operation, water released from the main powerhouse bypasses a 590-foot-long section of the Wells River between the dam and the powerhouse. GMP provides a minimum flow to the bypassed reach of at least 50 cfs from

[10] In the final license application, GMP indicates that the proposed project boundary includes 13.63 acres of land. Compared to the existing project boundary, the proposed project boundary removes 1.04 acres associated with non-project buildings and adds 0.23 acres associated with a impoundment boating access area (as indicated in a letter filed by GMP on February 2, 2022). Thus, staff calculated the acres of land within the existing project as: 13.63 acres + 1.04 acres - 0.23 acres = 14.44 acres.

[11] The current license does not include an article requiring run-of-river operation. However, on December 14, 1982, the Vermont Department of Water Resources and Environmental Engineering issued a water quality certificate that required the project to be operated in run-of-river mode, such that instantaneous outflows below the tailrace equal instantaneous inflows to the project. *See* Vermont Department of Water Resources and Environmental Engineering water quality certificate filed on December 20, 2014. Although the project is not capable of operating in an instantaneous run-of-river mode, GMP currently operates the project in run-of-river mode, where outflow from the project approximates inflow.

April 15 to June 10, and at least 25 cfs during the remainder of the year (or inflow to the impoundment, whichever is less).[12] Minimum flows in the bypassed reach are provided via a combination of discharge from the minimum flow turbine, spill over the pneumatic crest gate on the spillway, and discharge through the downstream fish passage chute. GMP also provides a year-round aesthetic flow of at least 5 cfs over the spillway.[13]

The fish passage chute is seasonally installed and operated by passing flows of 20 cfs during the spring (April 1 to June 1) and fall (September 1 to November 15).[14] The chute is installed by removing a 2-foot by 4-foot section of the pneumatic crest gate and attaching an 8-foot-long by 4-foot-wide sluice box that extends to the plunge pool. The impoundment is drawn down four times a year by 2.6 feet to seasonally install and remove the fish passage chute. These drawdowns last about 6 hours and minimum flows to the bypassed reach are provided through the minimum flow turbine during these maintenance drawdowns.

The minimum flow turbine is used to discharge a river flow of 30 cfs into the bypassed reach when inflows are available. When the river flow is too low to operate the minimum flow turbine (less than 30 cfs) or exceeds the hydraulic capacity of the main turbine (134 cfs), GMP maintains the minimum flow in the bypassed reach by raising impoundment elevations to spill flow over the spillway. When the minimum flow turbine is not operating, GMP can also use the downstream fish passage chute to provide minimum flows.

GMP monitors operation using a Supervisory Control and Data Acquisition system (SCADA) that collects and records impoundment elevation, tailrace elevation, and turbine output in 15-minute intervals. By monitoring this data, GMP is able to adjust generation to maintain stable impoundment elevations and provide the required minimum flows.

[12] The existing minimum flows are required by Article 25 of the current license. *See Newbury Hydro Company*, 24 FERC ¶ 62,275 (1983).

[13] The current license does not include an article requiring a year-round aesthetic flow of 5 cfs over the spillway. However, on July 21, 1988, the Vermont Department of Environmental Conservation issued a water quality certificate that required a minimum spillage flow of 5 cfs over the spillway at all times. *See* Appendix A of GMP's final license application filed on August 27, 2021.

[14] The current license does not include an article requiring fish passage. However, on July 21, 1988, the Vermont Department of Environmental Conservation issued a water quality certificate that required the downstream fish passage facilities pass flows of 20 cfs from April 1 to June 1 and 10 cfs from September 1 to November 15. *See* Appendix A of GMP's final license application filed on August 27, 2021. In a letter filed on April 28, 2023, GMP indicates that they currently pass 20 cfs through the fish passage chute during both the spring and fall periods.

## 2.2 APPLICANT'S PROPOSAL

### 2.2.1 Proposed Project Facilities

GMP proposes no modifications to the project's facilities.

### 2.2.2 Proposed Project Boundary

GMP proposes to modify the project boundary to remove portions of the mill building that do not include generating equipment and to fully enclose the project transmission lines. Staff estimates that the change would result in the removal of 0.98 acres from the project boundary.[15] The project boundary would then include a total of 13.46 acres.

### 2.2.3 Proposed Operation and Environmental Measures

GMP proposes to:

- Continue operating the project in run-of-river mode, such that outflow from the project approximates inflow on a continuous basis.
- Consult with Vermont ANR prior to conducting maintenance and repair work that has the potential to adversely affect water quality.
- Consult with Vermont ANR regarding the timing and duration of periodic maintenance drawdowns of the impoundment and maintain minimum flow requirements to the bypassed reach during any maintenance drawdowns.
- Continue providing minimum flows to the bypassed reach via a combination of discharge from the minimum flow turbine, spill over the pneumatic crest gate on the spillway of the dam, and/or discharge through a downstream fish passage chute.
- Decrease the minimum flow to the bypassed reach from 50 cfs to 37 cfs from April 15 to June 10 and increase the minimum flow from 25 cfs to 37 cfs during the remainder of the year.
- Continue to seasonally install and operate the downstream fish passage chute during the spring (April 1 to June 1) and fall (September 1 to November 15).

[15] On March 25, 2022, GMP filed revised Exhibit G maps that fully encompass the project transmission lines within the project boundary. These maps included 0.23 acres of land associated with a potential location for the proposed impoundment boating access. This land was previously identified as unfeasible for development of the impoundment boating access area in GMP's February 2, 2022, additional information response. GMP did not include an estimate of total acres of land within the project boundary in their March 25, 2022, filing. Therefore, using Geographic Information Systems, staff estimated that the project boundary included in the March 25, 2022, Exhibit G maps encompassed 13.69 acres. Accounting for the removal of land associated with the impoundment boating access area (0.23 acres), staff estimates that the proposed project boundary encompasses 13.46 acres.

- Decrease flows through the downstream fish passage chute from 20 cfs to 10 cfs during the spring and fall.
- Develop an operation compliance monitoring plan, in consultation with the Vermont ANR, detailing how GMP will operate in run-of-river mode and comply with minimum flow and aesthetic flow requirements. [16]
- Limit the removal of trees at the project greater than or equal to 4 inches in diameter at breast height (dbh) to the period of November 1 through April 14 for protection of rare, threatened, and endangered terrestrial species.[17]
- Increase the aesthetic flow over the spillway from 5 cfs to 10 cfs.
- Construct an impoundment boating access area for recreational boaters upstream of the project dam, if feasible, at a location to be determined after any subsequent license is issued.
- Develop a Historic Properties Management Plan for the historic properties at the project.

### 2.2.4 Modifications to the Applicant's Proposal – Mandatory Conditions

Vermont ANR filed 12 conditions pursuant to section 401 of the Clean Water Act (CWA), which can be found in Appendix E.

## 2.3 STAFF ALTERNATIVE

The staff alternative includes most of GMP's proposed measures, most of the mandatory conditions contained in Vermont ANR's water quality certification and the following recommended modifications or additions:

- Modify the proposed operation compliance monitoring plan to include provisions for monitoring and reporting compliance with all operating requirements of the license (e.g., run-of-river operation, minimum flows, aesthetic flows, fish passage flows, impoundment water levels, timing of planned maintenance), and reporting deviations from operating requirements to the Commission and Vermont ANR (Certification condition C);

[16] In a letter filed on August 18, 2022, GMP proposes to develop a flow management and monitoring plan. Staff refers to the flow management and monitoring plan as an operation compliance monitoring plan. GMP indicates that the plan would detail how they will operate in run-of-river mode and comply with "conservation flows" and "spillage flows." Staff understands "conservation flows" to be minimum flows and "spillage flows" to be aesthetic flows.

[17] GMP's proposal references four inches diameter at base height. Staff understands the intended reference to be 4 inches diameter at breast height (dbh).

- Develop a plan, within one year of American eel passage being installed at the Wilder Project,[18] to provide upstream and downstream American eel passage at the Newbury Project (Certification condition E);
- Develop a debris disposal plan (Certification condition G);
- Discontinue seasonal installation and operation of the downstream fish passage chute;
- Develop an upstream impoundment boating access plan that includes: (1) provisions to consult on boating access design (Certification condition F) and site selection with the Vermont ANR and U.S. Fish and Wildlife Service (FWS) before any construction activities occur; (2) an implementation and construction schedule that does not exceed four years (Certification condition F); (3) a design plan, including the estimated length, width, and composition of the proposed access area, parking area, trail and stairway; (4) best management practices (BMPs) that include, siltation and sedimentation controls and revegetating areas disturbed during construction using native species; (5) methods for preventing the establishment of invasive plants; and (6) guidelines for detecting and treating invasive plant populations.
- Restrict the removal of trees[19] greater than or equal to 3 inches dbh to the period between November 1 and April 14 for the protection of northern long-eared bats (NLEB) (Certification condition I).

**Water Quality Certification Conditions Not Recommended**

The staff alternative does not include the following water quality certification conditions because, pursuant to sections 4(e) and 10(a) of the FPA, the condition is not operationally feasible and has no added benefit, or the benefits would not justify the costs: (1) operate the project so that outflow always equals (rather than approximates) inflow on an instantaneous basis (Certification condition B); and (2) continue to install and maintain downstream fish passage from April 1 to June 1 and September 1 to November 15 (Certification condition D).

## 2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Certain alternatives to GMP's proposal were considered but eliminated from further analysis because they are not reasonable in this case. These alternatives are presented in Appendix B.

[18] The Wilder Project (FERC No. 1892) is the first dam downstream of the Newbury Project and about 49 river miles away on the Connecticut River

[19] Tree removal is defined herein as cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation.

# 3.0 ENVIRONMENTAL ANALYSIS

In this section, we present: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatics, recreation, etc.). Historic and current conditions are described first 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 potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*, of this EA.[20]

## 3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Wells River is a 22-mile-long tributary of the Connecticut River located in northern Vermont (Redstart, 2009). The Wells River drains an area of about 102 square miles and flows southeast from Osmore Pond in Peachum, Vermont to the Village of Wells River, Vermont where it joins the Connecticut River.

Land cover in the Wells River watershed includes forest (81%), agriculture (6%), and developed land (4%). The remainder of the watershed is composed of open water, barren land,[21] and wetlands.

Historically, the Wells River was used for log drives and hydroelectric power generation for mills (*i.e.*, paper mills, sawmills, fulling mills, grist mills) in the late 1800s and early 1900s (Redstart, 2009). At least 13 dams were once located throughout the watershed (Redstart, 2009). Many of the dams were used to store water and energy for the milling industry (Restart, 2009). More than half the dams have since been breached or removed and thus today there are only six active dams. Current uses of the Wells River include recreation and hydroelectric generation. In addition to the Newbury Project, the Wells River Project (FERC Exemption No. 4770; also known as the Boltonville Dam), located approximately 4.2 river miles upstream of the Newbury Project, is used for hydroelectric generation. Four other dams regulated by Vermont DEC are used for recreation.

The project region experiences mild summers and cold, snowy winters. The average total annual precipitation is 40 inches. Total average annual snowfall is 85.9 inches.

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[20] Unless otherwise indicated, the sources of our information are the final license application filed by GMP on August 27, 2021 (GMP, 2021), and the responses to requests for additional information filed on February 2, 2022 (GMP, 2022a), March 25, 2022 (GMP, 2022b), and August 18, 2022 (GMP, 2022c).

[21] Barren land includes unvegetated river banks, bare/exposed rock, and sand or gravel covered land.

## 3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations that implement NEPA, 40 C.F.R. § 1508.7, 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. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other development activities.

Based on our review of the license application, we have determined that aquatic resources could be cumulatively affected by the continued operation and maintenance of the Newbury Project, in combination with other hydroelectric projects, and other past, present, and foreseeable future activities in the Wells River Basin such as operation of the Wells River Project, agricultural activities, and landfill leachate from the Newbury landfill.[22] We discuss these cumulative effects at the end of section 3.3.1, *Aquatic Resources*, *Environmental Effects*.

### 3.2.1 Geographic Scope

The geographic scope of the cumulative analysis defines the physical limits or boundaries of the proposed action's effects on the resource and contributing effects from other hydropower and non-hydropower activities within the Wells River Basin. We have identified the geographic scope for water quantity, water quality, and resident fish species to include the Wells River Basin from its headwaters at Osmore Pond in Peacham, Vermont to its confluence with the Connecticut River. We chose this geographic scope because operation and maintenance of the Newbury Project, in combination with other upstream uses of the river basin, including the Wells River Project, the Newbury landfill, land development, and agriculture could contribute to cumulative effects on these resources. Contributors to cumulative effects on water quality in the basin include urban development, agriculture, and landfill leachate.

### 3.2.1 Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of a subsequent license, the temporal scope looks 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information. The quality and quantity of information, however, diminishes as we analyze resources further away in time from the present. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

[22] The Newbury landfill is located about 3.5 river miles upstream of the Newbury Project.

## 3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effects of the proposed action and project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the site-specific environmental effects.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that geologic and soil resources, aquatic resources, terrestrial resources, threatened and endangered species, recreation and land use resources, cultural resources, and environmental justice communities may be affected by the proposed action and action alternatives. We have not identified any substantive issues related to socioeconomics associated with the proposed action; therefore, this resource is not assessed in this EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

### 3.3.1 Geologic and Soil Resources

#### 3.3.1.1 Affected Environment

The Newbury Project is located within the Vermont Piedmont biophysical region. The Vermont Piedmont is the largest physiographic region in the state and consists of rolling hills and valleys located at the foot of the Green Mountains. The region consists of a number of isolated granite mountains that rise above the surrounding landscape and contains many lakes originally formed by glaciers. The Wells River watershed lies between two bedrock formations - the Silurian-Devonian and Ordivician bedrock units found to the west and east, respectively (Redstart, 2009). Gile Mountain and Waits River formations dominate these bedrock units, consisting primarily of metamorphic schists and phyllites, with lesser amounts of slate, limestone, quartzite, greenstone, amphibolite, and other minerals.

**Soils**

The most common soil mapped within the Newbury Project area is the Turnbridge-Woodstock complex, which is a fine sandy loam. The Turnbridge series consists of moderately deep, well drained soils on glaciated uplands and the Woodstock series consists of somewhat excessively drained soils that formed in loamy till on bedrock controlled, glaciated uplands. The Turnbridge-Woodstock complex has a soil erodibility factor (K) of 0.32, which indicates the soil is moderately susceptible to detachment and has moderate runoff potential (IWR, 2002). The second most common soil series within the project area is the Merrimac fine sandy loam which consists of very deep, somewhat excessively drained soils in broad areas on plains and terraces that commonly follow major stream valleys. The Merrimac fine sandy loam has an erodibility factor of 0.28, and like the Turnbridge-Woodstock complex is moderately susceptible to detachment and has moderate runoff potential (IWR, 2002).

**Impoundment**

The shorelines along the impoundment are a mix of steep rock outcrops and vegetated banks with soils ranging from 0 to 60 percent slopes (NRCS, 2021). The majority of the

northern shoreline is forested, and the southern shoreline is dominated by a vegetated and rip-rap bank associated with the U.S. Route 302 right-of-way.

**Bypassed Reach**

The bypassed reach has fairly steep rock ledges creating a channel environment. Downstream of the bypassed is a naturalized river channel with both woody and non-woody vegetation along both shorelines.

#### 3.3.1.2 Environmental Effects

**Impoundment Boating Access Construction**

GMP proposes to construct an impoundment boating access area upstream of the project dam at a location to be determined.

Vermont ANR's certification condition F requires that the location for the proposed impoundment boating access area be located upstream of the dam pending private landowner approval and cultural resource consultation, and that the access area be constructed within four years of the effective date an issued license.

*Our Analysis*

Although the specifics regarding the location and scope of construction have not been determined constructing this facility could disturb upland areas and potentially lead to erosion and sediment inputs to the river, which could negatively affect water quality and aquatic resources. However, any erosion that occurs would be minimized by implementing BMPs that include controls such as silt fencing and revegetation. Such measures could be included in a conceptual plan for the facility, to be filed for Commission approval prior to the start of ground-disturbing activities.

**Operation and Maintenance Drawdowns**

GMP proposes to continue operating the project in run-of-river mode using the automatic impoundment level control on the main turbine unit to maintain stable impoundment levels at about 463.9 feet. GMP also proposes to continue four planned drawdowns each year to install and remove the downstream fish passage chute, by lowering the impoundment by about 2.6 feet (461.3 feet msl).[23]

[23] GMP proposes to continue to install the downstream fish passage chute from April 1 to June 1 and from September 1 to November 15, which would require a one drawdown for installation and one drawdown for removal during each fish passage season, for a total of four drawdowns.

GMP proposes to consult with the Vermont Department of Environmental Conservation (Vermont DEC) on the timing and duration of maintenance drawdowns so as to conduct the drawdowns in a manner that protects nearshore terrestrial and aquatic habitat and maintain minimum flows to the bypassed reach.[24]

Vermont ANR's certification condition H requires GMP to file plans with Vermont DEC for review and approval of any project maintenance or repair work, including drawdowns below the normal operating level, if the work may result in a discharge, have a material adverse effect on water quality, or cause less-than-full support of an existing use or beneficial values or use of State waters.

*Our Analysis*

Project Operation

Impoundment fluctuations during normal operation have the potential to affect bank stability in the impoundment and in downstream reaches by exposing areas to periodic inundation and dewatering resulting in erosion of the moderately susceptible soils. Soil and sediment erosion from streambanks and shorelines of impoundments can adversely affect riparian and terrestrial habitat and historic properties that may be in the project area, and cause turbidity and siltation in the impoundment and downstream habitat, which can adversely affect water quality and aquatic resources. Operating the project in run-of-river mode by maintaining stable impoundment elevations would continue to limit shoreline erosion, turbidity, and siltation in the impoundment and have little effect on shoreline erosion downstream of the project. Nonetheless, project operation could cause adverse effects, due to ongoing erosion, on the historic Wells River Electric Light Plant and Pumping Station powerhouse foundation and penstock (see section 3.3.7.1, *Cultural Resources, Affected Environment*). As discussed in section 3.3.7.2, *Cultural Resources, Environmental Effects,* developing and implementing an Historic Properties Management Plan (HPMP), in consultation with the Vermont SHPO, would ensure that mitigation measures are in place to protect historic properties within the APE from adverse effects of erosion related to the operation.

Maintenance Drawdowns

Drawing down and refilling an impoundment during maintenance can affect bank stability in an impoundment and can also affect resources in ways that are similar to those discussed above for project operation. GMP proposes to continue to draw down the impoundment four times each year for installation and removal of the downstream fish passage chute by lowering the impoundment about 2.6 feet below the pneumatic crest gates. As

[24] In a letter filed on March 25, 2022, GMP stated that the only planned drawdowns that occur at the project are for installation and removal of the fish passage chute, and any other drawdowns would be for emergencies or unplanned maintenance and repair or inspection activity.

discussed above, there is ongoing erosion on the historic Wells River Electric Light Plant and Pumping Station powerhouse foundation and penstock that is potentially caused by project operation and maintenance. Developing and implementing the HPMP discussed above would ensure that mitigation measures are put in place if needed to protect historic properties from any erosion related to maintenance drawdowns.

For planned and unplanned drawdowns, GMP proposes to consult with Vermont DEC and the Commission, as needed, regarding the timing and duration of drawdowns. GMP also proposes to consult with Vermont DEC prior to any maintenance or repair work that could affect water quality. Notifying and receiving feedback from Vermont DEC prior to conducting planned or unplanned drawdowns for maintenance or repairs would allow the agency to make recommendations to GMP to minimize erosion and sedimentation and adverse effects to water quality and aquatic resources that may result from such maintenance drawdowns. However, Vermont ANR's requirement that GMP file plans and receive approval from Vermont DEC prior to performing planned or unplanned maintenance repairs could limit GMP's ability to complete needed repairs in a timely fashion.

### 3.3.2 Aquatic Resources

#### 3.3.2.1 Affected Environment

**Water Quantity and Use**

The Wells River at the Newbury Project has a drainage area of approximately 100 square miles. The estimated mean annual daily flow (MADF) at the project is 170 cfs, with flows typically highest in April and lowest during August and September (table D-1).

The project's main turbine and minimum flow turbine have a combined maximum hydraulic capacity of 164 cfs. Flows in the Wells River equal or exceed the maximum hydraulic capacity of the project about 32% of the time on an annual basis, based on USGS gage number 01139000.[25] The minimum hydraulic capacity (i.e., 20 cfs) is equaled or exceeded about 98% of the time on an annual basis, based on gage flows.[26]

[25] USGS gage number 0113900 is located about 0.7 miles upstream of the project dam. Flows were prorated by 1.013 to account for the difference between drainage areas at the gage and project dam.

[26] Under GMP's proposed operation, the Newbury Project would require a minimum inflow of 57 cfs to operate the main turbine (20 cfs minimum hydraulic capacity of the main turbine plus 37 cfs minimum flow to the bypassed reach) and 40 cfs to operate the minimum flow turbine (30 cfs through the minimum flow turbine plus 10 cfs aesthetic flow). Inflows of 57 cfs and 40 cfs are exceeded 77 percent and 88 percent of the time, respectively, on an annual basis, based on gage flows.

As discussed above in section 3.1, *General Description of the River Basin*, the only water uses in the project area are for recreation and hydropower production. There are no public water supply uses or withdrawals for agriculture or industrial purposes in the Wells River near the project.

**Water Quality**

The state of Vermont classifies the Wells River as a B2 waterway and designates the river as coldwater fish habitat.[27] The State manages Class B2 waters for the uses of aquatic biota and wildlife, aquatic habitat, aesthetics, recreation, public water, and irrigation and other agricultural uses. According to Vermont state water quality regulations, the dissolved oxygen (DO) concentration of coldwater fish habitat may not be less than 6 milligrams per liter (mg/L) and 70% saturation at all times. The regulations also state that in coldwater fish habitat, the total increase in water temperature due to all discharges and activities shall not exceed 1.0°F (table D-2).

The Vermont DEC periodically conducts water quality and benthic macroinvertebrate sampling at several sites within the Wells River. DO, pH, total nitrogen (NO3-N), total phosphorus, and turbidity samples that were collected at five stations in the river (one downstream and four upstream of the Newbury Project) between 1992 and 2017 demonstrated that the Wells River attained the standards for Class B(2) waters (Vermont ANR, 2023). Vermont DEC evaluates the biological integrity of the macroinvertebrate community by comparing specific metrics to the values expected for a naturally occurring macroinvertebrate population. Macroinvertebrate assessments completed between 1992 and 2017 in the Wells River found the community to be Very Good to Excellent,[28] and thus, to meet Class B(2) water quality standards and fully support aquatic life standards.

Water Quality Study

GMP conducted a water quality study from July 8 to September 30, 2019.[29] During the study, GMP monitored DO and water temperature at 15-minute intervals at six sites located: (1) in the riverine reach just upstream of the impoundment; (2) within the impoundment; (3) at the intake; (4) in the bypassed reach adjacent to the minimum flow turbine; (5) in the bypassed reach downstream of the minimum flow turbine and upstream of the tailrace; and (6) in the tailrace (figure C-1). During the study, the main turbine was not operational, thus all flows passed into the bypassed reach by spilling over the dam or by passing through the minimum flow turbine.

[27] Vermont Water Quality Standards, Environmental Protection Rule §29A-306 and §A-02.

[28] Benthic macroinvertebrate communities are classified on a scale ranging from poor to excellent, which correspond to highly degraded to near natural conditions, respectively.

[29] *See* Appendix C of the final license application.

The mean flow during the study was 54 cfs, which is less than the mean monthly flow for July, August, and September (table D-1).

In the riverine reach just upstream of the impoundment (site 1), DO concentration was 6.0 mg/L or greater and DO saturation was 70% or greater during the entire study period (table D-3). DO concentrations at site 1 ranged from 7.5 mg/L to 10.5 mg/L, with an average DO of 8.7 mg/L and DO saturation ranged from 93.1% to 98.4%, with an average saturation of 96.1%. Water temperature at site 1 ranged from 53.4°F to 79.5°F, with an average temperature of 67.2°F (table D-3).

Within the impoundment (site 2), the DO concentration was 6.0 mg/L or greater during the entire study period (table D-3), and DO saturation was 70% or greater during all but 15 minutes of the study. DO concentrations at site 2 ranged from 6.1 mg/L to 11.2, with an average DO of 8.9 mg/L and DO saturation ranged from 69.1% to 113.1%, with an average saturation of 98.3%. Water temperature at site 1 ranged from 55.8°F to 78.4°F, with an average temperature of 67.3°F (table D-3).

At the powerhouse intake (site 3), the DO concentration was 6.0 mg/L or greater 99.3% of the time, falling below 6.0 mg/L during about 14.3 hours of the study (table D-3). The DO saturation was 70% or greater 99.1% of the time, falling below 70% during about 17.5 hours of the study. DO concentrations at site 3 ranged from 4.5 mg/L to 11.5 mg/L, with an average DO concentration of 8.8 mg/L and DO saturation ranged from 49.4% to 125.5%, with an average saturation of 96.4%. Water temperature at site 3 ranged from 55.8°F to 78.1°F, with an average temperature of 67.3°F (table D-3).

In the bypassed reach adjacent to the minimum flow turbine (site 4), the DO concentration was 6.0 mg/L or greater during the study period (table D-3) and DO saturation was 70% or greater during all but 15 minutes of the study. DO concentrations at site 4 ranged from 6.3 mg/L to 10.7 mg/L, with an average DO concentration of 9.1 mg/L and DO saturation ranged from 69.4% to 107.2%, with an average saturation of 99.8%. Water temperature at site 4 ranged from 55.6°F to 78.4°F, with an average temperature of 67.9°F (table D-3).

In the bypassed reach downstream of the minimum flow turbine and upstream of the tailrace (site 5), the DO concentration was 6.0 mg/L or greater and DO saturation was 70% or greater during the entire study period (table D-3). DO concentrations ranged from 7.5 mg/L to 10.4 mg/L, with an average DO concentration of 8.8 mg/L and DO saturation ranged from 85.9% to 104.1%, with an average saturation of 96.9%. Water temperature at site 5 ranged from 55.6°F to 79.0°F, with an average temperature of 68.0°F (table D-3).

In the tailrace (site 6), the DO concentration was 6.0 mg/L or greater 99.9% of the time, falling below 6.0 mg/L during about 1 hour of the study. The DO saturation was 70% or greater 99.9% of the time, falling below 70% during about 2 hours of the study (table D-3). DO concentrations at site 6 ranged from 5.7 mg/L to 10.6 mg/L, with an average DO concentration of 8.9 mg/L and DO saturation ranged from 63.2% to 104.1%, with an average saturation of 99.3%. Water temperature at site 6 ranged from 55.6°F to 78.8°F, with an average temperature of 68.1°F (table D-3).

**Fishery Resources**

The Wells River supports both warm and coldwater fish species and is managed by the Vermont Fish and Wildlife Department (FWD) as a coldwater fishery. Fish species observed about 5.2 river miles upstream of the project include slimy sculpin, common shiner, lake chub, largemouth bass, yellow perch, brook trout, brown trout, white sucker, pumpkinseed, longnose sucker, bluntnose minnow, and creek chub.[30] Fish species observed about 1,000 feet downstream of the project dam in 2018 include brown trout, rainbow trout, smallmouth bass, longnose sucker, white sucker, creek chub, longnose dace, fallfish, and burbot.[31] Brown trout and rainbow trout are stocked annually in the Wells River between Ricker Pond (about 22 river miles upstream of the project dam) and the confluence of the Connecticut River (about 0.9 river miles downstream of the project dam) to support a put-and-take fishery. Brook trout were historically stocked in the Wells River but have not been stocked since 2013. However, wild brook trout populations are present in tributaries upstream of the Newbury Project.

Instream Habitat Flow Study

GMP conducted an Instream Habitat Flow Study in the bypassed reach to evaluate habitat suitability for aquatic species typical of Vermont river systems at different flows (15 cfs, 25 cfs, 35 cfs, and 50 cfs) (table D-4). Three representative transects were selected within the bypassed reach where water depth, water velocity, and stream width were measured, substrates were classified, and photographs were taken. Field data were then compared to habitat suitability curves that described water depth, water velocity, and substrate preferences of the target species/life-stages. For most species/life-stages (excluding benthic macroinvertebrates and juvenile and adult white sucker), the largest increase in habitat suitability occurred between 15 cfs and 25 cfs as the river channel became wetter, deeper, and faster flowing (table D-4). Habitat suitability continued to increase up to 50 cfs for nearly all species, except juvenile and adult white sucker. However, the increase in suitable habitat between 35 cfs and 50 cfs was less than 10 percent for all species/life-stages except benthic macroinvertebrates (25 percent).

**Freshwater Mussels**

Alewife floater, brook floater, and dwarf wedgemussel are the only freshwater mussels known to occur in the Connecticut River watershed. In 2019, GMP conducted freshwater mussel

[30] Redstart (2009) describes fish species observed about 1 mile upstream of Boltonville Dam (also known as the Wells River Hydropower Project [FERC Exemption No. 4770]) but does not provide a survey date.

[31] The downstream fish community information is based on personal communication between Kleinschmidt and Vermont Fish and Wildlife Department (*See* final license application).

surveys in the project impoundment, bypassed reach, tailrace, and downstream from the tailrace. No live mussels, shells, or other evidence of mussels were observed.

#### 3.2.2.2 Environmental Effects

**Project Operation and Maintenance**

The operation and maintenance of hydropower projects can affect aquatic habitat in impoundments and downstream reaches by exposing nearshore areas to periodic dewatering and altering the frequency and duration of downstream flows. Additionally, operating a dam on a riverine system can affect water quality by increasing the residence time of water in a reservoir and exposing more water at the surface to the heat of the sun. This can increase water temperature and lower the ability of water to retain DO. Collectively these alterations to the flow regime may reduce the suitability of aquatic and nearshore terrestrial habitats for the aquatic and terrestrial species that rely on them.

As described in section 2.2, *Applicant's Proposal*, GMP proposes to continue operating the project in run-of-river mode by maintaining stable water levels in the impoundment and releasing a year-round, minimum flow of 37 cfs or inflow, whichever is less, to the bypassed reach, rather than continuing to release a minimum flow of at least 50 cfs from April 15 to June 10, and at least 25 cfs during the remainder of the year. As discussed in section 3.3.1.2, *Maintenance Drawdowns,* GMP proposes to continue to conduct four planned drawdowns of the project impoundment each year to install and remove the downstream fish passage chute. GMP proposes to consult with the Vermont ANR regarding the timing and duration of maintenance drawdowns so as to conduct the drawdowns in a manner that is protective of nearshore terrestrial and aquatic habitat and to maintain minimum flows to the bypassed reach for the protection of aquatic habitat. In addition, GMP proposes to consult with Vermont DEC prior to conducting project maintenance or repair work that has the potential to have an adverse effect on water quality.

Vermont ANR's certification condition B requires that the project be operated in an "instantaneous run-of-river mode" with no use of the impoundment for storage and such that outflow from the project is equal to inflow to the impoundment on an instantaneous basis except for short term, unavoidable deviations. Certification condition B also requires GMP to provide a continuous minimum flow of 37 cfs or inflow, whichever is less, to the bypassed reach year-round.

Vermont ANR's certification condition H also requires GMP to file plans with Vermont DEC for review and approval of any project maintenance or repair work, including drawdowns below the normal operating level, if the work may result in a discharge, have a material adverse effect on water quality, or cause less-than-full support of an existing use or beneficial values or use of State waters.

*Our Analysis*

Water Quantity and Aquatic Habitat

Under current run-of-river operations, the water surface elevation in the project impoundment is maintained at or above the crest of the dam while the project is generating and any flows in excess of the maximum hydraulic capacity of the main turbine (134 cfs) are passed over the spillway, through the minimum flow turbine, and/or through the downstream fish passage chute and into the bypassed reach. GMP proposes to continue to operate in the current manner. Continuing to operate the project in run-of-river mode would maintain stable water surface elevations in the impoundment thereby limiting the potential for stranding of fish and other aquatic organisms and minimizing disruptions to habitat necessary for feeding, cover, spawning, and rearing. Further, run-of-river operation would maintain the existing habitat downstream of the powerhouse as downstream water level fluctuations continue to follow the natural seasonal variation of flows in the Wells River.

Vermont ANR has not demonstrated that the project is capable of operating in an instantaneous run-of-river mode, with total outflow from the project equaling inflow on an instantaneous basis. GMP maintains run-of-river operation with a stable, normal impoundment elevation at about 463.9 feet by operating the main turbine using an automatic pond level control. The automatic pond level system measures the surface elevation of the impoundment, thus providing an indirect measure of changes to the volume of inflow. The minimum flow unit is primarily turned on and off manually but shuts-off automatically when the impoundment falls to about 2.4 inches below the normal impoundment elevation. For the main unit, once the impoundment reaches a high or low threshold elevation, the pond level control system automatically adjusts turbine flow appropriately. Because of the inherent limitations of the system, regular, short-term delay in adjusting project outflow to match inflow is unavoidable.

As discussed in section 3.3.2.1, *Aquatic Resources, Fishery Resources,* GMP conducted an Instream Habitat Flow Study to evaluate the suitability of aquatic habitats for several fish species and life stages as well as benthic macroinvertebrates within the bypassed reach under varying flow releases. GMP's proposed, and Vermont ANR's required, minimum flow of 37 cfs provides 80% of the maximum available habitat for benthic macroinvertebrates, the most habitat limited biota, and greater than 90% of the maximum available habitat for all representative fish species and life stages (figure C-2; table D-4). A minimum flow of 37 cfs also provides more suitable habitat than the current 25 cfs minimum seasonal flow (June 11 to April 14) for all of the species and life stages examined. GMP's current 50 cfs maximum seasonal flow (April 15 to June 10) provides nearly 100% suitable habitat for benthic macroinvertebrates compared 80% at 37 cfs, but a 50 cfs minimum flow only provides a marginal increase in suitable habitat (less than 10%) for all fish species and life stages compared to 37 cfs. Thus, GMP's proposed minimum flow of 37 cfs would improve aquatic habitat from June 11 to April 14 and would result in a modest loss of habitat from April 15 to June 10. A minimum flow of 37 cfs, relative to 50 cfs, also allows the project to operate more frequently using either the minimum flow turbine or the main turbine. Therefore, GMP's proposed, and Vermont ANR's required minimum flow of 37 cfs to the bypassed reach would help to maintain suitable aquatic habitat within the bypassed reach while also providing more operational flexibility than the current 50 cfs, seasonal, minimum flow.

GMP conducts four planned annual drawdowns of the project impoundment to install and remove the downstream fish passage chute. These planned drawdowns last approximately six hours and lower the impoundment surface elevation about 2.6 feet. Though uncommon, additional unplanned maintenance and/or emergency drawdowns may occur throughout the year. Drawdowns of the impoundment have the potential to adversely affect aquatic resources by dewatering nests of nearshore spawning fish. If water surface elevations decrease rapidly, drawdowns can lead to stranding and isolating fish or benthic invertebrates in nearshore and off-channel habitats. GMP proposes to consult with Vermont ANR regarding the timing and duration of maintenance drawdowns and to maintain minimum flow requirements to the bypassed reach during drawdowns to minimize the effects of flow and water surface elevation fluctuations on terrestrial and aquatic resources. Given that GMP's planned drawdowns are short in duration and magnitude and that GMP proposes to consult with the Vermont ANR before initiating a drawdown of the impoundment, the effects of maintenance drawdowns on aquatic resources are likely to be minimal.

Notifying and receiving feedback from Vermont DEC prior to conducting a planned drawdown as required by Vermont ANR's WQC condition H would allow the agency to make recommendations to GMP to minimize adverse effects to water quality and aquatic resources that may result from maintenance drawdowns. However, Vermont ANR's requirement that GMP file plans and receive approval from Vermont DEC prior to performing planned or unplanned maintenance repairs could limit GMP's ability to complete needed repairs in a timely fashion.

Water Quality

During the 2019 water quality study, DO concentrations at the intake and in the tailrace stayed above the minimum instantaneous (6.0 mg/L) and saturation levels (70%) established by the state standards 99.3% and 99.9% of the time, respectively. Similarly DO concentrations upstream of the impoundment, within the impoundment, at the minimum flow turbine, and in the bypassed reach exceeded the minimums established as state standards, at all times. In waters containing salmonids, DO concentrations of 6.0 mg/L or greater are generally suitable for growth and survival (EPA, 1986). Water temperatures collected during the water quality study were generally consistent throughout the project area, followed similar daily trends, and were within the levels established as state standards except on a few occasions in the bypassed reach and tailrace (there were increases in water temperature between upstream and downstream of the project that exceeded 1.0°F) (table D-3). When water temperatures in the bypassed reach and tailrace exceeded the levels established as the state standards, the difference between upstream and downstream water temperatures was typically less than 2.0°F. The small size and shallow depth of the Newbury Project impoundment creates a short hydraulic water residence time of about 1.8 hours.[32] This short residence time and the small amount of warming appears to indicate that water in the impoundment is replaced quickly, limiting the length of time water is warmed by the sun. While a short residence time makes it unlikely that water temperature or DO

[32] The hydraulic residence time measures the average length of time the impoundment stores water, which can be many years for larger reservoirs. At the Newbury Project, the residence time is 1.8 hours, which is calculated by dividing the 25 acre-feet storage capacity of the impoundment by the 170 cfs mean annual flow.

in the impoundment will seasonally stratify, the slowing of water in the impoundment likely contributes to the small differences observed in upstream versus downstream water temperatures.

GMP proposes, and Vermont ANR recommends releasing a continuous minimum flow of 37 cfs or inflow, whichever is less, to the bypassed reach. Because the water quality study was conducted while the main turbine was inoperable, all flows were passed downstream to the bypassed reach via the minimum flow turbine or over the spillway. While this likely resulted in more spill into the bypassed reach than would have typically occurred during this time period, temperature measurements and DO concentrations in the bypassed reach generally exceeded the levels established as state standards during the study period, including during periods of low inflow when outflows would have been similar to or less than the 37 cfs minimum flow proposed by GMP.[33] As a result, we expect that water quality in the bypassed reach will generally remain above the minimum levels established as state standards under the proposed 37 cfs minimum flow release, as discussed above.

In summary, GMP's proposal to release 37 cfs or inflow to the bypassed reach at all times and continuing run-of-river operation would maintain current water quality conditions that are generally consistent with those levels established as state standards and protective of aquatic resources. As discussed in section 3.3.2.1, *Affected Environment, Water Quality,* these conditions support a variety of warm and coldwater fish species and a healthy macroinvertebrate community within the impoundment, bypassed reach, and tailrace. GMP's proposal, and Vermont ANR's recommendation, to consult with the Vermont ANR before conducting project maintenance or repair that has the potential to adversely affect water quality (as discussed in section 3.3.1.2, *Environmental Effects, Planned and Unplanned Drawdowns*), would help to ensure that water quality conditions throughout the project area remain protective of aquatic resources at all times during the term of any subsequent license issued for the project.

**Operation Compliance Monitoring**

GMP monitors project operation through regular onsite operational checks[34] and using a Supervisory Control and Data Acquisition (SCADA) system that collects and records the impoundment elevation, tailrace elevation, and turbine output in 15-minute intervals. GMP maintains run-of-river operation with a stable impoundment elevation at about 463.9 feet by operating the main turbine using an automatic pond level control. The minimum flow unit is primarily turned on and off manually but shuts-off automatically when the impoundment falls to about 2.4 inches below the normal impoundment elevation of 463.9 feet. By monitoring SCADA data, conducting regular operation checks, and using automatic pond level control of the main turbine, GMP is able to adjust generation to maintain stable impoundment elevations and provide required minimum flows through spillage, the minimum flow turbine, and/or, seasonally,

[33] During the 2019 water quality study, prorated inflow to the project dropped as low as 21 cfs and periodically dropped below 37 cfs on 2 days in July, 16 days in August, and 17 days in September.

[34] GMP reports that operational checks usually occur every weekday but can increase in frequency during high flows and decrease in frequency during low flows.

through the downstream fish passage chute. To ensure compliance with the operational requirements of any subsequent license, GMP proposes to develop an operation compliance monitoring plan for the project in consultation with the Vermont ANR within 6 months of license issuance.[35] The plan would detail how the Newbury Project would manage seasonal flow and operate in run-of-river mode while complying with minimum flow and aesthetic flow requirements.

Vermont ANR's certification condition C requires that GMP include as part of an operation compliance monitoring plan: (1) a method for continuous monitoring[36] and reporting of flow releases at the project (including spill flows, turbine discharge, impoundment levels, and inflows); (2) provisions for the flow data "to be available on a near real-time basis"; and (3) procedures for reporting deviations from operating requirements to Vermont DEC within 15 days of the deviation indicating the cause, severity, and duration of the deviation, observed or reported adverse environmental impacts from the incident, pertinent data, and measures to be taken to avoid recurrences.

*Our Analysis*

Although compliance measures do not directly affect environmental resources, they do allow the Commission to ensure that a licensee complies with the environmental requirements of a license. Therefore, operation compliance monitoring and reporting are typical requirements in Commission-issued licenses. Vermont ANR's requirement to monitor inflows, outflows, and spill over the dam and make the data "available on a near real-time basis" could be used to monitor compliance with run-of-river operation, aesthetic flows, and minimum flows. However, as discussed above, GMP currently uses an existing SCADA system to measure and record the impoundment elevation, tailrace elevation, and turbine output in near real-time (15-minute intervals). While inflow, outflow, and spill over the dam is not directly measured by the SCADA system, combining inflow data from USGS gage number 01139000[37] with output from the SCADA system would allow GMP to continue to verify, in near real-time, stable impoundment surface elevations, run-of-river operation, and minimum flows. Additionally, GMP can use the existing impoundment elevation monitoring to provide the proposed and required 37-cfs minimum flows when the minimum flow unit is not operating and the proposed and required 10-cfs aesthetic flow by operating the pneumatic crest gate in an inflated position

[35] In a letter filed on August 18, 2022, GMP proposes to develop a "flow management and monitoring plan." Staff refers to the "flow management and monitoring plan" as an operation compliance monitoring plan.

[36] Vermont ANR's certification condition C requires a "flow management and monitoring plan." Staff refer to the plan as an operation compliance monitoring plan. In certification condition C, Vermont ANR does not indicate the frequency of monitoring that would be needed to satisfy the continuous monitoring requirement. However, staff assumes this could be achieved via continuous monitoring and reporting at 15-minute intervals.

[37] USGS gage number 0113900 is located about 0.7 miles upstream of the project dam and provides real-time flow data.

and maintaining the impoundment elevation at pre-determined elevations. Therefore, GMP's existing SCADA system and impoundment elevation, tailrace elevation, and turbine output monitoring, would be sufficient to monitor compliance with project operating requirements. Consequently, there would be no project-related benefit of additional flow monitoring at the project, as required by the Vermont ANR, which would require installation of at least one stream gage for monitoring spill flows and minimum flows in the bypassed reach.[38]

Vermont ANR also requires flow data to be made available on a "near real-time basis." Although monitoring data from the SCADA system could be made available in near real-time via the internet, GMP could also provide the resource agencies with SCADA system data upon request, which would similarly provide operation compliance transparency.

In regard to reporting deviations from operating requirements, GMP does not formally propose to maintain a log of project operation, nor does it propose to report any deviations from its proposed operating requirements to the Commission. While reporting deviations to Vermont DEC as required by certification condition C would assist GMP and Vermont DEC in tracking compliance with operating requirements, it would not be sufficient for the Commission to determine compliance with the operating requirements of the license. Developing an operation compliance monitoring plan that includes GMP's proposed operation monitoring procedures with requirements to maintain a log of project operation and report deviations to the Commission and Vermont DEC would enable the Commission to track compliance with the operating requirements of the license and the water quality certification.

**Impingement, Entrainment, and Turbine Mortality**

Water intake structures at hydropower projects can injure or kill fish that come into contact with intake screens, trash racks, or turbines. Fish that have body widths greater than the clear spacing between the trash rack bars, and/or have burst swim speeds lower than approach velocities or through-screen velocities, can become trapped against intake screens or bars of a trash rack. This process is known as impingement and can cause physical stress, suffocation, and death of some fish (EPRI, 2003). Entrainment into the intake structure occurs if fish are small enough to pass between trash rack bars, and are unable to overcome the approach velocity, or if they choose to pass downstream through the trash rack. If entrainment occurs, fish injury or mortality can result from collisions with turbine blades, exposure to pressure changes, shear forces in turbulent flows, or water velocity accelerations created by turbines (Rochester *et al*., 1984). Fish that are impinged or entrained and killed are removed from the river population and no longer available for recruitment to the fishery.

GMP proposes to continue operating with full-depth (17-foot-tall by 10-foot-wide) trash racks that are angled approximately 45 degrees relative to inflow with 1-inch clear bar spacing.

[38] As indicated above, inflows at the project could be estimated using USGS gage number 01139000 and outflows are currently measured at the project as turbine output.

A maximum approach velocity of 1.0 feet per second (fps)[39] occurs when operating at the maximum hydraulic capacity (164 cfs) of the project. Debris is removed from the trash racks at least once per week during favorable weather conditions and more frequently during adverse conditions using a mechanical rack raker. GMP proposes no additional measures to reduce fish mortality as a result of impingement or entrainment.

No entity provided recommendations on fish impingement, or fish entrainment and turbine mortality in response to the Commission's public notice that the application was ready for environmental analysis.

*Our Analysis*

To estimate the risk of impingement and entrainment, we identified seven representative fish species that likely reside within the project impoundment (*e.g.*, brown trout, rainbow trout, smallmouth bass, longnose dace, white sucker, and pumpkinseed) based on surveys conducted upstream of the project (see section 3.3.2.1, *Affected Environment, Fishery Resources*) and compared burst swim speeds to the 1.0 cfs approach velocity in front of the trash rack. As indicated in table D-5, adults and juveniles of all seven species have burst swim speeds that exceed the approach velocity at the intake. Thus, the seven representative species that occur upstream of the project are capable of swimming to avoid impingement and entrainment.

Our analysis indicates that the seven representative species upstream of the project are not likely to be entrained, and thus would not be affected by turbine mortality. Nonetheless, some entrainment and turbine mortality are likely to occur at the project as fish volitionally swim downstream through the project's trash racks. However, entrainment studies have shown that the majority of fish entrained are small and many are young (EPRI, 1997). The younger individuals in a fish population generally have high rates of natural mortality, even in the absence of hydropower operations. Fish populations typically withstand losses of large numbers of these smaller and younger individuals with little impact to impact to the population. Further, any turbine mortality may be offset by increased survival and growth of the remaining fish within the project impoundment due to reduced competition for limited resources (Ricker, 1975; EPRI, 1992; Therrien and Bourgeois, 2000). Thus, entrainment and turbine mortality of smaller and younger individuals could occur but would have minimal consequences to the fish communities in the project impoundment and Wells River.

**American Eel Passage**

GMP does not propose any American eel passage measures. Vermont ANR's certification condition E requires GMP to develop a plan, within one year of American eel passage being installed at the Wilder Project (FERC No. 1892), to provide upstream and

[39] Maximum estimated approach velocity was calculated using the formula: approach velocity = (intake flow)/(intake cross section area) (EPRI, 2000). Approximately 20 inches of the project's 17-foot-tall trash racks is above water at normal pond level. Therefore, a height of 16.83 feet was used for calculating cross section area.

downstream American eel passage at the Newbury Project.[40] Condition E requires the plan to be developed in consultation with Vermont ANR and FWS and include an implementation schedule. Condition E states that the plan can include monitoring studies, and trap and truck, eel ramp installation, or other appropriate passage measures. Condition E requires that any results of the plan will be reviewed and approved by Vermont ANR and FWS.

*Our Analysis*

The Wells River Basin is within the native range of the American eel. After entering the Connecticut River from the Atlantic Ocean, eels must pass five hydropower dams[41] in the Connecticut River before reaching the Newbury Project. Of the Connecticut River dams, only the first dam on the river (Holyoke Project [FERC No. 2004]) has upstream passage facilities dedicated to passing eels. Although the remaining four dams downstream of the Newbury Project do not have passage facilities for eels, some eels do pass upstream through upstream fish passage facilities designed for other species (*e.g.,* Atlantic salmon, American shad) at the Turners Falls, Vernon, Bellows Falls, and Wilder Projects (FirstLight, 2016; TransCanada, 2016). Thus, some eels are present upstream of the Wilder Project dam, which is the first dam downstream of the Newbury Project and about 49 river miles away. Nonetheless, there is no evidence that eels currently occur downstream of the Newbury Project.[42] Therefore, there is currently no identifiable benefit to installing upstream or downstream passage for eels at the project.

Although there are no identifiable benefits to providing upstream or downstream eel passage at the Newbury Project at this time, federal and state management efforts in the Connecticut River Basin will likely result in eels becoming more abundant over time. In addition, should upstream eel passage be installed at the Wilder Project, eel abundance downstream of the Newbury Project may reach levels that would warrant installation of upstream and downstream eel passage during the term of any subsequent license issued. Vermont ANR's requirement to develop a plan, within one year of American eel passage being installed at the Wilder Project, to provide upstream and downstream American eel passage at the Newbury Project, would help to identify if, and when, installation of eel passage is warranted during the

[40] Certification condition E does not specify whether the required plan is intended for upstream passage, downstream passage, or both. Therefore, Commission staff assume the intent is for GMP to develop a plan for both upstream and downstream passage at the project.

[41] The five dams from downstream to upstream are at the Holyoke Project (FERC No. 2004) (RM 87), Turners Falls Project (FERC No. 1889) (RM 122), Vernon Project (FERC No. 1904) (RM 142), Bellows Falls Project (FERC No. 1855) (RM 174), the Wilder Project (RM 217).

[42] Personal communication between Kleinschmidt and Vermont Fish and Wildlife Department indicated that American eel were not observed during a fish survey conducted in 2018 (*See* final license application).

term of any subsequent license issued, as well as help to determine the type of passage that would be most beneficial.

**Downstream Fish Passage**

As described above, fish migrating downstream through hydroelectric projects may be injured or killed as they pass through project intake structures and turbines. GMP installs and operates a downstream fish passage chute to provide downstream passage of resident fish species. The chute, which is installed and operated during the spring and fall from April 1 to June 1 and from September 1 to November 15, extends through the crest gates of the dam and leads to a plunge pool located immediately downstream of the dam that is 6 to 10 feet deep. Installation and removal of the downstream fish passage chute requires lowering the surface elevation of the impoundment approximately 2.6 feet (4 times annually), using a crane to remove a 2-foot-high by 4-foot-wide section of the crest gates at the dam, and attaching an 8-foot-long by 4-foot-wide steel sluice box that extends to the plunge pool. Under current operations, the chute provides a flow of 20 cfs in the spring and fall. GMP proposes to continue operating the fish passage chute during the spring and fall but to modify the chute to provide a flow of 10 cfs during both operational periods.

Vermont ANR's certification condition D requires GMP to: (1) install and operate the downstream fish passage chute with a flow of 25 cfs from April 1 to June 1 and from September 1 to November 15;[43] (2) continue using the 1-inch trash rack angled toward the downstream fish passage chute; (3) maintain the existing 6-foot-deep baffle deployed in front of the existing intake structure; and (4) consult with the Vermont ANR on design and placement of the downstream fish passage chute should GMP seek to replace or modify the chute during the term of any subsequent license and file the proposed downstream fish passage design information with the Vermont ANR for approval prior to commencement of any work.

[43] The water quality certification states that GMP's proposed flow through the downstream fish passage chute does not meet the 25 cfs attraction flow recommended by the FWS Fish Passage Engineering Design Criteria (2017). However, the certification does not explicitly state the flow required by the Vermont ANR for the continued operation of the downstream fish passage chute. Certification condition D requires implementing "additional measures" described in paragraph 127. These measures include maintaining the existing angled trash rack and baffle curtain, and protection measures agreed to in a letter from Newbury Hydro Company (*i.e.*, the licensee at the time) to Vermont ANR and FWS and filed by Newbury Hydro Company on February 27, 2012. In addition to the trash rack and baffle curtain requirements, the 2012 filing describes an agreed upon flow of 25 cfs to be provided through the downstream fish passage chute. Therefore, while not explicitly stated, staff assume that the certification requires a flow of 25 cfs through the downstream fish passage chute when in operation.

*Our Analysis*

The existing fish passage chute was originally designed to pass Atlantic salmon smolts downstream of the project dam during the spring and fall. Atlantic salmon are anadromous and smolts must migrate out to sea to feed and grow, before returning to their natal rivers as adults to spawn. There are currently no Atlantic salmon at the project and efforts to reintroduce Atlantic salmon into the Connecticut River basin have been terminated (FWS, 2020). Therefore, operating the downstream fish passage chute does not provide any benefit to Atlantic salmon and would not provide any reasonably foreseeable benefit during the term of any subsequent license issued for the project.

As discussed in section 3.3.2.1, *Affected Environment, Fishery Resources,* currently only resident fish species occupy habitat in the vicinity of the Newbury Project. Unlike Atlantic salmon, for which the fish passage chute was originally designed, all of the resident species in the vicinity of the project can maintain populations entirely within freshwater and none require downstream passage to complete their life-cycle. Downstream passage facilities could provide an alternative route for fish to avoid impingement, entrainment, and turbine mortality, and potential injury or mortality associated with passage over the spillway. However, as discussed in section 3.2.2.2, *Environmental Effects, Impingement, Entrainment and Turbine Mortality,* impingement, entrainment, and turbine mortality of resident fish is not likely to have an effect on fish populations. Further, spillway flows can provide a relatively benign downstream passage route (Schilt, 2007). Thus, resident fish could successfully move downstream over the project spillway, especially during high flows when impoundment surface elevations are more likely to exceed the pneumatic crest gates on the spillway.

Successful downstream passage systems must create hydraulic signals strong enough to attract fish to one or multiple safe fish passage entrances in the presence of competing flows toward potentially unsafe entrances, such as turbine intakes (FWS, 2019). GMP proposes to continue seasonal operation of the downstream fish passage chute and to provide a continuous minimum flow of 10 cfs, rather than the current seasonal flow of 20 cfs during the spring and fall. As discussed in the certification, the FWS's 2019 Design Criteria Manual recommends that that downstream fish passage facilities should be designed to provide minimum attraction flows of 5% of the station hydraulic capacity or 25 cfs, whichever is larger (FWS, 2019). The proposed flow of 10 cfs represents 6% of the total capacity of the Newbury Project, and the existing flow of 20 cfs represents 15% of total capacity. While both existing and proposed flows exceed the 5% threshold, the 10 cfs and 20 cfs flows are less than the 25 cfs minimum flow recommended by the FWS's 2019 Design Criteria Manual. Thus, based on the FWS criteria, the downstream fish passage chute may be ineffective at passing fish under existing and proposed operation.

Operating the downstream fish passage chute with a flow of 25 cfs, as required by the certification, may provide sufficient attraction flow for resident fish species in the project area. However, as discussed above, continued operation of the downstream fish passage chute would likely have a limited effect on the resident fish population. Further, because resident fish species can travel downstream over the project spillway during periods of spill and resident fish species are not dependent on downstream movement to complete their life cycles, continued operation of

the downstream fish passage chute would provide minimal benefit to the resident fish populations upstream or downstream of the project.

**Debris Management**

GMP states that trash racks are cleaned using a mechanical raker a minimum of once per week during good weather conditions and as many as two times per day during adverse weather or high flow events. However, GMP does not indicate how or where it disposes of the debris.

Vermont ANR's certification condition G requires that "debris associated with Project operations shall be disposed of in accordance with state laws and regulations." Vermont ANR states that depositing or emitting debris and other solids[44] to state waters would violate Vermont's solid waste laws and standards and notes that debris that is not properly disposed of may also impair aesthetics and boating at the project.

*Our Analysis*

Organic and inorganic debris typically collect on the intake trash racks of a hydroelectric project. Although no debris piles or other solids have been observed at the project, periodic disposal would prevent accumulation of unsightly debris and keep that debris from entering the river where it could degrade water quality. Developing a debris disposal plan would guide how and when GMP is to remove and dispose of debris.

### 3.2.2.3 Cumulative Effects on Aquatic Resources

In late 1800s and early 1900s the Wells River was used for recreation, log drives, and hydroelectric power generation for mills (i.e., paper mills, sawmills, fulling mills, grist mills) (Redstart 2009). At least 13 dams were once located throughout the Wells River watershed (Redstart 2009). Today, there are six dams in the Wells River, including the Newbury Project dam and the Wells River Project (FERC Exemption No. 4770) (also known as the Boltonville Dam) (Vermont ANR, 2020a).

The construction of these dams during the last 200 years converted a riverine system into a series of impoundments, resulting in decreased velocity and increased water depth, and likely led to some increase in water temperature and lowering of DO concentration. Installing hydropower turbines also likely resulted in fish mortality and the dam structures impeded the migrations of diadromous species (*e.g.,* American eel, Atlantic salmon). In addition to dams, urban development, agriculture, and landfill leachate from the Newbury landfill has likely decreased water quality in the Wells River. Today, the Newbury Project, in combination with the other hydropower and non-hydropower dams in the Wells River Basin, and point and non-

[44] Vermont ANR does not define debris or other solids. We assume that they are referring to leaves, wood, tires, and other floating trash that could be caught on the trash racks.

point sources of water pollution cumulatively affect water quantity, water quality, aquatic habitat, and fish mortality.

GMP proposes and Vermont ANR requires construction of an impoundment boating access area for recreational boaters upstream of the project dam at a location to be determined after any subsequent license is issued. As discussed in sections above, any construction activity could disturb upland areas and potentially lead to erosion and sediment inputs to the river, which could negatively affect water quality and aquatic resources. Implementing an impoundment boating access plan that includes BMPs to reduce erosion and sedimentation would minimize the effects of construction and any cumulative effects on water quality and aquatic habitat.

GMP proposes and Vermont ANR requires operating the project in run-of-river mode and releasing a year-round, minimum flow of 37 cfs or inflow, whichever is less, to the bypassed reach. As discussed in sections above, run-of-river operation would maintain the short residency time and stable surface elevation of water in the impoundment and maintain good water quality and habitat conditions in the impoundment, bypassed reach, and downstream. Thus, run-of-river operation would contribute minimally to cumulative effects on water quality, habitat, and aquatic biota.

Vermont ANR also requires GMP to develop a plan, within one year of American eel passage being installed at the Wilder Project to provide upstream and downstream American eel passage at the Newbury Project. Installation of eel passage at the Newbury Project, if and when it is warranted during the term of any subsequent license issued would minimize the cumulative effects of dams and turbines on American eels in the Wells River.

Impingement and entrainment of fish can occur at the Newbury Project intake. However, as discussed above, the low approach velocity (1.0 fps) and narrow trash rack clear bar spacing (1 inch) would limit entrainment primarily to smaller, juvenile fish, which generally have high turbine survival rates. Further, fish populations typically withstand losses of large numbers of smaller and younger individuals with little or no impact to the population. Thus, the project's contribution to cumulative effects on fish mortality in the Wells River Basin is expected to be small.

### 3.3.3 Terrestrial Resources

#### 3.3.3.1 Affected Environment

**Vegetation**

The Newbury Project boundary mostly follows the shoreline of the Wells River. The area between the project boundary and the water's edge at the impoundment and bypassed reach is generally steep and narrow. As a result, minimal upland vegetation exists within the project boundary. Forests in the area contain a mixture of beech, sugar maple, yellow birch, hemlock, red oak, red maple, white ash, basswood, white pine, and red spruce trees. The northern side of the project impoundment contains a narrow band of such mixed hardwood and coniferous upland

forest located adjacent to the Wells River Streambank Management Area.[45] The impoundment's southern shoreline is dominated by a vegetated rip-rap bank associated with the U.S. Route 302 right-of-way. The shoreline along the bypassed reach and tailrace is also steep and narrow and consists of a bedrock wall with forest growth at the top of the bank.

**Wildlife**

Approximately 47 mammal species are likely to occur within the Newbury Project area, including: black bear, moose, bobcat, white-tailed deer, coyote, gray and red fox, snowshoe hare, Eastern cottontail, porcupine, fisher, and beaver, as well as various species of squirrels, voles, moles, shrews, and mice. Vermont also provides diverse terrestrial and subterranean habitats for nine species of bats, 21 species of amphibians (11 frogs and toads and 9 salamanders), and 21 species of reptiles (8 turtles, 12 snakes, and 1 lizard) (Vermont FWD, 2022b; Vermont FWD, 2022c).[46]

Roughly 265 migratory and non-migratory bird species are known to occur in Vermont, with 146 species found in Orange County (Vermont FWD, 2022d).

Special Status Species

Fifty-three state threatened or endangered species are found in Vermont (Vermont FWD, 2022e). According to the Vermont Natural Resource Atlas (Vermont ANR, 2020b), none of these species are known to occur within the project boundary. Eight bird species of Conservation Concern may occupy habitats near or within the project boundary (FWS, 2021a). The evening grosbeak is primarily a winter resident of the project area while the black-billed cuckoo, bobolink, Canada warbler, Eastern whip-poor-will,[47] wood thrush, and olive-sided flycatcher likely breed within the project vicinity. The bald eagle may be present within the project area, particularly during the fall months.

The Newbury Project is located within the summer breeding range of the eastern North American migratory monarch butterfly population (Xerces, 2022). The monarch butterfly is a candidate for listing as a threatened or endangered species under the ESA.[48]

[45] Streambank Management Areas are lands purchased by the Vermont Fish and Wildlife Department to ensure access to the state's rivers for angling and other recreation, and to improve habitat for aquatic species (Vermont FWD, 2022a).

[46] The federally listed northern long-eared bat is discussed in section 3.3.3, *Threatened and Endangered Species*.

[47] The Eastern whip-poor-will is a state threatened species. While it may occur within the project vicinity, it has not been identified within the project boundary.

[48] 85 Fed. Reg. 81,813 (2020).

**Wetlands**

According to the National Wetlands Inventory, there are 10.2 acres of palustrine[49] wetlands within the project area.[50] These wetlands consist of: (1) a permanently flooded freshwater pond (6.7 acres); (2) four seasonally flooded or temporarily flooded freshwater emergent wetlands (total of 3.1 acres); and (3) a temporarily flooded freshwater forested/shrub wetland (0.4 acres). Freshwater ponds include all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than about 2.4-2.8 inches), and a vegetative cover less than 30%. Freshwater emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes, with vegetation present for most of the growing season in most years. Forested/shrub wetlands include areas dominated by woody vegetation less than 20 feet tall (*e.g.*, shrubs, young trees [saplings], and trees or shrubs that are small or stunted because of environmental conditions).

**Invasive Species**

No non-native, invasive plant species are currently known to occur within the Newbury Project boundary. However, GMP conducted a review of Vermont's noxious plant list and identified 29 terrestrial and aquatic plant species that might occur, or have the potential to occur, within the project area during the term of a subsequent license (table D-6). Many of the species identified by GMP are spread by tiny seeds (i.e., garlic mustard and purple loosestrife) or fragments (i.e., flowering rush, Brazilian elodea, and hydrilla) that are transported by wind, water, and/or wildlife (Munger, 2001; Munger, 2002; Jacono *et al.*, 2022; Maine DACF, 2022; Morgan *et al.*, 2022). These seeds and plant fragments can also be inadvertently carried to new areas on tires, equipment, boat trailers, and the soles of shoes during construction, maintenance, and recreation activities.

#### 3.3.3.2 Environmental Effects

**Project Operation and Maintenance**

Hydropower operation and maintenance can affect wetlands, riparian habitat, and associated wildlife by modifying the frequency and duration of downstream flows and the stability of impoundment water surface elevations. These modifications may alter the

[49] The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand (ppt). It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 hectares (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2.5 meters (8.2 feet) at low water; and (4) salinity due to ocean-derived salts less than 0.5 ppt (FGDC, 2013).

[50] Five wetlands are found within or adjacent to the project impoundment and are enclosed within the project boundary. One, 0.2-acre freshwater emergent wetland, is found approximately 140 feet north of the project boundary.

availability and quality of nearshore habitats for the species that rely on them. Vegetation management along project facilities can result in the permanent removal of terrestrial habitat or temporary disturbances to the suitability of terrestrial habitat. These activities may affect species composition and density, as well as the structure and function of terrestrial habitats. Additionally, transmission lines and exposed energized components can pose electrocution and collision risks for birds and other wildlife.

As described in section 2.2, *Applicant's Proposal*, GMP proposes to continue operating the project in run-of-river mode by maintaining stable water levels in the impoundment and releasing a new, year-round, minimum flow of 37 cfs or inflow, whichever is less, to the bypassed reach. As discussed in section 3.3.1.2, *Planned and Unplanned Drawdowns*, GMP proposes to continue to conduct four planned annual drawdowns each year to install and remove the downstream fish passage chute. GMP proposes to consult with Vermont ANR regarding the timing and duration of maintenance drawdowns so as to conduct the drawdowns in a manner that is protective of nearshore terrestrial and aquatic habitat. GMP does not propose any changes to existing vegetation management at the project which includes occasional, one to two times per year, weed whacking of vegetation surrounding the dam, intake, and powerhouse areas to ensure there is no significant growth within 15 feet of project structures. No animal protection guards are installed on, or proposed for, the project transmission line or exposed, energized components.

No entity provided comments on the effects of continued project operation and maintenance on terrestrial resources in response to the Commission's public notice that the application was ready for environmental analysis.

*Our Analysis*

Project Operation

Continuing to operate the project in run-of-river mode would maintain stable water levels in the project impoundment and ensure that nearshore terrestrial habitat, including the wetlands located within, and adjacent to, the project impoundment, are not degraded by water level fluctuations. Further, run-of-river operation would maintain the existing downstream terrestrial habitat as downstream water level fluctuations would follow the natural, seasonal variation of flows in the Wells River. Because the bypassed reach is lined by a steep bedrock bank with limited forest growth on top, GMP's proposal to provide a year-round minimum flow of 37 cfs to the bypassed reach, instead of seasonal minimum flows ranging from 25 cfs to 50 cfs, is unlikely to adversely affect terrestrial habitat.

GMP's planned annual drawdowns last approximately six hours and lower the impoundment surface elevation roughly 2.6 feet. Nearshore vegetation, wetlands, and wildlife are adapted to periodic water level fluctuations, such as those caused by a storm event or seasonal drought. As discussed in section 3.2.2.2, *Environmental Effects*, continuing to install/remove and operate the downstream fish passage chute would provide minimal benefit to resident fish species. GMP's planned drawdowns, however, are short in duration and magnitude and are, therefore, unlikely to have adverse long-term effects on terrestrial resources, including wetlands. If the operation of the downstream fish passage chute is discontinued under any subsequent license issued for the project, there would no longer be a need for impoundment

drawdowns to install and remove the fish passage chute. As a result, any adverse effects associated with planned lowering of the impoundment surface elevation for installing and removing the chute, though expected to be minimal, would be eliminated.

Though uncommon, unplanned maintenance and/or emergency drawdowns may occur throughout the year. As discussed above, GMP proposes to maintain minimum flows to the bypassed reach and consult with Vermont ANR regarding the timing and duration of maintenance drawdowns to minimize the effects of flow and water surface elevation fluctuations on terrestrial and aquatic resources. Combined these measures would help to mitigate the effects of unplanned or irregular drawdowns on terrestrial resources.

Most bird collisions with transmission lines involve waterfowl and other large, heavy-bodied, and less agile birds (APLIC, 2012). Additionally, most electrocutions involve raptor species with large wingspans that enable them to simultaneously touch energized and/or grounded parts of the transmission structures, potentially resulting in electrocution (APLIC and FWS, 2005). As discussed above, numerous raptors, waterfowl, and other large-bodied bird species likely use the project impoundment (e.g., for foraging) or occur within the project boundary. However, at only seven feet long, the Newbury Project transmission line is short and there are no reports of bird or other wildlife collisions with the transmission line. Similarly, there are no reports of electrocutions associated with the transformers or other exposed energized components of the project transmission lines. Therefore, there would be no benefit to implementing mitigation measures to prevent wildlife collisions or electrocutions at the project.

Vegetation Management

Vegetation management activities, such as weed whacking, have the potential to affect monarch butterfly habitat if milkweed and/or nectar rich plants are cut or removed. Additionally, these activities can spread non-native invasive plants that have the potential to reduce local biodiversity and provide lower quality wildlife habitat and foraging opportunities than areas with diverse assemblages of native plants (Swearingen et al., 2014). Continuing GMP's current vegetation management practices would keep vegetation trimming to a minimum while maintaining access to project structures. Given the small amount of upland habitat within the project boundary (approximately 3 acres) and limited scale of trimming activities, vegetation management is expected to have minimal negative effects on monarch butterfly habitat and the spread of non-native invasive species.

**Project Recreation**

Construction, operation, and maintenance of new recreational features, and increased recreational activity, could affect wildlife by creating noise, habitat disturbances and deterioration, and an increased human presence within the project area. Additionally, areas disturbed by the construction and maintenance of recreational features, and public use of the features, could create suitable conditions for the establishment of non-native invasive plants which may reduce biodiversity and alter the composition of existing native plant and animal communities (Hobbs and Huenneke, 1992).

GMP proposes to construct an impoundment boating access area for recreational boaters to improve access the project impoundment and upstream waters. However, the location and timing of construction, if developed, depend on the results of an on-going feasibility analysis. GMP proposes to submit an annual feasibility assessment for an impoundment boating access area until the access area is deemed unfeasible or until construction of the area is completed.

No entity provided comments or recommendations regarding the potential effects of recreation related activities on terrestrial resources in response to the Commission's public notice that the application was ready for environmental analysis.

*Our Analysis*

Construction of the proposed impoundment boating access area is likely to involve some ground disturbing activities including vegetation/tree removal and/or trimming. These activities, along with use of the access area, have the potential to displace native plants and wildlife, including monarch butterfly, and spread non-native, invasive species, if present. Because the proposed impoundment boating access area is still in the conceptual stage, when, where, and how long it would take to construct and maintain the access area are unknown. As a result, the effects of the proposed impoundment boating access area on wildlife and their habitats are also unknown.

Approximately eight percent of Vermont's non-native species have the potential to create environmental and economic harm due to their ability to grow rapidly, profusely, and widely. Use of the impoundment boating access area is likely to result in increased human traffic which has the potential to spread non-native, invasive species if they are present. Invasive species often occur along the shorelines of rivers and waterbodies, in part, because when these locations are used for recreation, plant fragments and seeds can be spread by recreational users and flowing water.

As discussed in section 3.3.1.2, *Environmental Effects, Impoundment boating access Construction*, implementing BMPs to minimize soil erosion and sedimentation (e.g., silt fencing, revegetation with native species) would reduce the effects of construction of the impoundment boating access area on aquatic, riparian, and wildlife species and habitats, and are measures that could be included in an impoundment boating access plan. Additionally, including: (1) provisions to consult on site selection with the Vermont ANR and FWS before any construction activities occur; (2) methods for preventing the establishment of invasive plants; and (3) guidelines for detecting and treating invasive plant populations, in a impoundment boating access plan would ensure that the effects of the proposed impoundment boating access area on wildlife, including monarch butterfly, and their habitats are minimized.

### 3.3.4 Threatened and Endangered Species

#### 3.3.4.1 Affected Environment

On September 12, 2023, staff accessed the FWS's Information for Planning and Consultation (IPaC) database to determine whether any federally listed species could occur in the vicinity of the project. According to the IPaC database, the endangered northern long-eared bat

(*Myotis septentrionalis*) (NLEB),[51] the candidate monarch butterfly (*Danaus plexippus*),[52] and the proposed endangered tricolored bat (*Perimyotis subflavus*)[53] may occur in the project vicinity.[54] No critical habitat for these or other species occurs within project-affected lands.

Our analysis of project effects on the monarch butterfly is presented in section 3.3.3, *Terrestrial Resources*. Our analysis of project effects on NLEB and the tricolored bat is summarized here and presented in full in Appendix F.

No tree removal is anticipated as part of normal project operation and maintenance. However, if tree removal were to become necessary during a subsequent license, restricting the planned removal of trees three inches dbh or greater to the period between November 1 through April 14, would reduce the likelihood of disturbing NLEB and their newly born pups during the active season. Because the location of the proposed impoundment boating access area is undetermined and the duration of activity associated constructing and maintaining the access area, including when the access area would be created, is unknown, incorporating, at a minimum, a provision to consult on site selection with the Vermont ANR and FWS before any construction activities occur in an impoundment boating access plan would help ensure that the effects of the proposed impoundment boating access area on NLEB and their habitats are minimized whenever and wherever the impoundment boating access area is constructed. We conclude that relicensing the project, as proposed with our recommended measures, is not likely to adversely affect the NLEB.

Seasonal limits on tree clearing for NLEB would also reduce the likelihood of disturbing tricolored bats during the concurrent pup-rearing season for this species. Additionally, including a provision to consult on site selection with the Vermont ANR and FWS before any construction activities occur in an impoundment boating access plan would help ensure that the effects of the proposed impoundment boating access area on tricolored bats and their habitats are minimized. With the implementation of the staff recommended measures for the NLEB discussed above, we conclude that relicensing the project would not jeopardize the continued existence of the tricolored bat.

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[51] 88 Fed. Reg. 4908-4910 (January 26, 2023).

[52] 85 Fed. Reg. 81,813 (December 17, 2020).

[53] On September 14, 2022, FWS issued a proposed rule to list the tricolored bat as an endangered species under the ESA (87 Fed. Reg. 56,381-56,393). In the proposed rule, FWS found that designating critical habitat for this species is not prudent. While the tricolored bat does not appear on the September 12, 2023, IPaC report, the range of tricolored bat includes all of Vermont. Therefore, this species is included in our analysis of threatened and endangered species.

[54] See Commission staff's September 12, 2023, memorandum on *List of Threatened and Endangered Species Generated by ECOS-IPaC Website; see also,* IPaC, FWS, https://ipac.ecosphere.fws.gov/ (accessed September 12, 2023).

### 3.3.5 Recreation and Land Use

#### 3.3.5.1 Affected Environment

**Recreation Overview**

A wide variety of recreation activities are available within east-central Vermont. Groton State Forest is approximately 15 river miles northwest of the Newbury Project in the towns of Groton and Peacham, Vermont. Groton State Forest covers over 26,000 acres and is the second largest state forest in Vermont. Groton State Forest includes seven state parks (Ricker Pond State Park, Stillwater State Park, New Discovery State Park, Kettle Pond State Park, Big Deer State Park, Boulder Beach State Park, and Seyon Lodge State Park); the Groton Nature Center; eight lakes and ponds; and several state-designated natural areas (*e.g.*, Peacham Bog Natural Area, Lords Hill Natural Area).

There are no licensed project recreation facilities. However, a non-project recreation facility provided by the Vermont Department of Fish and Wildlife offers hand-carry boat access to the project's impoundment and Wells River. This facility is located approximately 500 feet upstream of the western end of the project boundary (figure C-3).

In a letter filed December 13, 1991, the licensee requested exemption from filing Licensed Hydropower Development Recreation Reports (Form 80), and subsequent Form 80 reports for the Newbury Project. On November 9, 1992, Commission staff exempted the licensee from filing recreation Form 80 reports due to minor existing or potential recreational use at the project.[55]

**Land Use**

The Newbury Project resides completely within the village of Wells River in the northern section of the town of Newbury in Orange County, Vermont. The town of Newbury consists of several small villages and hamlets and is largely composed of forest and agricultural land. Approximately 70% of land in the town of Newbury consists of forest parcels of 20 acres or more. The Village of Wells River includes the main commercial and retail section of the town of Newbury as well as a historic district.

#### 3.3.5.2 Environmental Effects

GMP proposes to continue to operate the project in run-of-river mode, such that outflow from the project approximates inflow. Rather than continuing to provide a minimum flow to the bypassed reach of at least 50 cfs from April 15 to June 10, and at least 25 cfs during the remainder of the year, GMP proposes to release a bypassed reach minimum flow of 37 cfs or inflow, whichever is less.

[55] Letter order issued November 9, 1992.

GMP hosted a group site meeting including representatives from Vermont FWD, Vermont DEC, the Town of Newbury, American Whitewater, the Connecticut River Conservancy, and Chief Logging and Construction, Inc.[56] to evaluate needs for river access on June 30, 2021. The participants agreed that an improved put-in area for hand carry boat access would improve recreational fishing, wildlife viewing, and other general river recreation opportunities. In the license application, GMP proposes to install a new hand-carry boat access area upstream of the project dam to accommodate interest in improved access near the project. However, after additional review, GMP determined that the initial location of the access area is not feasible immediately due to the identified presence of cultural resources associated with the former Wells River Electric Light Plant and Pumping Station located at the site.[57] Additionally, the remains of the plant and station located within the proposed access area are structurally hazardous and a safety issue. GMP is therefore working to identify a preferable, alternate location for the hand carry access area upstream of the project dam. GMP proposes to provide annual status and progress reports until the facility is deemed unfeasible or upon completion of any associated construction of the facility. American Whitewater recommends GMP's proposal and Vermont ANR's Certification requirement.

Vermont ANR's certification condition F requires that the location for the proposed impoundment boating access area be located upstream of the dam (pending private landowner approval and hand-carry cultural resource consultation), and that, if landowner and permit approvals allow, the access area be constructed within four years of the effective date of an issued license.

*Our Analysis*

Recreation Access and Use

Continued project operation in a run-of-river mode, would maintain flows downstream of the powerhouse that approximate inflows and minimize impoundment fluctuation levels, making them as stable as possible for recreation. The effects of releasing a minimum flow of 37 cfs, as opposed to continuing to release 50 cfs from April 15 to June 10, and at least 25 cfs during the remainder of the year would be negligible to recreation use because existing and proposed minimum flows are all very low and provide insignificant recreation value. With flows from the project approximating natural flows, operation of the project would likely cause no effect on recreation, including canoe and kayak navigation, upstream or downstream of the project. Therefore, relicensing the project as proposed would not significantly affect recreation use.

In the project vicinity, the Wells River provides angling opportunities and is a popular whitewater boating resource.[58] The Lower Wells River, in particular, provides a whitewater run

[56] Chief Logging and Construction, Inc. owns land abutting the project boundary.

[57] *See* letter filed by GMP on February 2, 2022.

[58] In comments filed on June 3, 2022, American Whitewater notes that Dartmouth University holds an annual whitewater boating race on this 1.1-mile stretch of the Wells River.

that is listed in American Whitewater's River Inventory as a 1.1-mile Class IV-V run.[59] Downstream of the put-in for this whitewater run are two possible hand-carry take-outs. One take-out is provided by the Vermont DFW and is located about 1,000 feet downstream of the put-in. However, as a result of the short distance from the put-in, this take-out omits over 4,800 feet of whitewater, including multiple named rapids. A second take-out exists at the head of the project impoundment and allows boaters to experience the entire 1.1-mile whitewater run. However, the second take-out at the head of the project impoundment is overgrown with vegetation and is steep and hazardous to navigate. Thus, currently there are no reasonable hand-carry take-outs for this popular whitewater run.

GMP thus proposes, and Vermont ANR's certification condition F requires, construction of an impoundment boating access area to be located upstream of the dam pending private landowner approval and cultural resource investigation. GMP proposes to submit an annual feasibility assessment for an impoundment boating access area that would help to identify and foster adequate boating access opportunities at the project. Constructing a impoundment boating access area upstream of the project dam would provide a safe take out for boaters that use the upstream whitewater run and access for fishing.

Developing an upstream impoundment boating access plan, including a schedule, would ensure that a decision is made in consultation with American Whitewater, Vermont FWD, Vermont DEC, the Connecticut River Conservancy, the Town of Newbury, and Chief Logging and Construction, Inc. on the feasibility of a project impoundment boating access area, and if feasible, that the impoundment boating access area is constructed within four years of the issuance of any subsequent license. Along with the aquatic and terrestrial resource protection measures discussed in sections 3.3.1.2 and 3.3.3.2, *Environmental Effects*, it would be beneficial for a impoundment boating access plan to include: (1) an implementation and construction schedule; (2) a design plan, including the estimated length, width, and composition of the proposed access area, parking area, trail, and stairway; and (3) provisions for operation and maintenance of the facility.

Land Use

Project boundaries should enclose "only those lands that are necessary for operation and maintenance of the project and for other project purposes, such as recreation, shoreline control, or protection of environmental resources."[60]

GMP proposes to modify the project boundary to remove portions of the mill building that do not include generating equipment. The change would result in the removal of 1.04 acres from the project boundary. The project boundary would then contain a total of 14.67 acres of land and water. The 1.04 acres of land does not appear to be needed for project purposes, and removal of this land from the project boundary would not affect project uses or substantially

[59] According to the international scale of river difficulty, Class IV rapids are for advanced paddlers, and Class V rapids are for expert paddlers.

[60] 18 C.F.R. § 4.41(h)(2) (2022).

affect land use. The Vermont SHPO concurred that this site is not eligible for the National Register of Historic Places.[61]

## 3.3.6 Aesthetic Resources

### 3.3.6.1 Affected Environment

The Newbury Project resides within a narrow, straight portion of the Wells River valley. The river left bank is steep and forested with ledge outcrops along the impoundment, bypassed reach, and tailwaters. The river right bank consists of a narrow impoundment shoreline that follows U.S. Route 302, the project intake structure, minimum flow turbine, and the former Adams Paper Company mill complex which houses the project powerhouse area within the lower level of the former mill building. The project is momentarily visible from vehicle while traveling U.S. Route 302. Much of the dam and powerhouse area consists of a gravel/dirt parking area used by the commercial businesses located on the property. GMP currently releases a year-round 5 cfs aesthetic flow over the dam by passing flows uniformly across the spillway gates.

Vermont DEC requested an aesthetic flow study during the relicensing process. GMP conducted the aesthetic flow study in 2020, and released five aesthetic flows (leakage, 5 cfs, 10 cfs, 15 cfs, and 25 cfs), documenting each of the flows via video and still photos. On March 4, 2021, GMP held a virtual aesthetic flow evaluation meeting. Meeting participants included Vermont ANR, Connecticut River Conservancy, Kleinschmidt (applicant's contractor), and GMP. The participants agreed that the release of 10 cfs provided good aesthetic value. The parties agreed that the 10 cfs flow provided a full veil across the dam, a good level of noise from falling water, mixing and flow of water in the pool below the dam, and wetted bedrock areas on the river margin that enhanced overall aesthetics (figure C-4).

### 3.3.6.2 Environmental Effects

**Aesthetic Flows**

Vermont ANR certification condition B requires, and GMP proposes to provide, a continuous spillage (aesthetic) flow of 10 cfs[62] over the dam, or inflow, whichever is less.

*Our Analysis*

GMP's proposed and Vermont ANR's required 10-cfs aesthetic flow is in accord with the consensus reached in the virtual aesthetic flow evaluation meeting. The flow would not only provide good aesthetic value, but also be consistent with the intent of Vermont's water quality standards for aesthetic flows. The proposed and required aesthetic flow would double GMP's current aesthetic flow, from 5 cfs to 10 cfs, thereby enhancing the scenic value to viewers of the

[61] *See* letter filed by Vermont SHPO on October 25, 2021

project. Further, a 10-cfs aesthetic flow would contribute to a year-round flow over the dam into the bypassed reach.

### 3.3.7 Cultural Resources

#### 3.3.7.1 Affected Environment

Section 106 of the NHPA requires the Commission to evaluate potential effects on properties listed or eligible for listing in the National Register prior to an undertaking. In this case, the undertaking is the issuance of a subsequent license for the Newbury Project. Project-related effects associated with this undertaking include those effects associated with the day-to-day operation and maintenance of the projects after issuance of a license. Section 106 also requires that the Commission seek concurrence with the Vermont SHPO on any finding involving effects or no effects on historic properties and allow the Advisory Council on Historic Preservation (Advisory Council) an opportunity to comment on any finding of effects on historic properties. If Native American properties have been identified, section 106 requires that the Commission consult with interested Native American tribes that might attach religious or cultural significance to such properties. 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.

**Area of Potential Effect**

Under section 106 of the NHPA of 1966, as amended, the Commission must take into account whether any historic property within the proposed project's area of potential effects (APE) could be affected by the issuance of a license for the project. The Advisory Council on Historic Preservation defines an APE as the geographic area, or areas, in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist (36 C.F.R. § 800.16(d)).

The APE for the Newbury Project was developed in consultation with the Vermont SHPO and is defined as lands enclosed by the project boundary and lands located within 10 meters (about 33 feet) of the edge of the riverbank as measured from the top of the bank, whichever is greater. The APE differs from the 10-meter buffer in locations where either the roadway or other infrastructure associated with the hydroelectric project necessitate a larger or smaller buffer around the project area. Along the right bank (facing downstream) of the impoundment where Route 302 is closer than 10 meters, the APE extends to the edge of the roadway. (In some areas, the roadway is as close as 3 meters from the edge of the impoundment.) The downstream end of the APE encompasses the dam and other infrastructure associated with the project and extends to the edge of the roadway. The downstream limit of the APE is past the tailrace of the powerhouse, and is where the tailrace and bypassed reach flows reconverge. The APE is presumed to extend upstream 10 meters beyond the upstream limit of the impoundment, where a natural cascade spills into the reservoir. In this area, the APE contains the remains of a former powerhouse located on the right bank of the river.

**Pre-contact Period**

The prehistory of the northeast is generally characterized by three broad periods: the Paleoindian period (before 8,000 BC – 1,000 BC), the Archaic period (8,000 – 1,000 BC), and the Woodland period (1,000 BC – 1620 AD). There is evidence of the first people in New England around the year 10,000 BC. The people of this era lived in a cold, tundra environment and centered their settlement and migration around a resource-rich mosaic of streams and wetlands formed in the basins of post-glacial lakes.

The period following the Paleoindian occupation 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, with the distinction between these being a marked change in tool usage and the organization of a sedentary way of life. The Early and Middle Archaic periods are defined by the use of quartz core and flake tools with fully channeled gouges[63] made from mostly local materials. Site rarity around the region suggests a relatively low population density at this time, but their prevalence on riverine terraces indicates that riverbanks were still primary occupation sites for Archaic populations. During the Late Archaic period there was a large population increase, as indicated by the greater prevalence of artifacts from this time period in the region. There was a clear shift in focus to utilizing marine resources, especially for food, with deer becoming a secondary diet supplement to fish.

The use of ceramics by New England Native Americans marks the transition from the Archaic period to the Woodland period. This ability to store food for the long-term and an enhanced ability to cook increased Native Americans' ability to create settlements and a more sedentary way of life. During the Early Woodland period, a cooling climate may have placed pressure on the native populations, resulting in smaller communities because of the constraints on resources. The Middle Woodland period was marked by an expansion of settlements. There was definitive evidence of crop cultivation in the Late Woodland period, including maize, gourds, and beans.

**Post-contact Period**

The first English settlers began to arrive in New England in the 1600s (National Geographic, 2023). New Hampshire Governor Benning Wentworth chartered the town of Newbury in 1763. Settlement by the European colonists was initially concentrated around the town of Newbury, to the south of the Newbury Project, and the prime farmland near two oxbows along the Connecticut River. The village of Wells River began to be actively settled around 1770 by Er Chamberlin, who cleared the land around the river, which was reportedly characterized by fallen trees and meandering streams. Chamberlin built the first gristmill and house and eventually constructed a sawmill and blacksmith shop, and established a ferry that crossed the Connecticut River to connect Wells River, Vermont to Woodsville, New Hampshire. The junction of the two rivers was a determining factor in the development of the town, providing power for early industries that served the surrounding agricultural communities in

[63] A stone tool in the form of chisel, with a curved blade having a channel extending its full length. The tool was used for scooping or cutting holes.

Newbury and acting as a major highway for transporting goods throughout northern New England.

The settlement and industrial development of the Village of Wells River accelerated during the 19th century following construction of the bridge linking Vermont and New Hampshire and the establishment of a paper mill around 1800, which remained in operation until the early 2000s. The Boston, Concord, and Montreal Railroad reached Wells River around 1850 and further connected the town with outside industries and commercial markets. By the mid to late-19th century there were over a dozen commercial buildings including fulling mills, additional grist mills and blacksmiths, a brickmaker, a tannery, slaughter houses, and various mercantile ventures, as well as residences and public structures constructed on Main Street and the surrounding streets. Population growth increased in the village of Wells River throughout the 19th century and then leveled off. The town's population is currently just under 400 residents.

**Cultural Resources Investigations**

A Phase I Archaeological Resources Assessment was conducted in 2020 for the Newbury Project APE by GMP's consultant, Northeast Archaeology Research Center (NE Archaeology). The field work portion of the survey included subsurface excavation of three 0.5-meter by 0.5-meter (about 1.64-feet by 1.64-feet) shovel test sites. The assessment identified structural remains from the former Wells River Electric Light Plant and Pumping Station circa 1896-1938 at the upstream end of the project APE. These structural remains were designated site number VT-OR-0122.

NE Archaeology then completed Phase II investigation field work for VT-OR-0122 in 2021 after receiving concurrence from the Vermont SHPO on the scope of survey work. Eight 0.5-meter by 0.5-meter shovel tests were excavated along three transects within the site. All artifacts identified appeared to be contemporaneous with the former Wells River Electric Light Plant and Pumping Station.

**Historic Properties at the Project**

The Wells River Electric Light Plant and Pumping Station structural remains are located within the APE for the project. The remains include stone and brick structural remnants and a steel penstock. The remains may have served as the location of an earlier sawmill (circa 1858). NE Archaeology recommended that the Wells River Electric Light Plant and Pumping Station is eligible for listing in the National Register. The Vermont SHPO concurred with this recommendation and stated that the site is being adversely affected by erosion due to project operation.[64]

**Traditional Cultural Properties**

There are no federally-recognized tribes in Vermont. However, on September 1, 2017, Commission staff invited the Saint Regis Mohawk Tribe to participate in the relicensing process

[64] *See* letter filed by Vermont SHPO on June 3, 2022.

for the Newbury Project. No response has been received. The tribe has not reported any known traditional cultural properties within the project's APE to date.

#### 3.3.7.2 Environmental Effects

GMP proposes to develop an Historic Properties Management Plan (HPMP) to address any potential adverse effects to historic properties over the term of a subsequent license and to consult with the Vermont SHPO before any land-disturbing activities or alterations to historic structures within the project boundary. In a letter dated October 25, 2021, and filed on March 25, 2022, the Vermont SHPO concurred with this proposal. In a letter filed June 3, 2022, the Vermont SHPO recommended that the three measures from the archaeological Phase II evaluation of the Wells River Electric Light Plant and Pumping Site VT-OR-0122 be implemented into an HPMP for the project. These measures are: (1) conduct Phase III data recovery investigations at VT-OR-0122 utilizing, but not limited to additional mapping and recordation, photo documentation, and the development of a more robust historic context; (2) complete a National Register of Historic Places Nomination for site VT-OR-0122; and (3) develop a public outreach program including an interpretive exhibit about the Wells River Electric Light Plant and Pumping Station near the site.

*Our Analysis*

As discussed in section 3.3.1.2, *Geologic and Soil Resources – Environmental Effects*, operating the project in run-of-river mode by maintaining stable impoundment elevations would continue to limit shoreline erosion, turbidity, and siltation in the impoundment and have little new effect on shoreline erosion downstream of the project. Nonetheless, project operation could cause adverse effects, due to ongoing erosion, on the historic powerhouse foundation and penstock. Therefore, mitigation measures have been developed for the identified effects, as discussed above. Developing and implementing an HPMP, in consultation with the Vermont SHPO, would ensure that the mitigation measures are in place to protect historic properties within the APE from adverse effects of erosion related to the operation and maintenance of project facilities. An HPMP would also include measures to ensure that any previously undiscovered archaeological resources within the APE are not adversely affected by the project during the term of any subsequent license. It is also possible that unknown archaeological resources may be discovered as a result of the project's operation or project-related activities. As stated above, GMP proposes to consult with the Vermont SHPO before beginning any land-disturbing activities or alterations to known historic structures within the project boundary.

To meet the requirements of section 106 of the NHPA, the Commission intends to execute a Programmatic Agreement with the Vermont SHPO for the project to protect historic properties. The terms of the Programmatic Agreement would require GMP to develop and implement an HPMP to ensure that mitigation measures are in place to minimize adverse effects to historic properties in the APE.

### 3.3.8 Environmental Justice

#### 3.3.8.1 Affected Environment

According to the U.S. Environmental Protection Agency (EPA), "environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies (EPA, 2022a). Meaningful involvement means:

1. people have an opportunity to participate in decisions about activities that may affect their environment and/or health;

2. the public's contributions can influence the regulatory agency's decision;

3. community concerns will be considered in the decision-making process; and

4. decision makers will seek out and facilitate the involvement of those potentially affected (EPA, 2022a).

In conducting NEPA reviews of hydropower projects, the Commission follows the instruction of Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income* Populations, which directs federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of their actions on minority and low-income populations (i.e., environmental justice communities).[65] Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, also directs agencies to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts."[66] The term "environmental justice community" includes disadvantaged communities that have been historically marginalized and overburdened by pollution.[67] Environmental justice communities include, but may not be limited to minority populations, low-income populations, or indigenous peoples.[68]

Commission staff used the Federal Interagency Working Group on Environmental Justice & NEPA Committee's publication, *Promising Practices for EJ Methodologies in NEPA Reviews*

[65] Exec. Order No. 12,898, 59 Fed. Reg. 7629, at 7629, 7632 (Feb. 11, 1994).

[66] Exec. Order No. 14,008, 86 Fed. Reg. 7619, at 7629 (Jan. 27, 2021).

[67] *Id.*

[68] See EPA, *EJ 2020 Glossary* (August 21, 2022), https://www.epa.gov/environmentaljustice/ej-2020-glossary.

(*Promising Practices*) (EPA, 2016), which provides methodologies for conducting environmental justice analyses throughout the NEPA process for this project. Commission staff's use of these methodologies is described throughout this section.

Commission staff used EJScreen, EPA's environmental justice mapping and screening tool, as an initial step to gather information regarding minority and/or low-income populations; potential environmental quality issues; environmental and demographic indicators; and other important factors. EPA recommends that screening tools, such as EJScreen, be used for a "screening-level" look and a useful first step in understanding or highlighting locations that may require further review.

**Meaningful Engagement and Public Involvement**

CEQ's *Environmental Justice Guidance Under the National Environmental Policy Act (CEQ Environmental Justice Guidance)* (CEQ, 1997) and *Promising* Practices recommend that federal agencies provide opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices.[69] They also recommend using adaptive approaches to overcome linguistic, institutional, cultural, economic, historical, or other potential barriers to effective participation in the decision-making processes of federal agencies. In addition, Section 8 of Executive Order 13985, *Advancing Racial Equity and Support for Underserved Communities Through the Federal Government*, strongly encourages independent agencies to "consult with members of communities that have been historically underrepresented in the Federal Government and underserved by, or subject to discrimination in, federal policies and programs."

There have been opportunities for public involvement during the Commission's review process. The Commission's communication and involvement with the surrounding communities began on October 26, 2018, with the public notice of the pre-application document, followed by public notice of the relicense application on November 10, 2021. Issuance of the *Notice Soliciting Scoping Comments* on December 8, 2021, opened a 30-day formal scoping period to identify issues, concerns, and opportunities for enhancement or mitigation associated with the proposed action. We issued a *Notice of Application Accepted for Filing, Soliciting Motions to Intervene and Protests, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Terms and Conditions, and Prescriptions* on April 6, 2022, which established a 60-day comment period and intervention deadline. Finally, we issued a *Notice of Intent to Prepare an Environmental Assessment* on June 10, 2022. Each of these notices were published in the *Federal Register* and local newspapers.

All documents that form the administrative record for this proceeding, with the exclusion of privileged or critical energy infrastructure information, are available to the public

[69] CEQ, *Environmental Justice: Guidance Under the National Environmental Policy Act*, 4 (Dec. 1997) (CEQ's Environmental Justice Guidance), https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/GCEQ-EJGuidance.pdf.

electronically on the FERC's website (www.ferc.gov). We recognize that not everyone has internet access or is able to file electronic comments. Anyone may comment to FERC about the proceeding, either in writing or electronically.

In 2021, the Commission established the Office of Public Participation (OPP) to support meaningful public engagement and participation in Commission proceedings. OPP provides members of the public, including environmental justice communities, landowners, Tribal citizens, and consumer advocates, with assistance in FERC proceedings – including navigating Commission processes and activities relating to the project. For assistance with interventions, comments, requests for rehearing, or other filings, and for information about any applicable deadlines for such filings, members of the public are encouraged to contact OPP directly at 202-502-6592 or OPP@ferc.gov for further information.

**Identification of Environmental Justice Communities**

According to CEQ's *Environmental Justice Guidance* and *Promising Practices*, minority populations are those groups that include: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. Following the recommendations set forth in *Promising Practices*, FERC uses the **50 percent** and the **meaningfully greater analysis** methods to identify minority populations. Using this methodology, minority populations are defined in this EA where either: (a) the aggregate minority population of the block groups in the affected area exceeds 50 percent; or (b) the aggregate minority population in the block group affected is 10 percent higher than the aggregate minority population percentage in the county. The guidance also directs low-income populations to be identified based on the annual statistical poverty thresholds from the U.S. Census Bureau. Using *Promising Practices'* **low-income threshold criteria** method, low-income populations are identified as census block groups where the percent low-income population in the identified block group is equal to or greater than that of the county. Here, Commission staff selected Caledonia and Orange Counties in Vermont and Grafton County in New Hampshire, in which the project action buffer is located, as the comparable reference communities to ensure that affected environmental justice communities are properly identified. A reference community may vary according to the characteristics of the particular project and the surrounding communities.

According to the current U.S. Census Bureau information, minority and low-income populations exist within the project area. Table D-7 identifies the minority populations by race and ethnicity and low-income populations within Vermont and New Hampshire, the counties affected by the relicense application (Caledonia and Orange Counties in Vermont and Grafton County in New Hampshire), and U.S. census block groups[70] within vicinity of the project site. For this project, staff chose a 1-mile radius around the project boundary (Figure C-5). Staff determined that a 1-mile radius is sufficient to encompass and address any potential impacts that may arise from the proposed action given the limited scope of the proposed relicensing,

[70] Census block groups are statistical divisions of census tracts that generally contain between 600 and 3,000 people. U.S. Census Bureau. 2022. Glossary: Block Group. Available online at: https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_4. Accessed October 2022.

including limited construction activities and the concentration of project-related effects within the project boundary. To ensure we are using the most recent available data, we use U.S. Census American Community Survey File# B03002 for the race and ethnicity data and Survey File# B17017 for poverty data at the census block group level.[71]

Within the study area, staff has identified two census block groups in which the populations qualify as environmental justice communities (see figure C-5 and table D-7). Of these, one block group qualifies as an environmental justice community with a minority population (Census Tract 9590, Block Group 1); and one block group qualifies as an environmental justice community with a low-income population (Census Tract 9603, Block Group 4).

#### 3.3.8.2 Environmental Effects

Consistent with *Promising Practices* and EO 12898, we reviewed the project to determine if its resulting impacts would be disproportionately high and adverse on minority and low-income populations and also whether impacts would be significant.[72] *Promising Practices* provides that agencies can consider any number of conditions for determining whether an action will cause a disproportionately high and adverse impact.[73] The presence of any of these factors could indicate a potential disproportionately high and adverse impact. For this project, a disproportionately high and adverse effect on an environmental justice community means the adverse effect is predominantly borne by such population. Relevant considerations include the location and natural physical environment of project facilities and the project's human health and environmental impacts, including associated social, economic, or cultural direct, indirect and cumulative impacts, on identified environmental justice communities.

As described in section 2.2.3, *Proposed Operation and Environmental Measures*, GMP proposes to continue operating the project in run-of-river mode, where outflow from the project approximates inflow by maintaining the impoundment water surface elevation at or above the crest of the dam at all times, and to release a minimum flow of 37 cfs or inflow, whichever is

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[71] U.S. Census Bureau, American Community Survey 2021 ACS 5-Year Estimates Detailed Tables, File# B17017, *Poverty Status in the Past 12 Months by Household Type by Age of Householder*, https://data.census.gov/cedsci/table?q=B17017; File #B03002 *Hispanic or Latino Origin By Race*, https://data.census.gov/cedsci/table?q=b03002.

[72] *See* Promising Practices at 33 (stating that "an agency may determine that impacts are disproportionately high and adverse, but not significant within the meaning of NEPA" and in other circumstances "an agency may determine that an impact is both disproportionately high and adverse and significant within the meaning of NEPA").

[73] *See* Promising Practices at 45-46 (explaining that there are various approaches to determining whether an impact will cause a disproportionately high and adverse impact). We recognize that CEQ and EPA are in the process of updating their guidance regarding environmental justice and we will review and incorporate that anticipated guidance in our future analysis, as appropriate.

less. As discussed in section 3.3.5, *Recreation and Land Use*, GMP proposes to attempt to locate a suitable location for an upstream hand carry access area to facilitate boating.

No entity provided comments or recommendations regarding the effects of the project on environmental justice communities in response to the Commission's public notice that the application was ready for environmental analysis.

*Our Analysis*

Staff evaluated the effects of continued project operation on aquatic resources, terrestrial resources, threatened and endangered species, land use, recreation, aesthetics, and cultural resources in sections 3.3.1 through 3.3.7 above.

GMP proposes no changes to project operation that would adversely affect environmental resources, including water supply, water quality, or fisheries. The Newbury Project has been providing safe and renewable power to the region since its construction, as well as recreational opportunities to the public. The project is operated in run-of-river mode, resulting in minimal impoundment fluctuations. The primary uses of the Wells River and land within the project area include hydroelectric power generation, recreation, and aquatic and wildlife habitat. The majority of the land in the project area is forested, with a small amount classified as agricultural, and smaller amounts classified as developed.

Implementing a hand carry access facility could provide additional opportunities and access for fishing and hand carry boating if feasible. When the location and scope of construction for GMP's proposed hand carry access area is finalized, GMP would be required to seek approval from the Commission. At that time, the need for protective measures during construction would be evaluated. There could be inconveniences with construction of the hand carry access area, such as noise, dust, and construction traffic, but these impacts would be temporary in nature. Although the concentration of recreation use at the project could increase slightly with public access at the reservoir, the site is remote and unlikely to experience large increases in usage that would adversely affect the identified communities through increases in traffic or overfishing.

In consideration of the included census data, the limited scope of the proposed project, the minimal anticipated adverse impact on environmental justice communities, and the environmental protection and enhancement measures for aquatic resources, threatened and endangered species, and cultural resources, the project would not result in a disproportionately high and adverse impact on the identified environmental justice communities.

## 3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Newbury Project would continue to operate in its current manner. None of the applicant's proposed measures or the resource agencies' recommendations would be required. Minimum flows would not improve between June 11 and April 14, aesthetic flows would not increase by 5 cfs, and measures to protect terrestrial resources would not occur. Development of a recreation site would not occur, and no additional avoidance, protection, mitigation, or enhancement measures would be implemented to protect historic properties.

## 4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Wells River for hydropower purposes to see what effect various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corp*.,[74] the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of alternative power). In keeping with Commission policy as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the hydropower project's power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for construction, operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and total project cost. If the difference between the cost of alternative power and total project cost is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license. However, project economics is only one of many public interest factors the Commission considers in determining whether, and under what conditions, to issue a license.

### POWER AND DEVELOPMENTAL BENEFITS OF THE PROJECT

Table 1 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by the applicant in their license application and subsequent submittals. We find that the values provided by the applicant are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; estimated capital investment required to develop the project; licensing costs; normal operation and maintenance cost; and Commission fees. All costs have been adjusted to 2022 dollars.

**Table 1.** Parameters for economic analysis of the project (Source: GMP, and staff).

| Parameter | Value |
|---|---|
| Installed Capacity | 0.365 MW |
| Average annual generation | 1,076 MWh |
| Period of analysis | 30 years |

[74] *See Mead Corp.*, 72 FERC ¶ 61,027 (July 13, 1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

| Parameter | Value |
|---|---|
| Local and Federal income tax rate | Included in the Operation and Maintenance (O&M) cost |
| Insurance rate | Included in the O&M cost |
| Interest rate | 5.5 % |
| Net Investment [a] | $4,423,222 |
| Application cost | $350,000 |
| Operation and maintenance | $92,299/year |
| Estimated Commission fees [b] | $0/year |
| Cost of Alternative Power (2022) [c] | |
| 1) Energy cost | $71.42/MWh |
| 2) Dependable Capacity Cost | $179.08/kW-year |

[a] Excludes protection, mitigation, and enhancement measures and licensing cost.

[b] The Commission collects an annual administration charge for all licensed projects which is based on the authorized installed capacity of the project and amount of federal land occupied by the project.

[c] The Cost of Alternative Power is based on the cost of providing the same amount of generation and capacity from a natural gas-fired combined cycle plant, as reported by The U.S. Energy Information Administration (EIA), Annual Energy Outlook 2023, for the Division 1, New England Region. The total cost of alternative power is a combination of energy costs and a cost for dependable capacity.

## COMPARISON OF ALTERNATIVES

Table 2 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no-action, the applicant's proposal, and the staff alternative with mandatory conditions.

**Table 2.** Summary of the annual cost of alternative power and annual project cost for three alternatives for the Newbury Project (Source: staff).

| | No Action | Applicant's Proposal | Staff Alternative with Mandatory Conditions |
|---|---|---|---|
| Installed capacity | 0.365 MWh | 0.365 MW | 0.365 MW |
| Annual generation | 1,076 MWh | 1,041 MWh | 1,041 MWh |
| Dependable Capacity [a] | 0.0 MW | 0.0 MW | 0.0 MW |
| Current alternative source of power cost [b] | $76,826 | $74,363 | $74,363 |

| | No Action | Applicant's Proposal | Staff Alternative with Mandatory Conditions |
|---|---|---|---|
| Total annual project cost (2022) [c] | $436,845 | $447,193 | $472,986 |
| Difference between the cost of alternative power and project cost [d] | ($360,019) | ($372,830) | ($398,623) |

[a] Staff estimated the dependable capacity based on the ratio of the mean annual flow available for generation for each of 12 months, and the hydraulic capacity of the project.

[b] The alternative source of power cost is based on the Cost of Alternative Power in the New England Region, as identified in table 4-1 above.

[c] All project costs were adjusted to 2022 dollars to be consistent with the value of energy which is also in 2022 dollars.

[d] A number in parentheses denotes that the difference between the cost of alternative power and project cost is negative, thus the project cost is greater than the cost of alternative power.

**No-Action Alternative**

Under the no-action alternative, the project has an installed capacity of 0.365 MW, a capacity benefit of 0 MW, and an average annual generation of 1,076 MWh. The alternative source of power's current cost to produce the same amount of energy and provide the same capacity benefit is $76,826. The total annual project cost, which includes purchasing/construction, operations and maintenance, and preparing the license application, is $436,845. Subtracting the total annual project cost from the alternative source of power's current cost, the project's cost to produce power and capacity is $360,019 more than the cost of alternative power.

**Applicant's Proposal**

Under the applicant's proposal, the project would have an installed capacity of 0.365 MW, a capacity benefit of 0 MW, and an average annual generation of 1,041 MWh. The current cost to produce the same amount of energy and provide the same capacity benefit from an alternative source of power is $74,363/year. The total annual cost for the project is about $447,193. Subtracting the total annual project cost from the alternative source of power's cost, the project costs $372,830/year more to produce power than the cost of alternative power.

**As Licensed with Mandatory and Staff Measures**

This alternative includes the same developmental components as the applicant's proposal and therefore, would have the same capacity benefit and energy values described above for the applicant's proposal. The levelized annual cost for this alternative is about $472,986. Subtracting the total annual project cost from the alternative source of power's cost, the project costs $398,623/year more to produce power than the cost of alternative power.

## 4.3 COST OF ENVIRONMENTAL MEASURES

Appendix G shows the applicant's proposed environmental protection and enhancement measures, staff-recommended additions, deletions, and modifications to these measures, mandatory conditions, and the estimated cost of each. All costs are in December 2022 dollars. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on the project and our review of the environmental and economic effects of the proposed project and project alternatives, we selected the staff alternative as the preferred alternative. We recommend this alternative because: (1) issuing a subsequent license for the project would allow GMP to continue to operate the project as a dependable and inexpensive source of electrical energy; (2) the 365 kW of electric capacity comes from a renewable resource that does not contribute to atmospheric pollution; (3) the public benefits of the staff alternative would exceed those of the no-action alternative; and (4) the proposed and recommended measures would enhance aquatic and recreational resources, and protect wildlife resources at the project.

In the following section, we make recommendations as to which environmental measures proposed by GMP or recommended by agencies or other entities should be included in any subsequent license issued for the project. In addition to GMP's proposed environmental measures listed below, we recommend additional staff-recommended environmental measures to be included in any license issued for the project.

### 5.1.1 Measures Proposed by GMP

Based on our environmental analysis of GMP's proposal in section 3, *Environmental Analysis*, and the costs presented in section 4, *Developmental Analysis*, we conclude that the following environmental measures proposed by GMP would protect and enhance environmental resources and would be worth the cost. Therefore, we recommend including these measures in any license issued for the project.

- Continue operating the project in run-of-river mode, such that outflow from the project approximates inflow on a continuous basis.
- Consult with Vermont ANR prior to conducting maintenance and repair work that has the potential to adversely affect water quality.
- Consult with Vermont ANR regarding the timing and duration of periodic maintenance drawdowns of the impoundment and maintain minimum flow requirements to the bypassed reach during any maintenance drawdowns.

- Continue providing minimum flows to the bypassed reach via a combination of discharge from the minimum flow turbine, spill over the pneumatic crest gate on the spillway of the dam, and/or discharge through a downstream fish passage chute.
- Decrease the minimum flow to the bypassed reach from 50 cfs to 37 cfs from April 15 to June 10 and increase the minimum flow from 25 cfs to 37 cfs during the remainder of the year.
- Develop an operation compliance monitoring plan in consultation with Vermont ANR, as modified below.
- Restrict the removal of trees, as modified below, for protection of rare, threatened, and endangered terrestrial species.
- Increase the aesthetic flow over the spillway from 5 cfs to 10 cfs.
- Construct an impoundment boating access area for recreational boaters upstream of the project dam, if feasible, at a location to be determined after any subsequent license is issued.
- Develop a Historic Properties Management Plan to address and mitigate project effects on historic properties.

### 5.1.2 Additional Measures Recommended by Staff

In addition to GMP's proposed measures noted above, we recommend including the following additional measures in any license that may be issued for the Newbury Project.

- Modify the proposed operation compliance monitoring plan to include provisions for monitoring and reporting compliance with all operating requirements of the license (e.g., run-of-river operation, minimum flows, aesthetic flows, fish passage flows, impoundment water levels, timing of planned maintenance), and reporting deviations from operating requirements to the Commission and Vermont ANR (Certification condition C);
- Develop a plan, within one year of American eel passage being installed at the Wilder Project, to provide upstream and downstream American eel passage at the Newbury Project (Certification condition E).
- Develop a debris disposal plan (Certification condition G).
- Develop an impoundment boating access plan that includes: (1) provisions to consult on boating access design (Certification condition F) and site selection with the Vermont ANR and FWS before any construction activities occur; (2) an implementation and construction schedule that does not exceed four years (Certification condition F); (3) a design plan, including the estimated length, width, and composition of the proposed access area, parking area, trail and stairway; (4) BMPs that include, soil erosion and sedimentation controls and revegetating areas disturbed during construction using native species; (5) methods for preventing the establishment of invasive plants; and (6) guidelines for detecting and treating invasive plant populations.
- Restrict the removal of trees greater than or equal to 3 inches dbh to the period between November 1 and April 14 for the protection of NLEB (Certification condition I).

In addition, we are recommending all of the conditions of Vermont ANR water quality certification, with the exception of those conditions discussed in Appendix H, *Comprehensive Development and Recommended Alternative*.

In Appendix H, *Comprehensive Development and Recommended Alternative*, we discuss the basis for our additional staff-recommended measures and the rationale for modifying GMP's proposal.

## 5.2 UNAVOIDABLE ADVERSE EFFECTS

Continued project operation would result in some unavoidable fish impingement and entrainment mortality. However, our analysis in section 3.2.2.2, *Environmental Effects, Impingement, Entrainment, and Turbine Mortality*, indicates that the level of impingement and entrainment mortality would have minimal effects on fish populations in the Newbury Project impoundment or Wells River.

## 5.3 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed the following 16 qualifying comprehensive plans that are applicable to the Newbury Project. No inconsistencies were found.

Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). (Report No. 36). April 2000.

Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.

Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.

Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.

Connecticut River Joint Commission. New Hampshire Department of Environmental Services. 2013. Connecticut River Recreation Management Plan: Headwaters Region. Concord, New Hampshire.

National Park Service. 1993. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C.

U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

Vermont Agency of Environmental Conservation. 1986. Vermont Rivers Study. Waterbury, Vermont.

Vermont Agency of Natural Resources. 1986. The waterfalls, cascades, and gorges of Vermont. Waterbury, Vermont. May 1986.

Vermont Agency of Natural Resources. 1988. Hydropower in Vermont: an assessment of environmental problems and opportunities. Waterbury, Vermont. May 1988.

Vermont Agency of Natural Resources. 1988. Wetlands component of the 1988 Vermont recreation plan. Waterbury, Vermont. July 1988.

Vermont Department of Environmental Conservation. 2020. Ompompanoosuc, Stevens, Wells, Waits & Connecticut River Direct Tributaries Basin 14 Tactical Basin Plan. Montpelier, Vermont. December 2020.

Vermont Department of Fish and Wildlife. 2015. Vermont's Wildlife Action Plan. Montpelier, Vermont.

Vermont Fish and Wildlife Department. 2017. Statewide Management Plan for Largemouth and Smallmouth Bass. Montpelier, Vermont. August 2017.

Vermont Department of Fish and Wildlife. 2018. The Vermont Plan for Brook, Brown, and Rainbow Trout. Montpelier, Vermont. January 2018.

Vermont Department of Forests, Parks and Recreation. 2019. Vermont State Comprehensive Outdoor Recreation Plan 2019-2023. Montpelier, Vermont. December 2019.

## 6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Newbury Project is issued a subsequent license as proposed with the additional staff-recommended measures, the project would continue to operate, while enhancing and protecting aquatic, terrestrial, federally threatened and endangered resources, recreation, aesthetic, and cultural resources in the project area.

Based on our independent analysis, the issuance of a subsequent license for the Newbury Project, with additional staff-recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

## 7.0 LITERATURE CITED

The literature cited in this EA is presented as Appendix I.

## 8.0 LIST OF PREPARERS

The list of preparers of this EA is presented as Appendix K.

# APPENDIX A: STATUTORY AND REGULATORY REQUIREMENTS

## Federal Power Act

Section 18 Fishway Prescriptions

Section 18 of the FPA, 16 U.S.C. § 811, states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the U.S. Department of Commerce or Interior. On June 2, 2022, Interior requested that the Commission include a reservation of authority to prescribe fishways under section 18 in any license issued for the project.

Section 10(j) Recommendations

Under section 10(j) of the FPA, 16 U.S.C. § 803(j)(1), each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. No section 10(j) recommendations were filed in response to the Commission's notice requesting conditions and recommendations for the Newbury Project, issued on April 6, 2022.

Section 10(a) Recommendations

Under section 10(a) of the FPA, each hydroelectric license issue by the Commission must be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce; for the improvement and utilization of waterpower development; for the adequate protection, mitigation, and enhancement of fish and wildlife; and for other beneficial public uses, including irrigation, flood control, water supply, recreation, and other purposes.

On June 3, Vermont SHPO and American Whitewater each filed one recommendation under section 10(a). We discuss these section 10(a) recommendations in section 3 and Appendix H of this EA.

## Clean Water Act

Under section 401 of the Clean Water Act (CWA), 33 U.S.C. § 1341(a)(1), a license applicant must obtain either a water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from the project would comply with applicable provisions of the CWA, or a waiver of such certification by the appropriate state agency. The failure to act on a request for certification within a reasonable period of time, not to exceed one year, after receipt of the request constitutes a waiver.

On June 3, 2022, GMP applied to the Vermont Department of Environmental Conservation (Vermont DEC) for section 401 certification for the Newbury Project.[75] Vermont DEC acknowledged receipt of the application request on June 6, 2022. On May 11, 2023, Vermont ANR issued a certification for the project. The conditions of the certification are included in Appendix E.

**Endangered Species Act**

Section 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1536, requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species. On September 12, 2023, we accessed the U.S. Fish and Wildlife Service's (FWS) Information Planning and Consultation (IPaC) database to determine whether any federally listed species could occur in the vicinity of the project. According to the IPaC database, the endangered northern long-eared bat (NLEB; *Myotis septentrionalis*) may occur within the Newbury Project boundary, or be affected by the project.[76] Additionally, the proposed endangered tricolored bat (*Perimyotis subflavus*)[77] and candidate monarch butterfly (*Danaus plexippus*)[78] may occur within the project boundary or be affected by the project. No designated critical habitats are located within the project boundary.

Our analysis of project effects on NLEB and the tricolored bat is summarized here and presented in full in Appendix F, and our recommendations are included in section 5.1, *Comprehensive Development and Recommended Alternative* and Appendix H.

No tree removal is anticipated as part of normal project operation and maintenance. However, if tree removal were to become necessary during a subsequent license, restricting planned removal of trees three inches dbh or greater to the period between November 1 through April 14, would reduce the likelihood of disturbing NLEB and their newly born pups during the active season. Because the location of the proposed impoundment boating access area is undetermined and the duration of activity associated constructing and maintaining the access area, including when the access area will be created, is unknown, including, at a minimum, a provision to consult with the Vermont ANR and FWS on site selection before any construction activities occur in an impoundment boating access plan would help ensure that the effects of the proposed impoundment boating access area on NLEB and their habitats are minimized whenever and wherever the impoundment boating access area is constructed. We conclude that relicensing

[75] By letter filed on June 6, 2022, GMP indicated that the section 401 water quality certification was requested on June 3, 2022, and that Vermont DEC acknowledged receipt of this request on June 6, 2022.

[76] 88 Fed. Reg. 4908-4910 (January 26, 2023).

[77] 87 Fed. Reg. 56,381-56,393 (September 14, 2022).

[78] 85 Fed. Reg. 81,813 (December 17, 2020).

the project, as proposed with our recommended measures, is not likely to adversely affect the NLEB.

Seasonal limits on tree clearing for NLEB would also reduce the likelihood of disturbing tricolored bats during the concurrent pup-rearing season for these species. Additionally, including, at a minimum, a provision to consult with the Vermont ANR and FWS regarding site selection before any construction activities occur in an impoundment boating access plan would ensure that the effects of the proposed impoundment boating access area on tricolored bats and their habitats are minimized. With the implementation of the staff recommended measures for the NLEB discussed above, we conclude that relicensing the project would not jeopardize the continued existence of the tricolored bat.

**National Historic Preservation Act**

Section 106 of the National Historic Preservation Act (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 objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

Commission staff designated GMP as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA on October 26, 2018. GMP consulted with the Vermont SHPO 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 project's APE. Vermont SHPO stated that site VT-OR-0122 is eligible for the National Register and that there are adverse effects to the site due to erosion. The license application stated that there may be additional effects related to the development of a hand carry access location, which is no longer being proposed at the location. GMP proposes to develop a Historic Properties Management Plan (HPMP) for these reasons, and in a letter filed on February 2, 2022, the Vermont SHPO concurred with this proposal.

To meet the requirements of section 106 of the NHPA, we intend to execute a Programmatic Agreement (PA) with the Vermont SHPO for the protection of historic properties from the effects of construction, operation, and maintenance of the Newbury Project. The terms of the PA would ensure that GMP addresses and treats all historic properties identified within the project's APE through the finalization of a HPMP.

**Executive Orders 12898 and 14008**

In conducting NEPA reviews of proposed hydropower projects, the Commission follows the instruction of Executive Order 12898, which directs federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of their actions on minority and low-income populations (i.e., environmental justice communities).[79] Executive

[79] Exec. Order No. 12,898, 59 Fed. Reg. 7629 (Feb. 16, 1994). While the Commission is not one of the specified agencies in Executive Order 12898, the Commission nonetheless

Order 14008 also directs agencies to develop "programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts."[80]

Staff identified two environmental justice communities within a 1-mile radius of the project boundary and considered how the communities may be affected by noise, visual, and traffic impacts of the construction of a potential new recreation facility, concentration of recreational activity, and the effect of project operation and recreation on subsistence fishing. Our analysis of the project's impacts on the communities is presented in section 3.3.8, *Environmental Justice*. We conclude that relicensing the project, as proposed with staff's recommended modifications, would not result in disproportionately high and adverse impacts on the identified environmental justice communities.

addresses environmental justice in its analysis, in accordance with our governing regulations and guidance, and statutory duty to evaluate all factors bearing on the public interest.

[80] Exec. Order No. 14,008, 86 Fed. Reg. 7619 (Feb. 1, 2021). The term "environmental justice community" includes disadvantaged communities that have been historically marginalized and overburdened by pollution. *Id.* § 219, 86 Fed. Reg. 7619, 7629. The term also includes, but may not be limited to, minority populations, low-income populations, or indigenous peoples (EPA, 2022a).

## APPENDIX B: ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

### Issuing a Non-Power License

A non-power license is a temporary license that the Commission would terminate when it determines that another governmental agency will assume regulatory authority and supervision over the land and facilities covered by the non-power license. No agency has suggested a willingness or ability to do so. No party has sought a non-power license for the project, and we have no basis for concluding that the project should no longer be used to produce power.

### Federal Government Takeover

Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested a federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

### Project Retirement

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing a project in most cases.[81] Decommissioning can be accomplished in different ways depending on the project, its environment, and the particular resource needs.[82] For these reasons, the Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or a participant in a relicensing proceeding demonstrates that there are serious resource concerns that cannot be addressed with appropriate license measures and that make decommissioning a reasonable alternative.[83]

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[81] See, e.g., *Eagle Crest Energy Co.*, 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc.*, 111 FERC ¶ 61,327, at PP 35-38 (2005).

[82] In the unlikely event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission." 18 C.F.R. § 6.2 (2021). This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

[83] *See generally Project Decommissioning at Relicensing*; Policy Statement, FERC Stats. & Regs., Regulations Preambles (1991-1996), ¶ 31,011 (1994); *see also City of Tacoma, Wash.*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

GMP does not propose decommissioning, nor does the record to date demonstrate there are serious resource concerns that cannot be mitigated if the project is relicensed; therefore, there is no reason, at this time, to include decommissioning as a reasonable alternative to be evaluated and studied as part of staff's NEPA analysis.

## APPENDIX C: FIGURES

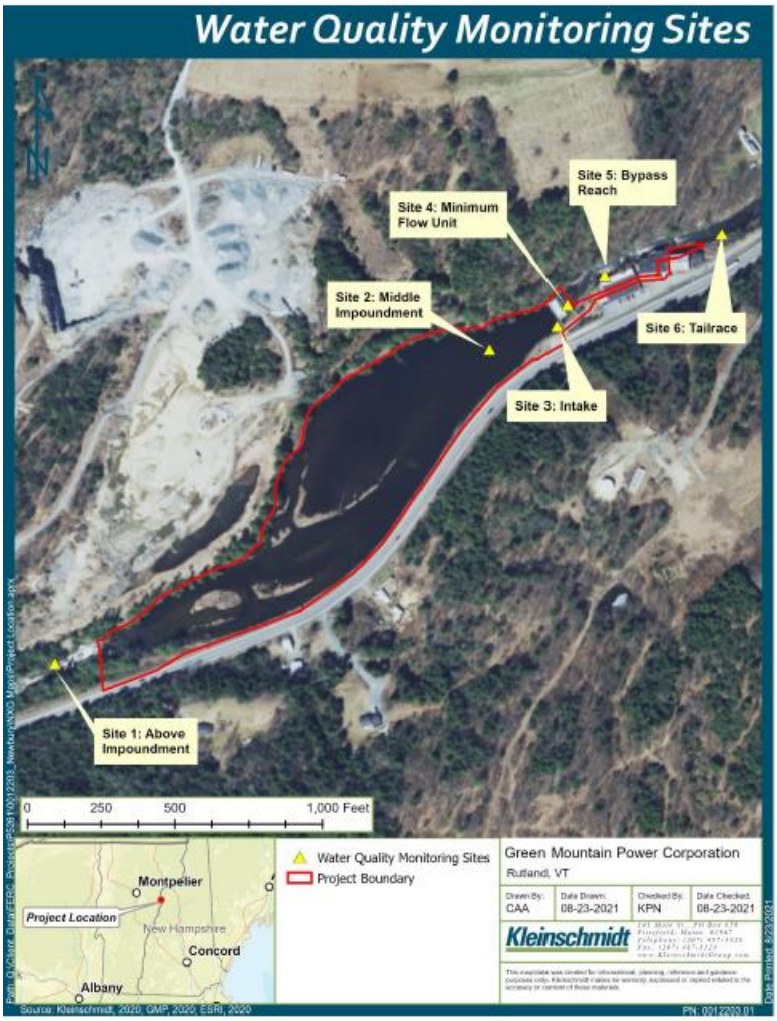


Figure C-1. Water quality monitoring locations (Source: GMP, 2021).

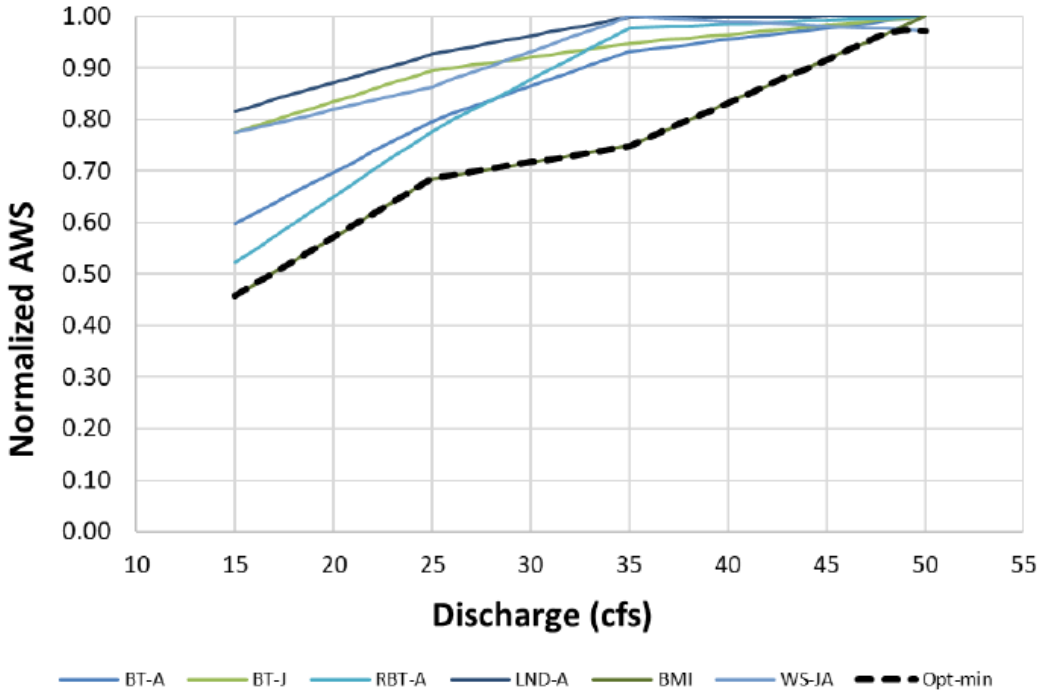


Figure C-2. Relationship between minimum flow (discharge) and habitat suitability (area weighted suitability, AWS) for select species and life stages in the project bypassed reach. Species include juvenile (BT-J) and adult (BT-A) brook trout, adult rainbow trout (RBT-A), juvenile (WS-J) and adult white sucker (WS-A), and benthic macroinvertebrates (BMI). The dashed line represents the most limiting available habitat across the measured flows, which is for BMI (Source: Vermont ANR letter filed June 6, 2022).


Figure C-3. Non-project recreation facility (Source: Staff).

Figure C-4. Proposed 10 cfs aesthetic flow release (Source: GMP, 2021, as modified by staff).

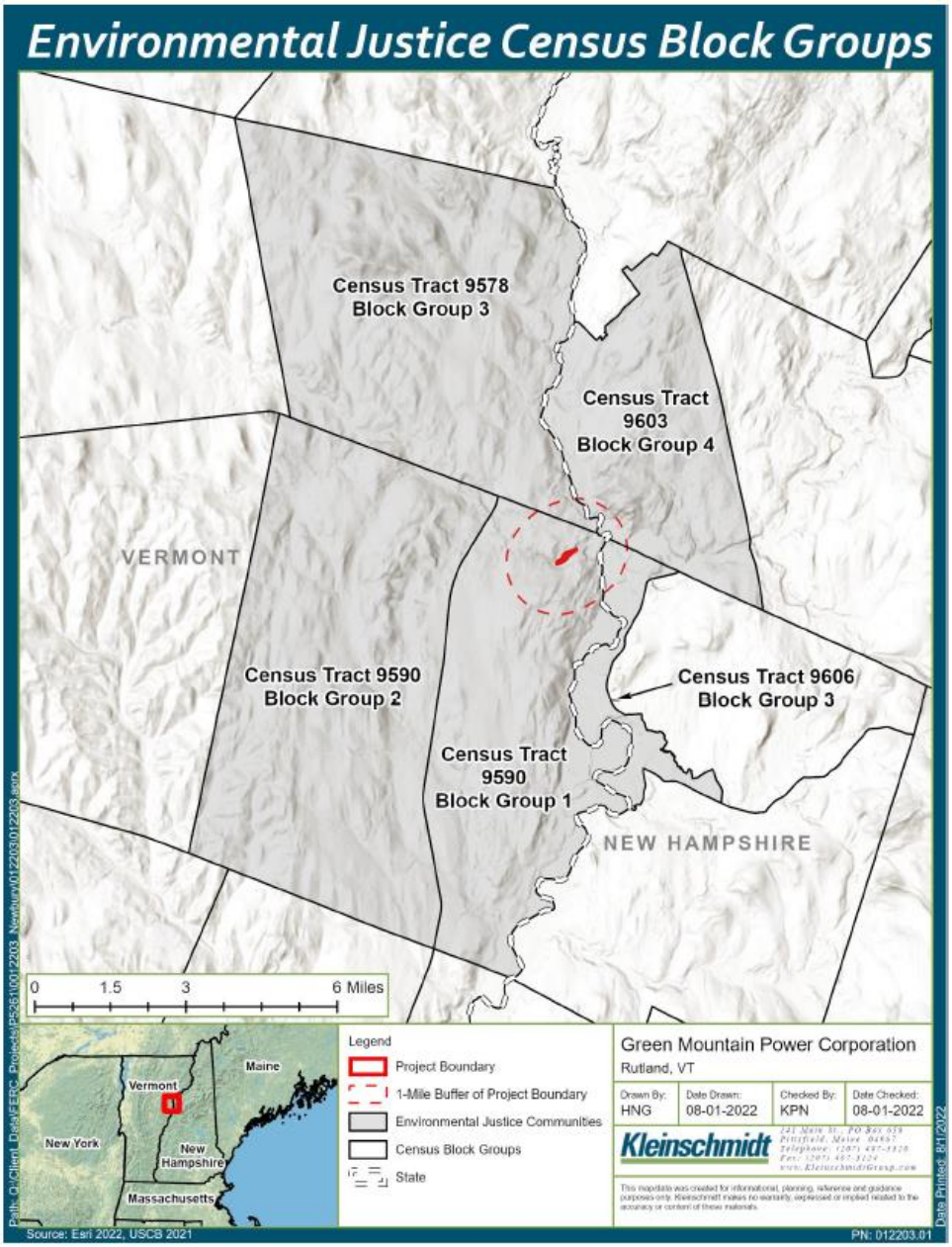


Figure C-5. Block Groups and Environmental Justice Communities within 1-mile of the project boundary (Source: GMP, 2022c).

# APPENDIX D: TABLES

Table D-1. Monthly flow data (cfs) from 1991-2020 at USGS gage number 01139000 Wells River at Wells River, Vermont (Source: GMP, 2021, as modified by staff).

| Month | Flow (cfs) | | | | |
|---|---|---|---|---|---|
| | Minimum | 90% exceedance | Mean | 10% exceedance | Maximum |
| January | 30 | 51 | 142 | 243 | 2,087 |
| February | 24 | 43 | 107 | 180 | 1,357 |
| March | 26 | 55 | 201 | 427 | 1,489 |
| April | 70 | 166 | 464 | 902 | 2,320 |
| May | 60 | 99 | 244 | 433 | 2,239 |
| June | 14 | 48 | 155 | 316 | 1,054 |
| July | 15 | 28 | 121 | 250 | 2,249 |
| August | 9 | 23 | 86 | 156 | 2,441 |
| September | 8 | 20 | 68 | 128 | 1,884 |
| October | 18 | 35 | 134 | 280 | 1,975 |
| November | 29 | 59 | 155 | 292 | 1,155 |
| December | 32 | 67 | 164 | 285 | 1,560 |

Table D-2. Water quality criteria for Class B(2) cold water fish habitat (Source: GMP, 2021).

| **Parameter** | **Criteria** |
|---|---|
| Water Temperature | Increase in temperature due to all discharges and activities less than 1°F |
| Turbidity | less than or equal to 10 nephelometric turbidity unit as an annual average under dry weather baseflow conditions |
| Dissolved Oxygen | greater than or equal to 6 mg/L and 70 % saturation<br>greater than or equal to 7 mg/L and 75% saturation at all times (instantaneous minimum) in designated salmonid spawning or nursery areas |
| pH | Not to exceed 8.5 standard units |
| NO3-N | less than or equal to 5.0 mg/L at flows exceeding low median monthly flows |
| Phosphorus | less than 12-27 µg/L parts per million at low median monthly flow depending on stream type |

Table D-3. Summary of water quality monitoring results collected from July through September 2019, in the Newbury Project area (Source: GMP, 2021, as modified by staff).

| | **Water Temperature (ºF)** | | | **DO (mg/L)** | | | **DO Percent Saturation (%)** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **July** | **August** | **Sept.** | **July** | **August** | **Sept.** | **July** | **August** | **Sept.** |
| **Site 1: Upstream of the Impoundment** | | | | | | | | | |
| Minimum | 65.1 | 61.3 | 53.4 | 7.5 | 7.7 | 8.7 | 94.0 | 93.1 | 94.2 |
| Maximum | 79.5 | 76.8 | 67.3 | 9.0 | 9.5 | 10.5 | 98.4 | 98.3 | 97.6 |
| **Mean** | **71.4** | **69.3** | **60.8** | **8.3** | **8.5** | **9.4** | **96.4** | **96.0** | **96.0** |
| **Site 2: Within the Impoundment** | | | | | | | | | |
| Minimum | 66.0 | 62.6 | 55.8 | 6.1 | 6.1 | 8.5 | 72.9 | 69.1 | 89.8 |
| Maximum | 78.4 | 75.7 | 66.9 | 9.3 | 10.3 | 11.2 | 106.8 | 113.1 | 110.2 |
| **Mean** | **71.4** | **69.3** | **61.2** | **8.3** | **8.7** | **9.7** | **96.0** | **98.8** | **99.5** |
| **Site 3: Intake** | | | | | | | | | |
| Minimum | 65.8 | 63.0 | 55.8 | 5.6 | 4.5 | 7.2 | 67.9 | 49.4 | 72.9 |
| Maximum | 78.1 | 75.0 | 68.4 | 10.8 | 10.7 | 11.5 | 125.5 | 121.6 | 121.6 |
| **Mean** | **71.2** | **69.3** | **61.3** | **8.3** | **8.5** | **9.4** | **95.7** | **96.3** | **97.2** |
| **Site 4: Minimum Flow Turbine** | | | | | | | | | |
| Minimum | 67.1 | 63.5 | 55.6 | 7.7 | 6.3 | 8.7 | 92.1 | 69.4 | 96.1 |
| Maximum | 78.4 | 76.5 | 67.6 | 9.4 | 9.9 | 10.4 | 106.6 | 107.2 | 104.3 |
| **Mean** | **72.1** | **70.0** | **61.5** | **8.6** | **8.7** | **9.7** | **100.2** | **99.0** | **100.2** |
| **Site 5: Bypassed Reach** | | | | | | | | | |
| Minimum | 67.1 | 63.7 | 55.6 | 7.5 | 7.8 | 8.1 | 90.1 | 85.9 | 88.9 |
| Maximum | 79.0 | 76.5 | 67.8 | 9.3 | 9.6 | 10.2 | 104.1 | 103.8 | 100.6 |
| **Mean** | **72.3** | **70.0** | **61.7** | **8.3** | **8.5** | **9.3** | **97.2** | **97.0** | **96.7** |
| **Site 6: Tailwater** | | | | | | | | | |
| Minimum | 67.1 | 63.7 | 55.6 | 6.7 | 5.7 | 8.8 | 80.9 | 63.2 | 95.4 |
| Maximum | 78.8 | 76.3 | 67.8 | 9.0 | 9.6 | 10.6 | 101.2 | 104.1 | 103.2 |
| **Mean** | **72.1** | **70.0** | **62.1** | **8.3** | **8.7** | **9.7** | **97.4** | **99.5** | **100.8** |

Table D-4. Percent change in habitat suitability across a range of flows released from the Newbury Project impoundment (Source: GMP, 2021).

| | Percent of Maximum Suitability | | | |
|---|---|---|---|---|
| **Species/Lifestage** | **15 cfs** | **25 cfs** | **35 cfs** | **50 cfs** |
| Brook trout (adult) | 60% | 80% | 93% | 100% |
| Brook trout (adult) | 78% | 89% | 95% | 100% |
| Rainbow trout (adult) | 52% | 78% | 98% | 100% |
| Longnose dace (adult) | 82% | 93% | 100% | 100% |
| Benthic macroinvertebrates | 46% | 69% | 75% | 100% |
| White Sucker (spawning) | 86% | 100% | 67% | 75% |
| White Sucker (juvenile and adult) | 77% | 86% | 100% | 97% |

Table D-5. Expected burst speeds of adult and juvenile resident fish species found upstream of the Newbury Project. (Source: Staff).

| **Species** | **Burst Speed (feet per second)** | | **Source** |
|---|---|---|---|
| | **Adult** | **Juvenile** | |
| Rainbow Trout | 2.4 to 11.5 | 3.6 to 5.8 | Domenici and Blake, 1997; Froese and Pauley, 2010 |
| Brown Trout | 7.0 to 12.7 | 2.7 to 7.1 | Bell, 1991 |
| Brook Trout[a] | 7.0 to 12.7 | 1.8 to 3.5 | Bell, 1991 |
| Longnose Dace | 3.8 to 4.4 | 1.9 to 3.4 | Aedo et al., 2009 |
| White Sucker | 5.2 to 10.2 | 1.4 to 2.2 | MTO, 2006; Bell, 1991 |
| Smallmouth Bass | 3.5 to 5.6 | 1.5 to 2.1 | Peake, 2004; Bell, 1991 |
| Pumpkinseed[b] | 4.3 | 1.8 | Webb, 1998; Beamish, 1978 |

[a] Brown trout used as a surrogate
[b] Bluegill used as a surrogate

Table D-6. Plant species on Vermont's noxious plant list that may occur in the project area (Source: GMP, 2021, as modified by staff).

| **Species** | |
|---|---|
| Goutweed (*Aegopodium podagraria)* | Bell Honeysuckle *(Lonicera x bella)* |
| Tree-of-Heaven (*Ailanthus altissima*) | Purple Loosestrife *(Lythrum salicaria)* |
| Garlic Mustard (*Alliaria petiolata*) | Parrot Feather* *(Myriophyllum aquaticum)* |
| Flowering Rush *(Butomus umbellatus)* | Variable-leaved milfoil* *(Myriophyllum heterophyllum)* |
| Fanwort* *(Cabomba caroliniana)* | Eurasian Watermilfoil *(Myriophyllum spicatum)* |
| Oriental Bittersweet (*Celastrus orbiculatus)* | Yellow Floating Heart *(Nymphoides peltata)* |
| Brazalian Elodea* *(Egeria densa)* | Common Reed *(Phragmites australis)* |
| Japanese Knotweed *(Fallopia japonica)* | Curly Leaf Pondweed *(Potamogeton crispus)* |
| Hydrilla* *(Hydrilla verticillata)* | Common Buckthorn (*Rhamnus cathartica)* |
| Frogbit *(Hydrocharis morsus-ranae)* | Glossy Buckthorn *(Rhamnus frangula)* |
| East Indian Hygrophila* *(Hygrophila polysperma)* | Giant Salvinia* *(Salvinia auriculata)* |
| *Japanese Honeysuckle (Lonicera japonica)* | Water Chestnut *(Trapa natans)* |
| Amur Honeysuckle *(Lonicera maackii)* | Swallow-wort* *(Vincetoxicum hirundinaria)* |
| Morrow Honeysuckle *(Lonicera morrowii)* | Black Swallow-wort *(Vincetoxicum nigrum)* |
| Tartarian Honeysuckle *(Lonicera tatarica)* | |

* Species not currently known to exist in Vermont.

Table D-7. Minority and low-income populations within one mile of the project boundary (Source: Census, 2021, as modified by staff). Note: Gray shading indicates an environmental justice community.

| Race and Ethnicity | | | | | | | | | | | Low-Income |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Geographic Area** | **Total Population** | **White (%)[a]** | **Black or African American (%)[a]** | **American Indian & Alaska Native (%)[a]** | **Asian(%)[a]** | **Native Hawaiian & Other Pacific Islander(%)[a]** | **Some Other Race(%)[a]** | **Two or More Races(%)[a]** | **Hispanic or Latino (any race) (%)[a]** | **Total Minority Population (%)[a]** | **Household in Poverty (%)[b]** |
| **Vermont** | **641,637** | 91.9 | 1.2 | 0.2 | 1.7 | >0.1 | 0.2 | 2.8 | 2.1 | 8.1 | 10.6 |
| **Caledonia County*** | 30,402 | 93.8 | 0.7 | 0.1 | 0.4 | 0.0 | 0.5 | 2.7 | 1.9 | 6.2 | 12.9 |
| Census Tract 9578, Block Group 3 | 1,068 | 94.3 | 0.0 | 0.3 | 0.7 | 0.0 | 0.0 | 1.0 | 3.7 | 5.7 | 8.2 |
| **Orange County*** | 29,286 | 94.6 | 0.3 | 0.2 | 0.3 | >0.1 | 0.4 | 2.6 | 1.4 | 5.4 | 8.9 |
| Census Tract 9590, Block Group 1 | 1,298 | 88.8 | 0.8 | 0.0 | 0.3 | 0.5 | 4.1 | 2.9 | 2.7 | 11.2** | 11.0 |
| **New Hampshire** | **1,372,175** | 88.9 | 1.4 | 0.1 | 2.7 | >0.1 | 0.2 | 2.6 | 4.1 | 11.1 | 7.8 |
| **Grafton County*** | 91,025 | 89.4 | 1.2 | 0.2 | 3.5 | >0.1 | 0.2 | 2.8 | 2.6 | 10.6 | 10.3 |
| Census Tract 9603, Block Group 4 | 297 | 99.3 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.7 | 12.4 |
| Census Tract 9606, Block Group 3 | 2,046 | 91.1 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 5.7 | 8.9 | 8.7 |

* Reference community

** This percent exceeds the meaningfully greater threshold of 5.94%

[a] Percent of Total Population (Table B03002 – Hispanic or Latino Origin by Race. 2021 ACS 5-Year Estimates Detailed Tables. U.S. Census Bureau, 2017-2021 American Community Survey 5-Year Estimates: https://data.census.gov/cedsci/table?g =ACS%205-Year%20Estimates%20Detailed%20Tables&tid=ACSDT5Y2019.B03002). Accessed July 14, 2023.

[b] Percent of Households (Table B17017 – Poverty Status in the Past 12 Months by Household Type and Age of Householder. 2021 ACS 5-Year Estimates Detailed Tables. U.S. Census Bureau, 2017-2021 American Community Survey 5-Year Estimates: https://data.census.gov/cedsci/table?t=Income%20and%20Poverty&g=ACS%205-Year%20Estimates%20Detailed%20Tables&tid=ACSDT5Y2019.B17017). Accessed July 14, 2023.

Gray shading denotes an environmental justice community.

## APPENDIX E: WATER QUALITY CERTIFICATION CONDITIONS

## WATER QUALITY CONDITIONS FOR THE NEWBURY RIVER HYDROELECTRIC PROJECT NO. 5261 ISSUED BY THE VERMONT AGENCY OF NATURAL RESOURCES, MAY 11, 2023

### Decision and Certification

The Department has examined the Project application and other pertinent information deemed relevant by the Department in order to issue a decision on this certification application pursuant to the Department's responsibilities under Section 401 of the federal Clean Water Act and 10 V.S.A. § 1253(h). After examination of these materials, the Department certifies that there is reasonable assurance that operation of the Project in accordance with the following conditions will not violate Standards; will not have a significant impact on use of the affected waters by aquatic biota, fish or wildlife, including their growth, reproduction, and habitat; will not impair the viability of the existing populations; will not result in a significant degradation of any use of the waters for recreation, fishing, water supply or commercial enterprises that depend directly on the existing level of water quality; and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, 33 U.S.C. section 1341, and other appropriate requirements of state law:

A. **Compliance with Conditions.** The Applicant shall operate and maintain this Project consistent with the findings and conditions of this certification. The Applicant shall not make any changes to the Project or its operations that would have a significant or material effect on the findings, conclusions or conditions of this Certification without approval of the Department.

   *See finding 114 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-101*.

B. **Flow Management.** The Project shall be operated in instantaneous run-of-river mode. Instantaneous run-of-river operation means no utilization of impoundment storage and that outflow from the facility is equal to inflow to the impoundment on an instantaneous basis except for short term, unavoidable deviations.

   The Applicant shall provide 37 cfs, or inflow if less, into the bypassed reach year-round. This flow shall not be interrupted. When generating, the Project shall spill 10 cfs continuously year-round in the bypass reach unless otherwise indicated in the flow management and monitoring plan (condition C). When the Project is not operating, all flow shall be spilled at the dam.

   *See findings 42, 43, 77, 106, 107, 129-133, and 147-151 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-304 & § 29A-306 (b)(3)(B) & § 306 (c)(3)(B)(i).*

C. **Flow Management and Monitoring Plan**. The Applicant shall develop within 180 days of the effective date of the FERC license, a flow management and monitoring plan detailing how the Project will operate in instantaneous run-of-river mode and manage flow seasonally to comply with the conservation flow requirements. The plan will also include a method for continuous monitoring and reporting (to allow records to be furnished upon request) of flow releases at the Project (conservation flow, spillage, and turbine discharge), impoundment levels and inflows. The plan shall include provisions for the flow data to be available on a near real-time basis.

The plan will include procedures for reporting deviations from prescribed operating conditions to the Department. Reports shall be made within 15 days after a deviation and will include, if possible, the causes, severity and duration of the deviation, observed or reported adverse environmental impacts from the incident, pertinent data, and measures to be taken to avoid recurrences.

The plan shall be subject to Department approval. The department reserves the right to review and approve any material changes made to the plan.

*See findings 42, 43, 77-80, 105-107, 129-134, and 147-151 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-304 & § 29A-306(b).*

D. **Fish Passage**. The Applicant shall install and maintain the downstream fish passage facility from April 1st- June 1st and from September 1st – November 15th and maintaining additional measures (finding 127). Prior to replacement of the fish passage chute, the Applicant shall consult with the Fish and Wildlife Department and US Fish and Wildlife Service with respect to the design, to determine the appropriate design meets requirements for safe, timely, and effective fish passage. The Applicant shall file the design information with the Department of Environmental Conservation for approval prior to commencement of work.

*See findings 44, 59-69, and 120- 128 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-306(a-b).*

E. **American Eel Passage.** Within one year of American eel Passage being installed at the Wilder Hydroelectric Project on the mainstem of the Connecticut River, the Applicant shall initiate plans to develop passage. Before developing the plan, the Applicant will consult with the Vermont Agency of Natural Resources and the US Fish and Wildlife Service. The results of the plan will be reviewed and approved by the Vermont Agency of Natural Resources and the US Fish and Wildlife Service. In addition to the method of passage, the Applicant shall include an implementation schedule which can include monitoring studies. The plan can include but is not limited to, a trap and truck program or eel ramp installation, or other appropriate measures.

*See findings 59-69, and 120- 128 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-306(a).*

F. **Recreation.** The Applicant shall develop and finalize designs for a hand carry access area located upstream of the Newbury Hydroelectric dam (pending private landowner approval and consultation surrounding cultural resources). The designs shall be done in consultation with appropriate stakeholders. The Applicant shall construct recreation access improvements within 4 years of the effective date of the FERC license (pending landowner and permit approvals).

*See findings 47, 100, 101, and 141- 145 for a statement of necessity10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A- 103(b)(1)(G).*

G. **Debris Disposal.** Debris associated with Project operations shall be disposed of in accordance with the Standards and applicable state laws and regulations.

*See findings 10, 102, 103, and 146 for a statement of necessity. 10 V.S.A. § 1258 & Vt. Code R. 12 030 026 § 29A-303(1).*

H. **Maintenance and Repair Work**. For any Project maintenance or repair work, including drawdowns below the normal operating level to facilitate repair/maintenance work, plans shall be filed with the Department for prior review and approval, if said work may result in a discharge, have a material adverse effect on water quality, or cause less-than-full support of an existing use or a beneficial values or use of State waters.

*See findings 62, 77, 95, 113, 122, and 139 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-103(a), § 29A-306(b) and § 29A-304(b).*

I. **Threatened and Endangered Species**. For activities requiring the clearing of trees 3-inches diameter breast height or greater, GMP shall abide by seasonal tree clearing restrictions and only clear trees between November 1st- April 14th to avoid any roost disruption of the Northern long-eared bat. Should tree clearing be required during the restricted time period (April 15th- October 31st), GMP will consult with the USFWS and VTFWD regarding removal.

*See findings 46, 91-93, and 137-139 for a statement of necessity. 10 V.S.A. § 5403.*

J. **Compliance Inspection by Department**. The Applicant shall allow the Department to inspect the Project area at any time to monitor compliance with certification conditions.

*See finding 114 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-104(a).*

K. **Posting of Certification**. A copy of the certification shall be prominently posed within the Project powerhouse.

*See finding 114 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-104(a).*

L. **Modification of Certification**. The Department may request, at any time, that FERC reopen the license to consider modifications to the license as necessary to assure compliance with Vermont Water Quality Standards.

*See finding 114 for a statement of necessity. 10 V.S.A § 1258 & Vt. Code R. 12 0330 026 § 29A-104(a).*

# APPENDIX F: BIOLOGICAL ASSESSMENT

## Affected Environment

### Northern Long-Eared Bat

The NLEB is a medium-sized nocturnal bat ranging from 3 to 3.6 inches in length with light to dark brown fur (Wisconsin DNR, 2013). The NLEB's historical range includes 37 states, encompassing most of the central and eastern United States. The NLEB typically feeds on moths, flies, and other insects in the understory of forested areas. These bats are flexible in selecting roost sites, choosing roost trees that provide cavities and crevices, and trees three inches or greater in diameter at breast height (dbh) (FWS, 2014). Human-made structures, such as buildings, barns, bridges, and bat houses can be considered potential summer habitat. However, trees found in highly developed urban areas are unlikely to be suitable NLEB habitat (FWS, 2014). In Vermont, NLEB are generally active from April 15 through October, and hibernate over the winter season (FWS, 2016; FWS, 2023). Winter hibernation typically occurs in caves and areas around them and can be used for fall-swarming[84] and spring-staging.[85]

There has been a 99% reduction of NLEB populations in recent years as a result of white-nose syndrome[86] in the Northeast United States. White-nose syndrome is expected to spread throughout the rest of United States in the foreseeable future. Other threats to NLEB include: (1) changes to hibernacula openings that restrict movement or change the microclimate; (2) blasting, drilling, and other noises that disturb bats during hibernation; (3) clearing trees that are used for staging or swarming habitat or as maternity roosts; (4) burning that allows smoke to pass through roost trees (spring through fall) or enter hibernacula during the winter; (5) changes to water resources entering hibernacula or used for drinking or foraging habitat; and (6) exposure to pesticides and herbicides.

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

[85] 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).

[86] 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.

There are no known occupied NLEB hibernacula within 0.25 mile of the project boundary, and there are no known maternity roost trees within 150 feet of the project boundary. On April 27, 2016, FWS found that designating critical habitat for NLEB was not prudent.[87]

**Tricolored Bat**

The tricolored bat is a small bat, rarely reaching 3.5 inches in length, with tricolored fur (dark gray at the base, yellowish brown in the middle, and dark brown at the tip) that usually appears yellowish in color overall but ranges from silvery-gray to black (Missouri Department of Conservation, 2023). It typically forages on small insects including moths, flies, leafhoppers, and beetles in areas over waterways along the forest edge (Missouri Department of Conservation, 2023). The range of tricolored bats includes southeastern Canada, most of Central America, and all, or portions of, 39 states and the District of Columbia, including all of Vermont.

Tricolored bats are active from spring to fall, using a combination of summer and winter habitats from mid-March to mid-April and August through October, respectively, and summer habitats from mid-April through July (FWS, 2021b). The pup-rearing season for tricolored bat occurs from May through July, with pups achieving adult-like flight and foraging ability four weeks after birth. During the summer, tricolored bats primarily roost among live and dead leaf clusters of live or recently dead deciduous hardwood trees, but they have also been observed within artificial roosts (*e.g.*, in barns and under roofs and bridges) and rarely in caves. During the winter, tricolored bats typically hibernate in caves and mines, exhibiting high interannual fidelity to their hibernacula (FWS, 2021b).

Similar to the NLEB, white-nose syndrome is the primary threat to the tricolored bat.[88] Forest removal or conversion and the disturbance or destruction of caves can result in the loss of suitable summer roosting and foraging habitat, as well as winter hibernacula.[89] The loss or disturbance of habitat may compound the effects of white-nose syndrome.

On September 14, 2022, FWS found that designating critical habitat for tricolored bat was not prudent.[90]

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[87] 81 Fed. Reg. 24,707-24,714 (April 27, 2016).

[88] See n. 86 supra.

[89] See n. 77 supra.

[90] *Id*.

## Environmental Effects

### Northern Long-Eared Bat and Tricolored Bat

The continued operation and maintenance of the Newbury Project, and the construction, maintenance, and use of the proposed impoundment boating access area, could affect NLEB and tricolored bats if they are present within the project area.

GMP proposes to abide by seasonal tree clearing restrictions and only clear trees greater than or equal to four inches diameter at breast height (dbh)[91] between November 1 and April 14 for the protection of NLEB. Should tree clearing be required during the time period between April 15 and October 31, GMP proposes to consult with the FWS and Vermont FWD regarding removal needs. No mitigation measures are proposed specifically for the protection of tricolored bats.

Vermont ANR's certification condition I requires GMP to restrict the removal of trees three inches dbh or greater to the period between November 1 through April 14 to avoid any disruption to roosting NLEB. Should tree clearing be required during the prohibited season, the certification also requires that GMP consult with the FWS and Vermont ANR regarding removal.

*Our Analysis*

Northern Long-eared Bat

GMP proposes no changes to project operations or maintenance other than providing a continuous, year-round, minimum flow to the bypassed reach instead of seasonal minimum flows. As discussed above, there are no known occupied NLEB hibernacula within 0.25 mile of the project boundary, and there are no known maternity roost trees within 150 feet of the project boundary. However, the limited upland forest in the project vicinity may provide suitable summer roosting habitat for NLEB and the project impoundment and riparian areas may be used for foraging and travel.

No tree removal is anticipated as part of normal project operation and maintenance. However, in the event that tree removal becomes necessary during a subsequent license, GMP's proposal to restrict the clearing of trees greater than or equal to four inches dbh to the inactive season between November 1 and April 14 would help prevent incidental take of NLEB. However, additional tree cutting size restrictions (greater than or equal to three inches dbh), as required by the certification, would better protect summer swarming, foraging, and travel habitat for NLEB in the project area during the active season.

Construction of the proposed impoundment boating access area is likely to involve some tree removal. Because the proposed impoundment boating access area is still in the conceptual stage, the location of the proposed impoundment boating access area is undetermined and the

[91] GMP's proposal references four inches diameter at base height. Staff understands the intended reference to be four inches dbh.

duration of activity associated constructing and maintaining the access area, including when the access area will be created, is unknown. Therefore, the presence of NLEB within the proposed impoundment boating access area and the effects of the proposed impoundment boating access area on NLEB and their habitat (i.e., the number and size of trees trimmed/removed and the magnitude of vegetative disturbance, if any) are unknown. Including, at a minimum, a provision to consult on site selection with the Vermont ANR and FWS before any construction activities occur in an impoundment boating access plan would help ensure that the effects of the proposed impoundment boating access area on NLEB and their habitats are minimized whenever and wherever the impoundment boating access area is constructed.

With the mitigation measures discussed above, we conclude that relicensing the project is not likely to adversely affect the NLEB.[92]

Tricolored bat

As with NLEB, the removal of woody vegetation, and construction of the proposed impoundment boating access area could affect potential summer roosting and foraging habitat of the tricolored bat. As noted above, restricting the planned removal of trees three inches dbh or greater to the period of November 1 through April 14 would protect NLEB, and would also reduce the likelihood of disturbing tricolored bats during the concurrent pup-rearing season for these species. Further, including, at a minimum, a provision to consult on site selection with the Vermont ANR and FWS before any construction activities occur in an impoundment boating access plan would help ensure that the effects of the proposed impoundment boating access area on tricolored bats and their habitats are minimized whenever and wherever the impoundment boating access area is constructed.

With these mitigation measures, we conclude that relicensing the project would not jeopardize the continued existence of the tricolored bat.

[92] A concurrence letter for the NLEB effects determination was generated using FWS' IPaC system on September 15, 2023, and filed to the record on September 18, 2023.

## APPENDIX G: COST OF ENVIRONMENTAL MEASURES

**Table G-1.** Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of the Newbury Project (Source: GMP, 2021; GMP, 2022a, GMP, 2023; and staff).

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| **General** | | | | |
| Continue operating the project in run-of-river mode, where outflow from the project approximates inflow. | GMP, Staff | $0 | $0 | $0 |
| Operate the project in an instantaneous run-of-river mode where outflow from the project equals inflow except for short term deviations such as during impoundment re-filling following planned or unplanned maintenance activities.[a] | Vermont ANR | Unknown[b] | Unknown[b] | Unknown |
| **Aquatic Resources** | | | | |
| Release a continuous minimum flow of 37 cfs year-round into the bypassed reach, rather than the current minimum flow of 50 cfs from April 15 to June 10 and 25 cfs the remainder of the year.[a] | GMP, Vermont ANR, Staff | $0 | $0[c] | $0 |
| Develop an operation compliance monitoring plan in consultation with Vermont DEC. | GMP | $12,000[f] | $500[f] | $1,366 |

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| Develop an operation compliance monitoring plan detailing how the project would operate in instantaneous run-of-river mode where outflow equals inflow while maintaining a 37 cfs minimum flow and 10-cfs aesthetic flow and include a method for continuous (near real-time) monitoring and reporting of impoundment levels, inflows, spill flows into the bypassed reach, and turbine discharges.[a] | Vermont ANR | $30,000[g] | $20,900[g] | $23,065 |
| Develop an operation compliance monitoring plan. | Staff | $12,000[f] | $500[f] | $1,366 |
| Consult with the resource agencies prior to conducting maintenance and repair work to minimize effects on water quality. | GMP, Staff | $0 | $0 | $0 |
| Consult with Vermont ANR regarding the timing and duration of periodic maintenance drawdowns of the impoundment and maintain | GMP, Staff | $0 | $0 | $0 |

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| minimum flow requirements to the bypassed reach during any maintenance drawdowns. | | | | |
| File plans with Vermont DEC for review and approval of any project maintenance or repair work, including drawdowns below the normal operating level, if the work may result in a discharge, have a material adverse effect on water quality, or cause less-than-full support of an existing use or beneficial values or use of State waters.[a] | Vermont ANR | $0 | $500[l] | $500 |
| Develop a plan, within one year of American eel passage being installed at the Wilder Project, to provide upstream and downstream American eel passage at the Newbury Project.[a] | Vermont ANR, Staff | $5,000[l] | $0 | $361 |
| Continue providing seasonal downstream fish passage but provide 10 cfs through the fish passage chute from April 1 to June 1 and September 1 to November 15, rather than 20 cfs during the same time periods. | GMP | $3,000[d] | $5,600[c e] | $5,817 |

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| Implement the following fish passage measures: (1) install and operate the downstream fish passage chute with a flow of 25 cfs from April 1 to June 1 and from September 1 to November 15; (2) continue using the 1-inch trash rack angled toward the downstream fish passage chute; (3) maintain the existing 6-foot-deep baffle curtain deployed in front of the existing intake structure; and (4) consult with the Vermont ANR on design and placement of the downstream fish passage chute should GMP seek to replace or modify the chute during the term of any subsequent license and file the proposed downstream fish passage design information with the Vermont ANR for approval prior to commencement of any work.[a] | Vermont ANR | $5,000[h] | $5,600[c e] | $5,961 |
| Dispose of project-related debris in accordance with state laws and regulations[a] | Vermont ANR | Unknown[i] | Unknown[i] | Unknown |
| Develop a debris disposal plan in consultation with Vermont ANR | Staff | $5,000[l] | $0 | $361 |

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| **Terrestrial Resources** | | | | |
| Restrict the removal of trees greater than or equal to 4 inches dbh to the period of November 1 through April 14 for protection of rare, threatened, and endangered terrestrial species. | GMP | $0 | $0 | $0 |
| Restrict the removal of trees greater than or equal to 3 inches dbh to the period between November 1 and April 14 for the protection of northern long-eared bats (NLEB).[a] | Vermont ANR, Staff | $0 | $0 | $0 |
| **Recreation and Land Use** | | | | |
| Construct an impoundment boating access area at a location to be determined after any subsequent license is issued.[a] | GMP, Vermont ANR, Staff | $20,000[j] | $500[j] | $1,944 |
| Develop an impoundment boating access plan for the construction and maintenance of the impoundment boating access area. | Staff | $5,000[l] | $1,000[l] | $1,361 |
| **Aesthetic Resources** | | | | |
| Increase the aesthetic flow over the dam from 5 cfs year-round to 10 cfs year-round.[a] | GMP, Vermont ANR, Staff | $0 | $0 | $0 |

| Enhancement/Mitigation Measures | Entity | Capital cost ($) (2022) | Annual Cost ($/year) (2022) | Levelized Annual Cost ($/year) (2022) |
|---|---|---|---|---|
| **Cultural Resources** | | | | |
| Develop a historic properties management plan in consultation with the Vermont SHPO to protect historic properties that are eligible or listed on the National Register. | GMP, Staff | $10,000[k] | $500[k] | $1,222 |

* All costs are in December 2022 dollars to be consistent with the value of energy which is also in December 2022 dollars. We convert all costs to equal annual (levelized) costs over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

[a] Water quality certification condition under section 401(a)(1) of the Clean Water Act (CWA), 33 U.S.C. § 1341(a)(1).

[b] Costs related to any required new or upgraded equipment needed for compliance with this measure cannot be accurately estimated.

[c] In a letter filed on April 28, 2023, GMP indicated that proposed changes to minimum flows, fish passage flows, and aesthetic flows would result in a generation loss of 34.5 megawatt hours per year compared to existing operations.

[d] In a letter filed on April 28, 2023, GMP stated that releasing 10 cfs through the fish passage chute would require fabricating a new weir at a capital cost of $3,000.

[e] In a letter filed on April 28, 2023, GMP stated that a crane is used at a cost of $1,400 per event each time the fish passage chute is installed and removed. At two installations and two removals per year, the annual cost of installing and removing the fish passage chute is $5,600.

[f] In a letter filed on February 2, 2022, GMP stated that the capital cost to develop an operation compliance monitoring plan would be $12,000 and the annual cost would be $500. Staff estimate the same costs for an operation compliance monitoring plan.

[g] Staff estimate $30,000 in year one for installing one new gage capable of real-time flow monitoring and reporting data at 15-minute increments, $400 annually to maintain data on the internet in real-time, $20,000 to maintain the new gage annually, and $500 to maintain the existing monitoring equipment annually.

[h] Staff estimate a capital cost of $3,000 to fabricate a new weir to provide 25 cfs through the fish passage chute (See footnote f) and an additional $2,000 to verify that the flows passing through the fish passage chute provide 25 cfs.

[i] Costs are unknown because they would depend on the quantity and method of disposal.

[j] In a letter filed on February 2, 2022, GMP stated that the capital cost of the impoundment boating access area would be $20,000 and the annual cost would be $500.

[k] In a letter filed on February 2, 2022, GMP stated that the capital cost to develop a historic properties management plan would be $10,000 and the annual cost would be $500.

[l] Staff estimated cost.

# APPENDIX H: COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

This appendix discusses the basis for the staff-recommended measures presented in section 5.1.2, *Additional Measures Recommended by Staff,* and the rationale for modifying GMP's proposal.

## Additional Measures Recommended by Staff

### Operation Compliance Monitoring

GMP proposes to continue operating the project in a run-of-river mode and provide a year-round, 10-cfs aesthetic flow over the spillway and a year-round 37-cfs minimum flow into the bypassed reach. To ensure compliance with the operational requirements of any subsequent license, GMP proposes to develop an operation compliance monitoring plan for the project in consultation with the Vermont ANR within 6 months of license issuance. The plan would detail how the Newbury Project would manage seasonal flow and operate in run-of-river mode while complying with minimum flow and aesthetic flow requirements.

Vermont ANR's certification condition C requires that GMP include as part of an operation compliance monitoring plan plan: (1) a method for continuous monitoring and reporting of flow releases at the project (including spill flows, turbine discharge, impoundment levels, and inflows); (2) provisions for flow data to "be available on a near real-time basis"; and (3) procedures for reporting deviations from operating requirements to Vermont DEC within 15 days of a deviation.

Our analysis in section 3.2.2.2, *Aquatic Resources, Environmental Effects* indicates that GMP's existing SCADA system, with impoundment elevation, tailrace elevation, and turbine output monitoring, would be sufficient to monitor compliance with its proposed run-of-river operation, aesthetic flow, and minimum flow requirements. While Vermont ANR's requirement to monitor inflows, outflows, and spill over the dam could be used to monitor compliance with run-of-river operation, minimum flow, and aesthetic flow releases, GMP would likely need to install and operate at least one new flow gage in the bypassed reach capable of continuously monitoring stream levels. In addition, Vermont ANR's requirement to make flow data available on a "near real-time basis" would require GMP to provide the data via the internet. We estimate that installing and maintaining one new gage for monitoring bypassed reach flows and making all flow data available via the internet would add $22,565 in levelized annual costs compared to continuing to monitor impoundment levels using GMP's automated system as it does currently, at a levelized annual cost of $500. Because monitoring impoundment levels via GMP's existing automated monitoring and control system would achieve the same compliance objectives at a lower cost, we conclude the benefits of the real-time flow monitoring would not be worth the higher costs.

However, to enable the Commission to track compliance with the operating requirements of any license issued for the project, we recommend that GMP develop an operation compliance monitoring plan that includes a detailed description of how the licensee would monitor compliance with the operational requirements of the license (i.e., run-of-river operation,

impoundment levels, minimum flow, aesthetic flow, timing of planned maintenance, etc.), maintain a log of project operation, and report deviations from operating requirements to the Commission and Vermont ANR. We estimate that the annual levelized cost of developing an operation and compliance monitoring plan with the above provisions would be $1,366, and conclude that the compliance benefits outweigh the cost.

**Debris Disposal Plan**

GMP states that trash racks are cleaned using a mechanical raker a minimum of once per week during good weather conditions and as many as two times per day during adverse weather or high flow events but does not indicate how or where it disposes debris collected at the project. Vermont ANR states in the water quality certification that depositing debris and other solids to state waters would violate Vermont's solid waste laws and standards and that debris that is not properly disposed of may also impair aesthetics and boating at the project. Therefore, certification condition G requires that "debris associated with Project operations shall be disposed of in accordance with state laws and regulations."

Although there is no evidence of accumulating debris at the project (e.g., presence of debris piles or other solids), our analysis in section 3.2.2.2, *Environmental Effects, Debris Management* indicates that periodic disposal would prevent accumulation of unsightly debris and keep that debris from entering the river where it could degrade water quality. Developing a debris disposal plan, after consultation with Vermont ANR, would avoid misunderstandings and guide how and when GMP is to remove and dispose of debris. We estimate that the annual levelized cost of developing a debris disposal plan would be $361, and conclude that the operational and resource benefits would be worth the cost.

**Northern Long-eared Bat Protection Measures**

GMP proposes to abide by seasonal tree clearing restrictions and only clear trees greater than or equal to four inches diameter at breast height (dbh) between November 1 and April 14 for the protection of northern long-eared bat (NLEB). Should tree clearing be required during the time period between April 15 and October 31, GMP proposes to consult with the FWS and Vermont FWD regarding removal needs.

Vermont ANR's certification condition I requires GMP to restrict the removal of trees three inches dbh or greater to the period between November 1 through April 14 to avoid any disruption to roosting NLEB. Should tree clearing be required during the prohibited season, the certification also requires that GMP consult with the FWS and Vermont ANR regarding tree removal.

As discussed in Appendix E, *Biological Assessment*, the limited upland forest in the project vicinity may provide suitable summer roosting habitat for NLEB and the project impoundment and riparian areas may be used for foraging and travel. While no tree removal is anticipated as part of normal project operation and maintenance, some tree removal might become necessary during the term of a subsequent license issued for the project. Restricting the planned removal of trees greater than or equal to three inches diameter at breast height to the period between November 1 through April 14 would help protect NLEB summer swarming,

foraging, and travel habitat during the active season. Additionally, because development of the proposed impoundment boating access area is still in the conceptual stage, including, at a minimum, a provision to consult on site selection with the Vermont ANR and FWS before any construction activities occur, in an impoundment boating access plan, would help ensure that the effects of the proposed impoundment boating access area on NLEB and their habitats are minimized whenever and wherever the impoundment boating access area is constructed. Staff recommends the above discussed measures required by certification condition I, because they would ensure that NLEB is protected from project-related activities, at no additional cost to GMP.

**Recreation Access**

Vermont ANR's certification condition F requires that the location of the proposed impoundment boating access area be located upstream of the dam pending private landowner approval and cultural resource consultation, and that the access area be constructed within four years of the effective date an issued license.

GMP proposes and American Whitewater recommends constructing an impoundment boating access area for recreational boaters upstream of the project dam at a location to be determined after any subsequent license is issued.

As discussed in section 3.3.5, *Recreation and Land Use,* developing an impoundment boating access plan would provide public recreational boating access at the project reservoir and provisions for operating and maintaining the facility at the project over the term of a subsequent license. Boating access is needed at the project impoundment because there are no reasonable hand-carry take-outs for the 1.1-mile Lower Wells River whitewater run, located immediately upstream of the impoundment. Incorporating BMPs that include erosion and sedimentation controls, such as installing silt fencing along the banks of the river, and revegetating areas disturbed during construction using native species, would help minimize erosion and sedimentation during construction. Additionally, including wildlife protection measures into the plan would help ensure that the effects of construction and operation of the impoundment boating access area on wildlife (including the federally endangered NLEB) and their habitats within the project area are minimized.

Therefore, we recommend GMP develop an upstream impoundment boating access plan that includes: (1) provisions to consult on site selection with the Vermont ANR and FWS before any construction activities occur; (2) an implementation and construction schedule that does not exceed four years; (3) a design plan, including the estimated length, width, and composition of the proposed access area, parking area, trail and stairway; (4) best management practices (BMPs) that include, erosion and sedimentation controls and revegetating areas disturbed during construction using native species; (5) methods for preventing the establishment of invasive plants; and (6) guidelines for detecting and treating invasive plant populations. We estimate that the annual levelized cost of developing a impoundment boating access plan would be approximately $1,361 and conclude that the benefits of the plan outweigh the cost.

## Measures Not Recommended

Some of the measures proposed by GMP and recommended by Vermont ANR, would not contribute to the best comprehensive use of water resources within the Wells River and or would not result in benefits to non-power resources that would be worth its cost. The following discussion includes the basis for staff's conclusions to not recommend the measures.

### Impoundment Drawdown Measures

GMP proposes to continue to conduct four planned annual drawdowns each year to install and remove the downstream fish passage chute, by lowering the impoundment by about 2.6 feet (461.3 feet msl). GMP proposes to consult with the Vermont DEC regarding the timing and duration of maintenance drawdowns so as to conduct the drawdowns in a manner that is protective of nearshore terrestrial and aquatic habitat and to maintain minimum flows to the bypassed reach for the protection of aquatic habitat. In addition, GMP proposes to consult with Vermont DEC prior to conducting project maintenance or repair work that has the potential to have an adverse effect on water quality. Vermont ANR's certification condition H requires GMP to file plans with Vermont DEC for review and approval of any project maintenance or repair work, including drawdowns below the normal operating level, if the work may result in a discharge, have a material adverse effect on water quality, or cause less-than-full support of an existing use or beneficial values or use of State waters.

Our analysis indicates that consulting with Vermont DEC prior to conducting a planned drawdown of the reservoir as required by Vermont ANR's certification condition H would allow the agency to make recommendations to GMP to minimize adverse effects to aquatic resources from such maintenance drawdowns. However, obtaining Vermont DEC approval prior to performing planned or unplanned maintenance repairs as required by the certification could limit GMP's ability to complete needed repairs in a timely fashion. Therefore, we recommend that GMP consult with Vermont DEC prior to conducting a planned drawdown but do not recommend that GMP be required to develop a plan for review and approval from Vermont DEC before conducting a maintenance drawdown or completing other maintenance activities at the project. However, we recognize that developing a plan for review and approval would be included in any license issued as a condition of Vermont ANR's water quality certification.

### Instantaneous Run-of-River Operation

GMP proposes to continue operating the project in run-of-river mode where outflow approximates inflow. Vermont ANR's WQC condition B requires that GMP operate the project in run-of-river mode where outflow always equals inflow (rather than approximating inflow) on an instantaneous basis throughout the year except for short term, unavoidable deviations.

As discussed in section 3.3.2.2, *Environmental Effects, Project Operation and Maintenance,* Vermont ANR has not demonstrated that the project is capable of operating in an instantaneous run-of-river mode, with total outflow from the project equaling inflow on an instantaneous basis. The project is currently operated in a run-of-river mode using an automatic pond level control system. This system measures changes to the surface elevation of the impoundment, thus providing an indirect measure of changes to inflow. As inflow increases or

decreases, a certain amount of time elapses before the impoundment elevation changes, depending on the rate and magnitude of the change in inflow. Once the change in inflow causes the impoundment elevation to reach a high or low threshold, the pond level control system automatically adjusts turbine flow. Because of these technical limitations and the inherent delay associated with the system adjusting project outflow to match inflow, regular, short-term deviations from instantaneous run-of-river are unavoidable. Moreover, Vermont ANR has not described how operating the project in an instantaneous run-of-river mode would provide additional protection or benefits to aquatic resources compared to current run-of-river operation.

Continuing to operate the project such that the total outflow from the project *approximates,* rather than equals, inflow at any point in time would maintain stable impoundment elevations, which in turn would help protect fish spawning areas from becoming dewatered and limit project-related erosion along the impoundment shoreline. Operating the project in this manner would likewise ensure that downstream flows are not affected by project operation. Therefore, operating the project as run-of-river – defined as the sum of all outflows approximating the sum of all inflows at any given point in time – would provide the same level of benefits to aquatic resources upstream and downstream of the project as Vermont ANR's instantaneous run-of-river mode of operation, and is operationally feasible.

As discussed in section 5.1.1, *Measures Proposed by GMP*, staff recommends GMP's proposal to continue operating the project in a run-of-river mode, such that outflow from the project approximates inflow to the project impoundment. Based on the technical limitations of the project described above, staff does not recommend operating the project in an instantaneous run-of-river mode, whereby outflow from the project equals inflow on an instantaneous basis, as required by Vermont ANR. We recognize that this measure would be included in any license issued as a condition of Vermont ANR's water quality certification. To that end, we recommend that the operation compliance monitoring plan required by Vermont ANR's condition C identify how GMP proposes to operate in instantaneous run-of-river mode, except for short-term, unavoidable deviations, throughout the year and that the plan be provided to the Commission for review and approval prior to implementation.

**Downstream Fish Passage**

GMP proposes to operate the fish passage chute by providing flows of 10 cfs during the spring and fall, rather than continuing to provide 20 cfs during both operational periods. Vermont ANR's certification condition D requires GMP to: (1) install and operate the downstream fish passage chute with a flow of 25 cfs from April 1 to June 1 and from September 1 to November 15; (2) continue using the 1-inch trash rack angled toward the downstream fish passage chute; (3) maintain the existing 6-foot-deep baffle curtain deployed in front of the existing intake structure; and (4) consult with the Vermont ANR on design and placement of the downstream fish passage chute should GMP seek to replace or modify the chute during the term of any subsequent license and file the proposed downstream fish passage design information with the Vermont ANR for approval prior to commencement of any work.

As discussed in section 3.2.2.2, *Environmental Effects*, operating the downstream fish passage chute does not provide any benefit to Atlantic salmon and would not provide any reasonably foreseeable benefit during the term of any subsequent license issued for the project.

All of the resident fish species found in the vicinity of the project can maintain populations entirely within freshwater and none require downstream passage to complete their life-cycle. Further, based on the FWS criteria, the 20 and 10-cfs attraction flows provided through the downstream fish passage chute under existing and proposed operation, respectively, may be ineffective at passing fish. Operating the downstream fish passage chute with a flow of 25 cfs, as required by certification condition D, may provide sufficient attraction flow for resident fish species in the project area, based on FWS's 2019 Design Criteria Manual (FWS, 2019). However, as discussed in section 3.2.2.2, *Environmental Effects*, the likelihood of fish experiencing impingement, entrainment, and turbine mortality at the project is low. Thus, operating the fish passage chute as required by certification condition D would likely have a limited effect on reducing impingement, entrainment, and turbine mortality. For these reasons, operating the downstream fish passage chute, as proposed by GMP and required by Vermont ANR, would likely provide minimal benefit to the resident fish populations upstream of the project. Therefore, GMP's proposal would not be worth the estimated levelized annual cost of $5,817 and Vermont ANR's certification condition D would not be worth the estimated levelized annual cost of approximately $5,961.

Even though we do not recommend Vermont ANR's certification condition D requirements, we recognize that the agency's downstream fish passage requirements, including passage flows of 25 cfs, would be included in any license issued because it is mandatory. To that end, we recommend that the operation compliance monitoring plan recommended above, include provisions for: (1) identifying how GMP would provide a 25-cfs flow through the downstream fish passage chute; (2) verifying that 25 cfs is passing through the downstream fish passage chute; and (3) describing methods for monitoring flows through the fish passage chute.

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## APPENDIX J: GLOSSARY OF TERMS

Anadromous – A life history strategy whereby adult fish species spend most of their time (feeding and overwintering) at sea but return to freshwater to reproduce.

Anticipated reserve margin – The unused electric generating capacity at the time of peak electrical demand. Expressed as a percentage, the anticipated reserve margin designates available generating capacity in excess of expected peak demand.

Approach velocity – The velocity of water as it approaches the trash rack and is defined as the average water velocity measured a few inches in front of an intake screening device (e.g., trash rack) (EPRI, 2000).

Burst swim speed – The highest speeds attainable by fish and can be maintained for brief periods, usually lasting up to a few seconds (Beamish, 1978).

Capacity benefit – The benefit a project receives for providing capacity to the grid, which may be in the form of a dependable capacity credit or credit for monthly capacity provided.

Coldwater fishery use – The ability of a waterbody to support a balanced, integrated, adaptive community of fish species which thrive in relatively cold water, generally including any of the following: (i) trout; (ii) salmon; (iii) whitefish; or (iv) cisco (Mich. Admin. Code R. 323.1043 - Definitions; A to L).

Diadromous – Fish that migrate between freshwater and saltwater to complete part of their lifecycle.

Diameter at breast height – The diameter of a tree as measured about 4 to 4.5 feet above the ground.

Environmental Justice – The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Hibernaculum – A place where a bat hibernates over the winter, such as in a cave.

Noxious Weed/Plant – Any plant in any stage of development, including all current and subsequent subspecies, varieties, and cultivars, and parasitic plants whose presence, whether direct or indirect, is detrimental to the environment, crops or other desirable plants, livestock, land, or other property, or is injurious to the public health or the economy generally (Vermont Agency of Agriculture, Food, and Markets, 2023).

Parturition – The process of giving birth that occurs at the end of the gestation period, or pregnancy.

Smolts – Outmigrating juvenile salmon.

Stratification – occurs when water bodies form distinct thermal layers, including a warm surface layer (epilimnion), a middle layer (metalimnion) with an abrupt change in temperature (thermocline), and a cool dense lower layer (hypolimnion). Persistent stratification can result in low DO concentrations in the lower part of the water column.

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